IMPLEMENTATION OF QUALITY ASSURANCE AND QUALITY CONTROL IN CONSTRUCTION AND MANAGEMENT FOR PROJECT EFFECTIVENESS

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ABSTRACT

The construction industry has been practicing to achieve the quality for many years, and dependant on the cost of economy which is drastically changing over period. The cost could potentially be reduced if the construction industry were to embrace the concept of quality assurance that has been used with great success by many other sectors of the economy.

- For achieving better quality of work at a minor cost compared with the total cost of the project, proper Quality Control process need to be adopted for best results.
- For achieving QA at the site it is necessary to comply the construction specification standards exactly. This can be achieved with a properly organized well equipped field laboratory at the site and centrally located at office.
- A Quality Assurance System to have any credibility must comply with ISO 9000 and ISO 14000.
- The construction specification in similar project to be executed in future should be modified based on lessons learnt during quality control exercised on previous projects.
- Quality of work largely depends upon the quality of materials to be used and workmanship. The relevant specification in respect of materials/ workmanship given in various IS codes be strictly adhered to for accomplishment of QA/QC.
- QC should be exercised at different levels such as pre-construction, during construction and post-construction.
- As far as possible use of materials for structural members fabricated under controlled condition and strict supervision should be encouraged.

1. INTRODUCTION

The construction industry has been struggling with quality issues for many years, and the cost to our economy is dramatic. The cost could potentially be reduced significantly if the industry were to embrace the concept of quality assurance that has been used with great success by many other sectors of the economy. The construction industry is unique, and therefore, the application of quality assurance requires an approach that meets the needs of the industry.

The quality assurance and quality control is having broad meaning as per as various sectors are concerned. In general to understand this concept of quality, we formulate four questions as follows,

1. What is mean by Quality?
2. How it is achieved?
3. What is Quality Assurance?
4. What is Quality Control?

The presence of quality is important in every service or product and it can be defined as:

- Quality is conformance to requirements or specifications.
- Quality is fitness for use.
- Quality is the degree to which a set of inherent characteristics fulfils requirements.

Quality cannot be differentiated as fair quality, moderate quality, quite poor or quite good quality.
1. Quality Control:
The dictionary defines Quality Control as the inspection, analysis and action required to ensure quality of output; the operational techniques and the activities used to fulfil and verify requirements of quality; a procedure for keeping quality of inputs or outputs to specifications.

1.2 Quality Assurance:
Quality assurance is about being “in control” of all major areas of your business so that you can assure quality. Being “in control” also reduces variation, which improves quality. “Control” and “variation reduction” is accomplished using various methods.

1.3 Achieving the quality of plan:
Following criteria’s provide guidelines to achieve quality of plan:

1.3.1 The plans should be accurate and thorough representation of existing project site and terrain features as well as future/proposed features and details of project to be constructed. The development process should be documented in detail and it should have consideration of all the affected parties and developmental stage owners throughout all stages of development.

1.3.2 The plans will be consistent with other plans developed and will comply with all standards and guidelines set by the design manuals.

1.3.3 The plans should be clear such that it will not contain any design errors or omissions which will require more than one addendum during the project advertisement period.

1.3.4 The plans should be correct such that it will not contain any design errors or omissions which will cause the delay, postponement, or cancellation of the project letting.

1.3.5 The plans should be Constructible such that it will not contain design errors or omissions that require more than two change orders throughout the construction phase which individually causes an increase or decrease of more than 3% of the original contract bid award amount or causes an increase or decrease in the contract time by more than one day.

It is recognized that good communication and significant effort by all “stakeholders” is necessary to meet the 5 C’s and achieve the desired result of a quality set of plans.

1.4 Objectives of the study:
The objectives of the study is 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’ is to define activities / tasks that focus on achieving customer’s quality expectations.

II. LITERATURE REVIEW
Shailendra Nigam et al [1] stated that Time, cost and quality are the important factors that affect the development of project. These factors must be in balance as any neglect of one will have a corresponding detrimental effect upon the other two. This follows the mathematical rule that an alteration to any angle in a triangle will amend one or both of the other angles. For maintaining the balance between time, cost and quality, an interest in quality assurance is developed.

QA requires you to define in writing precisely what you do. Put simply;

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<tr>
<th>S.NO</th>
<th>QA system means</th>
<th>Results in</th>
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<tr>
<td>1.</td>
<td>Efficient use of time</td>
<td>Time available to site manager</td>
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<td>2.</td>
<td>Addressing items in good time</td>
<td>Time saved in crisis management</td>
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3. Providing solutions drawn from past experience of others | Source of ‘experience’ for site management
4. Generating pertinent records | Generating pertinent records
5. Providing solutions by reviewing corrective and preventative actions taken | Reduction in replicated errors
6. Placing responsibility where it is intended to be | Source of records if required

Alan Huitson and Joan Keen et al [2] in the paper defined quality as the degree to which product is likely to meet the desired specification & limits given by the construction agency. This control ensures that the work done must be of required quality and durability. This can be achieved by conducting inspection from the source of supply of material up to the finished production. Major items of control before and during construction are verifications of soil characteristics, drawings and designs, structural safety, durability, checking the quality of materials, specifications, testing of materials and inspection of equipment. The IS specifications as contained in IS code should be studied and thoroughly employed while executing the work. Various test has to be done periodically for quality assurance. Quality improvement rely on advanced technology which needs to be recognized especially relating to quality control and reduced cost by use of software for structure analysis and design.

B. Janakiraman and R. K. Gopal et al [3] explains the process of quality control that includes quality planning, training, providing clear decisions and directions, constant supervision, immediate review of completed activities for accuracy and completeness, and documenting all decisions, assumptions and recommendations. The plan shall include, but is not limited to, the following areas:

- Organization
- Quality Control Reviews
- Proposed method of documentation of comments, coordination responses and quality assurance records
- Quality Assurance Certification

From the above literature reviews it can be summarized that, time, cost and quality are main three aspects of the construction project and management of time and cost along with maintaining quality of work leads to project effectiveness i.e completion of project within the estimated time, cost and specified quality. For project effectiveness, the construction work should be inspected throughout the lifecycle in all aspects such as material, workmanship, documentation, record keeping, coordination etc. It also depends on the inter relationship between client and contractor.

### III. IMPLEMENTATION OF QUALITY ASSURANCE AND QUALITY CONTROL IN CONSTRUCTION SECTOR

Quality assurance activities are performed by the owner or his agents in monitoring the quality control programme established and administered by others. Most quality assurance activities focus on administration and surveillance functions. The Surveillance function will generally include:

a) Monitoring laboratory and field testing of construction material and completed works. Reviewing contractor's compliance with specifications, requirement for construction methods and personals.
b) Monitoring or performing pre-operational tests or both.
c) Preparing and maintaining quality assurance manuals.

The administrative functions will include:

a) Initiating, analyzing and approving design, clarification or changes in contract documents.
b) Documenting all project related tests, inspection and visits by official visitors.
c) Maintain photographs of construction progress and other relevant construction events.
d) Maintain record of job oriented communication like telephonic conversation memorandum and letters etc.

- Quality control can be maintained by the utilization of sound engineering practice, professional attitudes, good construction practices and quality. Quality control program is an element of Quality Assurance Programme. It entails performing inspections, tests, measurements and documentation necessary to check, verify and correct the quality of materials and methods and through them the quality of construction. Quality can never come by accident. The best concept of quality control has to be prevention of defect rather than detection and rectification.

- To achieve good quality in work certain activities are required to perform such as planning and scheduling of activities, documentation and maintaining records, filing and indexing the records, communication between on site construction personnel and quality control personnel and training of inspection employee etc.

- Quality checks are required to achieve good quality. The builder needs to check the supplier or manufacturer before the items are purchased. As well as, the contractor needs to check the quality and type of material received on site, periodical check on stored material for deterioration. It is also necessary for supervising agency to check the contractors work quality, verification of test results by independent test and detailed and independent inspection of the materials, methods and the finished items.

IV. CONCLUSION

A quality system is a mechanism by which a company can organize and manage its resources to achieve, sustain and improve quality economically. Quality Systems are analogous to financial control systems, information technology systems and personnel management systems. Thus it can be stated that, quality is doesn't happen by chance, it has to be managed at every stage of the product. A well directed quality auditing programme should be focused upon making the procedures more effective in terms of both Total Quality and company's aims. Inspections of material and workmanship should be done periodically. The client as well as contractor must hire qualified engineers for inspection and execution of work respectively. The reports of inspections as well as supervision must be discussed and documented for any modification/alteration in the achieving the desired quality. While taking the efforts for maintaining quality one should always keep the estimated time and cost in mind. For project effectiveness along with implementation of quality assurance and quality control for achieving quality, it is important that the project should complete within the estimated amount and should be delivered within designed time period.

V. REFERENCE

[17] Duncan, A J: "QUALITY ASSURANCE IN CONSTRUCTION".