Evaluation Of Factors Affecting Quality In Construction Project

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Abstract— Construction projects play a vital role in the development of our nation. Quality is one of the important features in all projects. Success parameter in construction greatly depends on the quality performance. Improvement of quality performance in construction helps to develop the nation. This research mainly focuses on to study the quality aspect which are inherent of the construction. Based on the identified factors a questionnaire is developed & it is surveyed to collect opinion from the construction experts. The collected data are analysed using Arithmetic mean method and it is ranked to get the top most values. The results are based on the survey including the respondents which gives the most affecting factor in construction. Using Factor Analysis in SPSS Found Factors affecting Quality in Construction Project.

Keywords—Quality, Construction Project, Questionnaire Survey, Arithmetic Mean Method, Quality Factors

I. INTRODUCTION

Quality is one of the important key performance indicators of a construction industry which may cause cost overrun and time delays. Quality control (QC) and Quality Assurance organizations are established only as a result of the prescribed requirements. In construction sector quality control can be looked upon as client satisfaction, relation with cost, and enough time to obtain quality. A quality assurance system has been developed by an international standard organization (ISO) to improve the quality. For quality ISO 9001 series have been developed and can relevant to all type of organization. Quality is affected by shortage of materials and equipments, design changes, error in cost estimation and lack of budget. These wastages can be achieved by maintaining quality throughout the project. It has been seen that the quality and customer service offered by an enterprise plays a crucial role in the survival and success of an enterprise under the existing environment. Quality is a key to a nation’s economy. It is an essential requirement for any product.

II. NEED FOR STUDY AND OBJECTIVES

Quality in construction is very essential to increase end user satisfaction. To increase end user satisfaction study and analyses of the factors influencing quality in construction becomes necessary. The Objectives of the Study Are as Follows:

- To study the quality aspect which are inherent of the construction.
- To improve and analyse the factors affecting Quality of Construction.
- To recommend solutions at project where quality is given priority. Implementation of quality aspect on such project.
III. LITERATURE REVIEW

Author O Z Oni describes that Legislative arm of government should endeavor to pass National Building Code into law [1]. Abuo suggested that all local planning authorities approving building plans should be properly organized and adequately staffed with the right professionals to enforce all building laws, regulations and codes [2]. Zanesa (2017) confirms that during certain phases of the construction project a different importance can be allocated to quality factors depending on a managerial perspective [3]. Preethi (2017) says that during controlling the whole process of construction, according with the required quality standards and user promising requirements, fulfilling quality, time and cost, construction companies could get the best economic effects [4]. It has been discovered that the quality administration framework can guarantee the possible allotment of venture assets and make the task run on the foreordain quality destinations in order to accomplish the impact of development venture quality control. Chinchu describes that Coordinating ability and report of Project Manager with owner representatives, contractors at site is observed to be the most significant factor at almost all levels of the quality performance rating [5].

According to Ghanim A. Bekr, A construct methodology and technique should be acknowledged to overcome the effect of local political and economic situations on the work of construction projects [6]. Department must create a system for alter experience or knowledge between projects. Author Mr.A.G.Rajasekaran says that a new strategy must be introduced for the selection of contractors other than the present system of lowest tendered at least for important projects [7]. According to K.S. Shobana, The study revealed that the significant factors affecting quality are occurrence of meeting, environmental risks, working hours, material delay, and labour shortage, coordination, checking inventory level, resource delay, coordination and safety precautions [8].Author Mahajan Ganesh S (2015) The Quality of Materials, Manpower and Workmanship should be depend by the Quality of Work. The relevant specification in respect of materials/ workmanship given in various IS codes be strictly adhered to for accomplishment of quality assurance/quality control [9]. Behnam Neyestani justifies that the impact of QMS on customer's satisfaction is more than other vital criteria in construction projects because process approach of QMS is considered and prioritized the customer's requirements and satisfaction as its input and output in the organizations [10]. Abu El-Maaty says that The occurring over of flexible pavement can be represented in equation form as follows “quality of highway=skilled staff + effective design + good construction practice”[11]. Author David (2015) discovers that In order to establish the corporate image and strengthen competitiveness, the quality of construction is required continuous improvement [12]. Melba Alias revealed that Average delay due to closures and material shortage, Time needed to rectify defects, Average delay in payments from owner to contractors have been ranked first second and third Respectively under time factors [13]. According to Muhammad Abas, The contractors should admit these factors on a priority basis when conducting construction project. The contractor should implement new technologies to build an effective risk management team as well as quality management team [14]. According to D.Ashokkumar, To all level construction companies especially small scale companies, this study would create awareness of the quality management [15].

IV. RESEARCH METHODOLOGY

In This Research Work, Literature will be collected through national journal and international journal. The Data Collection will be done through Questionnaire Survey and by literature review. Information will be obtained via Google forms and by meeting the site manager, the architect and contractors with completing the questioners. Questionnaire questions will be selected from website review. These survey responses are analysed using Arithmetic mean method and mean value are analyzed by ranking each factor and gives the most important factors affecting Quality in Construction Project.
4.1 QUESTIONNAIRE DESIGN:
To secure a simple Ranking of all items involved we simply do the total of rank values received by each item from each respondent.
The data obtained through this method is Ordinal data hence rank ordering is an ordinal scale.
The respondents were required to give Numbers between (1-5) determine the weight of factor on the Quality that affects the Construction Project. Likert scale is used to rank the importance of each factors. This range from 1 to 5. 1. Disagree, 2.Less Agree, 3.Agree, 4.Strongly Agree, 5.Very strongly disagree.

V. DATA ANALYSIS
The reliability of data is done using Cronbach’s Coefficient Alpha Method, in SPSS software which is commonly used to estimate the reliability of data. Reliability scores are analysed from the respondents given from the survey.

| Table I Reliability Statistics |
|--------------------------------|
| Cronbach's Alpha | N of Items |
| .960 | 44 |

The Cronbach’s alpha obtained for respondents. Cronbach’s alpha value is 0.96. The value must be in the range of 0.6 to 1.0 if the data has to be reliable. Hence here in this analysis the data values are reliable. These data are analysed using Arithmetic mean method. Ranks are provided for the mean values analysed using this method. Table II gives the mean values and ranks provided for the analysis.

| Table II : Arithmetic Mean Method & Ranking Factor Method |
|----------------------------------------------------------|
| **Factors** | **Mean** | **Percentage** | **Rank** |
| Bureaucracy and Political Influence | 2.94 | 59% | 44 |
| Law and Order Situation | 3.20 | 64% | 42 |
| Project Completion date specified but not yet planned by the owner | 3.32 | 66% | 38 |
| Ability to delegate authority to various members of his team by project manager | 3.62 | 72% | 31 |
| ISO certification | 3.78 | 76% | 15 |
| Procurement Unit of Contractor | 3.56 | 71% | 31 |
| Leadership Quality of PM | 4.34 | 87% | 01 |
| Risk Assessment | 3.78 | 76% | 14 |
| Management Team of Contractor | 3.96 | 79% | 05 |
| Size and value of the project | 3.68 | 74% | 22 |
| Financial Capability of Contractor | 4.10 | 82% | 01 |
| Quality of Equipment | 4.06 | 81% | 02 |
| Quality Training | 4.08 | 82% | 01 |
| Unexpected Geological Condition | 3.28 | 66% | 28 |
| Issue                                                                 | Rating | Percentage | Count |
|----------------------------------------------------------------------|--------|------------|-------|
| Understanding of Non-Compliance and Resolution                        | 3.42   | 68%        | 27    |
| Tracking of Quality Reports                                           | 3.68   | 74%        | 19    |
| Co-ordination of communication with the execution team                | 3.90   | 78%        | 05    |
| Resource Management of Quality Inspection of Material, Tools, Equipment & Safety Gadgets | 3.80   | 76%        | 08    |
| Availability of Relevant Standards, specifications, codes to confirm Quality Compliance | 3.72   | 74%        | 10    |
| Snag list and Compliance                                              | 3.78   | 76%        | 08    |
| Inadequate Control Procedure                                          | 3.66   | 73%        | 15    |
| Material Management                                                   | 3.82   | 76%        | 07    |
| Mistake during construction                                           | 3.28   | 66%        | 20    |
| Ineffective Communication                                             | 3.46   | 69%        | 19    |
| Frequent Equipment Breakdown                                           | 3.18   | 64%        | 20    |
| Non-adherence to contract condition                                   | 3.24   | 65%        | 19    |
| shortage of Technical Personnel                                       | 3.86   | 77%        | 06    |
| Quality Assessment System in Organization                             | 3.72   | 74%        | 07    |
| Availability of Experience Persons                                    | 3.94   | 79%        | 02    |
| Escalation of Material Prices                                         | 3.70   | 74%        | 09    |
| Effective Monitoring and feedback by the project team members         | 3.88   | 78%        | 04    |
| Conflicts between the PM and TM                                       | 3.54   | 71%        | 12    |
| Financial Problems arise during Construction                          | 3.70   | 74%        | 08    |
| Revision of Plans & Schedules Frequently                              | 3.64   | 73%        | 09    |
| Maintenance of equipment                                              | 3.72   | 74%        | 05    |
| Confined Site                                                         | 3.60   | 72%        | 08    |
| Conformance to Specification                                          | 3.78   | 76%        | 04    |
| Performance Measurement                                               | 3.92   | 78%        | 03    |
| Understanding operational difficulties by the owner, Engineer Thereby Taking Appropriate Decisions | 3.66   | 73%        | 05    |
| Availability of Resources as planned throughout the project duration  | 3.94   | 79%        | 02    |
| The tendency to pass on the blame to others                           | 3.54   | 71%        | 04    |
| Developing and maintaining a short and informal line of communication among project team | 3.72   | 74%        | 02    |
| Top Management's backing up the plans and identify critical activities| 3.72   | 74%        | 02    |
| Top Management's Enthusiastic support to the project manager and project team | 4.00   | 80%        | 01    |
VI. RESULTS AND DISCUSSIONS

Based on the Arithmetic Mean method analysis, the ranking is provided to data. From this analysis, the top ten ranked factors are identified. These are the most important factor that affects quality in construction. The most important factors are given in Fig 1.

![Fig 1 Top 10 Important Factors Affecting Quality]

In Construction Field, Leadership is main Factor in terms of Quality. An effective construction manager should be able to assign tasks to different workers based on their capabilities. For Quality Control, Quality Training should be given to the workers and employees for improving the company’s growth. The equipment should be proper inspected and checked before using it. It gives the better results. Proper use of appropriate equipment contributes to Quality, economy, safety and timely completion of the project. For better Quality, Material Management should be proper. Material Management done by inventory control. Material Management involves planning and programming for the material procurement and it gives you the desired quality.

VII. CONCLUSION

This research had three primary objectives, which were achieved through the literature review and data collection using questionnaire survey and the detail analysis of the survey results. 44 factors are identified for questionnaire research. The identified factors are combined into 3 groups. The field survey included 20% Project Managers, 12% contractors and 42% consultants.

Input from all respondents’ shows that the top ten Influential factors are Leadership Quality of Project Manager , Financial Capability of Contractor, Quality Training, Quality of Equipment, Top Management's Enthusiastic support to the project manager and project team, Management Team of Contractor, Availability of Experience Persons, Co-ordination of communication with the execution team, shortage of Technical Personnel, Material Management.

The main factor in Quality Management is following quality plan and tender specifications. If tender specifications are made as per the required level of quality in construction and there is a protocol in
the project quality plan to verify where those specifications are being met or not and also has a fair and corrective protocol when specifications are not met, which may also include leaving penalties on the contractor, then quality will be maintained as per the level of the project. Before project execution, one should make complete QAP for better quality. The workmanship is very important factor, it can help to improve Quality with better accuracy and perfection in construction project.

The statistical analyses of the data show the followings:
1. No participant response specify any of the identified factors with low influence on Quality as all of these factors have a percentage more than 50%. This indicates that the selection of parameters was realistic in its impact on Quality.
2. The minimum percentage is 59% 
3. The maximum percentage is 87% 
4. The minimum and maximum average rank is 2.94 and 4.10 respectively.

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