

Effectiveness of Total Quality Management in the Process of Construction

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Abstract

For to have a quality in any construction works, there needs to be a continuous improvement process. The noticed faults are rectified by the feedback loop, that are developed for the continuous upgradation of the construction industries for to compete globally, that enables the adoption of smart technology, so that the work should move smoothly and to have a early completion of work with quality construction. Quality elements are given prior importance in the construction industries. The quality elements are team work, training, suppliers involvement, cost of quality, customer service, management commitment and leadership, statistical methods. The quality of codes and standards, drawings and specifications and constructability analysis plays a vital role in the quality of the construction works. There is a great need of changing the concept of "Quality control of construction" to the "controlling the construction process for quality". Some of the engineers, designers, architects believe that the quality can be expressed in terms of aesthetic condition of the facilities that they design. It can also be defined as a how closely the project confirms to the requirements of safety and quality as deserved by the owners. In this paper the effectiveness of the TQM are discussed with reference to their elements. The elements of TQM are ranked according to their importance by conducting the surveys and by doing case studies. The importance of feedback loop is analysed and discussed for their implacability. The quality effects related to the drawings, specifications and constructability are also studied. It is also found that commitment of management to the quality and in the continual improvement is very important in all phases of the construction activity.

Keywords: Continual improvement , Total quality management ,Quality Control, Quality assurance.

Introduction

Because of the Liberalization, Privatization and Globalization, there is a great need of quality in the construction work in all the phases of work. The quality of the resources that we use for the construction is directly influences the quality of the construction. Global competition resulting in the greater awareness of the quality among the construction industries to compete globally. The TQM concept was first idealised in USA. It was first implemented by the Japan in the manufacturing industries. After successful implementation in

the manufacturing industry, it was planned to implement to the construction industries, though the construction process is of non repetitive and non uniform in nature[1,2,5,8].Some of the researchers believed that implementation of TQM will increase the productivity and efficiency, thereby leads to success and profit in terms of quality. But some researchers believe that the TQM cannot be implemented successfully in the construction industries because the owners, site location, engineers, contractors, budget, everything changes for every project. There is only a partial similarities in the construction process[3,4,6,7]. There is a great scope of studying the effectiveness of implication of TQM in the construction industries.

Quality of the construction industries

Quality of the construction industries can be defined from the aspect of the owner and designer[1,3,4] . In general the quality can be defined as a degree of meeting the requirement of the owner and designer. Good appearance, aesthesity are the requirements of the owner, while the legal and functional requirements are for the designers and engineers. Professional liability is the definition of the quality in terms of law. According to that, the professionals should know their trade, job nature and they are responsible for it. It can also be defined in terms of the function[2,5,6]. It refers to how closely the project confirms to the requirements. The requirements may be of a owner or designers. There is a lot of difference between the "Quality in perception" and "Quality in fact". The goods or products, services that meets the specifications, drawings are the quality in fact. The goods or products, services that meets the customers expectations are the "Quality in perception"[5,6,7].

ASCE characterises the quality as below.

1. Meeting the requirements of the owners, completion of the project within stipulated time and budget[7,8].
2. Meeting the requirements of the design professionals so as to define the scope of the project, budget to be considered for the project, for to have a good experienced professionals for to execute the quality work, and also for to assemble the work as per the material availability, nature of work and manpower.
3. Requirements of the constructors to be met, so as to prepare the project plan, contract plan, specifications

to prepare the priced proposal or competitive bid. The desired changes are made in advance on meeting with the design professionals and owners.

4. Regulatory requirements are to be met, so as to consider the public health, safety and healthy precautions, environmental considerations, and to protect the public properties and utilities. These are to be considered with respect to the codes, laws, rules and regulations, policies that are mentioned by the regulatory agencies or bodies.

We have to differentiate between the process quality and product quality. Product quality refers to the quality of the materials that we use for the project. The process quality refers to the effectiveness of methods that we use for the quality. For example, in case of construction industries, the product quality refers to the quality of the materials that go into the buildings such as sand, cement, aggregates, admixtures etc, that in turn effects the strength and durability. Process quality refers to the technology, machineries, methods that we use for the construction works. It also refers to how the projects are well organized and managed. The construction projects generally can be managed in three phases namely, a) Design and planning phase, b) Construction phase, and c) Operation and maintenance phase.

Quality assurance (QA) and Quality control (QC)

Quality assurance is a program that covers the activities that are responsible for the quality work. It involves establishing the policies, procedures, standards, training and guidelines, and to establish a system that are necessary for to produce the quality work. The constructors and design professionals are responsible for to prepare the system policies(programs) for the project[8]. Quality assurance gives the protection against the quality problems that are being arising in the future. It solves the internal and external problems of a construction industries. Quality assurance gives the assurance to the owners that the materials, procedures and the processes that are considered for the project are of standard quality, which namely gives the assurance of safety and durability[8]. Quality control is the effective and specific implementation of the quality assurance policies. Effective quality control avoids the changes, modifications and mistakes.

Factors affecting the quality

Establishing the project quality starts with the project inception. There should be a careful balance between the requirements of an owners, design professionals and constructors. An owner can think and requirements are set as per the economical criteria. But for a design professionals needs a requirements in terms of the safety and public health. The constructors are responsible for the means, methods, sequences, procedures for the construction activity. They are also responsible for the safety precautions and health conditions to be taken care during the execution of work (during the construction phases).

The generally accepted elements of TQM, and the construction industry specific factors are training,

management leadership and commitment, team work, suppliers involvement, cost of quality, customers service, statistical methods. The specific factors that involves are

1. Quality of standards and codes.
2. Specifications and drawings.
3. Analysis of constructability

The quality affecting factors in each phases of construction are discussed in the following sections. The factors that affect the

Management commitment and leadership

The main reason for the failure of the construction industry is the poor involvement of the management and poor management practices. The main aim of the management is to identify the problem. Since quality is also a part of the productivity. The TQM success depends mainly on the management practices. For the success of any construction industry the commitment of management to the work and leadership plays a vital role in the success of the construction.

Training

The importance of training is recognised by the every quality expert. In the TQM implication the training becomes the everyones responsibility and the training is given to all the levels of the company for to increase the efficiency and productivity of a construction industries.

Team work

A good quality team provides the well structured environment for the effective and successful implication of the TQM. The TQM can be implemented and its continuity are checked at the different stages of the construction industries.

Statistical methods

They provide the tools that are helpful in the solving of the construction problems. It is needed to identify the problems related with the quality aspects of the construction industries. Statistical methods communicate in a precise language that has to be understood by all levels team members.

Cost of quality

Some of the researchers believe that the implication of the TQM finds advantable and profitable only for the large scale industries. The TQM implementation may increase the paper work, duration of the project and also there is increase in the budget for the quality. Some professionals are to be hired or appointed for to check the quality at different levels and phases of construction activity.

Suppliers involvement

For to have a good quality of construction, we should maintain a good relationship with the suppliers. For to have a good construction, there should be a good plan, drawings and

specifications. The suppliers will provide good quality of materials for a reasonable rates only when there is a long and healthy relationship prevail between the suppliers and company management professionals.

Customer service

In the construction process, both the internal and external customers are to be satisfied. Designer is a customer of owner. Owner provides the requirements to the designer and the designer make the plan, drawings and specifications as per the requirements. Now constructor is a customer of designer, constructor gets the drawings and specifications for the execution of work. After the execution of construction work, the constructor handovers constructed building to the owner. Here the owner is a customer of constructor. Hence there is a great need of satisfying the internal and external customers for the quality work.

The quality standards are set for the construction .The design and drawings are prepared by considering the quality standards. The construction is well organised and controlled by the quality management by quality assurance(QA) and quality control(QC).Every phase of the construction is monitored ,as the construction process has three phases. Each phases are evaluated individually and the feedback from the evaluation is useful in the modification of the quality standards.

Specific factors of construction

1. All the construction projects are single order and unique in nature.
2. Here the construction site is always different and the sites are with the different conditions.
3. Construction of projects life cycle is longer than that of the life cycle of the manufacturing industries.
4. There is no uniform and clear evaluation processes for the construction industries, owner directly influences the construction activity.
5. The owner, designer, constructor, contractor and sub contractor, material suppliers are all different for the different projects.

ISO standards

A series of standards are first published in 1987 by the Geneva based international organization for standardization. The ISO consists of series that deals with the production, standard service, design of products, delivery, service and testing. There are two basic types in the ISO series namely, one explaining about the quality assurance and another explaining the quality management. The quality assurance are framed for the assessment purposes and contractual purposes, and are series of ISO 9001, ISO9002 and ISO 9003. The series ISO 9004 deals with the quality management standards. This ISO 9004 series is framed to give the ideas relating the developing and implementation of the TQM. The companies activities in terms of quality are all monitored and controlled by the approved third party (A body framed for inspection by

the government). The construction company has to demonstrate on behalf of the third party. The documentation and the systematic auditing are carried out periodically by the third party. A TQM system is a big picture and deals mainly with the internal and external customers satisfaction. An ISO standards provides the excellent beginning for the construction industries, those willing to start a TQM program.

Conclusion

In the competitive world the delays and reworks, time and resource wastes are not acceptable. There is a great scope of improving the quality to minimise the resource waste, effective utilization of resources and manpower. The TQM implementation is advantable in minimizing the wastes, effective monitor and control the construction activity. From the research it is found that the effective implementation of elements of TQM will leads to success of an construction industries. The factors that mainly affects the TQM are

1. Commitment of management to the quality and the continuous improvement.
2. Effective team work.
3. Effective use of statistical methods.
4. Drawings and specifications are clearly defined and are prepared with respect to the quality standards.

Company administrators and managers should consider these elements of TQM for the effective development of their quality systems.

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