

THE EXTENT OF TOTAL QUALITY MANAGEMENT (TQM)  
IMPLEMENTATION IN THE CONSTRUCTION INDUSTRY: A  
CASE STUDY OF THE KENYAN BUILDING INDUSTRY

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BY  
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A MANAGEMENT RESEARCH PROJECT SUBMITTED IN  
PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR  
THE AWARD OF THE DEGREE OF MASTERS IN BUSINESS  
AND ADMINISTRATION

FACULTY OF COMMERCE  
UNIVERSITY OF NAIROBI.

OCTOBER 2001

This Research Project is my original work and has not been presented for a degree in this or any other university.

*Anne N. Omufira*

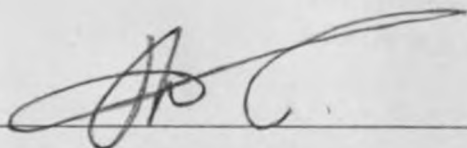
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DEDICATION

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This Research Project has been submitted for examination with my approval as a University Supervisor.



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**DEDICATION**

**TO MY MOTHER SUSAN AWINJA OMUFIRA  
YOU INSPIRE ME. THANK YOU**

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## ACKNOWLEDGEMENTS

These acknowledgments I make with pleasure

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To my supervisor, Mr. J.T Kariuki for the assistance and guidance given to realize this project paper.

To the respondents for taking time to fill in the questionnaires, without whom this project would never have been.

To my family for their support materially or otherwise. Special mention goes to my sister Caroline, who stepped in to give the project the necessary “jerk”. Josephine Alukwe who assisted especially matters related to typography.

To my colleagues and friends who contributed in their own special way. Special thanks to Natasha for always being there to encourage and offer support, materially or financially. Catherine Wakina whose contribution morally and materially I will never be able to repay. Fidelia Omondi, who despite the distance was able to be part of this project.

The group that met at “Walkers”, Florence, Nyambura, Lillian and all my other friends whom I cannot mention individually; thanks for their kind support.

To Emmanuel Gono whose contribution in the final phase of writing this project is invaluable.

And to the ALMIGHTY God, who makes ALL things possible. Indeed He has been Faithful!

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# CHAPTER ONE

## 1.0 INTRODUCTION

### 1.1 Background to the study

Quality, reliability, price and delivery are things most companies compete for : whatever the industry– competition is rife ; competition for customers, for students, for patients, for resources, for funds. (Oakland , 1998). When attention is paid to quality there is improvement in performance in relation to reliability, delivery and price. The goal is, a satisfied customer who becomes the organization’s best advertisement. A satisfied customer will not only do more business in future but will recommend the firm to others. A dissatisfied customer on the other hand will not only reduce profitability but will deter new customers.

Total Quality Management (TQM) is a philosophy of management that links policy and operational practice. It aims at the need to move from asking the question ‘ Have we done the job correctly?’ which is not quality control but detection, to asking ‘Are we capable of doing the job?’. TQM is devoted largely to the various activities needed to ensure that the answer to these questions is YES.

For successful TQM implementation each individual at each level has to be involved through teamwork, trust and empowerment. This implies adopting a proactive rather than a reactive approach to improving quality, whereby striving for quality is incorporated into daily job routines at every level.

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The need for achieving quality of the finished products/services in the construction industry is no less than in any other industry. The large cost of building makes it necessary to assure quality of the finished product

Clients in the construction industry range from individuals to corporate bodies. Their policies and procedures vary considerably; but they all want soundly constructed buildings, which function effectively, look attractive and are economical to build and maintain.

At the Nigerian Institute of Quantity Surveyors Biennial Conference, Olusegun(1998) noted:

Total Quality Management (TQM) is one of the new management clichés that are gaining ground by the day. Infact most international clients now require to know if consultants in the construction industry are now ISO certified before they are patronized. TQM must be part of the agenda for implementation by practicing firms if the Quantity Surveying profession is to become totally acceptable locally and internationally

He says that if professional firms adopt TQM, there would be many business opportunities. He adds that, awareness should not be through talk- shops like seminars, symposia and workshops; but must be entrenched through organized training programmes possibly with reputable management consultants.

## 1.2 Statement of the problem

The construction process in Kenya has in the recent past been criticized for, among other things, poor design, sub-standard work, stalled projects and delayed project completion. This raises concern about the quality of services provided by the construction team members.

Njoroge, (1996) responding to a newspaper report about a storeyed building that collapsed in Umoja I, Nairobi, noted that even with a fully-fledged team of qualified consultants, commitment to quality achievement is lacking. He attributed this to, among other factors; negligence, ignorance and lack of enforcement by consultants.

At a seminar hosted by the Construction Review in February 1996, Mr. Kairu Bachia, the then chairman of the Architectural Association of Kenya (AAK) had this to say,

Much as consultants are expected to exhibit the highest dispensation of professional know-how and integrity, the client or employer must deliver his end of the bargain

He suggested that the foursome group comprising of the client, consultants, contractors, and suppliers must co-operate fully in a project for the minimization of problems and avoidance of costly disputes.

Dan Tindiwesi in an article "*Quality Management in the Ugandan Construction Industry*" adopts a more radical approach. He argues that if quality in construction is to be attained, the following has to happen first:

- Participants involved in the project must understand clearly their own process.
- Secondly, the project process must be understood and each participant must know how his / her own process (in terms of inputs and outputs) relates to that of others.
- Then, the requirement of each participant, starting with the client must be understood, clearly communicated in good time to those participants that must meet them and it must be agreed objectively that they have in fact been met.

Tindiwesi decries, "It is too late, too demoralizing, too costly and totally ineffective to try and achieve quality by inspecting the outcome of the process".

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Arising from the above, there is need for a clear understanding of what quality in the construction process is; and the responsibility of every member in trying to achieve it. It is against this background that this research study intends to establish the extent of Total Quality Management (TQM) implementation in the construction industry in Kenya.

### **1.3 Objective of the Study**

The objective of this study is

To establish the extent of TQM implementation in the construction industry in Kenya.

### **1.4 Significance of the Study**

The success of any construction project can be evaluated by the degree to which it meets the customer's requirements. Achieving these requires not only enough resources (financial or human resources), but also the successful interaction amongst the parties concerned. TQM provides a means by which this can be achieved.

1. This study will be of interest to all members of the construction process as they look into ways of improving quality of products/services offered to the customer.
2. From the findings, the study will highlight the level of interaction necessary among members for effective TQM implementation.

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## CHAPTER TWO

### 2.0 LITERATURE REVIEW

#### 2.1 The Evolution of Total Quality Management (TQM)

Total Quality Management (TQM) is a concept that rapidly evolved and matured during the early and mid 80's. Glaudiex (1995) attributes certain events as contributing to what is now generally accepted as TQM principles. Some of these events include, the United States (US) Department of Defense Master plan on TQM and the US commerce department's concern with foreign competition. Another event includes numerous new books on workplace changes including Japan's work processes. The influence of U.S quality gurus: W. Edward Deming, Joseph M. Juran, Phil Crosby and Armanda V. Feigenbaum have also played a part in formulating what is now generally accepted as TQM principles.

TQM has a number of definitions: -

- (i) Chase and Aquilano (1995) define TQM as "managing the entire organization so that it excels on all dimensions of products and services that are important to the customer."
- (ii) According to Naylor (1995), TQM is a process of involving everyone in an organization in continuously improving products/ services and processes to achieve on every occasion, quality that satisfies the customer needs. The key implications of this definition are:-
  - Involving everyone in the company through teamwork, trust and empowerment;
  - Continuous Improvement;
  - Identification of customers and their needs, and then focusing on them;

Naylor adds that of the three elements of TQM:

- *Total* suggests wholehearted commitment of everyone in the organization.
- *Quality* means continuously meeting customers' requirements.
- *Management* implies an active process led from the top.

(iii) Heizer and Render (1996) reinforce Naylor's definition by stating that "TQM refers to a quality emphasis that encompasses the entire organization from supplier to customer." They stress on commitment by management to have a companywide drive toward excellence in all aspects of products and services that are important to the customer.

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The above definitions elucidate the concept of TQM as a business philosophy which aims at quality assurance of products/services by moving from classical 'Inspection function' (error detection) to the more modern 'Quality Management System Approach' (error prevention). This can be attributed to a number of factors, some that are obvious and inherent in the culture of some organizations such as, accelerated schedules and delivery requirements, increased customer expectations and international competition (Glaudiex 1995). Another factor that is significant is the 'Human factor'. Basically, people have pride in their work and in general do not like to have it 'inspected', especially with the potential fear of being wrong. The most significant factor with the quality management issue is: "Who is responsible for product or service quality throughout the process of performing the work; internal and external to each organization? This is especially for service quality where precise specifications are hard to define and measure.

Some of the main principles of TQM are:

- Determine customers' requirements;
- Perform to customers' requirements;
- Implement defects prevention systems as company performance standard;
- Hold everyone accountable for meeting requirements (total employee involvement).

## 2.2 Core concepts of TQM

There are a number of core concepts and values in TQM. Some of the most important ones are discussed below.

### 2.2.1 Continuous Improvement

Total Quality Management requires a never-ending process of continuous improvement. The end goal is perfection, which is never achieved but always sought.

According to Imai (**Heizer et al, 1996**) every person's work comprises of two parts, continuation and improvement. The former, which Imai calls maintenance, refers to current work. People must know what they are supposed to be doing and follow these standards and agreements. The second half of doing everybody's job is improvement.

This means finding a better way of doing the job and raising the standard. Imai argues that this behaviour should be seen as deviation rather than improvement

because key factors of quality cost and delivery have not been affected. For improvement to take place, the standard must be raised. The Japanese use the word

*Kaizen* (**Heizer et al, 1996**) to describe this ongoing process of unending improvement - the setting and achieving ever-higher goals.

*Kaizen* implies continuous challenges to the standards in the existing jobs.

Imai suggests a set of questions to act as a guide when problems occur.

Did the problems occur as a result of

- (i) There being no standards?
- (ii) The present standards being inadequate?
- (iii) Staff not following standards?
- (iv) Staff not trained to follow standards?

When problems arise the manager's job is to find out what happened, using the above questions.

Imai introduces another Japanese word, *Gemba*.

*Gemba* means the place where the activity takes place.

1. When abnormality occurs, go to *Gemba* first and right away!
2. Check with *Gembutsu*, *Gembutsu* in Japanese means something tangible such as machine, material failures, rejects, unsafe conditions etc.
3. Take temporary countermeasures on the spot.
4. Find and remove the root cause.
5. Standardize for recurrence prevention.

### 2.2.2 Employee Empowerment

TQM requires employee empowerment, or involving employees in every step of the production process. The holistic goal is commitment and sharing of quality issue among employees so that the contribution of each is both recognized and influential. Empowerment can only occur when people are trained and given access to relevant information. People need to know and use the best techniques, and should be involved in decision making. They should be commended and motivated by being

rewarded. When non-conformance occurs, the worker is seldom wrong. Either the product was designed wrong, or the employee was improperly trained. ( Heizer et al,1996 ). Most quality problems relate to materials, designs, specifications, and processes and have little to do with poor employee performance (Naylor 1995). The same employees, since they deal with the system on a daily basis are usually aware of shortcomings of the production system and can be valuable in finding solutions.

### 2.2.3 Being customer- centred

In TQM, customers are considered as either *internal* or *external*.

*Internal* customers are members of the organization who rely on the individual next along the quality chain for inputs to get their work done. Usually, it is another internal customer who receives 'output' from whatever the individual is responsible for. Sometimes people can be so interconnected that they are mutually dependent; that is each is the other's customer. When it comes to quality it follows that the internal customer is very much like the external customer. The difficulty of the customer's work and quality of the output are strongly affected by the quality of the input.

*External* customers are the consumers of the final product or service, and include individuals and corporate bodies with whom the organisation interacts. TQM requires that all employees who deal with them to be committed to satisfying their needs. Being customer oriented entails: -

- (i) Appreciating situations through customers eyes so that their needs are anticipated;
- (ii) Listening to customers, especially the details of what they want;
- (iii) Understanding possible ways of satisfying the customer's wishes;

- (iv) Providing the appropriate response.

#### 2.2.4 Benchmarking

Any organization, which desires to create improvement, must continually compare its performance on critical criteria against the best in the business. This is *benchmarking*. The idea behind any benchmarking exercise is to develop a target at which to shoot. After developing the target then a standard or benchmark is identified against which to compare performance.

Heizer et al (1996) outline the following steps for developing benchmarks

- (i) Determine what to benchmark
- (ii) Form a benchmark team
- (iii) Identify benchmark partners
- (iv) Collect and analyze benchmarking information
- (v) Take action to match or exceed the benchmark

Heizer et al recommend that one finds one or more similar organizations that have proved their leadership in a particular area of interest and then compare against them.

#### 2.3 Tools of TQM

Heizer et al (1996) outline six tools /techniques that aid the TQM effort.

They are: -

##### 2.3.1 Quality Function Deployment (QFD)

Quality Function Deployment (QFD) refers both to

- (1) Determining what will satisfy the customer and
- (2) Translating those customer desires into the target design

It is used early in the production process to help determine where to deploy quality efforts.

### 2.3. 2 Taguchi Technique

Most quality problems are the result of product and process design. Therefore, tools are needed to address these areas. One of the tools is the *Taguchi technique*, named after a Japanese engineer, Genichi Taguchi.

The Taguchi method calls for making products and processes that are quality robust.

Quality robust products are products that can be produced uniformly and consistently in adverse manufacturing and environmental conditions. In any product or service

development, three stages may be identified; product or service design, process design, and production or operations. Each of these overlapping stages has many

steps, the output of one being the input to others. The output/input transfer points between steps clearly affect the quality and cost of the final product or service. The

complexity of many modern products and services demands that the crucial role of design be recognized. The prevention of problems in using products or services under

varying operating and environmental conditions must be built in at the design stage. Equally, the costs during production or operation are determined very much by the

actual manufacturing or operating process. Controls, including Statistical Process Control (SPC) methods added to processes to reduce imperfections at the operational

stage are expensive, and the need for controls and the production of non-conformance can be reduced by correct initial design of the process itself.

The belief by some people, often based on experience (**Oakland, 1998**) that it is unwise to buy a new model of motor car 'until the problems have been sorted out'

testifies to the fact that insufficient attention is given to improvement at the product and process design stages. In other words, the bugs should be removed before and not

after product launch. This may be achieved in some organizations by replacing detailed quality and reliability evaluation methods with approximate estimates, and using the liberated resources to make improvements.

### 2.3.3 Pareto charts

Pareto charts organize errors, problems, or defects to help production personnel on problem-solving efforts. They are based on the way of Vilfredo Pareto, a nineteenth-century economist. His work was popularized by Joseph M Juran when he suggested that 80% of a firm's problems are a result of only 20 % of the causes. An analysis of problems is done, then a graph plotted with the cause and percent of the causes on the X-axis and the frequency on the Y-axis. From this, a majority of defects can be eliminated when one of the causes is corrected.

### 2.3.4 Process charts

These are designed to help understand a sequence of events (that is, the process) through which a product or service travels. The process flow chart graphs the steps of the process and their relationships. This type of analysis can:

1. Help identify the best data collection point.
2. Isolate and track the origin of problems.
3. Identify the best place for process audits; and
4. Identify opportunities for travel distance reduction.

A process chart organizes information about a process in a graphical manner, using five standard symbols namely, O= operation, T= Transportation; I= inspection; D= Delay; S= Storage as used by the American Society of Mechanical Engineers (AMSE).

This type of analysis helps to determine:-

- (1) Where inspection and data collection could take place,
- (2) The opportunities for reducing the distance traveled and
- (3) Where to look, should certain types of problems arise.

### 2.3.5 Cause- and Effect diagram

This tool is used for identifying possible locations of quality problems and inspection points. It is also known as an *Ishikawa* diagram fish-bone chart. The chart is represented in the shape of a fish-bone with each “bone” representing a source of error. The way to get started on any cause-and effect diagram is to have four categories: materials, machinery/equipment, manpower, and methods. These four “M’s” are the cause. They provide a good checklist for initial analysis. When such a chart is systematically developed possible quality problems and inspection points are highlighted.

### 2.3.6 Statistical Process Control (SPC)

This tool monitors standards, makes measurements, and takes corrective action as a product or service is being produced. Samples of process output are examined; if they are within acceptable limits, the process is permitted to continue. If they fall outside certain specific ranges, the process is stopped and typically, the assignable cause is located and removed.

Control charts are graphic presentations of data over time that show upper and lower limits for the process to be controlled. Control charts are constructed in such a way that new data can be quickly compared to past performance data. Samples of the process output are obtained, and the average of these samples plotted on a chart that

has the limits on it. The upper and lower limits in a control chart can be in units of temperature, pressure, weight, length, and so on. When the average of the sample falls within the upper and lower control limits and no discernible pattern is present, the process is said to be in control. Otherwise, the process is out of control or out of adjustment.

## 2.4 The Construction Process

### 2.4.1 Definition of a process

Oakland (1998), defines a process as ' the transformation of a set of inputs, which can include actions, methods and operations, into outputs that satisfy customers needs and expectations in form of products, information, services or generally - results'.

He stresses that in each area or function of an organization there will be many processes taking place. Examining the inputs and the outputs would help with analysis of each process in each department or area.

According to Oakland, the output from a process is that which is transferred somewhere or to someone – the customer. He emphasizes that to produce an output that meets the requirements of the customer, it is necessary to define, monitor and control the inputs to the process, which in turn may be supplied as output from an earlier process. At every supplier-customer interface then, there resides a transformation process; and every single task throughout an organization must be viewed as a process in this way.

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Seeley (1991) subdivides the construction industry into two major areas of activity, namely building and civil engineering works. He describes the industry as embracing a wide range of loosely integrated organizations that collectively construct, alter and

repair a wide range of different building and civil engineering structures. He reiterates the uniqueness of the industry, which stems mainly from the physical nature of the construction product and its demand. All projects differ and site characteristics vary extensively, therefore each project has unique challenges.

Balchin et al (1986) acknowledge the unique characteristics of the industry as stemming mainly from the physical nature of the product and its demand. The nature of the construction product is such that customers' needs in relation to quality are difficult to establish. This is partly because there are many definitions in use. The other reason could be attributed to the inexperience of customers in separating quality from other factors involved in the purchase of the product.

Seeley (1991) portrays the construction industry as an assembly industry; assembling on site the products of other industries. The designer's intentions are portrayed in drawings and other documentation, and skilled operatives undertake the work of construction and assembly of components on site. Construction work is mainly carried out on site and thus subject to the vagaries of the weather and of ground conditions.

Whatever the project there are distinct stages that are followed during the project implementation and management.

At this stage, the design of every wall and component of the building is carried out by

#### **2.4.2 Pre-design stage**

This is the inception stage at which various options on how to undertake the project are evaluated and considered. Traditionally, only the client's representative who is

the Architect or Engineer is involved at this stage. The tasks to be done include setting up the client organization for briefing and considering the clients' requirements. The consultants <sup>1</sup> may also advise on the suitability of the site for the particular project.

### **2.4.3 Preliminary Design Stage**

The composition of the project team at this stage varies, depending on the nature of the project. For some projects the team may comprise the entire building team; i.e the clients' representatives, the architect, engineer, quantity surveyor and other consultants. The major tasks include developing the brief further. The consultants involved in the project work in collaboration and investigate any available data related to the project at hand. This data could have been previously prepared by the consultants or by others and passed to them by the client. Site inspection and survey of existing facilities or services, which may affect the design work, is carried out. Advice is given to the client on the need for special survey, investigations or tests required for proper design and construction of the works. Preliminary information in form of sketch plans along with preliminary estimates is presented in form of a report. On the basis of this report the client is able to consider the consultants' general proposals before being instructed to proceed to the detailed design stage.

### **2.4.4 Detailed/ Final Design stage**

At this stage, full design of every part and component of the building is carried out by collaboration of all concerned. Complete cost checking of designs is also done. Advice is also furnished on appropriate conditions of contract, forms of tender and on

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<sup>1</sup> An institution, firm or individual that provides professional/expert service and advice based on deep understanding and considerable practical experience

how invitations of tender are to be done. Tender documents are thoroughly examined to ensure their consistency with the final design and any other documents prepared by all consultants. The team will usually comprise of the Architect, Quantity Surveyor, Engineers and Specialist Contractor (if appointed).

#### **2.4.5 Tender Procurement Stage**

Tenders are invited and on receipt, a detailed report on the tenders is done after which advice is given on the appointment of a suitable contractor. Where elements of work are not competitively bid for, negotiation on behalf of the client is done to establish a fair and equitable price for the work to be carried out. Contract documents are then prepared based on the accepted tender.

#### **2.4.6 Construction Stage**

This is the most important stage, as this is when the client's dream is translated into reality. The contractor undertakes to complete a building project in accordance with contract documents on behalf of the employer (Seeley, 1991). The contractor therefore, is accordingly one of the most important parties to the building contract and has control of all operations on site, including the work carried out by sub-contractors. The consultants receive and approve a construction programme outlining the starting and finishing dates; establishing the major milestones for each segment of the project. Periodic visits to site by the consultants are necessary to ensure that the contractor complies with the terms of the contract in accordance with the drawings and specifications. The construction progress is checked especially relating to quality, cost and time issues as well as reporting any deviations from the set programme that may affect the progress of the project.

Site meetings are conducted regularly where the client, contractors and any involved consultants discuss the progress of the work. Variations in the work if any is sanctioned as dictated by site conditions, which may save on time and money without compromising on the quality of the final product. On completion of a project, a certificate of completion is issued.

#### **2.4.7 Completion stage**

After a project is complete, it is delivered to the client, including contractors' working drawings, manufacturers' operational and maintenance manuals and where appropriate, certificate of work tests. This enables the client to operate and maintain building works.

### **2.5 Quality Assurance in the Construction Industry**

The Building Research Establishment in a report '*A Survey of Quality and value in Building*' ( Seeley, 1991) indicated that although the preparation of the brief and the layout design are crucial, all aspects of the design, construction and use of the building have to be dealt with effectively to ensure quality and value. Quality is concerned with totality of attributes of a building, which enable it to satisfy the clients' needs. It encompasses three main aspects: -

- 1) External Attributes: The effects of the building on its surroundings and vice-versa such as appearance, compatibility and safety.
- 2) Performance Attributes: Aspects of the building that make it operationally efficient and provide reasonable conditions for users such as the size and layout of spaces, services, environment, safety, security, maintenance, adaptability and longevity.

3) Aesthetics and amenity: They include the external appearance of the building and any landscaping to the outside, while internally standards of comfort, convenience and visual attraction are important.

A building should also be sufficiently adaptable to accommodate the changes in use that will arise over time.

### 2.5.1 The Meaning of Quality Assurance

The Australian Standard AS 1057(Chan, 1996) defines quality assurance as all those planned and systematic actions necessary to provide adequate confidence that goods and services will satisfy given requirements. The Royal Institution of British Architects (RIBA) defines quality assurance, as a management process needed to provide high probability that the objective of the product or service will be achieved. The Construction Industry Research and Information Association (CIRIA), defines quality assurance as a systematic way of ensuring that organized activities happen in the way they are planned. It is a management discipline concerned with anticipating problems and with creating the attitudes and controls, which prevent problems arising. These three definitions, though different in the exact wordings, provide several common threads. In essence, quality is the responsibility of every member of the project team. Each activity should be properly identified and, where it interfaces with other activities, integration and cooperation are important. By controlling all these functions systematically, one can be reasonably assured that each activity is right before the next starts. Hence, quality assurance should apply to everyone involved in a construction project: consultant, contractor, project manager, subcontractor, supplier, and testing laboratory, although the emphasis is placed more heavily on the requirements for the contractor. Each participant in the design and construction project, whether they are administrative, design, manufacture, or installation, also

have to supervise and control their operations to ensure that the desired level of quality is achieved and to document these functions to demonstrate that they are being done.

### **2.5.2 The need for Quality Assurance in the Construction Industry**

Chan (1996) decries the decline of quality in the construction industry. This, he argues is manifested in the increase in the incidences of contractual claims and disputes. He cites the change in the number of interested parties as one of the contributing factors. Where previously there were effectively three parties; client, consultants and contractor with clearly established relationship and responsibilities, that number has more than doubled; client, project manager, consultants, contractors, suppliers and sub-contractors with relationship and responsibilities poorly defined. These added relationships make the consultants traditional responsibility of ensuring quality compliance more difficult to achieve. Naylor (1995) observes that in many circumstances and industries the design process is seen as quite separate to production. He cites the construction process as a good example of this because the design is frequently let as a separate contract from production. He observes that since the cost of design is usually a small proportion of the total project cost, its significance is often ignored.

Quality Assurance thus becomes a part of the overall marketing strategy of the contractor's organisation. It is now, or is fast becoming, essential for any responsible or reputable construction company to design and implement their own Quality Assurance program in order to remain profitable and maintain a good reputation. Contractors who have a quality assurance system, and strongly promote it can increase their potential for attracting clients.

In order to successfully implement a quality management program there must be a total commitment by top management to improve company performance. This includes both establishing a company structure and operating procedures, which fit the company objectives.

A quality assurance system does not promise to solve all problems on a construction site. It does, however, ensure that, if conducted properly, the chances of committing mistakes are greatly reduced. Similarly as a consequence of the additional documentation and planning, potential problems have a better chance of being recognised prior to their occurrence.

Quality Assurance systems should commence at the brief and design stages of a project, and continue throughout the construction until completion. Quality Assurance will only work effectively if all parties involved, client, designer, contract administrator, contractor and sub-contractor, are convinced that Quality assurance is good for their business.

### **2.5.3 Systems for Quality Management in the Construction Industry**

Most systems aimed at monitoring quality assurance within the construction industry have been developed mainly in Europe and America. (Chan, 1996). The British Property Federation (BPF) published its "Manual of BPF System" in 1983. In Australia, the Construction Industry Development Agency (CIDA) and the Building and Construction Council of New South Wales (BACC) have both produced Codes of Practice documents for application in the construction industry. A quality system from Canada (AS2990 –1987) has been adopted for Quality Systems for Construction and Engineering Projects.

These systems are discussed briefly.

### **2.5.3.1 The BPF System**

The British Property Federation system was developed to produce good buildings more quickly and at a lower cost. It alters the relationships of the professionals and the contractor. Its main objective is to prescribe what has to be done by the professionals, including the contractors, at every stage of the project from concept to commissioning. It provides innovation by clearly allowing clients to establish clear goals with the professionals. The BPF system is designed to encourage early decision making, and to encourage consultants to work for a fixed fee, while providing the client with an option to pay supplementary as an incentive for lower tendering prices and earlier completion dates on project. The system recommends that there should be only one key member responsible for all pre-tender designs. In addition, the system consolidates the clients' interests by channelling them through a "client's representative". An independent adjudicator, who has no other duties in administering the contract, settles disputes and disagreements between the client's representative and the consultants or the contractor.

### **2.5.3.2 CIDA'S Code of Practice**

The aim of the Construction Industry Development Agency (CIDA) is to carry out the Construction Reform Strategy originated by the Federal Government through the production of a Code of Practice document CIDA aims to assist the industry to change the way it does business. By increasing emphasis on quality, the client's needs can be met better. Main areas addressed by the Code include improvements in contract definition, work practices, rationalisation of awards and agreements and a minimisation of lost time.

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Under the CIDA's Code of Practice, contractors, subcontractors and consultants will be required to meet minimum standards of performance against each of the prescribed criteria in order to pre-qualify for the projects to which the code applies.

### **2.5.3.3 BACC Quality Assessment Scheme**

The Building and Construction Council of New South Wales produced a Quality Assessment Scheme for Medium Density housing in 1991. The Scheme aims to improve consumer confidence that buildings will perform properly and age gracefully. The Scheme helps ensure that buildings have been adequately specified and constructed to cope with all expected environmental conditions and that detailing and materials have been specified to a level that will give acceptable durability.

The BACC Scheme outlines five steps to achieve this:

- Commission an accredited quality assessor.
- Ensure that the designer and the engineer are familiar with the requirements of the quality scheme and contracted to produce documents suitable for Quality Assessment.
- Ensure that the building contract will require the builder to provide the assessor with the necessary documentation.
- Make sure that the contractor supplies the assessor with the appropriate information.
- Advertise with the stamp of Quality Assessment.

The central feature of the BACC scheme is the use of an independent accredited quality assessor who will award a Certificate of Quality Assessment on his/her professional opinion to the satisfactory completion of a project. This Certificate will only be issued when the assessor is confident that the standards set out in the Quality Guide have been achieved.

## CHAPTER THREE

### 3.0 RESEARCH DESIGN AND METHODOLOGY

#### 3.1 The Population

The population of the study comprised of members<sup>2</sup> of the construction industry countrywide. The Board of Registration of Architects and Quantity Surveyors (BORAQS) of Kenya directory (2001) reveals that there are 570 registered Architects and 384 registered Quantity Surveyors. Registered Architectural firms are 107, whereas Quantity Surveying firms are 86. The Institution of Engineers of Kenya directory reveals there are 400 registered Engineers and registered firms are 83. The population of this study consists of registered firms and consultants.

#### 3.2 Sampling

For this research the sample was drawn from consultants, contractors and workers based in Nairobi. Given its cosmopolitan nature, it was felt that quality emphasis is likely to be appreciated more by members of the construction industry, than in other towns countrywide.

The sample consisted of one third of the total population of the firms for each category, giving a total of 36 Architects, 27 Quantity Surveyors, 27 Consulting Engineers.

The number of contractors sampled was 25 and a total number of 30 construction workers. The directory included in the Construction Review magazine was used to select the sample. This was done through random and convenience sampling.

Workers based at ongoing construction sites were targeted, to provide the required information.

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<sup>2</sup> For purpose of this study members include, consultants, contractors and construction workers.

### 3.3 Data Collection Method

The research relied on primary data collected using the questionnaires.

Three questionnaires were designed, one for the Building Consultants (*Appendix I*), another for Building Contractors (*Appendix II*) and the third for Construction Workers (*Appendix III*). The questionnaires were distributed via e-mail and some were physically administered to the respondents. Follow-up was done physically, via e-mail and by telephone. Workers were interviewed by prior arrangement with site agents.

During the time of the study, visits were made to selected construction sites to observe and interact with some of the members involved in the construction process.

### 3.4 Data Analysis Technique

The Likkert technique was used to analyze responses relating to the level of quality awareness and leadership commitment to TQM. Item scores were assigned to each of the responses evaluating their contribution to the qualitative factor being measured.

The itemised scores were summated to come up with a value for each of the qualities. For example, Question 4 in the workers' questionnaire was used to measure the level of leadership commitment to TQM. The following itemised score were used:

- (a) Strongly agree [5], (b) Agree [4], (c) Strongly disagree [3], (d) Disagree [2]
- (e) Neutral [1]

The maximum summated rating for the five parts of the question would be 25, indicating the highest possible level of leadership commitment to TQM; while the minimum would be 5 indicating a very low level of commitment to TQM. This type of analysis was applied for all questions that required the use of the Likkert technique.

4.0 DATA ANALYSIS AND INTERPRETATION

4.1 Response Rate

The questionnaires to building consultants that were returned duly completed were 14 giving a response rate of 21%. For contractors, 5 questionnaires were returned, indicating a response rate of 20%. For the workers, 17 out 30 questionnaires were returned duly completed giving a response rate of 57%.

The data was collated and the analysis is based on the above statistics.

The three questionnaires were analyzed separately and the responses complemented one another. This type of analysis is maintained throughout.

4.2 Services offered by the respondents

The data collected indicates 71% of the construction workers were general workers<sup>3</sup>, the rest were supervisors. The contractors can generally be categorised into two, general building contractors and building and civil engineering contractors. One of the contractors indicated that they also offer consultancy services. The category of services offered by the consultants is shown in Figure 1

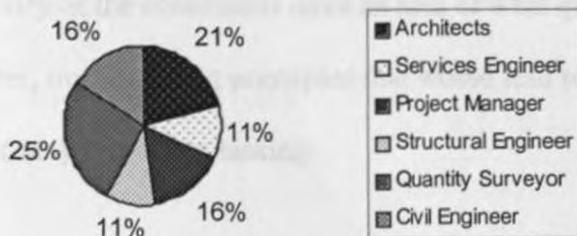


Figure 1: Services offered by the consultants.

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### 4.3 Level of Quality Awareness

The level of quality awareness was addressed in Question 3 of the workers' questionnaire. The consultants and contractors were required to check the common definitions of quality.

65% of the respondents are below the average score (see **Data analysis technique**) an indication of a low level of quality awareness.

More than 50% of the respondents indicated that workers understand the quality of work and the same proportion agreed that people see continuous improvement as essential. However, 65% are neutral on the issue of people contributing willingly to quality improvement. A possible explanation for this state of apathy would be that the workers acknowledge the need for quality work; but factors such as attitudes, poor communication or fear hinder their willingness to participate in quality improvement. It could also be that people are treated like machines making their work uninteresting and unsatisfying, which in turn affects their morale.

Of the consultants 84% endorsed all the definitions of quality, the other 16% checked at least one of the other definitions. Of the contractors 20% agreed with all the definitions, whereas 80% agreed with three out of four definitions.

A majority of the consultants have an idea of what quality means to the client.

However, implementing principles that would lead to the achievement of the perfect product may be what is lacking.

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<sup>3</sup>The general worker refers to the one who performs tasks in any trade, as opposed to the supervisor who is assigned to a specific trade.

#### 4.4 Involvement with client

100% of the consultants and 67% of the contractors indicated that the client normally approached them for services. On the involvement of the contractor at the various stages of the construction process the observations are shown in Table 1

|                          | %Always | %Occasionally | % Never |
|--------------------------|---------|---------------|---------|
| 1. Briefing stage        | 80%     | 20%           | -       |
| 2. Sketch plan stage     | 60%     | 40%           | -       |
| 3. Working drawing stage | 40%     | 60%           | -       |
| 4. Site operations       | 20%     | 60%           | 20%     |
| 5. Handover stage        | 80%     | 20%           | -       |

Table 1: Contractor involvement at the various stages of the construction process.

Considering the role played by the contractor; that of transforming the clients' dream into reality, his involvement at every stage is crucial. His little involvement at some stages is an anti-thesis to TQM implementation. When the contractor is involved as early as possible in the process it would help especially where the design proposed by the Architect or Engineer may not be feasible once on site.

On composition of the design team, Table 2 shows that for any given project you are likely to find an Architect, a Quantity Surveyor, the Contractor and the Client.

| BUILDING TEAM MEMBERS | CLIENT | ARCH. | CIVIL/ STRUCT. ENG | QUANTITY SURVEYOR | PROJECT MAN. | CONTRACTOR | OTHERS |
|-----------------------|--------|-------|--------------------|-------------------|--------------|------------|--------|
| RESPONSE              | 83.30% | 100%  | 83.30%             | 100%              | 66.60%       | 91.70%     | 33.30% |

Table 2 : Composition of building team members

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As mentioned earlier, quality in the construction industry is difficult to define. The above responses may be an indicator of where the emphasis is placed. The architect

deals with the design aspect, the quantity surveyor deals with cost and the contractor has to be there to ensure the building is built according to specifications. Given that quality is most “correctly” defined by the consumer it can be concluded that appearance and cost are definitely important in defining quality.

#### 4.5 The Supervisor and Group dynamics

Workers involved in groups expressed their opinions on the supervisors in their groups and the results are shown in Table 3

|                                                                    | Always | Occasionally | Never |
|--------------------------------------------------------------------|--------|--------------|-------|
| Challenged by supervisor to find ways to improve their work        | 58%    | 33%          | 9%    |
| Fair pay for work done                                             | -      | 58%          | 42%   |
| Promotion on merit                                                 | -      | 67%          | 33%   |
| Exchange of information with superiors regarding work              | 33%    | 50%          | 17%   |
| Appropriate personnel for work to done                             | 42%    | 58%          | -     |
| Equipped with right tools, equipment and materials to get job done | 25%    | 67%          | 8%    |
| Balanced work distribution                                         | -      | 50%          | 50%   |
| Recognition of outstanding performance                             | -      | 58.3%        | 41.7% |

**Table 3 : The Supervisor and Group dynamics**

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Table 3 indicates that some of the activities associated with TQM ideology are given occasional attention. Workers feel they do not receive fair pay for work done and outstanding performance is not always recognised. It is also the feeling of majority of the workers (67%) that they are not equipped with the right tools to get the work done. All these factors affect the quality of work produced thereby affecting the final product.

#### **4.6 Leadership commitment to quality**

The workers were asked to comment on the managers in their particular stations of work. 23.5 % of the respondents scored below average.(see data analysis technique) an indication of management's positive approach to the TQM ideology. The question however is, if there is such commitment on the part of management why hasn't this rubbed onto the workers? One possible reason; which is a limitation to the research, could be that the workers forming part of the research were afraid of being victimized for giving the managers negative publicity. It is also possible that the latter may actually be committed to quality but communication is a problem.

#### **4.7 Most Effective type of communication**

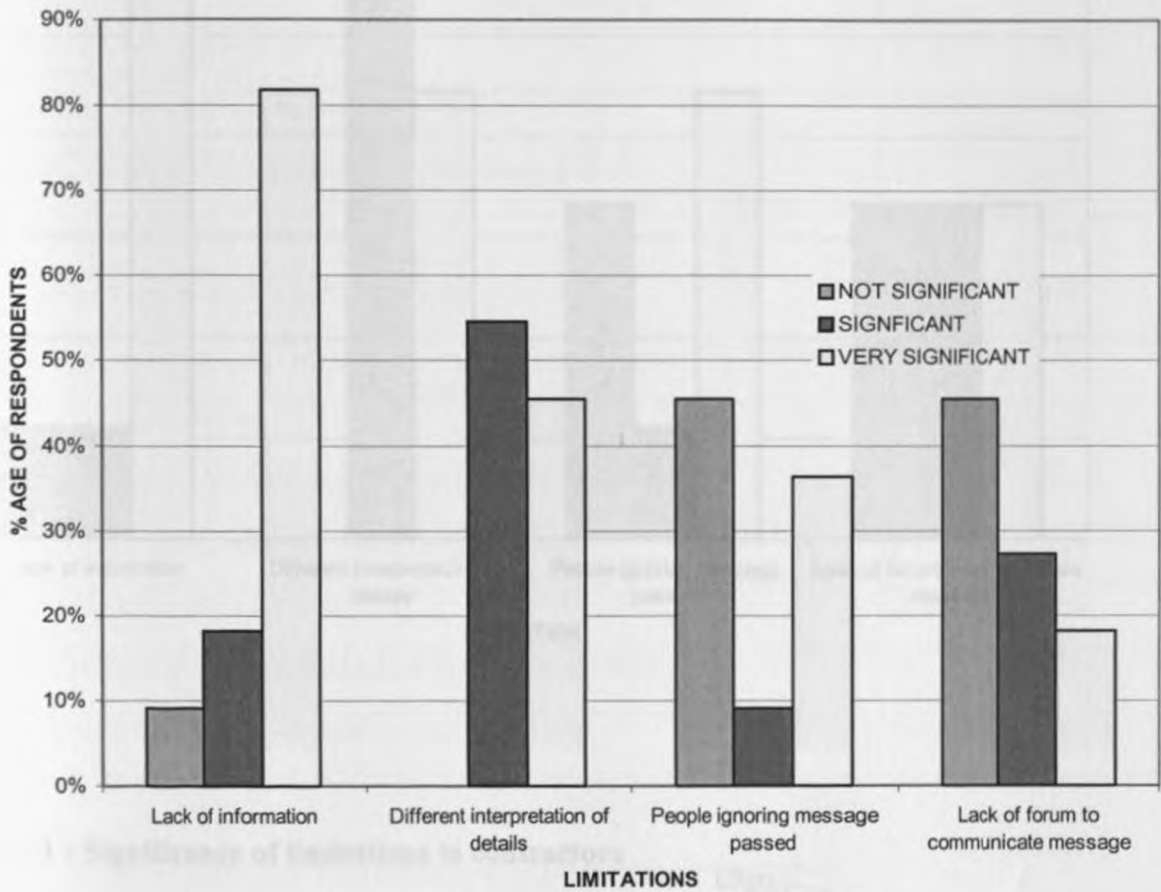
The information gathered shows that the most effective mode of communication among the building team members, is verbal, written and through example, with 100% of the contractors and 67% consultants affirming this. Verbal and written were also endorsed as very effective in communication by both contractors and consultants. The verbal method of communicating when used alone was said to be not effective at all. There are various reasons which can be attributed to this; one being that verbal messages are worst victims of misinterpretations. The interpretation is in most cases at the discretion of the recipient and cannot be validated by any proof. Each of the above modes of communication has its strengths and weaknesses. Where the three are used there is likelihood of reducing most obstacles encountered in day to day communication. This is because where the other fails, the alternative can be adopted.

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#### 4.8 Limitations to communication among members

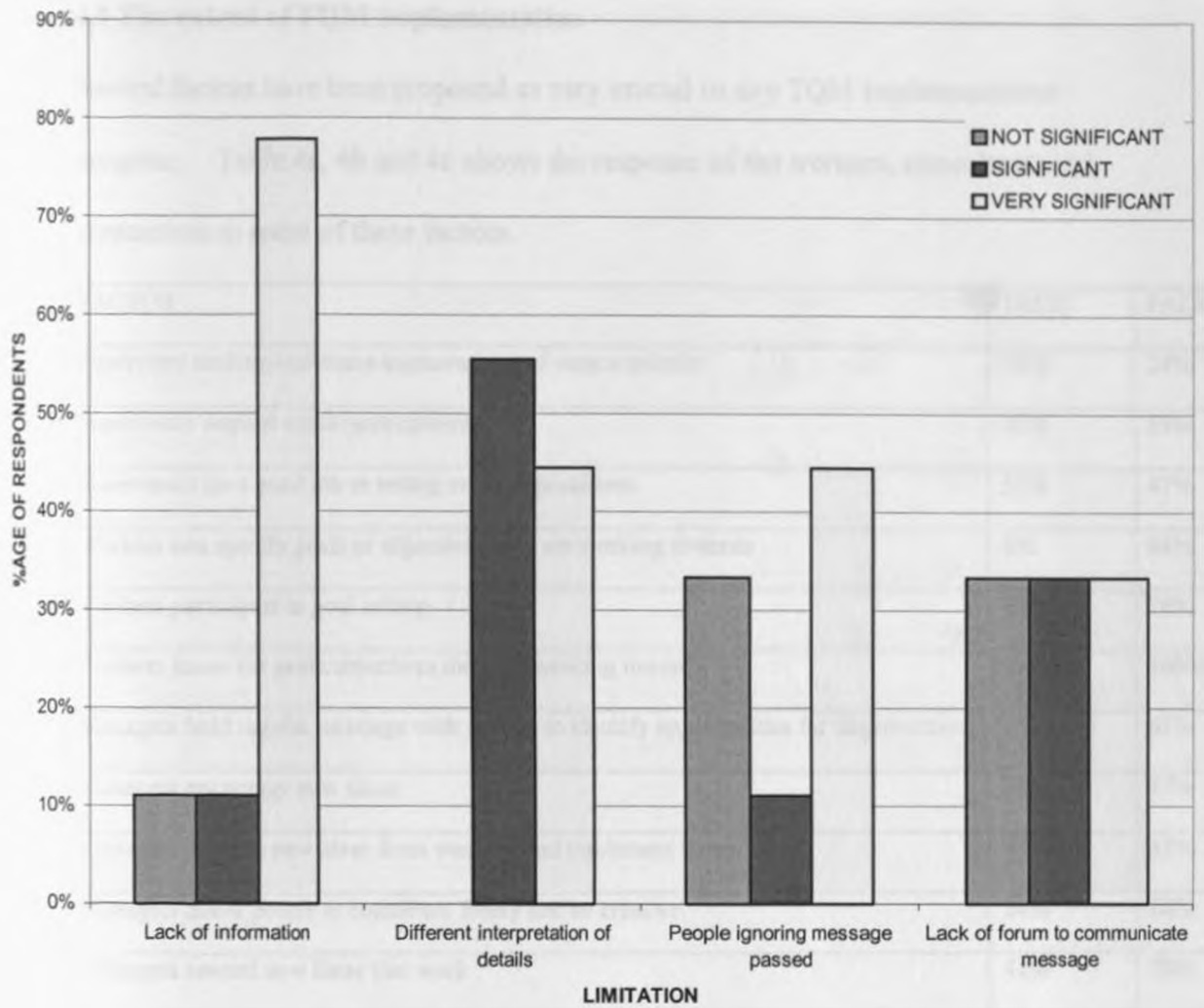
On the issue of limitations that hinder communication with other team members,

Figure 2 and 3 shows responses from the consultants and contractors respectively.



**Figure 2 : Significance of limitations to communication for consultants**

45% agreed that lack of information was a very significant limitation , 25% felt that different interpretations of message passed was very significant. 20% cited people ignoring the message passed as a very significant limitation. 10% of the consultants said that lack of forum to communicate was a very significant limitation.



**Figure 3 : Significance of limitations to contractors**

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Information for any organisation is necessary to make informed decisions. Lack of information therefore implies poor or lack of such decisions. Not only is communication hampered but employees are left to work on assumptions which is pointless especially when the client has given his requirements in the at the briefing stage.

#### 4.9 The extent of TQM implementation

Several factors have been proposed as very crucial in any TQM implementation program. Table 4a, 4b and 4c shows the response of the workers, consultants and contractors to some of these factors.

| FACTOR                                                                                | TRUE | FALSE |
|---------------------------------------------------------------------------------------|------|-------|
| Supervisor making continuous improvement of work a priority                           | 76%  | 24%   |
| Supervisors request employees opinion                                                 | 41%  | 59%   |
| Supervisors do a good job in setting work expectations                                | 53%  | 47%   |
| Workers can specify goals or objectives they are working towards                      | 6%   | 94%   |
| Workers participate in goal setting                                                   | 24%  | 76%   |
| Workers know the goals/objectives they are working towards                            | 0%   | 100%  |
| Managers hold regular meetings with juniors to identify opportunities for improvement | 35%  | 65%   |
| Managers encourage new ideas                                                          | 53%  | 47%   |
| Managers analyze new ideas from workers and implement them                            | 47%  | 53%   |
| Managers allow people to contribute freely and be creative                            | 24%  | 76%   |
| Managers reward new ideas that work                                                   | 41%  | 59%   |
| Managers have authority to try new approach that looks promising                      | 0%   | 100%  |
| Managers approve for trials a new promising approach                                  | 41%  | 59%   |

**Table 4a : Workers response to factors in TQM implementation**

The information in Table 4a show that TQM is hampered by among other factors; non-participation of workers in goal setting and the fact that they do not know the goals/objectives they are working towards. Managers in the work stations have no authority to try out any new approach that sounds promising implying that continuous improvement is not given priority. This is affirmed by the response given on the issue of managers allowing people to contribute freely and be creative. 76% responded

negatively ; an indication that new ideas that allow continuous improvement are not encouraged.

| FACTORS                                               | Very important | Important | Very Essential | Essential | Not important |
|-------------------------------------------------------|----------------|-----------|----------------|-----------|---------------|
| Building team representatives to oversee improvements | 13%            | 63%       |                | 13%       | 13%           |
| Establish measurements appropriate to every activity  | 0%             | 25%       | 25%            | 50%       |               |
| Estimating cost of sub-standard work                  | 0%             | 25%       | 38%            | 13%       | 50%           |
| Raising quality awareness among members               | 13%            | 13%       | 25%            | 25%       | 25%           |
| Raising awareness on importance of conformance        | 38%            | 25%       | 13%            | 25%       | 0%            |
| Goal setting among individuals                        | 25%            | 13%       | 13%            | 50%       | 0%            |
| Public, non-financial appreciation                    | 13%            | 63%       | 0%             | 25%       | 0%            |
| Communication of any problems                         | 0%             | 13%       | 38%            | 50%       | 0%            |
| Post project analysis after completion                | 38%            | 38%       | 13%            | 13%       | 0%            |

**Table 4b : Contractors response to factors in TQM implementation**

Among the contractors as shown in Table 4b, it was felt that a team comprising of building team members is important and so is public, non-financial appreciation to those who meet quality goals. Raising awareness on the importance of conforming to clients' specification and cost of non-conformance was considered as by a majority (38%) as very important. 50% of the respondents consider the estimating of cost of sub-standard work, which is aimed at identifying areas in need of improvement ; as not important. There are a few possible reasons for the response given regarding sub-standard work; one being that in most cases this cost is transferred to the client through high profit margins. The other reason could be the sub-standard work is addressed only when discovered by the inspector (who in most projects is the

Architect or Engineer) implying that, if it is not discovered it is allowed to pass by the contractor's organization. Ownership of the process, an important ingredient of TQM implementation is lacking!.

| FACTORS                                               | Very important | Important | Very Essential | Essential | Not important |
|-------------------------------------------------------|----------------|-----------|----------------|-----------|---------------|
| Building team representatives to oversee improvements | 36%            | 55%       | 9%             | 9%        |               |
| Establish measurements appropriate to every activity  | 9%             | 18%       | 18%            | 55%       | 0%            |
| Estimating cost of sub-standard work                  | 18%            | 18%       | 27%            | 9%        | 27%           |
| Raising quality awareness among members               | 36%            | 18%       | 27%            | 27%       | 0%            |
| Raising awareness on importance of conformance        | 36%            | 27%       | 9%             | 27%       | 0%            |
| Goal setting among individuals                        | 18%            | 18%       | 9%             | 45%       | 0%            |
| Public, non-financial appreciation                    | 9%             | 55%       | 9%             | 18%       | 9%            |
| Communication of any problems                         | 36%            | 27%       | 9%             | 27%       | 0%            |
| Post project analysis after completion                | 27%            | 27%       | 18%            | 27%       | 0%            |

**Table 4c : Consultants response to factors in TQM implementation**

From Table 4c, the consultants, building team representatives are considered important and so is non-financial public appreciation of those who achieve quality goals. Raising quality awareness and importance of conformance to standards among members was also considered as very important. Communication of any problems was also considered as very important. This gives less than 50% (4 out of 9) factors being regarded as very important indicating a very low level of TQM implementation.

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## CHAPTER FIVE

### 5.0 FINDINGS, RECOMMENDATIONS AND LIMITATIONS

#### 5.1 Findings

The foregoing analysis shows that members of the construction industry have heard about the TQM ideology and some of them are indeed practising it given that they are ISO certified(ISO 9001). The extent to which it is being implemented is what this study sought to establish. The general conclusion is that poor or lack of implementation is a major drawback. Several factors come out clearly from this study as contributing to this state of affairs. They include:-

- Communication channels are not clear. For the success of any TQM program, communication is central. A possible reason for this may be the lack of information which has been cited as a significant limitation. Information for any organization empowers the employees and enables them make value-based decisions.
- Non involvement of construction workers in setting goals related to their work is evident from the information gathered. People in an organization are the source of ideas and innovation. Their expertise, experience, knowledge and co-operation has to be harnessed to get those ideas implemented. This is best achieved by involving workers in setting goals related to their work.
- The construction workers being important players in TQM implementation are not involved in decision making. Lack of motivation is evident from the neutral standpoint adopted by some respondents regarding TQM related activities. The onus is upon management, because the degree of management's enthusiasm and drive will determine the ease with which the whole work force is motivated.

- The definition of quality, especially among the consultants and contractors is varied, implying that it may be difficult to agree on what quality is in the construction process. This explains the different definitions checked by the respondents.

## 5.2 Recommendations

The following are some of the suggested recommendation from the research

- The contractor and the workers who are crucial in delivering the product to the customer must be involved as early in the process as possible, especially in matters related to design. Given that the design contract is let as separate from the actual construction; where a given design is not feasible the contractor may be able to point it out early and issues rectified before its too late.
- More emphasis should be placed on motivating the workers on site and involving them as much as possible in goal setting where their work is involved.
- Training on quality should be given preference. Commitment from the work force is tied to the amount of training they receive. In Kenya, for every big contract the contractor pays an amount of money as Training Levy which is remitted to the Directorate of Industrial Training, affiliated to the Ministry of Labour. This money can be channeled to training of workers in the construction firms.

## 5.3 Scope and limitations

The research focused on consultants, contractors and workers. These group of people are *internal customers*, as opposed to *the external customer*, to whom the product is finally delivered. External customers are also important, but the focus on the internal customer is because quality chains can break down at any one point in the flow of

work. Internal customers therefore must be well served if the external ones are to be satisfied.

Successful TQM implementation is pegged on among other factors, the style of management and the size of the firm. These factors have not been considered. The ones considered are thought to be at the crux of TQM implementation. For every respondent it was assumed that the views expressed represented those of the organization they work for.

One of the limitations encountered by the researcher is the suspicion among the contractors when information was sought from the workers. Some of the workers gave information they thought was favourable to management for fear of losing their jobs.

These limitations greatly affected the response rate.

#### **5.4 Suggestions for further study**

What has been achieved in this study is the beginning of a journey . The extent of TQM implementation has been approached from a broader perspective as opposed to individual firms or 'departments'. Further research is suggested on why the extent of TQM implementation is not as it should be from the standpoint of the following participants in the construction industry:-

- The external customer, both as the final consumer and as the purchaser of the product.
- The Local authority and other bodies charged with the responsibility of enforcing building standards.
- Suppliers of materials to the building industry.

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- Individual firms and workers involved in the industry. This is especially because it has been established that a very small, almost negligible percentage of firms are ISO certified.

|                               |                                                                                                                                                                                                                                           |
|-------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Construction Process:         | This involves the establishment, alteration and repair of building and Civil engineering structures.                                                                                                                                      |
| Consultants:                  | Refers to an institution, firm or individual that provides professional/expert service and advice based on deep understanding and considerable practical experience. The most prominent is a <i>Costa Rican</i> <i>Inten Consultant</i> . |
| Building / Construction Team: | This comprises of the client, consultants and contractors and others who are involved in the construction process.                                                                                                                        |
| Client / Employer:            | The organization or person who commissions the construction project.                                                                                                                                                                      |
| Building Knowledge:           | Professionals like Architects, Engineers, and Quantity Surveyors who offer services related to design of the Construction project and management of the Construction process.                                                             |
| Architect:                    | The Professional who oversees the construction to design and supervises the progress of a building project.                                                                                                                               |
| Structural Engineer:          | The Professional who designs the structural frame of a building project.                                                                                                                                                                  |
| Service Engineers:            | Electrical and Mechanical Engineers who provide services. Engineering involves multipurpose methods of controlling natural surroundings by means of heating, ventilating, air conditioning and lighting services, and providing electric  |

<sup>1</sup> Construction Methods in the Latin America, 6th revised edition, 1993, Chapter 300. Lack of control in the operation of subcontractors at work and through use of subcontracting systems.

**GLOSSARY OF TERMS**

- Construction Process:** This involves the development<sup>4</sup>, alteration and repair of Building and Civil engineering structures.
- Consultants:** Refers to an institution, firm or individual that provides professional/expert service and advice based on deep understanding and considerable practical experience. The word professional is at times used to mean Consultant.
- Building / Construction Team:** This comprises of the client, consultants and contractors and others who are involved in the construction process.
- Client / Employer:** The organisation or person who commissions the construction project.
- Building Consultants:** Professionals like Architects, Engineers, and Quantity Surveyors who offer services related to design of the Construction product and management of the Construction process.
- Architect:** The Professional who receives the commission to design and supervise the erection of a building project.
- Structural Engineer:** The Professional who designs the structural frame of a building project.
- Services Engineer:** Electrical and Mechanical Engineer who designs services. Engineering services encompasses methods of controlling internal environment by means of heating, ventilating, air conditioning and lighting installations, and providing utilities

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<sup>4</sup> Development is defined in the Land Planning Act (revised edition, 1970 ), Chapter 303; Laws of Kenya, as the erection of such buildings or works and carrying out of such building operations . . .

such as electrical supplies, lifts and compressed air.

**Quantity Surveyor:**

A cost expert whose prime task is to ensure that the project is kept within the agreed budget. He advises on cost aspects and prepares Bills of Quantities and other documentation.

**Other Consultants:**

These include those who may be engaged to design special services and include landscape architect, interior designer and acoustic consultants.

**Contractor:**

Is the person or firm who undertakes to construct a building project in accordance with the contract documents on behalf of the employer.

**Suppliers:**

These supply building materials and components to contractors and sub-contractors.

## TOTAL QUALITY MANAGEMENT

**(TQM):**

The process of involving everyone in an organization in continuously improving products and processes to achieve on every occasion, quality that satisfies customers needs.

**TQM CONCEPTS:**

The three concepts necessary for effective TQM implementation namely: continuous improvement, employee empowerment, and customer focus.

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## Appendix II

### BUILDING CONSULTANTS QUESTIONNAIRE

1. What consultancy services do you offer? ( Tick where appropriate)  

|                                               |                                                 |
|-----------------------------------------------|-------------------------------------------------|
| <input type="checkbox"/> Architectural        | <input type="checkbox"/> Structural engineering |
| <input type="checkbox"/> Services engineering | <input type="checkbox"/> Quantity Surveying     |
| <input type="checkbox"/> Project Management   | <input type="checkbox"/> Civil engineering      |
  
2. How long have you been in practice? ( Tick where appropriate)  

|                                               |
|-----------------------------------------------|
| <input type="checkbox"/> Less than Five years |
| <input type="checkbox"/> 5 – 10 years         |
| <input type="checkbox"/> Over 10 years        |
  
3. Who normally approaches your organization for services? ( Tick where appropriate)  

|                                              |                                                  |
|----------------------------------------------|--------------------------------------------------|
| <input type="checkbox"/> Architect           | <input type="checkbox"/> Project Manager         |
| <input type="checkbox"/> Client              | <input type="checkbox"/> Quantity Surveyor       |
| <input type="checkbox"/> Civil engineer      | <input type="checkbox"/> Contractor              |
| <input type="checkbox"/> Structural Engineer | <input type="checkbox"/> Others ( specify) _____ |
  
4. Do you deal directly with your clients?  
YES ( ) NO ( )
  
5. If NO for question 4, who represents the client? ( Tick where appropriate)  

|                                                 |
|-------------------------------------------------|
| <input type="checkbox"/> Project manager        |
| <input type="checkbox"/> Architect              |
| <input type="checkbox"/> Others (specify) _____ |
  
6. For the projects you have been involved in, who comprises the building team? ( Tick where appropriate)  

|                                                      |                                            |
|------------------------------------------------------|--------------------------------------------|
| <input type="checkbox"/> Client                      | <input type="checkbox"/> Quantity surveyor |
| <input type="checkbox"/> Architect                   | <input type="checkbox"/> Project Manager   |
| <input type="checkbox"/> Civil / Structural Engineer | <input type="checkbox"/> Contractor        |
| <input type="checkbox"/> Others (specify) _____      |                                            |

7. The team members in Question 6 may be referred to as “customers”. Which of the following is the most **effective** type of communication? ( Tick where appropriate)

|                                         | Effective | Very Effective | Not effective |
|-----------------------------------------|-----------|----------------|---------------|
| Verbal only (direct and indirect)       |           |                |               |
| Written only                            |           |                |               |
| By example only e. g adherence to rules |           |                |               |
| Verbal , Written , and By Example       |           |                |               |
| Verbal and Written only                 |           |                |               |

8. To what extent are the following limitations significant to your organization when communicating with other team members?

|                                          | Not significant | Significant | Very significant |
|------------------------------------------|-----------------|-------------|------------------|
| Lack of information                      |                 |             |                  |
| Different interpretations of details     |                 |             |                  |
| People ignoring the message passed       |                 |             |                  |
| Lack of forum to communicate information |                 |             |                  |

9. What would you define as **QUALITY** when referring to a building or other construction products? ( Tick where appropriate)

- Fitness of the building for the intended purpose or use
- Features and characteristics of a building that enable it to satisfy stated or implied needs
- The ability of the building to satisfy the need of the client, whether present or future
- Conformance of building to requirements (statutory, environmental etc)

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10. How **important** do you consider the following factors in trying to achieve quality in the construction process?

| FACTORS                                                                                                                                  | Very Important | Important | Very Essential | Essential | Not important |
|------------------------------------------------------------------------------------------------------------------------------------------|----------------|-----------|----------------|-----------|---------------|
| A team composed of representatives of building team members to oversee improvements in their role and in the entire construction process |                |           |                |           |               |
| Establishing measurements appropriate to every activity to help identify areas that need improvement                                     |                |           |                |           |               |
| Estimating cost of sub-standard work in order to identify areas in need of improvement                                                   |                |           |                |           |               |
| Raising quality awareness among all members of the building team                                                                         |                |           |                |           |               |
| Raising awareness on the importance of conforming to clients' specification and cost of non-conformance                                  |                |           |                |           |               |
| Goal setting where individuals establish improvement goals for themselves and the entire building process.                               |                |           |                |           |               |
| Public, non-financial appreciation to those who meet their quality goals or perform outstandingly.                                       |                |           |                |           |               |
| Communicate any problems that hinder performance of error free work                                                                      |                |           |                |           |               |
| Upon completion of a project the building team meets to share experiences, problems and ideas about completed project.                   |                |           |                |           |               |

11. Have you heard about Total Quality Management (TQM)?

YES ( ) NO ( )

12. If YES, what is your organization doing about it?

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13. Do you think it applies to the Construction Process?

YES ( ) NO ( )

### Appendix III

## BUILDING CONTRACTORS QUESTIONNAIRE

1. What is the nature of your business? (Tick **where appropriate**)

- General building Contractors
- Specialized Service Contractors(i.e. electrical plumbing etc)
- Building and civil engineering contractors
- Civil engineering contractors
- Others (specify) \_\_\_\_\_

2. How long have you been in practice? (Tick **where appropriate**)

- Less than Five years
- 5 – 10 years
- Over 10 years

3. Who normally approaches your organization for services? ( **Tick where appropriate**)

- Architect
- Client
- Civil engineer
- Structural Engineer
- Project Manager
- Quantity Surveyor
- Contractor
- Others ( specify) \_\_\_\_\_

4. Do you deal directly with your clients?

YES ( ) NO ( )

5. If NO for question 4, who represents the client? ( Tick where appropriate)

- Architect
- Project manager
- Others (specify) \_\_\_\_\_

6. At what stage of the construction process do you deal with the client?

| STAGE                    | Always | Occasionally | Never |
|--------------------------|--------|--------------|-------|
| 1. Briefing stage        |        |              |       |
| 2. Sketch plan stage     |        |              |       |
| 3. Working Drawing stage | ✓      |              |       |
| 4. Site Operations stage |        |              |       |
| 5. Handover stage        |        |              |       |

7. In the projects you have been involved in, who comprises the building team? ( Tick where appropriate)

- Client                       Quantity surveyor  
 Architect                       Project Manager  
 Civil Engineer               Others (specify) \_\_\_\_\_  
 Structural Engineer

8. The team members in Question 7 may be referred to as “customers”. As manager of the production process, which of the following do you consider as the most **effective** type of communication? ( Tick where appropriate)

|                                              | Effective | Very Effective | Not effective |
|----------------------------------------------|-----------|----------------|---------------|
| Verbal only (direct and indirect)            |           |                |               |
| Written only                                 |           |                |               |
| By example only      e. g adherence to rules |           |                |               |
| Verbal , Written , and By Example            |           |                |               |
| Verbal and Written only                      |           |                |               |

9. To what extent are the following limitations significant to your organization when communicating with other team members?

|                                          | Not significant | Significant | Very significant |
|------------------------------------------|-----------------|-------------|------------------|
| Lack of information                      |                 |             |                  |
| Different interpretations of details     |                 |             |                  |
| People ignoring the message passed       |                 |             |                  |
| Lack of forum to communicate information |                 |             |                  |

10. What would you define as **QUALITY** when referring to a building or other construction products? ( Tick where appropriate)

- Fitness of the building for the purpose or use it is meant for  
 Features and characteristics of a building that enable it to satisfy stated or implied needs  
 The ability of the building to satisfy the need of the client, whether present or future  
 Conformance of building to requirements (statutory, environmental etc)

11. How **important** do you consider the following factors in trying to achieve quality in the construction process?

| FACTORS                                                                                                                                  | Very Important | Important | Very Essential | Essential | Not important |
|------------------------------------------------------------------------------------------------------------------------------------------|----------------|-----------|----------------|-----------|---------------|
| A team composed of representatives of building team members to oversee improvements in their role and in the entire construction process |                |           |                |           |               |
| Establishing measurements appropriate to every activity to help identify areas that need improvement                                     |                |           |                |           |               |
| Estimating cost of sub-standard work in order to identify areas in need of improvement                                                   |                |           |                |           |               |
| Raising quality awareness among all members of the building team                                                                         |                |           |                |           |               |
| Raising awareness on the importance of conforming to clients' specification and cost of non-conformance                                  |                |           |                |           |               |
| Goal setting where individuals establish improvement goals for themselves and the entire building process.                               |                |           |                |           |               |
| Public, non-financial appreciation to those who meet their quality goals or perform outstandingly.                                       |                |           |                |           |               |
| Communicate any problems that hinder performance of error free work                                                                      |                |           |                |           |               |
| Upon completion of a project the building team meets to share experiences, problems and ideas about completed project.                   |                |           |                |           |               |

12. Have you heard about Total Quality Management (TQM)?

YES ( ) NO ( )

13. If YES, what is your organization doing about it?

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14. Do you think it applies to the Construction Process?

YES ( ) NO ( )

## Appendix IV

### CONSTRUCTION WORKERS QUESTIONNAIRE

1. What is the nature of your job? ( **Tick** where appropriate)

Supervisor       General Worker

2. For how long have been working in the construction industry? ( **Tick** where appropriate)

Less than 5 years

5 – 10 years

Over 10 years

3. Please answer the following question by ticking where appropriate  
For the projects you have been involve in, . . . . .

|                                                       | Strongly Agree | Agree | Neutral | Strongly Disagree | Disagree |
|-------------------------------------------------------|----------------|-------|---------|-------------------|----------|
| People understand the quality of work                 |                |       |         |                   |          |
| People see continuing improvement as essential        |                |       |         |                   |          |
| People contribute willingly to quality improvement    |                |       |         |                   |          |
| People emphasize on doing things right the first time |                |       |         |                   |          |

4. What do you think about the following statements?

Managers in my organization . . . . .

|                                                                    | Strongly Agree | Agree | Neutral | Strongly Disagree | Disagree |
|--------------------------------------------------------------------|----------------|-------|---------|-------------------|----------|
| Are committed to providing top quality work                        |                |       |         |                   |          |
| Regularly review the quality of work produced                      |                |       |         |                   |          |
| Ask people about ways to improve the work produced                 |                |       |         |                   |          |
| Set examples of quality performance in their day to day activities |                |       |         |                   |          |
| Follow up suggestions on improvement                               |                |       |         |                   |          |

5. Does your job involve working in groups?

YES ( ) NO ( )

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If your answer is YES for question No. 5, answer question no. 6 & 7, if NO proceed to Question No. 8

6. People in my work group ...

|                                                                                | Always | Occasionally | Never |
|--------------------------------------------------------------------------------|--------|--------------|-------|
| Are challenged by the supervisor to find ways to improve their work            |        |              |       |
| Are paid fairly for the work they do.                                          |        |              |       |
| Are promoted because they have earned it                                       |        |              |       |
| Are able to exchange information with their supervisor regarding work          |        |              |       |
| Are the appropriate personnel to get the job done ( i.e. adequately trained)   |        |              |       |
| Are equipped with the right tools, equipment and materials to get the job done |        |              |       |
| Are well balanced in terms of work distribution                                |        |              |       |
| Are recognized for outstanding performance by an individual or team            |        |              |       |

7. Do you agree with the following statements?

People in my work unit . . . . .

|                                                                                | Strongly Agree | Agree | Neutral | Disagree | Strongly Disagree |
|--------------------------------------------------------------------------------|----------------|-------|---------|----------|-------------------|
| Understand how quality emphasis leads to more productive use of resources      |                |       |         |          |                   |
| Know who their customers are                                                   |                |       |         |          |                   |
| Care about their customers ( both within the construction process and outside) |                |       |         |          |                   |
| Get materials and supplies needed on time as ordered                           |                |       |         |          |                   |
| Rely on ' grapevine' or rumours for information                                |                |       |         |          |                   |
| Have work goals and standards that are generally realistic                     |                |       |         |          |                   |

8. WHAT DO YOU THINK ABOUT THE FOLLOWING STATEMENTS?

a. The supervisors in my section

|                                                   | TRUE | FALSE |
|---------------------------------------------------|------|-------|
| i. Make continuous improvement of work a priority | ( )  | ( )   |
| ii. Request employees opinion                     | ( )  | ( )   |
| iii. Do a good job of setting work expectations   | ( )  | ( )   |

b. Almost all workers on site . . . . .

- i. Can specify, if asked what goals or objectives they are Working towards ( ) ( )
- ii. Are invited to participate in setting goals or objectives related to their work ( ) ( )
- iii. Know how the goals/ objectives they are working toward relate to their group's mission ( ) ( )

c. Managers at the top . . . . .

- i. Hold regular meetings with juniors to identify opportunities improvement ( ) ( )
- ii. Encourage new ideas ( ) ( )
- iii Analyse new ideas from workers and implement them ( ) ( )
- iv. Allow people to contribute freely and be creative ( ) ( )
- v.. Reward new ideas that work ( ) ( )
- vi. Have the authority to try a new approach that looks promising ( ) ( )
- vii . Approve for trials a new promising approach ( ) ( )

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