Quality Management in Construction industry

Ms. Shweta Tathe[1], Prof. P.G. Kurle[2]

[1]PG Student, [2]Professor

[1]Department of Civil engineering

[1]JSPM's Imperial College of Engineering and Research, Wagholi, Pune, India

Corresponding Author: Ms. Shweta Tathe

ABSTRACT: Quality management plays an important role in the development of any construction project. Quality can be regarded as fulfilment of expectation of customers and is defined as an important parameter that determines success or failure of a construction project. Construction projects are always expected to create a balance between quality, time and cost. It is possible to have low cost and high quality however at an expense of time, and conversely to have high quality and a fast project, but at an expense of cost. High quality is not always the primary objective for the customer, however, it is extremely important to a successful project. To stay competitive throughout, the companies have to focus on their business policies through the improvement of business quality performance.

Quality Management is now more often adopted by construction companies as an initiative to solve the problems related to quality and to meet the needs of the customer, thus the industry needs to take up the concept of QMS (Quality Management System). However, implementing QMS principles in construction industry is particularly difficult as there are many parties involved.

KEYWORDS: Construction, Project, Quality Management, Quality Management System.

I. INTRODUCTION:

Since decades, achievement of acceptable levels of quality in the construction projects has been a problem. Each year great expenditures of resources, money and time, both human and material, are wasted because of inefficient quality management procedures.

In today's market, it is essential for construction industries to provide more consistent quality and value to their owners/clients. Now it is time to develop more direct relationships with our owners/clients, to initiate more teamwork at the jobsite, and to cultivate better quality work.

Total Quality Management seeks to increase the quality of goods & services delivered through the participation at all levels and functions of the organization. It has proved to be an useful tool in ensuring the achievement of standards and successful productivity in construction industry. For the implementation of quality management in construction industry, we consider concepts of quality planning that is identification of quality standards, quality assurance that is evaluation of overall project performance and quality control that is monitoring of specific project results in quality management processes which were defined by Project Management Institute in 2000. Several techniques were identified as part of an implementation process which includes control charts, pareto diagrams, statistical sampling, benefit-cost analysis, benchmarking, flow-charting, design of experiments, cost of quality, trend analysis , inspection, flow-charts and quality audits.

II. LITERATURE REVIEW:

1. P.P.Mane, J.R.Patil : Quality Management System at Construction Project : ISSN: 2248-9622, Vol. 5, Issue 3, March 2015, pp.126-130

The best time, quality and cost are the important aspects of successful construction project which fulfills the main goal of construction industry. Quality management system is related to the procedures and techniques that can be deployed effectively leading to operational success of a construction project. The role of quality management in a construction company is not an isolated activity, but intertwined with all the managerial and operational processes of the project. The quality management system (QMS) in construction industry refers to quality planning, quality assurance and quality control. The paper includes the outcome of the research methodology conducted by authors based on interview of project participants and analysis of scrutinized interview data.

2. Behnam Neyestani : Effectiveness of Quality Management System (QMS) on Construction Projects; (2015 December , IEEE)

Quality management system provides comprehensive guidance for establishing an appropriate management procedure, in order to lower cost, customer's satisfaction, increase productivity, and market share in the organizations since the last two decade. In construction industry, it can assist the companies to achieve their objectives successfully, and ensure that all phases of project consistently meet client's needs. The main aim of this article was to assess the impact of QMS implementation on main factors of construction projects in Metro Manila, Philippines. For this intention, the study was conducted an in-depth literature review from different books, websites and journals in order to understand intensely quality management system, identify the characteristics of the crucial factors of the projects, and the findings of factual studies concerning the effects of QMS on construction projects. Eventually, a questionnaire was designed based on previous studies and then distributed randomly among the 37 managers with the aim of accumulating data. Finally, the survey of data was accomplished by illustrative statistics to find the results. The findings have shown that the implementation of Quality Management System can mostly affect customer's satisfaction, followed by time and cost respectively, while minimal effectiveness of QMS was on scope through QMS implementation in construction projects in Metro Manila.

3. D.Ashokkumar : Study of Quality Management in Construction Industry ; IJIRSET ISSN (Online) : 2319 - 8753

Construction industry plays a vital role in the development of any country. The growth of construction industry depends on the quality of construction projects. Quality is one of the critical factors contributing in the success of construction projects. Improvement in the quality of projects is linked with quality management in the project life cycle. Even though quality management at every stage of project life cycle is important but the quality management at the execution stage contributes significantly on final quality outcome of construction projects. This project mainly focuses the importance and factors that affects the quality management in the execution phase. The project also comprises visiting of some construction companies and organise the questionnaire survey, then analyse the difficulties and the cost difference due to quality defect in quality management and suggests some dynamic measures for the improvement of quality in the execution phase of construction projects.

4. Study of Quality Management System in Construction : AnupW S1, Arun Kumar H2, SNA Saqhi ; (IRJET) e-ISSN: 2395 -0056

Construction industry has realized the importance of Quality Management System in their expansion. This is an analytic research conducted primarily to give awareness about quality practices, tools, techniques, management commitment towards quality implementation in construction projects. It also explores the concerns faced during the implementation of Quality Management Systems. The research utilizes a qualitative questionnaire approach to gather data. A case study which upholds the questionnaire is conducted using content analysis method. Conclusions are drawn based on the results of the analysis and the research of case study data. Suitable propositions on how to overcome the issues of implementation of QMS has been made by consulting the experts through an unstructured interview.

5. Dr. Om Prakash Bawane : Construction Quality Management: Issues and Challenges before Construction Industry in Developing Countries ; 2017 IJEDR,| Volume 5, Issue 3, ISSN: 2321-9939

In the era of open economy, quality has appeared as important criterion that determines the success or failure of an organization. Quality, though an elusive attribute, has always been an important issue in construction. It is an intrinsic concept that provides a competitive edge to one organization over the other. The quality movement that emerged in post-industrialization era primarily directs the concerns of enhancing product quality in a controlled industrial environment. The construction industry being eccentric in nature often defies the guiding principles of quality that apply to manufacturing industry. Construction being complex and heterogeneous process needs a quality assurance plan that advances around the specific elements to construction industry. In the current scenario of globalization, the construction industry in developing countries is facing a hardened competition from multinational construction companies. Superior organization structure and manpower, state of art technology and sound financial state provide an fringe to MNCs over the local construction firms. ISO 9000 is one of the certification that many construction firms are opting for, despite the fact that ISO quality system does not adequately address the needs of construction industry. This present paper aims to discuss the elements having bearing on the construction quality management in developing countries.

III. NEED FOR STUDY

In other industries TQM (Total Quality Management) system is establishing but in construction industry we cannot even establish QMS (Quality Management System). The reason behind is every construction project is unique and quality is ever changing factor that means quality change with time to time, and place to place like the concrete work, block work, plastering, etc.

These common works are affected by some major factors like quality of material, quality of manpower, construction detailing, concrete work, etc.

IV. PROBLEM STATEMENT

The common man look towards a project as it is presented for the customers on the brochures they do believe on the mentioned specifications of the quality, however if quality defects are being mistakenly carried in the construction then the customers are supposed to be cheated by the organization. Due to quality defects many a times buildings may get collapse and result in a huge accident. Hence urgent steps have to be taken to stop the failures in quality maintenance in construction.

One thing that can cope up with the problem, is by analysing the causes and taking preventive measures to minimize them at the fullest. Now some urgent and hard decisions should be taken for this concept and their implementation which is of most importance to minimize the defects in quality maintenance.

V. SCOPE OF WORK

This work focuses the study of "Quality Management in construction projects" which is the need of an hour by which we can achieve control over the general defects that are seen in construction sites. There is not much resources nor time to waste. Reworks and delays are not acceptable. As in the manufacturing industries, even the construction industry should focus on process quality.

It involves better employee relations with greater customer satisfaction and improved operational performance in the project. This seminar highlights the study of the factors leading to quality in construction and how to overcome the quality defect on site.

.

VI. EVOLUTION OF TQM

1. Inspection : Aimed at checking, testing and measuring of one or more products. Inspection is usually performed by specialized personnel and does not fall within the responsibility of production workers. Products that do not comply with the specifications are rejected to improve.

2. Quality control : It involves evaluating a product with the requirement specification. Testing is the pointer technique used to perform product evaluation. QC is work oriented, it measures the product, identifies deficiencies and suggests improvement for the product.

3. Quality assurance : It involves the entire development of process, monitoring and improving the process, making sure that agree upon standards and procedures throughout the life cycle. It is oriented to preventing the defects from occurring in the products. Audits are key techniques for process monitoring.

4. Total Quality Management : Total quality management can be sketched as a system for a customer focused organization that involves all the employees in repeated improvement.

VII. QUALITY MANAGEMENT TECHNIQUES

- Check-sheet:

Check-sheet is used to document events or non-events (non–conformances). They can also comprise information such as the position where the event occurred and any known causes. They are prepared prior to time and are completed by those who are carrying out the operations or monitoring their progress. The value of check-sheet can be retroactive analysis, so they help with problem identification and problem solving.

- Checklist :

Checklist is used to notify the user if there is a certain thing, which must be checked. It can also be used in the assessing of quality assurance and to follow the steps in a particular process.

- Histogram:

Histogram provides an illustrative representation of the individual measured values in a data set according to the frequency of occurrence. It helps to imagine the distribution of data and there are several forms, which should be recognized, and in this way they reveal the amount of difference within a process. It should be well designed so that people who fetch out the operation can easily use them.

- Pareto Analysis :

It is a method of analyzing employed to prioritize the problems so that attention is initially focused on those, having the greatest effect. It was found out by an Italian economist, named Vilfredo Pareto, who noticed how the vast majority of wealth (80%) was owned by relatively few of the population (20%). As a generalized rule for considering solutions to problems, Pareto analysis focuses to identify the critical 20% of causes and to solve them as a priority.

- Cause and Effect Diagram (Fishbone Diagram) :

Cause and Effect Diagram, is useful in breaking down the major causes of a particular problem. The shape of the diagram represents skeleton of a fish. This is because the process often has a multitude of tasks footing into it, any one of which may be a cause. If a problem occurs, it will surely have an effect on the process, so it will be necessary to consider the whole multitude of tasks when searching for a solution.

- Flowcharts:

Flow chart is used to provide a picture using a set of symbols. They are used to show all the steps in a process project or sequence of events. A flowchart assists in documenting and explaining the process so that it can be examined and improved. Analysing the data collected can help to uncover irregularities and potential problem points.

- Scatter Diagram:

The relationship of two variables can be plotted in the scatter diagram. They are easy to complete, understand and obviously linear pattern reveals a strong correlation.

- Statistical analysis:

Statistics is referred as the study of the collection, analysis, interpretation, organization and presentation of data. It deals with all aspects of data, along with the planning of data collection in terms of the design of surveys and experiments.

VIII. FACTORS AFFECTING QUALITY OF CONSTRUCTION:

After having a view on all the literatures over quality of construction we can conclude that :

- Limitation of Finance:

This was the main factor affecting quality of construction and in every type of work where contractor had to plan for financial payment to remove the risk because it might affect the project.

- Limitation of Communication:

Construction site are sometimes located in rural areas or far away from the community. It might be a cause which affected transportation causing delay and difficulty, therefore it was a limitation that contactor had to consider.

- Limitation of Labour and Wage:

In many local areas, the problem related to labour such as lack of skilled labour, complex work, not being able to find labour might occur, which might be causes of work delay and low quality work.

- Limitation of Weather:

Weather is again one of several important limitations because it sometimes cannot be prevented such as flooding, storm, etc.

- Limitation of Building Plan and Construction Detail:

Problems in building plan and construction detail found were such as drawing not clear, drawing mistake, so they also became big problems in construction.

- Limitation of Material and Equipment:

Some construction works might use special equipment or machines which contractor had to study carefully regarding performances, suitability for work and prepare enough equipment for each work.

- Limitation of Time:

Some construction works had to be completed within the time limit such as in cases of urgent works. They caused limitation of work planning and they also caused other management problem. Therefore, contractor had to carefully consider this issue.

- Limitation of Construction Methodology:

Construction works in some areas could not be performed by regular method because there were buildings around construction site, so the contractor had to find new ways that were suitable to construct and sometimes used specialist engineer when some construction works were in step of construction.

- Limitation of Rule or Regulation:

This problem also greatly affected construction such as problem from traffic which had an effect on transportation, problem of building construction regulation, problem of labour hiring, etc.

IX. CONCLUSION

After having a view on all literatures over implementation of various QMS, we can conclude that :

- Management commitment to quality improvement is very important in each phase of the building process. Literature review stated that the implementation of QMS can be an effective technique to achieve the objectives of projects successfully through process approach, towards the optimization of project performance, and problem solving.

- The impact of QMS is customer's satisfaction more than any other vital criteria in construction projects, because process approach of QMS is considered and prioritized according to customer's needs and satisfaction, as an input and output in the organizations.

- From a studied review , it can be seen that the 80% respondents very strongly believe checklists and 60% prefers to fishbone diagram are quality control tools used at construction projects.

- The whole construction industry is project oriented; so improved quality performance must be project-related and must include manufacturer, subcontractors, main contractor, professional designers, vendors, project managers and above all, the owner must be involved in the process.

- Engineering, architecture and construction management students who eventually become the industry's future leaders must be instructed in the basics of quality management. Training in TQM theory and practice at all levels that means management as well as operative levels and in all phases such as design, construction, and operation are essential to enhance competitiveness.

- The success of QMS doesn't entirely depend upon setting policies and maintaining documents. If there is no proper monitoring and control. The importance of Quality Representative at site has to be communicated to the lower management.

X. ACKNOWLEDGEMENT

The author thankfully acknowledged to Prof. P.G. Kurle, of JSPM's Imperial college of Engineering and Research, Wagholi and Prof. A.N. Bhirud PG Coordinator (Construction & Management) Civil Engineering Department of JSPM's Imperial college of Engineering and Research, Wagholi for their motivation and infrastructural support to carry out this review paper.

XI. REFERENCES

[1] Burstein D and Stasiowski F. A. : Total Quality Project Management for the Design Firm in Wiley, New York, 1994.

[2] Ferguson H. and Clayton L. (Eds), Quality in Constructed Project : A Guideline for Owners, Designers and Constructors, Vol 1. ASCE, New York, 1988.

[3] Culp, G. et al. : Implementation TQM in consulting engineering firm. Journal of Management in Engineering, 1993, 9(4), 340-366.

[4] Nagasaku, C. and Oda, M. : Planning and Execution of Quality Control. Juse Press, Tokyo, 1965.

[5] Juran, J. M. (Ed.) : Juran's Quality Control Handbook, 4th edn. McGraw-Hill, New York, 1988.

[6] Gunaydin, H. M., TQM in the Construction Industry. MS Thesis, Illinois Institute of Technology, Chicago, IL, 1995. 13. lami, M., Kaizen, the Key to Japan's Competitive Success. Random House, New York, 1986.

[7] Dumas, R. A., Organization wide quality: how to avoid common pitfalls. Quality Progress, 1989, 22(5), 41-44

[8] Applications and Assessment of Quality Management in Construction Projects, International Journal of Innovative Research in Engineering & Management (IJIREM) ISSN: 2350-0557, Volume-3, Issue-5, September-2016

[9] Construction Quality Management: Issues and Challenges before Construction Industry in Developing Countries, 2017 IJEDR | Volume 5, Issue 3 | ISSN: 2321-9939

[10] Implementation of Total Quality Management in a Construction Firm, International Journal of Science, Engineering and Technology Research (IJSETR), Volume 3, Issue 10, October 2014

[11] A Study on Factors Influencing Quality of Construction Projects, International Journal for Research in Applied Science & Engineering Technology (IJRASET) , Volume 3 Issue V, May 2015 ISSN: 2321-9653

[12] ASSESSEMENT OF QUALITY PROBLEMS FOR HIGH RISE BUILDING-CASE STUDY; INTERNATIONAL JOURNAL OF ENGINEERING SCIENCES & RESEARCH TECHNOLOGY, ISSN: 2277-9655

[13] Study of Quality Management in Construction Industry; International Conference on Engineering Technology and Science-(ICETS'14) Volume 3, Special Issue 1, February 2014, ISSN (Online) : 2319 - 8753