

Evaluation of Quality Management System (QMS) in Tanzania Construction Companies

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ABSTRACT

In this paper, Quality Management System (QMS) in Tanzania Construction Companies is evaluated and ways to enhance quality excellence are suggested. To achieve the goal, questionnaires survey of companies and interview were administered to 22 randomly selected construction companies based in Dar es Salaam. Research shows that the top management had paid very little attention in setting quality policy, establishing quality objectives, conducting management review and communicating to subordinates the importance of meeting customer requirements. Regarding resource management, companies had paid very little attention to human resource and provision of other resources. Generally, companies had paid little attention in improving the effectiveness of the Quality Management System. The findings add to the stock of knowledge on understanding the implementation of Quality Management System (QMS) in developing countries like Tanzania.

Keywords: Quality, Quality Management System, Construction.

INTRODUCTION

Quality has been defined in a number of ways, such as: meeting the requirements of the designer, constructor and regulatory agencies as well as the owner (David and Murat, 1997); customer satisfaction or fitness for purpose, focusing on how product or services produced satisfy the real need (Juran and Gryna;1993); conformance to requirements based on the measure of how well the product or service meets the target and tolerances determined by its designers, thus making quality tangible, manageable, and measurable (Crosby, 1989); the development, design, production and service of a product that is most economical, most useful, and always satisfactory to the customer (Ishikawa, 1985); the judgment by customers or users of a product or service - the extent to which the customers of the product or service surpass their needs and expectations (Gitlow et al., 1989).

Ferguson and Clayton (1988), characterized quality as consisting of four main facets: First; meeting the requirements of the owner as to functional adequacy; completion on time and within budget; lifecycle costs; and operation and maintenance. Second; meeting the requirements of the design professional such as provision of a well-defined scope of work; budget to assemble and use a qualified, trained, and experienced staff; budget to obtain adequate field information prior to design; provision for timely decision by owner and design professional; and contractor to perform necessary work at fair fee with adequate time allowance. Third; meeting the requirements of the contractor such as provision of contract plans; specifications; and other documents prepared in sufficient detail to permit the contractor to prepare priced proposal or competitive bid, timely decisions by the owner and design professional on authorization and processing of change orders; fair and timely interpretation of contract requirements from field design and inspection staff; and contract for performance of work on a reasonable schedule which permits a reasonable profit. Lastly; meeting the requirements of regulatory agencies (the public) as to public safety and health; environmental considerations; protection of

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public property including utilities and conformance with applicable laws, regulations, codes and policies.

According to Owlia (1996), quality in construction can be categorized into three main groups: corporate, product and service. At corporate level, quality refers to the image that customers have of an organization. This type of quality is that which is expected from a company rather than that from a product or service and has its foundations defined at organizational rather than at project level (Yasamis et al, 2002). Quality-conscious companies normally have a strong quality culture, which is helpful for achieving customer satisfaction. Yasamis et al. (2002) named nine critical success factors (CSFs) of Total Quality Management as indicators of corporate quality. The nine critical success factors are: (i) Management and Leadership, (ii) Continuous improvement system, (iii) Measurement and feedback, (iv) Improvement tools and techniques, (v) Supplier quality management, (vi) System and processes, (vii) Resources, (viii) Education and training and (ix) Work environment and culture. The use of the CSFs factors at corporate level is critical for achieving customer satisfaction and in fact, they could be used as predictors of the corporate quality that a construction company should provide (ibid). The awareness and use of such critical success factors (CSFs) is apparent in the quality policy of the company, which according to Seaver (2001), plays a key role in corporate quality. From the customer perspective, this may be a valuable simplification because the quality policy may be the only evidence that customers will have, prior to setting up a working relationship with a company, about its commitment to providing both corporate and product/service quality.

Quality Management System (QMS).

A quality management system (QMS) is a set of policies, processes and procedures required for planning and execution (production/development/service) in the core business area of an organization, that is areas that can impact the organization's ability to meet customer requirements (AbdulAziz and Tawfiq, 1999; Abdul Rahim, 2004). Successful implementation of Quality Management System can contribute to an increase in product quality,

improvement in workmanship and efficiency, a decrease in wastage, and increase profit. The International organization for standardization provide standard for quality management (ISO 8402) to enable companies preparing themselves for competition within a larger market, a market in which customers may increasingly require suppliers to employ a quality system.

According to ISO 9001 (2008) the basic requirements of the Quality Management System (QMS) are: (i) To determine needs and expectations of customers (ii) To establish the quality policy and objectives (iii) To determine and provide resource (iv) To establish and implement processes (v) To monitor and measure the efficiency and effectiveness of each process (vi) To establish the means to prevent the non-conformities and to eliminate their causes (vii) To establish and implement processes to improve the existing QMS. The Quality Management System consists of four main elements, namely, (i) Management responsibilities (ii) Resource Management (iii) Product Realization (iv) Measurement, Analysis and Improvement (Abdul Rahim, 2004).

Research Method

The study involved a sample from all construction companies registered by the Contractors Registration Board (CRB) operating in Dar es Salaam City. The term Construction Companies were used as an operational definition to include Building Contractors, Civil Works Contractors, Electrical Contractors, Mechanical Contractors and Specialist Contractors.

In order to gain information regarding Quality Management System practice in construction companies, information was obtained from individuals working in those companies. The questionnaires targeted those in the management who are the fore front group or are aware of what is taking place in the company for its survival. These include directors and other employees in the organization such as engineers, architects, quantity surveyors and technicians acting in the middle group within the company. This group was expected to present their views on behalf of the company with minimum or without biases.

The sample size for this study was determined using the formula proposed by Olive and Abel

(1999) who argue that where time and resources allow, a researcher should take as big a sample as possible. With a large sample the researcher is confident that if another sample of the same size was to be selected; findings from the two samples

would be similar to a high degree. If the target population is less than 10,000 the required sample size will be smaller. In such cases we calculate the final sample estimate (n_f) using the following formula:

$$n_f = n / ((1+n)/N) \quad [1]$$

Where: n_f = the desired sample size (where the population is less than 10,000)
 n = the desired sample size (Where the population is more than 10,000)
 N = the estimate of the population size

From the 2012 directory of the Contractors Registration Board (CRB) in 2013, there were 3268 construction companies which indicated their addresses to be within Dar es Salaam, registered in class 1 to 7 in civil, building, mechanical, electrical and specialist categories. As it was difficult for the researcher, within the constraints of time and money to collect information from all the companies, it was considered to take a representative sample of 25 from the population of the 3,268 registered contractors within Dar es Salaam.

This number was considered adequate for addressing the research questions. Using the formula above, the required sample would be.

$$\begin{aligned} N_f &= 25 / (1 + (25/3268)) \\ &= 25 / 1.00765 \\ &= 24.81 \end{aligned}$$

Therefore, the required sample size for this study is 25. In this study, questionnaires were sent to the sample of 5 contractors who were randomly taken from each category of registration, namely; building, civil, electrical, mechanical and specialist.

Due to a non-homogenous population of contractors, the concept of stratification was necessary. In the context of this study, stratified random sampling involves the following steps: (i) The researcher compiled a list of all construction companies registered in class 1 to 7. The list was

obtained from the Contractors Registration Board (CRB) (ii) The population was then divided into five groups (strata) before selection of representatives. The criteria used for stratification was contractors who undertake building works, contractors who undertake civil works, and those who undertake electrical works, contractors doing mechanical works and lastly contractors undertaking specialist works, (iii) The required sample size is 25. The equal proportion method was used to determine the appropriate representation in each stratum, (iv) Random sampling was used to select the appropriate number in each stratum and fish bowl draw technique was used to pick the sample because the total number of the population is small.

All the instruments were categorized according to the key variables of the study to ensure that they all follow suit in abstracting the required knowledge, all the data found unusable was set aside and where necessary the collection was repeated. Only the required useful data was coded and stored.

RESULTS AND DISCUSSION

The respondents were asked to indicate if they practice quality management. The answer of "yes" reflects the respondent practice quality management, whilst the answer of "no" indicates the lack of quality management practice in the company.

Table 1.1 Responses from the questionnaires sent.

Companies by category	Questionnaires sent	Questionnaires returned	Percentage success
Building	5	5	100
Civil engineering	5	5	100
Electrical	5	5	100
Mechanical	5	3	60
Specialist	5	4	80
TOTAL	25	22	88

Table 1.2 Respondents in respect to classes of registration

Companies by classes	Frequency	Percentage
Class one	3	13.64
Class two	1	4.54
Class three	3	13.64
Class four	4	18.18
Class five	3	13.64
Class six	4	18.18
Class seven	4	18.18
TOTAL	22	100

Quality Management System.

The respondents were asked to specify if their firm is certified to ISO-9001 and for those certified, respondents were asked to state when the certification was obtained. Results show that, there is no ISO 9001 certified companies out of twenty two companies surveyed. Also responses by respondents reveal that, two out of twenty two non-ISO certified companies are currently working towards getting certified. "ISO is a current trend in the industry, in order not to loose out in the competition; we have no choice, but to have it", one respondent said. The companies without formal Quality Management System (ISO certification) claimed that they practice quality management by their own approaches. It is perceived that quality management is part of project management and concern of every company surveyed.

However, the purpose of quality management is mainly for fulfilling their obligation under the construction contract rather than increasing customer satisfaction as emphasized in the philosophy of Total Quality Management (TQM). "As far as a company is concerned, making profit stills the focus. If our works do not achieve the

satisfaction of the SO (Superintending Officer), we have to redo, and it brings losses to us", a respondent commented.

Furthermore, the respondents were asked to indicate if their companies are certified to any other Quality Assurance System, and for those who are certified were asked to state when the certification was obtained. Responses reveal that, no company is certified to any other Quality Assurance System out of twenty two companies surveyed. This indicates that the respondent companies do not practice formal Quality Assurance System.

Quality Initiatives.

The respondents were asked to indicate if they undertake any quality initiatives. The results are shown in table 1.3. From the results it shows that, most of the respondent companies had implemented some kind of initiative. Only 4 out of 22 companies had created a new department to deal with quality. A cultural change programme has been implemented by 10 out of 22 companies while strategies for total quality have been implemented in almost 5 out of 22. Nonetheless, this means that TQM ideas have begun to

influence management practices in the sector. The results reveal that, only 4 out of 22 companies had created a department to deal with quality. This number is very small because as a starting point in quality management in the organization a quality department is of great importance.

The two initiatives with the highest scores were employee involvement to improve quality and customer satisfaction initiatives. Where 11 out of 22 and 14 out of 22 respondent companies respectively implement the initiatives.

Table 1.3 Quality initiatives practiced in Tanzania construction companies

	Respondents																						Total (N=22)
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
Quality Department	/										/				/			/					4
Employee involvement		/	/	/		/		/	/	/	/				/	/	/						11
Cultural change		/	/			/		/	/		/				/				/		/	/	10
Customer satisfaction initiative	/		/	/			/		/	/	/			/	/	/		/	/		/		14
Strategies For total quality						/					/							/	/			/	5

Quality improvement methods:

The respondents were asked to specify the methods undertaken by their firms towards quality improvement by indicating their opinion about both the level of use and perceived importance of each method in the company. Using Likert-type scale ranging from very high (5 points score) to very low (1 point score).The results are shown in table 1.4

Use of Methods

With regard to the mean level of use of quality improvement methods in the sector, table 1.4 summarizes the results. From the results, it shows that; mean score ranged from 1.25 to 4.10 When they were ordered, computer networks (technology), laws and regulations, checklists, inspection(quality control) and customer complaints (performance measures) were the five most used by the respondent companies while Programme Evaluation Review Technique(PERT), Department purpose analysis (Planning and programming tools), Focus group, Customer telephone interview and Brainstorming

(Gathering customer needs) were least used. From the results it shows that, construction companies are oblivious to the value in the sector of the last two groups of methods.

Perceived Importance of Methods

With regard to the levels of perceived importance of the quality improvement method, the results are shown in table 1.4. Results show that, companies in the sector placed a higher degree of importance on almost all the methods than was displayed by their level of use. The mean score ranged from 1.53 to 4.17. The respondents placed computer networks (technology), laws and regulations, inspection (quality control), customer complaints and customer satisfaction surveys(performance measures) as the five highest and Department purpose analysis, Programme Evaluation Review Technique (PERT) (Planning and programming tools); Quality audit(Quality control); Focus group, Brainstorming and Customer telephone interview(Gathering customer needs) as the five lowest.

Table 1.4 Paired Sample Statistics for Mean Levels of Use and Perceived Importance of Methods

Group	Method	Use of method (mean score)	Perceived Importance of method (mean score)
Gathering customer needs	Customer survey	2.97	3.44
	Customer one to one interview	2.6	3.25
	Customer telephone interview	1.72	2.08
	Brainstorming	2.32	2.75
	Focus group	1.88	2.35
Planning and programming tools	Mission statement	2.89	2.99
	Gantt chart	2.44	2.49
	Critical path method	2.69	2.93
	Programme Evaluation and Review Technique (PERT)	2.03	2.14
	Team and Team work	3.42	3.65
	Department purpose analysis	1.25	1.53
Quality control	Law and regulations	4.00	4.10
	Checklist	3.69	3.76
	Inspection	3.97	4.06
	Sampling	2.75	2.82
	Quality audit	1.92	3.69
	Contractor partnership	3.17	3.29
Performance measures	Customer satisfaction survey	3.50	3.88
	Customer complaints	3.71	4.07
	Litigation	2.63	2.72
Technology	Planning software	3.61	3.65
	Design software	3.31	3.26
	Computer network(e.g. email)	4.10	4.17
OVERALL MEAN SCORE		2.89(approx.=3)	3.18(approx.=3)

3 means moderately used/perceived important

Quality Management Tools and Techniques.

The respondents were asked to indicate quality management tools and techniques commonly used in their companies. The results are shown in table 1.5. A list of quality management tools and techniques was prepared based on the review of literature, to verify the extent that the tools and techniques stated are relevant in the local context of construction project management. From the

responses, it shows that the design of experiments and inspection are seen as the common practices to all. Design of an experiment is used for conducting various types of test, e.g., concrete test, etc. Meanwhile, site supervisors are engaged in every project to supervise and inspect the construction works. Except for the two mentioned, there is no any other quality management tools or techniques that is common to all. A quality audit is not common to all.

Table 1.5 Quality Management Tools and Techniques Applied by Construction Companies

Tools	Respondents																						Total(out of 22)
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
Benefit/cost analysis	/					/					/	/			/			/					6
Benchmarking			/			/					/				/	/	/						6
Flowcharting		/	/			/		/	/		/				/				/		/	/	10
Design of experiment	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	22
Quality Audit																							
Inspection	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	22
Control chart						/		/		/		/				/		/	/		/		8
Pareto analysis						/					/												2
Statistical sampling	/					/			/	/			/		/	/		/		/	/		10
Trend analysis						/		/			/											/	4
Any other method		/	/	/	/	/	/		/		/	/	/		/			/	/	/			14

Management responsibility.

The respondents were asked to indicate the level of leadership and participation exhibited by the top management of the respective company. The answer of “yes” reflects leadership and participation of the top management is exhibited, whilst the answer of “no” indicates the lack of leadership and participation. Results are summarized in table 4.6 .The respondents were asked to specify if their top management communicate to the subordinates the importance of meeting customer, statutory and regulatory requirements

The results show that, 10 out of 22 respondents answered “yes”; 12 out of 22 respondents answered “no” and none answered “not sure”. Results reveal that, top management of most of the companies do not communicate about the importance of meeting customer requirements, this is a weakness because as emphasized in the total quality management concepts, all workers should be involved in ensuring quality of the products and services, to those who answered “yes” it was noted that their concerns are mainly to avoid problems instead of achieving excellence in their works. “My boss is concerned about the cost and time implications if the construction works do not meet the expectation of client/consultants”. One respondent commented.

With regard to quality policy, respondents were asked to specify if their top management lead in

setting quality policy. Responses from the respondents reveal that, 9 out of 22 respondents answered “yes”; 13 out of 22 respondents answered “no” and none answered “not sure”, the results show that, majority of respondents companies are in service without quality policy. This is a problem because each worker will execute work at his or her own standard, as there is no quality policy to provide focus and direct the organization hence meeting the required standard becomes impractical.

Concerning conducting management review, respondents were asked to indicate if their top management reviews the organization’s Quality Management System, at planned intervals, to ensure its continuing suitability, adequacy and effectiveness.

Responses by the respondents reveal that, 8 out of 22 respondents answered “yes”; 14 out of 22 respondents answered “no” and none answered “not sure”. Results show that, top management of most of the respondents companies does not conduct management reviews in order to improve the quality of products or services. This shows that, the majority of the respondent companies do no understand the importance of conducting management review in improving the quality of products or services, also in improving the effectiveness of the Quality Management System.

Regarding quality objectives, respondents were asked to specify if top management ensure quality

objectives are established. The results are shown in table 1.6. From the results, it shows that, 10 out of 22 respondents answered “yes”; 10 out of 22 answered “no” while 2 out of 22 respondents answered “not sure” the results show that, only 10 out 22 respondents companies understand the importance of establishing quality objectives needed to meet quality requirements for products in the company.

Pertaining to communication process, respondents were asked to indicate if top management ensures the appropriate communication processes are

established within the organization. Responses shows that 16 out of 22 respondents answered “yes”; 6 out of 22 respondents answered “no” while none answered “not sure”, the results show that, top management of most of the respondent companies know the importance of ensuring the appropriate communication processes within the company. Six (6) out of twenty two (22) respondent companies are oblivious to the importance of ensuring that appropriate communication processes are established within the company.

Table 1.6 State of Leadership and Participation of Top Management in Quality Management

	Respondents																						Total(out of 22)
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
Communicate important of meeting customer requirement	/			/	/		/		/	/	/	/				/		/					10
Quality policy			/	/		/			/	/	/				/	/	/		/				9
Management review		/						/	/	/	/		/								/	/	8
Quality objective		/	/	/		/		/		/						/		/	/		/		10
Internal communication	/	/		/	/		/		/	/		/	/	/	/		/	/	/	/		/	16

Resource Management:

The purpose was to ascertain the extent to which different elements in resource management is given priority when implementing quality management in construction companies. Using Likert-type scale ranging from strongly agree (5 points score) to strongly disagree (1 point score). The results are as shown in table 1.7.

The mean score ranged from 1.24 to 4.05. When they were ordered, teamwork and involvement; positive values such as trust, honesty, hard work are fostered by management and current payment scheme motivate employees (work environment and culture); building, workspace and associated

utility and process equipment (both hardware and software) are suitable to achieve conformity to the requirements (infrastructure) were the five most practiced by the respondent companies while employees training in job specific skill; employees training on total quality concepts; employees training in quality specific tools and techniques (human resources),provision of sufficient financial resources to support improvement activities and provision of technical resources (e.g. software, equipment) (provision of resources) appeared lowest in the list. This may indicate that construction companies are oblivious to the importance of the last two groups of resource management in achieving conformity to the customer’s requirements.

Table 1.7: State of resource management in the construction companies in Tanzania.

Group	Elements	Mean score
Provision of resources	Sufficient financial resources provided to support improvement activities.	1.42
	Human resource availability considered in improvement activities.	2.69
	Technical resource are provided	2.14
Human resources	Employees are trained in job specific skill	1.20
	Employees are trained in quality specific tools and techniques	2.24
	Employees are trained on total quality concepts	1.27
	Training time is provided for employees	2.99
	Management always updates their knowledge	2.83
Work environment and culture	A pleasant environment exists in the working area	3.21
	Positive values such as trust, honest, hard working are fostered by management.	3.65
	Attitudes and behaviors are reinforced through a caring culture	2.64
	The current payment scheme motivate employee to contribute towards building quality culture.	3.32
	Team work and involvement are normal practices	4.05
Infrastructure	Building, work space, and associated utilities are suitable to achieve conformity to the requirement.	3.94
	Process equipment (both hardware and soft ware) are suitable to achieve conformity to the requirement.	3.46

Production Realization

Under product realization each respondent was asked to elicit the product realization process of the respective company. The answer of “yes” reflects that the companies implement necessary steps needed in product realization process, whilst the answer of “no” indicates the lack of necessary steps in the product realization process. The responses revealed that 10 out of 22 respondents answered “yes”; 11 out of 22 respondents answered “no” while 1 out of 22 respondents answered “not sure” to the question asking “does your organization determine required verification, validation, monitoring, measurement, inspection and test activities specific to the product and criteria for product acceptance?” The results were that, most companies do not determine required verification, validation, monitoring, measurement, inspection and test activities specific to the product and criteria for product acceptance which is an important step in planning for product realization.

Regarding the review of requirements related to the product, respondents were asked to specify if their organizations determine requirements related to the product and review them prior to the organization’s commitment to supply a product to the customer. Results revealed that, 15 out of 22 respondents answered “yes”; 7 out of 22 respondents answered “no” and none answered “not sure”. Results show that, top management of

most of the respondent companies determines requirements related to the product and review them prior to the organization’s commitment to supply a product to the customer.

Concerning customer communication, respondents were asked to indicate if their organizations determine and implement effective arrangements for communicating with customers in relation to product information, enquiries, contract or order handling, including amendment and customer feedback. From the results, it show that, 12 out of 22 respondents answered “yes”; 10 out of 22 respondents answered “no” while none answered “not sure”. Results show that, top management of most respondent companies determine and implement effective arrangement for communicating with customers in relation to product information, enquiries, contract or order handling, including amendment and customer feedback.

The respondents were asked to indicate if their organizations plan and control the design and development of the product. Responses from the respondents reveal that, 10 out of 22 respondents answered “yes”; 12 out of 22 respondents answered “no” and none answered “not sure”. Results show that, more than half of the respondent companies do not plan and control the design and development of the product.

With regard to purchasing process, respondents were asked to indicate if their organizations ensure that the purchased product conforms to specified purchase requirement. Results reveal that, 12 out of 22 respondents answered “yes”; 10 out of 22 answered “no” whereas none answered “not sure” to the question asking “does your organization ensure that the purchased products conform to specified purchase requirements?” The results show that, most of the respondent companies ensure that purchased products conform to specified purchases requirements.

Furthermore, respondents were asked to specify if their organizations evaluate and select suppliers based on their ability to supply products in accordance with the organization’s requirement. Responses reveal that, 7 out of 22 respondents answered “yes”; 15 out of 22 answered “no” and none answered “not sure”.

Concerning verification of purchased products, respondents were asked to indicate if their organizations establish and implement the inspection or other activities necessary for ensuring that purchased products meet specified purchased requirement. From the responses, it shows that 8 out of 22 respondents answered “yes”; 14 out of 22 respondents answered “no” and none answered “not sure”.

Regarding control of production and service provision, respondents were asked to specify if their organizations plan and carry out production and service provision under controlled conditions such as availability of information that describes the characteristics of the product, availability of work instruments and suitable equipment. Results shows that 10 out of 22 respondents answered “yes”; 12 out of 22 respondents answered “no” and none answered “not sure”.

Concerning monitoring and measurement, respondents were asked to indicate if their organizations determine the monitoring and measurements to be undertaken and the monitoring and measuring equipments needed to provide evidence of conformity of products to determined requirements. the results were that 8 out of 22 respondents answered “yes”; 13 out of 22 respondents answered “no” while 1 out of 22 answered “not sure” showing that, the majority of respondents are oblivious to the importance of monitoring and measurements and provision of

monitoring and measuring equipments needed to provide evidence of conformity of products to determined requirements

Measurement, analysis and improvement

Under measurement, analysis and improvement, respondents were asked to elicit the monitoring, measurement, analysis and improvement process implemented by their companies. The answer of “yes” reflects that the company plan and implement the monitoring, measurement, analysis and improvement processes needed, whilst the answer of “no” indicates the lack of implementation of the monitoring, measurement, analysis and improvement processes needed in the company.

The respondents were asked to indicate if their organizations plan and implement the monitoring, measurements, analysis and improvement process needed to demonstrate conformity of products to the requirements. The results were that 5 out of 22 respondents answered “yes” to agree that their organizations plan and implement the monitoring, measurements, analysis and improvement process needed to demonstrate conformity to product requirements. Where as 17 out of 22 of respondent companies answered “no” to the question. One of the respondent said, they depend on the consultants to come and inspect the work. If any defect is found out they rectify it and proceed to the next stage.

Also respondents were asked to specify if their organizations monitor information relating to customer perception as to whether the organization has met customer requirements. Results show that, 8 out of 22 respondents answered “yes” and 14 out of 22 answered “no” showing that, the majority of the respondents do not monitor information relating to customer perceptions as one means of monitoring and measurement.

Concerning quality audit, respondents were asked to indicate if their organizations conduct internal audit at planned intervals to determine whether the Quality Management System conforms to the planned requirement of the organization’s Quality Management System and is effectively implemented and maintained.

Responses from the respondents reveal that, 2 out of 22 respondents answered “yes” to agree that

their organizations conduct internal audit at planned intervals to determine whether the quality management system conforms to the planned requirement of the organization's Quality Management System and is effectively implemented and maintained. The majority of the respondents i.e. 20 out of 22 answered "no" to the question.

Responses from the respondents reveal that, 8 out of 22 respondents answered "yes" to the question asking "does your organization apply suitable methods to demonstrate the ability of the processes to achieve planned results?" And 14 out of 22 respondents answered "no" to the question showing that, they do not apply suitable methods to demonstrate the ability of the processes to achieve planned results.

With regard to control of nonconforming products, respondents were asked to identify if the organizations ensure products which do not conform to product requirements is identified and controlled to prevent its unintended use or delivery.

Responses from the respondents reveal that, 12 out of 22 respondents answered "yes" to the question to agree that their organizations ensure products which do not conform to product requirements is identified and controlled to prevent its unintended use or delivery; 10 out of 22 respondents answered "no" to the question. Whereas none answered "not sure" to the question.

Respondents were asked to indicate if their organizations continually improve the effectiveness of the Quality Management System through the use of the quality policy, quality

objective, audit results, analysis of data, corrective and preventive actions.

Responses by respondents reveal that, 9 out of 22 respondents answered "yes" and the rest i.e. 13 out of 22 respondents answered "no" showing that, their organizations do not continually improve the effectiveness of the Quality Management System through the use of the quality policy, quality objective, audit results, analysis of data, corrective and preventive actions.

Responses from the respondents reveal that, 15 out of 22 respondents answered "yes"; 7 out of 22 respondents answered "no" while none answered "not sure" to the question asking "does your organization take action to eliminate the causes of nonconformities in order to prevent recurrence?" The results show that, the majority of respondent companies take action to eliminate the cause of nonconformities in order to prevent recurrence.

Respondents were asked to indicate if their organizations determine action to eliminate the causes of potential nonconformities in order to prevent recurrence. Responses from the respondents reveal that, 15 out of 22 respondents answered "yes" and 7 out of 22 answered "no".

Effectiveness of Quality Management System in construction companies

Respondents were asked to indicate to what extent implementation of Quality Management System assist their companies to achieve elements listed in table 1.8. Using Likert – type scale ranging from strongly agree (5 point score) to strongly disagree (1 point scale). The results are shown in table 1.8

Table 1.8 List of elements and the effectiveness of Quality Management System

S/NO.	Elements	Mean score
1	Enhance image and reputation of organization	3.64
2	Performance improvement and increase customer satisfaction	3.31
3	Consistency in quality of service	3.15
4	Efficiency of operations in construction site	2.90
5	Reduction of quality cost	3.45
6	Prevention of error at the earliest stage of the project	2.95
7	Clear line of duties	3.97
8	Increase chance to be awarded the tenders/contract	3.89
9	Facilitate access to certain market	3.22
10	Improve relationship and cooperation between clients and contractors	3.84
11	Project completion within the stated period of time	3.66
OVERALL AVERAGE SCORE		3.45

For the ranking of effectiveness of QMS in the Tanzania Construction companies on elements are, clear line of duty; increase chance to be awarded the tenders/contract; improve relationship and cooperation between clients and contractors; project completion within the stated period of time and enhance the image and reputation of the organization were the five highest ranked. Whereas efficiency of operations in construction site; prevention of error at the earliest stage of the project; consistency in quality of service; facilitate access to certain market; increase chance to be awarded the tenders/contract; performance improvement and

increase customer satisfaction and reduction of quality cost were least ranked.

Obstacles encountered by organization in implementing Quality Management System

Regarding obstacles facing implementation of Quality Management System, respondents were asked to indicate using Likert-type scale ranging from strongly agree (5 point score) to strongly disagree (1 point score) what obstacles do their companies face in implementing Quality Management System. Table 1.9 summarizes the main results.

Table 1.9: The Ranking of Obstacles Encountered by Organizations in the Implementation of QMS in Tanzania Construction companies

List of Obstacles	Mean score
Resistance to change	3.83
Misconception of the ISO 9000 quality system	3.71
Quality perceived as something secondary to the business;	3.51
Scheme may have appeared too complex;	3.39
Lack of understanding of the ISO 9000 quality standards;	3.75
High cost especially the initial cost;	3.52
Loss of productivity of the workforce due to the effort exerted in learning and implementing the new system besides their regular duties;	3.67
Absence of special regulations that make it incumbent upon contracting companies to establish and implement QMS;	3.73
No encouragement from the construction industry clients	3.79
High cost to implement QMS	3.59
Difficult to apply to the construction industry	3.59

In ranking of the obstacles encountered by organizations in the implementation of QMS in the Tanzania Construction companies, “Resistance to change” topped the list followed by “no encouragement from construction industry clients”; The respondents results put “lack of understanding of the ISO 9000 quality standards” as the third in the line up, followed by “Absence of special regulations that make it incumbent upon contracting companies to establish and implement QMS” and next “Misconception of the ISO 9000 quality system”; “Difficult to apply to the construction industry” was listed as the least in the obstacles encountered by organizations in the implementation of QMS in the Tanzania construction companies.

CONCLUSIONS

Construction companies in Tanzania are experiencing problem of delivering good quality products and services to their customers. Based on the data collected and analyzed in this study, the said problem of delivering poor products and services by construction companies in Tanzania have been linked to the following:

- (i) Inadequate knowledge and use of quality management tools and techniques in construction companies.
- (ii) Failure of management to perform their responsibilities with regard to quality;
- (iii) Insufficient provision of resources to support improvement activities in construction companies ;
- (iv) Failure to develop human resources. Such as provision of training to workers;

(v) Failure of companies to plan and implement the monitoring, measurement, analysis and improvement process needed to demonstrate conformity of product to requirements.

Regarding the effectiveness of Quality Management System in Tanzania, the problem of ineffectiveness of Quality Management System in Tanzania construction companies is linked with failure of sampled companies to realize the planned activities within the QMS as described in ISO 9001, this is because the manner in which quality is managed by these sampled companies is unstructured and unsystematic and does not integrate towards QMS.

The proposed ways to enhance quality excellence in Tanzania construction companies includes the following actions:

- (i) Improvement of construction workers' motivation, productivity and competitiveness;
- (ii) Establishment of pre qualification system for suppliers of products and services;
- (iii) Establishment of quality manual for construction workers;
- (iv) Improvement of Information management approaches; and,
- (v) Providing sufficient funds and technical resources to support improvement activities.

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