

# Utilization of Social Technique For Quality Control In Building Construction : A Review

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## ABSTRACT

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With the progress of the times, the construction industry has undergone great changes and development, and has received more attention. When people treat a thing, it is necessary to consider its quality. The quality of engineering is of vital importance to a construction project, which should not only meet people's living needs, but also guarantee people's life and property safety. Therefore, this article will from the significance of quality management and control in the construction engineering, respectively discuss the architectural engineering quality problems causes and solutions, so as to effectively enhance the level of the current construction project quality. In fact, it is also a 'shortcut' to improve the competitiveness of enterprises.

Construction industry plays an important role in the development of any country. The development of the construction industry depends on the quality of construction projects. Quality is one of the critical factors in the success of construction projects. Improvement in the quality of construction projects is linked with quality management in the project life cycle. Although quality management at every stage of the project life cycle is important, quality management at the execution (construction) stage contributes significantly to the final quality outcome of construction projects. This project mainly focuses on the importance and factors that affect the quality management in the execution (construction) phase. The project also includes visiting some construction companies and conducting the questionnaire survey, then analyse the difficulties (major factors) and the cost variance due to quality defect in quality management and suggest some proactive measures for the improvement of quality in the execution phase of construction projects.

**Keywords** :- Quality Control, Complex, Topography, Geology, Hydrology, Construction technology.

## I. INTRODUCTION

The Construction Sector plays a major role in the economic growth of a country and occupies an important position in the nation's development plans. Construction projects are increasing rapidly in recent years, reflecting the interest of public and private sectors. Construction sector is one of the largest contributors to the Gross Domestic Profit (GDP) of any country. Construction projects are extremely complex processes involving a wide range. It generates substantial employment and provides growth impetus to other manufacturing sectors like cement, bitumen, iron and steel, chemicals, bricks, paints, tiles etc. Quality is the symbol of human civilization, and with the progress of human civilization, quality control will play an incomparable role in the business. It can be said that if there is no quality control, there is no economic benefit. Construction projects are an extremely complex process, involving a wide range. There are plenty of factors affecting the quality of construction, such as design, materials, machinery, topography, geology, hydrology, meteorology, construction technology, methods of operation, technical measures, management systems, and so on. Quality is one of the critical factors in the success of construction projects. Quality of construction projects, as well as project success, can be regarded as the fulfilment of expectations (i.e. the satisfaction) of the project participants. The construction industry in India has been struggling with quality issues for many years. A significant amount of the budget is spent each year on infrastructure and other development projects. Since the quality outcomes of the projects are not according to required standards, faulty construction takes place.

## II. Literature Survey

A literature review for the research. Relevant literature on quality management is discussed, the

concepts of quality and quality management are explored and the tools and techniques used in quality management in the construction projects are examined.

**Namhun Lee et al (2014)** the research paper focused on the utilization of BIM for quality management in highway and bridge construction. A review of the literature on quality information model and quality control process was presented and application of BIM for quality management was described.

BIM technology has been used for detecting design errors prior to actual construction and achieving better communication among project participants in vertical construction project. BIM technology will allow for easy access to data sharing and information exchanges for quality control in infrastructure projects, utilizing an integrated database, providing the dynamic simulation of the construction process, and identifying critical control point deviations from the state DOT specifications. Therefore, the accuracy of the quality control process will increase and the overall quality of highway and bridge construction will be improved. In conclusion, BIM technology has great potential as a quality management tool. BIM technology should be adopted to improve the integration and collaboration in infrastructure construction projects. The information integration resulting from the utilization of ICT and BIM technology enables us to enhance the overall project quality and the quality management in accordance with the customer's requirements and expectations.

**Rikesh Shah et al (2012)** the primary objective of the research paper was to undertake qualitative and quantitative assessment on the quality of concrete in the building construction industry of India Investigating the current practices of concrete production in building construction sites and looking at whether or not there is a gap between the existing practice on site. Assessing the level of quality control being undertaken after performing statistical analysis on sample test results collected from construction

sites and after checking the compliance of these compressive strength test results with the Indian Standards.

Results concluded that training should be given to the semi-skilled laborers on concreting work. As concrete is a major construction material forming the structural part of buildings manual on concrete production has to be separately prepared and used as a guide on construction sites. Quality management plan has to be prepared and properly implemented during concrete production processes that identifies the critical activities and helps in taking the appropriate measures at any stages during concrete production. Systematic and Well-organized quality control by an independent body is useful in improving concrete quality on construction projects.

**SOLOMON OYEBISI et al (2019)** this study evaluated the quality management and the quality grading practices in the construction project with emphasis on the Covenant University Sports Complex and the quantitative research strategy and questionnaire survey were used as the main data collection instrument for soliciting information from the project participants in order to determine the best key for quality management practice.

Results concluded that quality practices and client's needs and satisfaction were discovered as the key quality management techniques. Moreover, UPV test proved the concrete as good and excellent in terms of quality grading. However, the study was limited to a certain geopolitical, cultural, and societal zone and Thus, the study recommended the quality management techniques at the execution of projects by construction engineers to build a safer society. Also, control and regulatory bodies at the construction environment should institute an award scheme for the best firm which strictly adheres to quality practices as a way of motivating them to use quality management techniques.

**V. G. Salunkhe et al (2018)** the research paper Attained desired improvement of quality in major

issues in the construction sector. Human and material resources are expelled unnecessarily due to insufficient or nonexistent/ unawareness of procedures relating to quality management and the potentials of quality should be explored and its vital concepts should be overviewed in a broader sense.

Results concluded apparently, to achieve successful implementation of Total Quality Management, the principles of TQM should not only be used as a theoretical concept but also put into practice on construction sites. Firms need to bond Quality Control in their work process, empowering workers education, training, effective worker-supervisor relationship, worker motivation program thus leading to meaningful change with implementation of Total Quality Management. Thus, from case studies it concludes that the Quality Control System needs to be put strictly into practice in the construction industry so as to achieve its benefits in terms of customer satisfaction, economy, time factor.

**Tan Chin-Keng et al (2011)** the research explored preliminarily practices of quality management, management commitment in quality management, and quality management implementation problems in construction projects in the context of Malaysian construction industry. The research applies a semi-structured interview approach with twelve project management practitioners. The findings of the study indicate that the state of quality management in construction projects in Malaysia needs to be strengthened and they were problems in relation to quality management implementation that require attention and further research. The paper provides an insight on the state of quality management in construction projects in Malaysia.

Results conclude that the total quality management was not a common practice and the ISO registration was mainly for marketing purpose and also Implementation of quality management was greatly perceived as a mean to fulfill contractual obligations instead of satisfying the needs of clients, In terms of

quality management tools and techniques, construction companies were commonly using the traditional methods such as experiments and inspections.

Leadership and participation of top management of construction companies in quality management were in need to be strengthened and Allocation of financial and human resources for the purpose of problems of the implementation of quality management should be further increased.

**O Z Oni et al (2019)** this research evaluated the factors affecting quality management practices on building construction sites with a view to improve quality management on building construction sites and the study concludes that most of the factors affecting effective project quality management in Oyo State were generated by the government, professionals, quality organization agencies construction workers and other stakeholders in construction industry.

Results concluded that the study revealed the top among the factors affecting quality management on construction sites both in public and private organization in Oyo State were Lack of adequate sanction by the standard assurance organization, Non implementation of National Building Code, Lack of proper inspection at every construction stages, Award of contract to unqualified contractor, Lack of construction quality control inspection programme, Lack of effective quality policy implementation, Inadequate personnel and craftsmen training, Poor specification, Bribery and corruption and Usurpation of role among professional and also study has clearly established the fact that most of the factors affecting effective project quality management in Oyo State were generated by the government, professionals, quality organization agencies, construction workers and other stakeholders in construction industry.

**Junying Lou et al (2017)** the research paper analyzed the construction characteristics and construction quality control difficulties of the project. Then

combining BIM technology and AR technology at the concrete application of the construction stage, the project construction quality was enhanced through prior control and process control and post control. Construction quality control for the future urban complex and the use of BIM technology aimed to provide reference and improve project quality and construction industry production efficiency.

Result concluded that the construction technology, methods and processes were more advanced, the project construction quality was getting better and better. Because the urban complex of the Rooster independent, its construction quality was also of great concern, the quality requirements of natural than the average project was much higher. The paper was based on the BIM technology studying the construction of urban complex project quality control, Through literature reference and experience, the effective method of construction quality control is obtained with AR, and it was hoped to provide some reference for large-scale project construction and BIM application and development.

**Shuo Yuan et al (2018)** the research paper has formed the significance of quality management and control in the construction engineering, and has discussed the architectural engineering quality problems causes and solutions, so as to effectively enhance the level of the current construction project quality. In fact, it was also a 'shortcut' to improve the competitiveness of enterprises and the aim of implementing quality management and control on construction projects was to improve the quality of construction projects.

Results concluded that architecture was become a strong support for China's current economic development, which is directly related to the livelihood of its citizens and plays an important role in the development of the national economy. As an important part of architectural engineering, the quality management and control of architectural engineering is of great significance to people's work and life and social development. Therefore, it was

necessary to strengthen the quality control management of the project, strictly followed the relevant operation norms of the construction law, ensure the quality of the project and promote the long-term and healthy development of the enterprise. **Sahil Sanjeev Salvi and Samiksha Shridhar Kerkar (2020)** the main objective of the research papers were to identify the prerequisites for QA and QC and develop the concepts and procedures, to understand the concept of QA and QC specifications and apply to building construction, to understand the general process of performance related specifications and testing procedures for construction materials, to develop checklist for onsite inspection for appraising the QA and QC data periodically, to provide 'Project Quality Plan' was to define activities / tasks that focus on achieving customer's quality expectations and these activities / tasks were defined on the basis of the quality standards set by the organization delivering the product. Result concluded that the better quality of work can be achieved by proper QC process at a minor cost when compared with the total cost of the project. QA can be achieved at the site by exact compliance to the construction specification standards. This can be achieved with a properly organized well equipped field laboratory at the site and centrally located at office and Quality of work largely depends upon the quality of materials to be used and workmanship.

**Ying-Mei Cheng (2019)** this research focused on integrating BIM with quality management for innovative development and improving performance efficiency of the quality management system in the construction stage. First, this study proposes an application framework for BIM in the AEC (Architecture/Engineering/Construction) field and basically, this framework emphasizes the application of different BIM models with different special requirements during different phases of the project life cycle. Second, based on this framework, a QC

(Quality Control) model system prototype is established.

Results concluded were BIM incorporated to demonstrate its ability to record and examine construction defects for contractors. A quality system prototype is established using Autodesk Revit API to code the add-in, which displays 3D elements with onsite quality defects. In addition, engineers may upload the quality defect models they wish to share to the cloud for those who need the information and also study only focuses on the discussion of building the quality management system prototype for walls.

**D.Ashokkumar (2014)** the research project mainly focused on the importance and factors that affect the quality management in the execution (construction) phase. The project also included visiting some construction companies and conducting the questionnaire survey, then analyse the difficulties (major factors) and the cost variance due to quality defect in quality management and suggested some proactive measures for the improvement of quality in the execution phase of construction projects.

Results concluded will expose the main factors which affect the construction quality and also increase in cost of construction due to quality defects. This study has created quality management awareness to all level construction companies especially small scale companies. From this we get the major factors and issues which affect the construction quality and that create a chance for finding out the remedial measure. This research is useful for minimizing the material wastage, workmanship wastage, time wastage and indirect cost. Then increase the customer satisfaction and company reputation.

**Ramesh Marasini and Paul Quinnell (2010)** the research presented in this paper investigates the status of quality management on building construction sites of a major ISO9000 certified construction company in the UK and the findings of the study suggested that site managers possess familiarity with some techniques used to ensure quality in their respective

projects and also the majority of site managers suggested that they considered quality management equally important when compared to health and safety. However, the site managers perceived that senior management attention to the quality was less. Result concluded that the perceived importance of quality when compared to health and safety by the site managers and the priority given to the management of quality by the senior management was found to be different. The majority of site managers stated they 'shared' equal importance; however the priority of the company, as perceived by the site managers, was of less importance when compared to health and safety. The need for training in developing good site practices is of paramount importance. Although ISO9000 puts high priority on training, the provisions of training in quality management skills are currently inadequate. The site managers were reliant upon their own experience and concepts to manage quality

**J. Bhattacharjee (2018)** the research managed primary responsibility within the construction, to ensure that the design both fulfils user's requirements and was prepared correctly, and that quality control/assurance procedures were correctly administered. QFD was developed to improve quality and lower the costs in industrial and business related fields, by assuring all of building construction operational decisions were driven by owner needs. It used a set of matrices to relate what the owner wants and needs with project specifications and requirements. QFD assists project managers to clearly identify and prioritize owner and labour requirements in development of the conceptual and final design.

Results concluded where one can say that for effective QC & QA policies, various parties' roles were involved. Firstly the role of planner & designer. The Architects and engineers who plan and design various facilities play a key role in determining the quality of these facilities. Both the agencies and their designers should work to assure that the drawings and

specifications that present requirements to the constructor were complete and clear statement of what the owner and user expect in the facility and quality facilities that meet and exceed expectations for enhancing our safety, productivity, and overall quality of life were the result of such commitment and the real goal.

**Preethi S and Monisha Manoharan (2016)** the research, there was learnt that the function and importance of quality control. The aim of the research on quality control is to find out the shortcoming of quality management of enterprise, then to make progress through the research, so as to improve the quality of product, work, and service, while strengthening the quality management system, and raised the overall level of quality management. For a construction organization, the quality of construction project is the protection of all the work.

Results concluded that the systematic quality management system should be applied. The quality of each process and project can be ensured through systematic planning, control and inspection. The waste of workforce, machinery, materials and other costs can be avoided, as well as the schedule delays. It was been found out that the scientific quality management system can ensure the rational allocation of project resources, and make the project run on the pre concert quality objectives, so as to achieve the effect of project quality control.

**B. Kapre Varad and S.K. Sekar (2020)** this research paper describes the possible way of assuring quality of construction by implementing six sigma methodology in the construction. The basic theory of six sigma is, DMAIC i.e. (Define, Measure, Analyse, Improve, Control). The methodology has been implemented to the concreting process and for the plastering work on the construction site in the residential building and a DMAIC methodology was used to improve the quality of the both processes, by analysing defects, their possible causes and effects.

Results concluded the use of six sigma in building construction ensures that everything should remain within the scope of the project. A DMAIC methodology of six sigma has been implemented on Concreting and Plastering work in construction. The use of six sigma principles for the processes gave a systematic approach to identify the defects, their root causes and gave a solution to improve them. The process capability report helps us to know the opportunities for improvement in the process. The variation in the process can be monitored with the six sigma tools. Through the research it has been founded that the use of six sigma in the construction industry is still limited for a few processes. Instead, it has a wide scope in every process. The few recommendations are suggested to improve the current processes. By using six sigma in construction the highest level of quality can be achieved with the customers satisfaction.

**A.K.S PRIYADHARSAN and M.NAVEEN RAJA (2020)** the research purpose was to find out the knowledge of quality control and management and its impact towards engineers and laborers. Construction Industry plays a vital role in the advancement of any areas, Project manager has primary responsibility within the construction and the Quality control/assurance procedures are correctly administered. Quality control circles have been found to be a simple technique of TQM and proposed implementable in the construction industry and the paper included the outcome of the research methodology decided by authors based on interview of project participants and analysis of data. The project includes visiting construction companies and conducts the questionnaire survey, then analyses the factors that included quality control and its management and also suggest the improvement of quality measures in the execution of the projects. Result concluded that Quality Control reduces the problems of engineers in different ways. Engineer experience is the key factor for the construction of

buildings. They did not depend on the Quality Control procedures. For Engineers, Quality Control helps to improve the Qualities of the construction to make a project in a given time. Engineers can retrieve their decision with the Quality Control and its Management and by the decision of Quality Control, Labours may be affected. According to the Labours, they want to work like a normal procedure. So, they don't want any insist from an Engineer or Quality Control Departments.

**S. Arunmozhi et al (2015)** the paper presented an empirical study in the construction industry in order to improve the quality performance. The main objective of this study was to identify the critical factors which were responsible for the implementation of a quality management system in construction projects. The study was carried out by conducting a questionnaire survey among the professionals of various construction projects, for testing their experience in the quality management system. The study has indicated that a quality management can only be successful in a company if the users have a positive attitude towards the system and it is therefore required that the system be launched and maintained in a user-friendly manner, with the emphasis on real risk-reducing aspects.

### III. RESULTS

Results concluded that quality is an important problem for the construction industry and revealed that there was a gap in the use and knowledge of quality management systems. There were substantial organizational advantages that resulted from implementing a QMS. There seems to be a cap in training the employees. There was a positive view on the usefulness of the Quality Management System (QMS) There was a cap in the collection of quality cost. This study revealed that training and teaching methods about QMS

among engineering firms is more comprehensive than among the contractor firms.

#### IV. CONCLUSION

From the literature survey it had been learnt concluded there are many issues about quality in construction industry. Due to time constraint for the project, the descriptive survey method is to be adopted, whereas other methods may take long duration. Several methods for collecting information from the industry were evaluated from various literatures. The following steps are carried out in the project. These are

- After title conformation relevant literatures were collected.
  - From the literature the problem and issues were identified.
  - Framing the questionnaires based on the analysis from the various people of construction industry, literature review.
  - Group the companies based on the methodology
  - Conduct the questionnaire survey in predefined companies
  - Analysis the data using SPSS software
  - Find out the factors that affects the quality of construction
  - Calculate the cost variance for quality defect
- Conclusion

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