

IMPLEMENTATION OF TOTAL QUALITY MANAGEMENT OF CONSTRUCTION COMPANIES IN LAGOS STATE, NIGERIA

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Abstract

Total Quality Management (TQM) is a continuous method of sustaining improvement and satisfying the clients' demands. The essence is to increase competitive, innovation, profits and also to reduce rework. Construction companies had been reluctant in the implementation of TQM. Thus, the purpose of this study is to assess the challenges and constraints in the implementation of Total Quality Management (TQM) of construction companies with a view to ensure conformity to client specification and satisfaction. Cross sectional research design was used for this study and the population entails construction professionals in indigenous and expatriate construction companies in Nigeria. Random sampling procedure was used to select the respondents. Statistical Package for Social Science (SPSS) 17th version was used to analyse using descriptive statistic and the relative importance index(RII) of the level of importance of the factors were calculated. Findings showed that management commitment factors, role of quality department, training and education, employee involvement and client's satisfaction orientation were constraints affecting the implementation of TQM. The difficulties faced in implementation of TQM were challenges of lack of available quality system documentation, lack of understanding in the process requirement, high cost to implement TQM, lack of TQM exposure and lack of planning. In conclusion, Nigeria construction companies practice TQM at the management level with no adequate quality control and assurance manual. It was therefore recommended that Nigeria construction companies should developed a framework for the purpose of quality standard and for them to compete with their counterpart globally.

Keywords: Construction companies, Implementation, Quality, Total Quality Management (TQM), Training.

INTRODUCTION

TQM is a management philosophy, a paradigm, a continuous improvement approach to doing business through a new management model. BSI (1992) cited in Wahid and Corner (2009) defines TQM as the management philosophy and company practices that aim to harness the human and material resources of an organization in the most effective way to achieve the objectives of the organization. The TQM concept is an aspect of continuous improvement which aims at quality as a key parameter of any successful business, hence the quality of a product or service is essential to TQM. According to Phenga and Teo (2004), TQM is a "journey" hence a change in behaviour and culture of the organisation. TQM entails managing construction activities, the stakeholders and

construction process from the early stage of the project till the completion stage. TQM focus on meeting client requirement by providing quality services at a cost that provides value to the client. TQM can be sustained through leadership style at all levels of the organization (Alwi, *et al.* 2001).

TQM is a successful philosophy in the manufacturing sector (Bakar *et al.*, 2011) but the construction industry is behind other industries in implementing this concept. However, it can be adopted to improve quality and productivity and to ensure clients get good value for money (Phenga and Teo, 2004). TQM also ensure reduction in quality costs (Iruobe *et al.*, 2010), better employee, job satisfaction because they do not need to attend to defects and client complaints (Phenga and Teo, 2004), recognition by clients, work carried out correctly from the design stage and closer subcontractors and suppliers cordial relationships. TQM performance can be measured through top management commitment, customer involvement and satisfaction, employee involvement and empowerment, customer-supplier relationship and process improvement and management (Baidoun, 2004; Ahmadinejad, *et al.*, 2005).

Hernandez and Aspinwall (2008) cited in Odusami *et al.* (2010) opined that the construction industry in the UK has taken up the challenges of quality management hence it has led to increase in market shares and improvement in customer satisfaction.. The Australian construction companies have not adhered to the implementation of TQM due to the short term benefit (Jaafari, 1996 cited in Love and Heng, 2000). Studies had showed successful implementation of TQM in Japanese and American construction industry (Elghanorawy and Shibayama, 2008; Panuwatwanich and Nguyen, 2017). In Nigeria where corruption practices and reconstruction of the oil boom has lead to poor quality construction projects, scarcity of materials, poor workmanship, poor quality output, delay, cost overrun and collapse of work due to not adhering to quality management (Odusami *et al.*, 2010)

To be competitive in today's market, it is necessary for construction companies especially in developing countries like Nigeria to provide quality and value to their clients. Contractors who are the suppliers of construction services must address the needs of the clients for projects success because clients need to mirror the economic pressure and challenges faced by the contractors and the construction professionals. Hence the old adversarial procedure to manage construction projects should be put behind and a better means of developing direct relationships with the client should be adopted through teamwork at jobsite. TQM should be established to provide quality management at all phases of the projects since client satisfaction is the main prerequisite of quality management. Hence this study intends to assess the factors mitigating total quality management of construction companies to ensure clients' satisfaction and project delivery within time, cost and quality standard.

TQM CONCEPT AND APPLICATION

TQM is a procedure of managing people and the organisation processes in order to ensure customer satisfaction at every stage. The main emphasizes is on quality and communication of the quality message to create total quality (Dahiya and Bhatia, 2013). TQM has been widely implemented throughout the world. Many firms have arrived at the conclusion that effective TQM implementation can improve their competitive abilities and provide strategic advantages in the marketplace (Zhang, 2000). Studies have shown that the adoption of TQM practices can allow firms to compete globally

(Saeed and Hasan, 2012; Suwandeji, 2015). TQM implementation has led to improvements in quality, productivity, and competitiveness in only 20-30% of the firms that have implemented it and reduction in rework (Phenga and Teo, 2004).

The construction industry in Nigeria is growing in complexity and in order to be competitive at the global level (Agwu, 2012), TQM should be strictly adhered to in order to ensure clients' satisfaction and for profitability. Many Nigeria construction companies have comprehensive quality plans just as safety plans as opined by Hinze (1997) cited in Agwu (2012) but the quality of the plan does not necessarily correlate to the company quality performance. Quality in each phase is affected by the quality in the preceding phase, therefore, customer service in each phase is important for the overall quality performance of the process (Odusami, *et al.*, 2010). Quality is, therefore, an importance feature of any construction companies because the safety of the construction companies and the stakeholders depends on the quality of the structure (Idoro, 2010).

Haupt and Whiteman (2004) and Bubshait and Al-Atiq (1999) reiterate that TQM as a management system has not been effective in the construction industry as much as it has been in other industries because of lack of adequate budget, failure to plan for quality, inadequate training at all levels except for top or senior management positions (Gunning and McCallion, 2007), and little recognition given to those who strive for quality improvement on their projects. Contractors have failed in setting out adequate funds required for the accomplishments of improving and maintaining the requisite quality expected of construction products and services. Saeed and Hasan (2012) reported that the construction industry has not fully paid attention to the application of TQM basically because the construction professionals are unaware of the TQM principles and techniques. For the industry to therefore adhere to TQM, effort must be made to spread the culture of TQM among the professionals and TQM courses should be introduced to build environment undergraduate programs.

According to Willar, *et al.* (2009), the all-encompassing management philosophy, termed TQM has generated a tremendous amount of interest and has emerged in the forefront as a major management movement, influencing many sectors of the economy worldwide. The subject matter has churned up some commitment on the part of management of most contracting organizations, thereby increasing the level of quality culture available in those organizations. TQM consists of management principles aimed at achieving quality performance in all aspects, i.e. product, service, process, profit and productivity (Sodangi, *et al.* 2010; Idrus and Sodangi, 2010). The fundamental difference between the QA/QC (Quality assurance/Quality control) approach and TQM is that the former is a "top-down" approach, whereas the latter is a centralized approach which makes TQM consists of management principles aimed at achieving quality performance in all aspects, i.e. product, service, process, profit and productivity. The principles of TQM have been widely used by the manufacturing and service industries, and they have seemingly been welcomed by the construction industry as an opportunity to improve construction quality management (Sodangi, *et al.* 2010). The success of applying TQM to the construction industry would be felt in the nearest time. Considerable research has been directed at implementing TQM in the construction industry. Most of which deals with specific building blocks of TQM (e.g. service quality, continual improvement), with some attention focused on identifying opportunities, barriers to and procedures for implementing TQM in construction firms.

RESEARCH METHOD

Cross sectional research design is used for this study, this comprises of descriptive and explanatory research survey. Panuwatwanich and Nguyen (2017) identified the used of quantitative research used for their study. And Saeed and Hasan used random sampling to select their respondents. It indicates that the method used for this study is appropriate. Random sampling technique was used, thus every respondent have an equal chance of been selected. The population consists of construction professionals in construction companies in Nigeria. The construction professionals are made up of quantity surveyors, engineers, builders and architect in both indigenous and expatriate construction companies. A total of 50 questionnaires were distributed and 30 were duly filled and returned for the purpose of analysis. It shows an average response rate of 60%.SPSS 17th version is used for the analysis of data via descriptive statistic and relative importance index (RII). RII formula as applied to this study is:

$$RII = \frac{5n_5 + 4n_4 + 3n_3 + 2n_2 + n_1}{5(n_5 + n_4 + n_3 + n_2 + n_1)}$$

Where:

N₅=no of respondents with very importance

N₄= no of respondents with importance

N₃= no of respondents with moderately importance

N₂= no of respondents with of little importance

N₁= no of respondents with not importance

That is: 5-very importance, 4- importance, 3- moderately importance, 2- of little importance, 1- not importance

ANALYSIS OF DATA AND RESULTS

Demographical information of respondents

Professional qualification of respondents

Fig 1 is a graphical representative of respondents, from the bar chart 47% of the respondents are project managers, 27% are Engineers, 10% are architects and builders and 7% are quantity surveyors. It shows that TQM is an aspect of management which entails quality assurance and control hence the project's managers should have adequate skill in the knowledge of quality management.

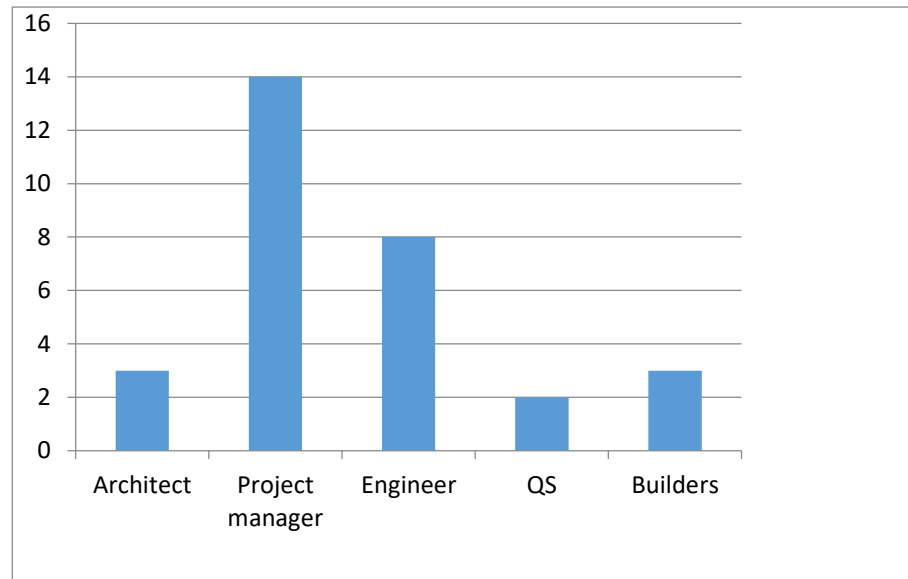


Fig 1: Position of the respondents

Numbers of years in the construction companies

From figure 2, 34% of the respondents had spent between 3-6years in the construction companies, 23% had spent 11-15years while 20% had spent not less than 3years. This confirms that the respondents have adequate experience within the construction companies to be able to provide information on TQM of the contracting organisation.

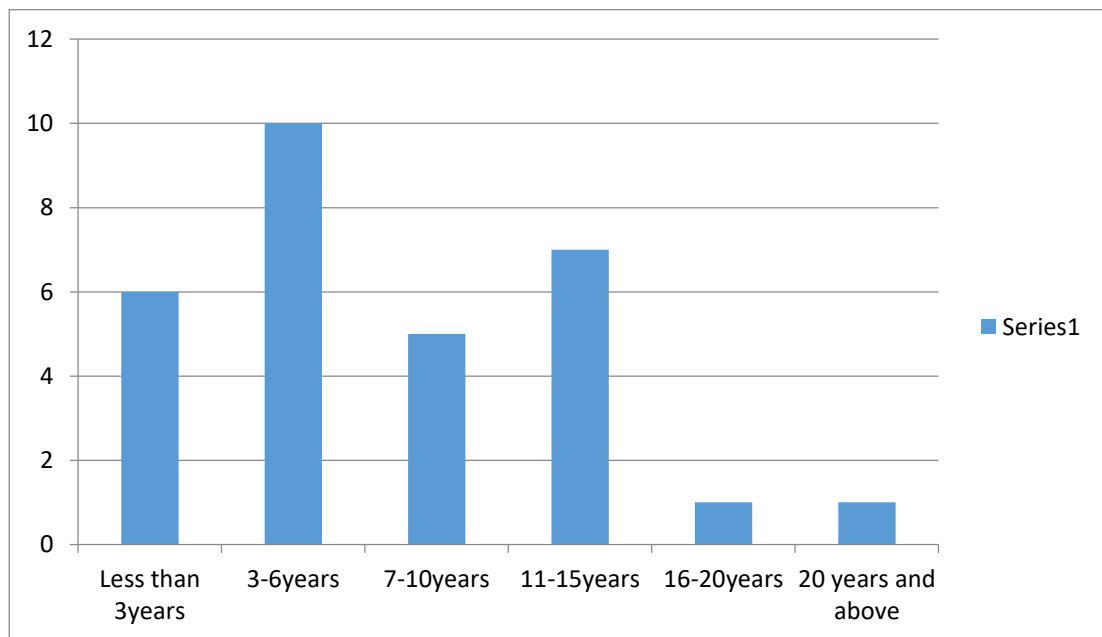


Fig2: Numbers of Years in construction companies

Highest academic qualification of respondent

Table 1 shows the highest academic qualification of the respondents. From the table it shows that 43% of the respondents are master of science (M.Sc.) or a master of project management (MPM) holders and 40% are bachelor of science (B.Sc.) holders in their

different professional discipline. 7% are postgraduate diploma (PGD) holders and 3% are higher national diploma holders (HND). It shows that the respondents are well knowledgeable of the concept of total quality management as required from the questionnaire and so the information provided is reliable.

Table 1: Highest academic qualification

Highest academic qualification	Frequency	Percentage (%)	Cumulative Percentage
HND	1	3	3.3
B.Sc	12	40	43.3
PGD	2	7	50.0
M.Sc/MPM	13	43	93.3
Others	2	7	100
Total	40	100	

Type of Construction Company

Table 2 presents the type of Construction Company of the respondents. It shows that majority of the respondents are from the indigenous contracting organisation (73%), 6% are fully expatriate contracting organisation and 3% are from government agency and from a combination of indigenous and expatriate contracting organisation.

Table 2: Organization ownership and management

Type of construction company	Frequency	Percent (%)	Cumulative Percent
Fully indigenous	22	73	73.3
Fully expatriate	6	21	93.3
Government agency	1	3	96.67
Both fully indigenous and fully expatriate	1	3	100
Total	40		

Factors affecting implementation of TQM

Table 3 presents the factors affecting the implementation of TQM. From literature the identified factors according to Saeed and Hasan (2012) are management commitment factors, the role of quality department, training and education, employee involvement, supplier partnership, project design, quality policies, quality data reporting and clients' satisfaction orientation. Each of these major factors consists of subfactors as shows in the table below. For management commitment factors, the most significant factors are top management assumes responsibility for quality performance (RII = 0.93), acceptance of responsibilities for quality by the departmental head (RII= 0.89) and clear consistent communication of mission statements and objectives (RII=0.89). For the role of quality department, the establishment of the quality department (RII=0.88), the effectiveness of quality awareness (RII= 0.82) and effectiveness of the department (RII=0.81) is an important factor for implementation of TQM. Quality related training given to managers, supervisors and employees (RII=0.89), Specific work skill training given to employee through the company (RII=0.85) and Training in problem

identification, solving skills and quality improvement skills (RII=0.82) are important factors affecting training and education for implementation of TQM. For employer involvement factor, quality circle or worker involvement in type organisation (RII=0.81), recognition of employee for superior quality performance (RII=0.78) and participation in quality decision by non supervisory employees (RII=0.77) are relative importance factors while for suppliers partnership, use of supplier rating system (RII=0.83), selection of the supplier based on quality instead of price (RII=0.82) and clarity of specification provided by supplier (RII=0.81) are major significant factors. Coordination among professionals involved in project design (RII=0.91), analysis of client's requirement (RII=0.89) and Clarity of project design (RII=0.88) are most importance project design factors. For quality policies, Implementation of strategies focused on quality (RII=0.89), self inspection of work by workers and inspection (RII=0.87), review and checking (RII=0.87) are importance factors while for quality data and reporting the relative importance index factors that are deemed importance are extent to which quality data are available to managers and supervisors (RII=0.82), extent to which quality data are used as tolls to manage quality (RII=0.80) and extent to which quality data are available to employees (RII=0.80). Determinations of improvements in client's satisfaction (RII=0.89) and Commitments to clients through strengthening of politics (RII=0.87) are major significant clients' satisfaction orientation factors for TQM implementation.

Table 3: Factors affecting the implementation of TQM

TQM constraints factors implementation variables	TO	RII	Rank
A. Management commitment factors			
Top management assumes responsibility for quality performance	30	0.93	1
Acceptance of responsibilities for quality by departmental head	30	0.89	2
Clear, consistent communication of mission statements and objectives	30	0.89	2
Top management supports long term quality improvement process	30	0.87	4
Degree top management considers quality improvement as a way to increase profits	30	0.85	5
Degree of comprehensiveness of the quality plan within the company	30	0.83	6
Specificity of quality goals within the company	30	0.82	7
Quality goals and policy are understood within the company	30	0.82	7
Importance attached to quality by the top management	30	0.81	9
Commitment of the top management to employees training	30	0.78	10
B. Role of quality department			
Establishment of quality department	30	0.88	1
Effectiveness of the quality awareness	29	0.82	2
Effectiveness of the quality department	30	0.81	3
Visibility of quality department	30	0.80	4
Quality department accesses to top management	30	0.79	5
Utilization of quality staff professionals as a consulting resources	29	0.79	5
Autonomy of the quality department	30	0.75	
C. Training and education			
Quality related training given to managers, supervisors and employees	30	0.89	1

Specific work skill training given to employee through the company	30	0.85	2
Training in problem identification, solving skills and quality improvement skills	30	0.82	3
Programs to develop team work between employees	29	0.81	4
Training in the total quality concept	29	0.81	4
Quality awareness building among employees	29	0.79	6
Availability of resources for employee training	30	0.79	6
Training for employees to implement quality circle type program	29	0.78	8
Training in interactive skills	30	0.77	9
Employees are trained in statistical improvements techniques	30	0.69	10
Training in advanced statistical techniques in the company	30	0.66	11
D. Employee involvement			
Quality circle or worker involvement in type organisation	30	0.81	1
Recognition of employee for superior quality performance	30	0.78	2

Table 3(contd.):Factors affecting implementation of TQM

TQM factors implementation variables	TO	RII	Rank
Participation in quality decision by non supervisory employees	30	0.77	3
Involvement of lower level workers in decision making by top management	30	0.67	4
E. Supplier partnership			
Use of supplier rating system	30	0.83	1
Selection of the supplier based on quality instead of price	30	0.82	2
Clarity of specification provided by supplier	30	0.81	3
Technical assistance to improve the quality and responsiveness of suppliers	30	0.78	4
Involvement of the supplier in the project development process	30	0.67	5
F. Project design			
Coordination among professionals involved in project design	30	0.91	1
Analysis of client's requirement	30	0.89	2
Clarity of project design	30	0.88	3
Determination of quality standard	30	0.87	4
Design of the implementation system	30	0.85	5
G. Quality policies			
Implementation of strategies focused on quality	30	0.89	1
Self inspection of work by workers	30	0.87	2
Inspection, review and checking	30	0.87	2
Policy of preventive equipment maintenance	30	0.84	4
Clarity of work or process instruction given to employee	30	0.84	4
Use of acceptance sampling to acceptance lots of hatches of work	29	0.81	6
Zero defect as the quality performance standard	30	0.79	7
Use of statistical control charts to control process	30	0.75	8

H. Quality data and reporting

Extent to which quality data are available to managers and supervisors	30	0.82	1
Extent to which quality data are used as tools to manage quality	30	0.80	2
Extent to which quality data are available to employees	30	0.80	2
Extent to which quality data, control charts are displayed at employees' work site	30	0.76	4

I. Client's satisfaction orientation

Determination of improvements in client's satisfaction	30	0.89	1
Commitments to clients through strengthening of policies	30	0.87	2
Comparisons of client's satisfaction with competitors and internal indicators	30	0.85	3

TO=Total number of respondents, RII=Relative Importance Index,

Maintenance factors of TQM in contracting organization

Table 4 indicates the factors responsible for the successful maintenance of TQM in a contracting organisation. The respondents were told to rank their level of importance to the various factors. The mean item score (MIS) was calculated based on the Likert scale given to the respondents, it shows that management committee (MIS=0.93) and quality awareness and review (MIS=0.91) are major significance factors responsible for the implementation of TQM. Other significance factors are developed a quality improvement plan (MIS=0.87), quality measurement (MIS=0.86) and identify the client's requirements (MIS=0.85). Establish an ad-hoc committee for zero defect programme (MIS=0.74), do it all over age (MIS =0.73) and supervisor (MIS=0.66) are the least rank important factors for implementation of TQM.

Table 4: maintenance factors of TQM in contracting organization

Factors	N	MIS	Rank
Management commitment	30	0.93	1
Quality awareness and review	30	0.91	2
Develop a quality improvement team	30	0.87	3
Quality measurement	30	0.86	4
Identify client's requirement	30	0.85	5
Goal setting	30	0.85	5
Cost of quality	30	0.84	7
Analyse feedback	30	0.84	7
Define specification	30	0.83	9
Application of evaluation measurement	30	0.81	10
Error causes removed	30	0.81	10
Zero defect day in a year/month/week	30	0.81	10
Correction action	30	0.81	10
Recognition of people	30	0.79	14

Quality councils	30	0.76	15
Establish ad-hoc committee for the zero defect programme	29	0.74	16
Do it all overage	29	0.73	17
Supervisor training	28	0.66	18

MIS=Mean Item Score

Challenges in the implementation of TQM in contracting organisation

Table 5 presents the difficulties encountered in the implementation of TQM. From the table, it shows that lack of available quality system documentation (MIS=0.75), lack of understanding in the process requirement (MIS=0.75), high cost to implement (MIS=0.74), lack of TQM exposure (MIS=0.74) and lack of planning (MIS=0.74) are the most importance challenges faced in the implementation of TQM in contracting organisations. The least rank challenges as rated by the respondents are the difficulty of verbal communication (MIS=0.64), Lack of subordinate propensity to follow orders (MIS=0.60) and Lack of time to implement TQM/time consuming (MIS=0.59).

Table 5: Challenges in the implementation of TQM in contracting organisations

Difficulties in implementation of TQM	N	MIS	Rank
Lack of available quality system documentation	29	0.75	1
Lack of understanding in the process requirement	29	0.75	1
High cost to implement TQM	28	0.74	3
Lack of planning to implement TQM	30	0.74	3
Lack of TQM exposure	29	0.74	3
Lack of continuous professional development	29	0.73	6
Lack of documentation of suppliers, materials and services	29	0.72	7
Lack of awareness in benefit of TQM	29	0.71	8
Lack of support from the top management	28	0.71	8
Lack of understanding in the TQM	29	0.70	10
Difficulty of verbal communication	29	0.64	11
Lack of subordinate propensity to follow orders	29	0.60	12
Lack of time to implement TQM/time consuming	29	0.59	13

Discussion of findings

From the analysis it shows that the factors affecting the implementation of TQM in Nigeria contracting organisation are grouped into these following factors. They are management commitment factors, role of quality department, training and education, employee involvement, supplier partnership, project design, quality data and reporting and client's satisfaction orientation. From these major factors, the various factors identified are top management assumes responsibility for quality performance, acceptance of responsibilities for quality by departmental head, clear consistent communication of mission statements and objectives, establishment of quality

department, effectiveness of quality awareness, effectiveness of the department, supervisors and employees, specific work skill training given to employee through the company, training in problem identification, solving skills and quality improvement skills, quality circle or worker involvement in type organisation, recognition of employee for superior quality performance, participation in quality decision by non supervisory employees, use of supplier rating system, selection of the supplier based on quality instead of price, clarity of specification provided by supplier, coordination among professionals involved in project design, analysis of client's requirement, clarity of project design, implementation of strategies focused on quality, self inspection of work by workers, inspection, review and checking, extent to which quality data are available to managers and supervisors, extent to which quality data are used as tolls to manage quality, extent to which quality data are available to employees, determinations of improvements in client's satisfaction and commitments to clients through strengthening of polities.

According to Saeed and Hasan (2012), TQM have a positive effect on construction team satisfaction, quality of construction project, client satisfaction and construction project performance. Suwandeji (2015), identified leadership role, management of strong teamwork, appropriate trainings, incentives and evaluation and effective communication factors influencing TQM. It is in support of the finding in this study that training, client satisfaction are parameter for implementation of TQM.

The maintenance factors responsible for successful implementation of TQM are management commitment, quality awareness and review and developing a quality improvement team. However the following difficulties are issue faced by the stakeholders in the implementation of TQM in Nigeria. They are lack of available quality system documentation, lack of understanding in the process requirement, high cost to implement, lack of TQM exposure and lack of planning. These identified challenges will unable Nigeria construction companies to compete in the global market as opined by Agwu (2012).

Conclusion and Recommendation

In conclusion, the constraints affecting implementation of TQM in Nigeria construction companies are management commitment factors, the role of quality department, training and education, employee involvement, supplier partnership, project design, quality data and reporting and client's satisfaction orientation. However, the construction companies are also faced with the challenges of lack of available quality system documentation, lack of understanding in the process requirement, high cost to implement TQM, lack of TQM exposure and lack of planning. These issues prevent the Nigeria construction companies from competing with their counterpart in the global world and the clients are not satisfied with the end products hence there are cases of cost overrun, delays and collapsing of the building.

We, therefore, recommend that Nigeria construction companies should develop strategies or framework for effective implementation of TQM so that they could compete with the global market. The total quality manual should be enforced to ensure quality control and quality assurance mechanism in all construction process.

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