

Implementation of Total Quality Management in Construction Company: A Review

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Abstract

Total Quality Management is an approach to enhance quality of the construction works. Main parameter of this is to achieve client satisfaction. This can achieve by combining all quality parameters in the company. Main focus of total quality management is to control quality, product inspection, assurance of quality by mean of different authorities of the company. Total Quality Management accounts also with the lowest level of defects from the workers side of the company. There are varied parameters that influence implementation of TQM in the company. Parameter specifically, Higher level Authorities, Human Resource Management, Worker Involvement, Process Improvement and Satisfaction of the customers are mainly affecting the total quality management. Recommendation on every parameter on however, they may improve their performance and implement Total Quality Management in Construction Company are listed.

Keywords: Construction, Inspection, Preventive measures, Quality Assurance, Quality Control, Total Quality Management

1. Introduction

The TQM philosophy became advanced in Japan after the second World War. Edwards Deming, an American Quality professional helped the Japanese to use the ideas of TQM. They focused on client expectation and targeted on understanding client desires and expectations. The Construction enterprise is one of the primary industries in the Indian economy. A large, wide variety of companies and businesses in the Construction have risen in a decade or so. With globalization happening, the client has gained access to many companies inclined to offer what they need. This will increase stress on the construction companies to carry out high quality standard that the customer wants.

Standard Principle of the TQM is to achieve client satisfaction. One of the goals for any organization is to maintain the quality of product. It is going nicely past the conventional limits of quality assurance and quality control.

Total Quality Management is a philosophy steadily developed from the management theories together with control via way of means of objectives, quality circles, strategic making plans etc. There are mainly three phenomena which can clear the view of TQM for any purpose the individual or team want.

All employees withinside the agency is involved in growing and preserving the first-class of the products and services provided with the aid of using the agency. It is a complete manner of coping with complicated units of interacting troubles involving everybody in any respect stages, at all levels. Figure 1. shows the flow to adapt Total quality Management.

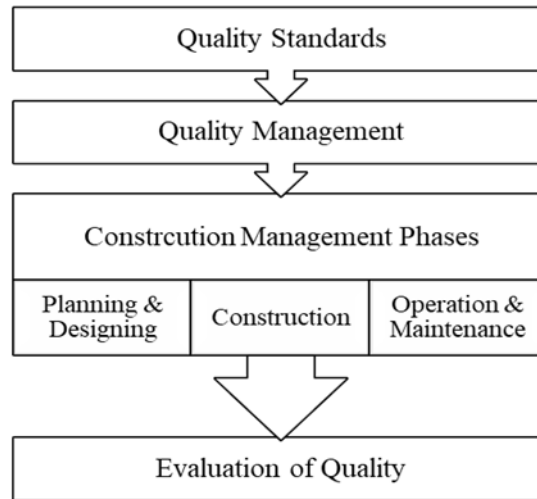


Figure 1. Quality Management Flowchart

The organization gives focus on client satisfaction and to fulfill their need at economic and easy way. Quality of construction is first priority of any company as per the norms, specification and some standards. It is company's responsibility to assure that client will get the best quality at economic price.

TQM is a system which gives quality work with in view of economy, work standards, possible solutions to all issues etc. criteria with the well-educated and different levels employees of company for the better customer satisfaction. After applying this concept company can achieve most effective quality work.

1.1 Fundamentals of TQM

TQM concept primarily based on the idea that the quality of production and procedures is the duty of anyone concerned with the consumption of the goods or services which might be provided via way of means of an organization, requiring the involvement of management, workforce, suppliers, and buyers, to fulfill or exceed consumer needs. Following are the factors:

- (1) Customers
- (2) Total workers in company
- (3) Process to maintain quality
- (4) Strategic and systematic approach
- (5) Continuous development
- (6) Decision making based on facts
- (7) Communications between different level of authority

1.2 Evolution OF TQM

Figure 2. Shows the evolution of Total Quality Management.

Inspection: - Quality inspection is geared toward checking, measuring, or trying out of extra product traits and to narrate the consequences to the necessities to verify compliance. This task is commonly achieved through specialized employees. These employees have mastery in their particular field and can give solutions and suggestions over the inspection of the quality.

Quality Control (QC): - Quality of the work can be measured in comparison of some specific standards. It is orientated to detection i.e., Locating defects in products. Different test is carried out to evaluate whether the product is as per the standards and specification or not. Quality Control is product orientated. It is related to the defect detection method.



Figure 2. Evolution of TQM

Quality Assurance (QA): - QA includes the whole improvement of technique, tracking and enhancing the technique, ensuring requirements and approaches are accompanied during the life cycle and making sure the troubles are located and dealt with. It is orientated to prevention i.e., Stopping the defects from going on withinside the products. Main parameters to assure qualities are to make audits which are key strategies for technique tracking.

Total Quality Management (TQM): - It is a control device for a client-satisfaction. It makes use of system, database, powerful communications and involvement of all stage employees to combine the thinking or suggestions of all the individuals for quality improvement.

1.3 Objectives

Following are the objectives to implement TQM in company:

- (1) Top Management Commitment in Companies.
- (2) Essential Employee’s Training in Companies.
- (3) Culture of company towards implementation of TQM in Companies.
- (4) Influence of Communication in Companies.
- (5) Human Resource department on recruiting employees in company.

The standard goal of TQM is to make certain continuous development withinside the organization’s people, systems, strategies and surroundings with a view to acquire improvement.

1.4 Conceptual Work

Parameters that are important to implementation of TQM which are shown in Figure 3.

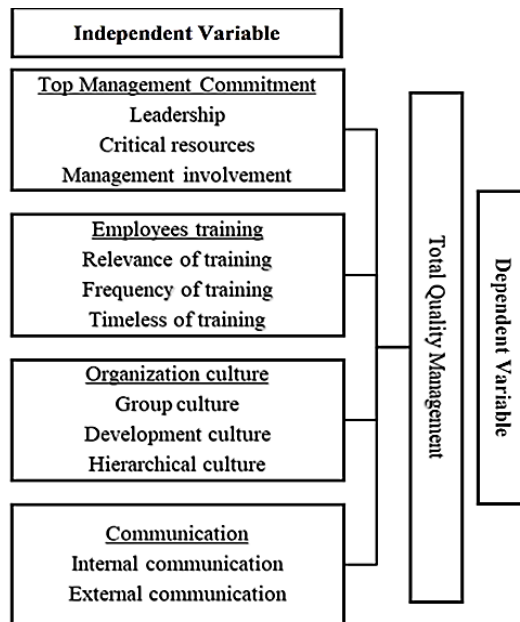


Figure 3. Parameters influencing TQM

2. Literature Review

The review paper containing the work done by various authors and the outcomes of various research papers. Paper published in various national and international journals, Ph.D. Thesis, reports and books have been studied. This paper enhances knowledge to understanding the subject and provide extensive background to carry out work ahead in proper flow.

Following are the literature reviews based on Implementation of TQM in a construction company.

Irtishad Ahmad et al. (2000) researched success of the TQM concept in the construction venture. The study is mainly on the basis of organizational hierarchy in which every level employee has some unique role towards adoption of TQM. There are some project traits like project team, thinking ability etc. which also affect the process of implementation. Proper designing process can lead to betterment of company by application of TQM.

Low Sui Pheng et al. (2004) expressed that as creating projects get larger and greater complex, customers also are an increasing demand for better requirements for his or her delivery. TQM overall performance measures had been additionally contemplated via high level authority, customer factors, employee ability and empowerment, process development and control.

Ahmed Mohammed Al-Musleh et al. (2010) examined construction firm in state of Qatar to become aware of the modern reputation and to focus on modern limitations confronted with the aid of using construction firm towards the adoption of Total Quality Management (TQM). Both qualitative and quantitative methodology is used to find out the perceptions amongst personnel of the “customer” construction firm closer to the elements.

Mahisa Giri (2014) studied that company needs to carry out a cultural evaluation earlier than imposing TQM in order that company targets and that may be achieved by using some of the software for TQM. Technique to propose TQM in the company is also plays important role to achieve the target as well as to increase the company's reputation.

Bonventure Wesonga Oruma et al. (2014) studied that the construction firm are confronted with lots of demanding situations specifically withinside the desire of technique to manage the and allot some specific standards to the final services which can utilize by customer with great ease and for the longer periods. Success of the service is mainly depending on the customer or client's satisfactions. One of the useful and fruitful technique that company can utilize to have effective control on their work is total quality management. The study of which is done in Nakuru country. Higher level authority plays an important role in adoption of TQM. Also, all authority level employees have to develop some important skills to achieve the quality goals of company.

Aiswarya. Lalaji et al. (2014) identified that the Total Quality Management (TQM) is evaluating and enhancing the standard of quality. But most companies find it difficult to plan and implement Total Quality Management concepts. The research is based on goal to identify the TQM activities in construction firms in Kerala, the level of efficiency and problems in the implementation of TQM in construction firms. The study involves the development of a questionnaire and an analysis of its response from large and medium-sized companies in Kerala. The study also includes interviews with project managers, contractors and so on. This paper uses the chi square test, frequency and response rate for analysis purposes.

Saurin Kakkad et al. (2014) studied that TQM takes into consideration all excellent measures taken in any respect stages regarding all company employees. They studied Implementation of TQM in a company “Kakkad Developments”. For the identical preliminary tests had been made approximately the numerous parameters which affect implementation of TQM. Further questionnaires had been organized on every parameter, namely, Higher level authority, Human Resource Management, worker participation, Process Improvement and Client Satisfaction. The responses to questionnaires had been then judged primarily based on their overall performance indices and the corporation that had the best overall performance index for every parameter changed into taken because the benchmark corporation.

Ephantus ndirangu wanderi et al. (2015) studied the function of construction quality and non-stop development is critical in the improvement of the construction industry of developing nations. Construction quality and ordinary development are related to the adoption of quality control structures in Construction agencies. Primary information for the study could be assessed by the use of questionnaires that be administered to the respondents. A pilot check could be carried out at the Clear enterprise in Nyamata to test on validity and reliability.

Debby Willar et al. (2017) tested the effect after adoption of some of quality management systems in Grade 7 Indonesian construction firms. A survey turned into performing regarding around four hundred response of seventy-seven G-7 in addition to ISO 9001 licensed Indonesian construction firms. The foremost purpose for

company in organizing and enforcing ISO 9001 primarily based on totally QMSs are way too efficiently and effective for the management of venture's day to day life events and deliver good stuff works.

3. Benefits and Obstacles of TQM

3.1 Benefits of TQM:

The benefits of TQM are as follows:

Good relations between employees: The main function to achieve greater success with adoption of new techniques is higher involvement between employees of the company. The great results come with the team work. Also, there are lot of ideas compared to individual when all the employee starts to think towards one goal. This will also help to make company's working environment more friendly where one can think with open mind.

Improve Quality of work: Several techniques like defect detection, defect prevention etc. will lead to make the product or the services as per the standard norms & specifications given by the government authorities. Daily quality check can also give idea about final product's quality keeping the customer's point of view.

Higher client satisfaction: Main purpose to allot the better-quality product and services is to satisfy the client. Client gets the right type of service with right quality and at the economic rate than the others. Company's reputation also plays major role in this factor as company has to be in market and be in competition, they have to give qualitative assets to the client.

Economical aspect: Construction companies have to give the quality work which can survive for longer design periods without any dangerous effects to their clients at the economic price to increase the products or service's value. Competition is very high in local market and to survive in it, one has to give all their services at the right price which is advantageous for client. Client get services at fair market rates.

3.2 Obstacles of TQM:

The obstacles of TQM are as follows:

Absence of higher authority decisions: Biggest barrier to adoption of such kind of technique is lack of skill and masteries in Top management of the company. Also lack of experience can leads to decision making which can give worst result to company.

Traditional management system: Traditional management system where only higher authorities has all the powers to take decision cannot give stuffiest good result. All the level employees have to contribute equally towards company and all the ideas should be welcomed to have achieve targets.

Department based thinking and actions: TQM implementation plan should keep all the levels of the company. There should be better communication between different levels of authorities. Companies should change their department-based thinking style in order to implement TQM effectively.

Lack of appreciation towards new techniques and Methods: TQM playing tremendously important role in changing the thinking of number of firms. The experiences of senior authority of these firms can be shared, therefore TQM ideas and principles can be appreciated.

Lack of Methodology: Quality is one of the important criteria in construction field. There should be proper methodology to achieve the quality indexes in construction because it plays major role to achieve highest satisfaction of client.

Decision towards starting of technique: TQM is a procedure which has no starting point and no end- point. The only aim is quality improvement; therefore, firms generally waste a lot of time in, "deciding how can we start". This is one of the difficulties for TQM implementation.

Lack of leadership: TQM is a milestone which can be achieved by the help of all levels and all the employees of the company. Dedicated Leader can give much better result to achieve common goal and to manage all the employee to work towards single aim. Good leadership quality can remove many barriers and empower the team.

Mutual trust: Manager or leader has to keep faith in their team, empower them and keep trusting them. This can give all the employees positive attitude to achieve goal.

Content with certifications or awards: Achieving license certificates like ISO 9001-2000 or ISO 14000 or QS 9000 or any other awards is beginning in the journey of quality.

4. Training and Education in Construction Company

4.1 Training and Education in construction Firms

Education is oriented o personal level of knowledge whereas training is oriented to job sector. This is the very basis difference between education and training. Objectives of training are short term but it can be beneficial for person in his lifetime for any company relevant to candidate's sector. Training program schedule vary from company to company but it is for lower time schedule and some of are for some days and weeks. In comparison to training. Education is long term for any company. It is varying from months to years. Training and Education increase individual strength to be in competition in this era so this is must to implement TQM in construction firm.

4.2 Training for implementation of Quality

Essential point of the TQM system is to implement quality processes and level of quality employees in the company. By education all the employees about quality in the work, implementation of TQM becomes more easier and betterment of company takes place which leads to be in this competition in the market for long term. Training of quality among employee leads to the increase in personal responsibilities of employees and also leads to take care of all the quality parameters. Employees also have to check proper quality work of other employees under them. Company can generate different policies for quality education and training given to the employees.

4.3 Importance of Training

Some of the few importance of training is as follows:

- 1) Change of attitude.
- 2) Customer's point of view thinking by employees.
- 3) Management commitment.
- 4) Different skill improvement of workers.
- 5) Decision making powers.
- 6) Problem-solving with different approach.
- 7) Greater a team spirit.

Education and training make the person good enough understanding and abilities to carry out their jobs, however additionally to own specific values, information, and capabilities related to TQM troubles and activities. The main reason of failing in implementation of TQM is lack of educated and trained worker on new technologies and decision-making process. This can be controlled by providing education and training to the workers. Rules has been made towards the training of workers on joining for some period.

4.4 Level of training

Training for different levels authority differs from level to level because of the power of these authorities are different and also the responsibilities and job details of these authorities are also different. So, the quality of product always depends on the coordination between these all-authority level and their commitment towards company.

Basically, company can divide following levels as per powers in their hands:

- (1) Top level Authority
- (2) Middle level Authority
- (3) Technical persons in company
- (4) Operators of company

4.4.1 Top level Authority training

The starting of TQM implementation is always based on the top management commitment. Top management has to decide that which training is given to which employee to increase reputation of company by increase quality of product. Some of the failure if TQM implementation are listed below:

- (1) Training is must but also implementation after training is to be supervised.

- (2) Training of only some of the employees who are on higher levels.

Top level authority is attached with following activities to implement TQM in company:

- (1) provide the vision to implement TQM
- (2) Create a path to TQM implementation
- (3) They are backbone of company,
- (4) Provide sufficient and proper resources to employee to increase quality.
- (5) Decide training time as per level of authority.

4.4.2 Middle level Authority training

The employees just below top level is placed into the middle level authority. This level employee training is also same as the top management. Training related to the less strategical or technical but focuses more on management perspective for employees. TQM implementation depends on all the quality methods of the training understand by the employees and application of that training to achieve greater success in customers satisfaction.

4.4.3 Technical persons training

The training of the technical persons of company involved in the is parameter. Technical staff is a crucial parameter for any company to complete the project with quality and complete the project as per specifications. Top and middle level authorities are corresponding to the management work of any project but technical persons are ones who actually execute the project. The training and knowledge of different IS codes are very essential for this staff and also training related to the execution of different works of project is given to the employees. They are also carrying out different testing and investigation surveys of project for betterment of the quality of project and to satisfy all need of customer.

4.4.4 Operator training

Training of operators is critical aspects for any company. Operators are generally attached with handling machinery and operation of machinery and provide maintenance at regular interval to ensure efficient working of machinery. In latest era, there are many new technologies which are essential to be introduce to the operators for quality improvement of product. Company has to use latest technologies to keep their hands in market and to win the project to their company name.

5. Training and Education in Construction Company

Saurin Kakkad [10] find outs lack in many of the parameters in his study and finds out the recommendations based on that parameters to enhance TQM concept. Recommendations given by the authors listed in table 1:

Table 1. Recommendations for Different Departments

Recommendations for top management commitment	(1)	Quality policy of the firm.
	(2)	Increase number of management reviews conducted per month.
	(3)	Adopt proper documentation methods.
	(4)	Better and improved methods of training.
	(5)	Quick Redressal of complaints.
	(6)	Better communication between management and the employees.
Recommendations on human resource management	(1)	System to get information about all the employees and their abilities with the latest software.
	(2)	Innovative and creative ideas.
	(3)	Psychological test carried out during employee selection.
	(4)	The performance appraisal system should be used.

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Recommendation on process improvement methods	(1)	Methods for collection of data should be reviewed.
	(2)	Better processes should be applied for analysis of collected data.
	(3)	Continuous improvement methods should be based on the analysis of data.
	(4)	Adopt published standards like ISO 9000.
	(5)	The contractors should be rated by the firm using effective methods.
	(6)	Adopt methods to reduce wastage.
Recommendation on employee involvement	(1)	Improvement of level of training
	(2)	Distribution of handbooks, references, checklists, etc.
	(3)	Workshops and betterment campaigns
	(4)	Knowledge regarding the working of the equipment.
	(5)	Appropriate response should be given for the management to the employees regarding questions asked.
	(6)	Annual or periodic reward systems should be set up.
	(7)	Programs such as zero-defect days and zero accidental days should be set up.
Recommendation on customer satisfaction	(1)	Improve the customer service.
	(2)	Effective costing of service.
	(3)	Quality should exceed expectation of the customers.
	(4)	The customer should be able to contact the employees easily.
	(5)	The field supervisors should be responsive towards customer queries.
	(6)	Customer complaints should be given the proper attention.
	(7)	The customer should be able to check the progress of the work.
	(8)	Continuous improvement based on customer feedback.

6. Conclusion

Following Conclusions are from the literature review:

- (1) Adoption of the concept of Total Quality Management will enhance the effectiveness of work and reputation of the company within the local competition.
- (2) Provides Long Term Competitiveness to stand out better in the market.
- (3) Produce desired outcomes to satisfy customers need at economic cost.

This method can be used to reduce the wastage and increase the resource optimization

References

- [1] Ahmed Mohammed Al-Musleh, "Development of A Framework for Total Quality Management Principles in the Construction Companies with Special Reference to the Construction Companies in the State of Qatar", University of London, London, United Kingdom, 2010.
- [2] Aiswarya.k. lalaji, Sivagami M., "total quality management practices in construction companies (Kerala)", International Journal of Civil Engineering and Tehnology, ISSN 0976 – 6308 (Print) ISSN 0976 – 6316(Online) Volume 5, Issue 12, December 2014.
- [3] Bonventure Wesonga Oruma, John Momanyi Mironga, Benard Onyango Muma, "Top Management Commitment Towards Implementation of Total Quality Management (TQM) in Construction Companies in Nakuru County-Kenya", International Journal of Economics, Finance and Management Sciences, doi: 10.11648/j.ijefm.20140206.15, ISSN: 2326-9553, 2014
- [4] Debby Willar, Vaughan Coffey. Bambang Trigunaryyah, "Examining the implementation of ISO 9001 in Indonesian construction companies", The TQM Journal, Vol. 27 Issue: 1, pp.94-107, 2017.

- [5] Ephantus ndirangu wanderi,” Factors influencing implementation of total quality management in construction companies in Rwanda: a case of fair construction company”, 2015.
- [6] Irtishad u ahmad and Maung k. Sein, “Construction project teams for TQM: A factor- element impact model”, Newcastle University, 2000.
- [7] Loiy Bani Ismail, “An evaluation of the implementation of Total Quality Management (TQM) within the construction sector in the United Kingdom and Jordan” 2012.
- [8] Low Sui Pheng and Jasmine Ann Teo, “Implementing Total Quality Management in Construction Firms”, Journal of Management in Engineering Asce / January 2004
- [9] Mahisa Giri, “Total Quality Management (TQM) Implementation In Construction Firm”, Master Of Science In Management Engineering Politecnico Di Milano, 2014
- [10] Saurin Kakkad, Pratik Ahuja, “Implementation of Total Quality Management in a Construction Firm”, International Journal of Science, Engineering and Technology Research (IJSETR), Volume 3, Issue 10, October 2014.