An Investigation into the Impact of Total Quality Management Application in the Construction Industry (A Case of Training)

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Abstract

Training helps individuals and organizations to improve for quality, competitiveness, productivity, incoming changes and set out future ideas. The paper aimed at investigating the impact of total quality management to the construction industry in Nigeria with a view to ascertaining if the application of total quality management has led to significant success to project delivery and assess the impact of training on project workers in achieving quality products in the construction industry in Nigeria. Relevant literatures were reviewed through primary and secondary sources of information. Well-structured questionnaire forms were sent out to stakeholders in the construction industry in the study areas. Responses from respondents were analyzed using simple percentages and hypothesis statements analyzed with multiple regression and correlation analyses. It was discovered that the application of total quality management to the construction industry has led to significant project delivery and that adequate training of project staff is a critical factor for successful total quality management application to construction projects. The paper recommends that workers be trained regularly. The choice of training method adopted must be given utmost consideration. The method selected will depend on the needs of the organization, employees and technological changes.

Keywords: delivery, management, product, project, quality, significant, training

INTRODUCTION

Total quality management is a holistic approach to managing a project. It includes continuous improvement, training and re-training of staff, customers satisfaction, top management support, defect-free product at first attempt, elimination of reworks, cost effectiveness etc. Harris and McCaffer (2002) stated that total quality management consists of all activities that managers perform to improve their quality and policy such as quality planning, quality control, quality assurance and quality improvement. It is a process of getting rid of poor quality from production rather than getting rid of poor quality products.

Total Quality Management (TQM) is a philosophy that involves everyone in an organization in continual efforts to improve quality and achieve customers’ satisfaction. Continuous improvement is the philosophy that seeks to make never ending improvements to the process of converting inputs into outputs. The three key philosophies in TQM according to Telsang (2004) are:

(i) Continuous improvement is never-ending push to improve
(ii) Involvement of everyone in the organization
(iii) Goal of customer’s satisfaction

According to Bamisile (2004), quality can be measured by clearly laid down requirements. Newlove (1987) and Pateman (2004) used the concept of conformity with requirement as the definition of quality in construction. All team members who perform quality functions should endeavour to produce quality products at first attempt. This will ensure client’s satisfaction and save cost for rework.

AIM AND OBJECTIVES

This project is aimed at investigating the impact of total quality management to the construction industry in Nigeria. The objectives are:

i. To investigate if the application of TQM factors in Nigeria has led to significant success in project delivered
ii. To assess the impact of training on project workers in achieving quality products in the construction industry.

STATEMENT OF HYPOTHESIS

Hypothesis I: Application of TQM to building construction project has not led to significant success in project delivery.

Hypothesis II: Adequate training of project staff is not a critical factor for successful TQM application to building construction projects.
Hypothesis III: Provision of documentation on technical specification of project is not a critically important for successful TQM application to building construction projects.

TRAINING
Training is a systematic process of altering the behaviour, knowledge and motivation of employees in a direction towards increasing the trainees effectiveness and organizational goal achievement. Training is a remedy for employees who fall short of established standards of performance. It also involves the acquisition of new knowledge and technology that will aid better performance. Training increases the level of individual and organizational competence. It helps to reconcile the gap between what should happen and what is happening between desired targets or standards and actual levels of work performance. Training helps individuals and organizations to improve for quality, competitiveness, productivity, incoming changes and seek out future ideas. Most organizations have excellent training policies and facilities for employees but when sales are down, the organizations may carry out cost-netting exercises and may see training as luxury.

Obikoya (1996) identified two approaches to training: The reactive and proactive approaches. While reactive training is directed towards identifying and finding solutions to current needs and problems of the organization such as low product quality, wastage, increase in errors, etc, proactive training on the other hand is a forward looking approach in which training is conducted in anticipation of future need of the organization.

The Need for Training
The need for training in an organization is imperative for the following reasons, among others:

1. Orientation of new employees: - New employees often require additional training to learn skills specific to their jobs so that they can achieve a satisfactory level of performance.
2. Performance improvement: - Training is needed to enable workers perform adequately on their present jobs, assume greater responsibilities in future, develop people and enable the entire organization to succeed.
3. Response to changing environment: - Effective training can equip employees with skills necessary to respond favourably to the rapidly changing environment such as new technology, increasing competition, movement towards downsizing and so on.
4. Increasing morale: - Effective training can help to increase the morale of employees because training makes them feel that management is genuinely interested in them and value their contribution. Increased employee morale can lead to lower absenteeism, lower labour turnover, reduced costs, increased sales turnover, increased customer satisfaction and increased in production.
5. Investment in human resources: - Training serves as an investment in human resources. Employees are crucial, but expensive resource. In order to sustain economic and effective performance, it is important to optimize the contribution of employees to the aim and goals of the organization, through proper training activities.

Determination of Training Needs
Beach (1980) presented a detailed analysis of the various ways in which the training needs of an organization can be determined as follows:

- Identifying organizational and production problems
  - Low productivity
  - High costs
  - Poor material control
  - Poor quality, excessive scrap and waste
  - Excessive labour-management disputes
  - Excessive grievances
  - Excessive violation of rules of conduct and poor discipline
  - High employee turnover
  - Excessive absenteeism
  - Delayed production, schedules not met
- Analyzing job and employees
  - Job analysis
  - Employee appraisal
  - Testing
- Collective employee and managerial opinions
  - Interview and questionnaire to obtain views regarding perceived problem areas and deficiencies which would indicate desirable training programme.
- Anticipating impending and future needs
  - Expansion of business
  - New products, new services, new designs
  - New technology
  - Organizational changes
  - Human resource inventory (comparing present human resources with estimate needs)

Once the need for training has been identified in an organization, trainees can be selected. Training selection policies should ensure that those whose needs are greatest and whose capacities to absorb and utilize training are selected. Training opportunities should not be given as a reward for good behaviour, favouïtism or long service. Where an organization operates an effective system of performance appraisal, training selection decision can be based on the outcome of such appraisals. Moreover, criteria
used for selecting training programme participants, should be carefully designed and publicized widely within the organization.

METHODS OF TRAINING

On-the-job Training: This training is accomplished within the context of work, while the actual work is taking place. Organizations tend to favor on-the-job training for the acquisition of operational skills. Initiation and skills upgrading tend to be more rapid with this method, and employees benefit from associating with co-workers, and having actual hands-on experience.

Classroom Training: This method is commonly used when concepts, theories, attitudes and problem-solving abilities need to be learnt. For example, some aspects of company orientation and current changes in technology can be undertaken more effectively in the classroom than on the job. Classroom training of different types are commonly used for technical, professional and managerial personnel as well as for high skill jobs where considerable amounts of theories, principles and concepts are examined. Sources of classroom training include courses offered by schools, colleges of technology, polytechnics, and universities.

Vestibule Training: This method is designed to provide a formalized systematic training provided for new employees in an environment replicating the actual production environment, i.e. using facilities, equipment and workshop materials normally used in the workplace. Organizations can set up training schools in a separate part of the plant or in a different location. It is most useful where a relatively large number of people are to be trained.

Apprenticeship Training: This method is most often used to train operatives and is traditionally used in craft jobs such as plumbing, carpentry, printing, photography and so on. The method involves a combination of classroom and on-the-job training and the period of training varies according to craft.

Internship: This method is designed to provide practical realistic experience under supervision of professional or semi-professional employees, trainees or others who can benefit from some period of supervised practice. For example, internship, housemanship or residency phase, is used in the training of medical doctors, and clerksip is used in the legal profession.

The Management of Training

In order to secure the full benefits of successful training, there must be a planned and systematic approach to the management of training. Mulling (1991) enumerated the following components of a planned and systematic approach to training.

1. There must be clear commitment to training throughout all levels of the organization. The cooperation of all stakeholders such as line managers, trade union etc., must be sought and top management must provide adequate finance and resources for successful implementation.

2. There should be an objective assessment of training needs related to a vision of where the organization is going, the need to be responsive to changes in the external environment, a comprehensive system of human resource planning, and a process of job analysis, leading to the preparation of job description and person specifications.

3. The staff should feel a sense of involvement and know how they can play their part in achieving the goals and objectives of the organization.

4. There should be a clear set of objectives and a defined policy for training. This will enable the design of a carefully planned programme of training which will address such questions as: who is to be trained and why? What should they be taught, how, where and by whom? How will the training be assessed and evaluated? The expected results should be clearly understood, and also be seen to be reasonably attainable. Wherever possible, the desired objective should be stated in behavioural terms.

5. The choice of the most appropriate methods of training must be given proper consideration. The methods must be selected carefully, according to the particular needs of the organization and employees.

6. There should be an effective system of review and evaluation. This should include the ongoing monitoring of progress, supporting appraisal system and the maintenance of suitable training records. Evaluation should involve assessment by the trainers, line managers, supervisors and the trainees. The review process should include identification of those areas to which greater attention should be given in future training programmes.

7. Wherever possible, evaluation should be related to objective, measurable factors such as increased outputs or sales, reduced scrap or wastage, fewer accidents at work, fewer errors and fewer customer complaints. The ultimate evaluation, however, is the extent to which it contributes to improved organizational performance and effectiveness and to the quality, job satisfaction and prospects of employees.

RESEARCH METHODOLOGY

Questionnaire forms prepared for the write-up was designed primarily for Architects, Builders, Consultants, Clients, Quantity Surveyors, Engineers and contractors because useful information on the topic can be gathered only from these groups of persons.

The questionnaire removed bias as the interviewer was not present when the forms were filled and responses were collected simultaneously. Some of the respondents were also interviewed in the study area.
The Total Quality Management factors taken into consideration include:

- Factor Y: Success of TQM factors in the construction industry.
- \( X_1 \) = Training of project staff.
- \( X_2 \) = Top management support.
- \( X_3 \) = Project cost planning.
- \( X_4 \) = Documentation on technical specification of projects.

### ANOVA

<table>
<thead>
<tr>
<th></th>
<th>Df</th>
<th>SS</th>
<th>MS</th>
<th>F</th>
<th>Significance F</th>
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<tbody>
<tr>
<td>Regression</td>
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<td>564.9859945</td>
<td>112.997199</td>
<td>100.6799</td>
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<tr>
<td>Residual</td>
<td>103</td>
<td>115.6011615</td>
<td>1.059406</td>
<td>0.380145</td>
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<tr>
<td>Total</td>
<td>108</td>
<td>680.587156</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. Predictors (constant) \( X_5, X_2, X_1 \), \( X_3, X_4 \).  

b. Dependent variable \( Y \).

### Coefficients

<table>
<thead>
<tr>
<th>Coefficients</th>
<th>Standard Error</th>
<th>t Stat</th>
<th>P-value</th>
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<tbody>
<tr>
<td>Intercept</td>
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<tr>
<td>( X_1 )</td>
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<td>5.52589807</td>
<td>0.583264</td>
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<tr>
<td>( X_2 )</td>
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<tr>
<td>( X_3 )</td>
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<td>( X_4 )</td>
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<tr>
<td>( X_5 )</td>
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<td>5.72509183</td>
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</table>

Relationship model: \( Y = 14.75 + 0.17X_1 + 0.44X_2 + 0.05X_3 + 0.40X_4 + 0.37X_5 \).  

### INTERPRETATION OF RESULTS

Equation 4.1 indicates the nature of relationship existing between our respondents assessment of the level of success in TQM application in the execution of building construction projects in Nigeria (\( Y \)) and all the explanatory variables (\( X_1, X_2, X_3, X_4 \) and \( X_5 \)). In fact the level of this joint relationship is \( 91.11\% \) (see Multiple R = 0.911123).

### TEST OF HYPOTHESES

The stated hypotheses are tested using equation 4.1

**Hypothesis 1:**

Application of TQM to building construction projects has not led to significant success in project delivery. This hypothesis was tested using the F-test of equation 4.1. The F calculated value of 100.6799 is greater than the tabulated value at \( F \text{ at } 0.05 \), \( 5; 103 \) df = 2.776. We therefore reject the null hypothesis and conclude that application of TQM to building construction projects has led to significant success in project delivery.

**Hypothesis 2:**

Adequate training of project staff is not a critical factor for successful TQM application to building construction projects. This hypothesis was tested using the t-test of equation 4.1 with specific reference to \( X_1 \). The t calculated value of 3.21 is greater than the tabulated value at \( t \text{ at } 0.025 \), \( 4 \) df = 2.776. We therefore reject the null hypothesis and conclude that adequate training of project staff is a critical factor for successful TQM application to building construction projects.

**Hypothesis 3:**

Provision of documentation on technical specification of project is not a critically important for successful TQM application to building construction projects. This hypothesis was tested using the t-test of equation 4.1 with specific reference to \( X_4 \). The t calculated value of 5.53 is greater than the tabulated value at \( t \text{ at } 0.025 \), \( 4 \) df = 2.776. We therefore reject the null hypothesis and conclude that provision of documentation on technical specification of projects us critically important for successful TQM application to building construction projects.

### CONCLUSION

For training to be successful there must be a clear commitment to training at all levels of the organization. Top management must provide adequate finance and resources for implementation. The organization should be able to identify where she is coming from her present level attained and where she is going, how to be responsive to changes in both internal and external environments, a comprehensive system of human resource planning, job analysis, job description and personal specifications. The objectives and policy for training be clearly defined so that such questions as who is too be trained, where and why, what should be taught, how, where and by whom, how will the training be assessed and executed for expected results to be attained. There should be an effective system of review and evaluation.

- \( X_5 \) = Scheduling of project.
RECOMMENDATIONS
1. Training in form of orientation should be given to newly employed staff.
2. In view of technological changes in the country, staff should be trained regularly.
3. Staff should be encouraged to attend seminar or conferences so as to be able to keep breast of current developments.
4. The choice of most appropriate methods of training must be given consideration; the method selected will depend on the needs of the organization, employees and technological changes.
5. There should be clear set of objectives and defined policy for training
6. The criteria used for selecting training participants should be carefully designed and publicized within the organization. The selection policies should ensure that those whose needs are greatest and whose capacities to absorb and utilize training are selected.

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