ISSN 2394-3777 (Print)
ISSN 2394-3785 (Online)
Available online at www.ijartet.com

International Journal of Advanced Research Trends in Engineering and Technology (IJARTET)
Vol. 4, Special Issue 11, March 2017

A STUDY ON THE EFFECT OF ISO QUALITY MANAGEMENT SYSTEM FOR THE IMPROVEMENT OF CONSTRUCTION PROJECT PERFORMANCE

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***Abstract*—Quality is important in the Engineering and construction industry because of risk involved in any project. Firstly all the quality factors are to be identified, understand the significance of various quality factors and its affect in the construction project. If it is done so, then it will be easy to mitigate the risk in construction industry due to the issues in quality. An international effort to identify the key elements of a quality system has resulted in a series of quality standards, ISO standards . This project deals with identification and analysis of various quality factors, and a comparative study on quality between ISO certified and a non ISO certified construction companies to be done by conducting a detailed survey through questionnaires. The collected data through the survey will be analyzed to find out the quality issues and suggestions will be given to non ISO certified construction companies to improve their quality standards. This also helps the customer in understanding the importance of quality management while choosing a contractor.**

***Keywords*—ISO certificated**

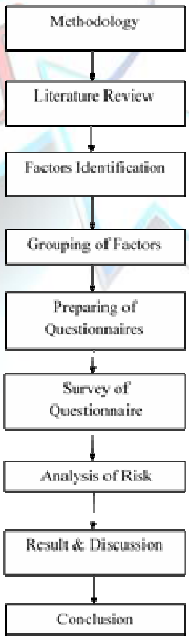
I.INTRODUCTION

Quality has become a very popular subject in recent years due to conceptual changes in the industry. The definition of quality in the past as ―compliance to standards‖ is now found to be inadequate and replaced with the current definition as ―customer satisfaction‖. The approach to quality has evolved from control (QC) to management (QM) through assurance (QA) and reached policies like Total Quality Management (TQM). In developed countries, where quality systems have been established long time ago, the principle has become to produce quality rather than to control it at the end. The new approaches are not only beneficial to the customer but also to the manufacturer as cost of quality are optimized to minimize the totalloss. The results are less cost per unit of better quality, more shares in the market and increased profits. In construction industry, the quality is generally considered to be very costly, and QC or QC/QA organizations are established only as a result of contractual requirements. In construction industry, production is different from factory or plant production; therefore quality considerations need special care. Especially when the production (construction/installation) is not in place, cost of remedial works may go extremely high if attention is not paid to quality assurance. In the modern construction market, quality is a major function in construction organization. Quality is rapidly becoming as important factor as price has been traditionally..

II. AIM, OBJECTIVE AND RESEARCH QUESTIONS

- Creates greater customer confidence and satisfaction.
- Improves market confidence in the construction industry.
- Increases the overall profit of the company.
- Reduces compliance with applicable rules risks.
- To Increase credibility and competitiveness.
- To improve communication, planning and administration.
- To have better cost management.
- To maintain competitive edge in the industry.
- To reduce the wastage of materials in the work.

III. METHODOLOGY



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IV. QUESTIONNAIRE SURVEY APPROACH

QUALITY FACTORS

1. Quality planning
2. Continuous improvement
3. Defect prevention
4. Zero defects
5. Supplier certification
6. Quality circle
7. Quality audit
8. Quality assurance
9. Roll of quality department
10. High level of customer satisfaction
11. Performance improvement
12. Parameters
13. Dimensions of quality
14. Quality culture in organization

V. QUESTIONNAIRE RESPONSE

ISO CERTIFIED COMPANY

Totally ten number of ISO certified companies were chosen in and around Coimbatore and Erode district, prepared questionnaire were distributed among the Quality Engineers, site Engineers and the project in charges. The responses were consolidated using RII method and top fifteen factors were taken. The response has been enclosed in appendices.

NON ISO CERTIFIED COMPANY

Totally ten number of Non ISO certified companies were chosen in and around Coimbatore and Erode district, prepared questionnaire were distributed among the site Engineers and the project in charges. The responses were consolidated using RII method and top fifteen factors were taken and comparison is made between top factors of both ISO certified and Non ISO certified companies. The response and comparison has been enclosed in appendices.

QUALITY MANUAL

The quality manual explains the quality management system prevailing in the M/S ISO certified constructions. The quality manual, associated Quality system procedure, process modules and third level documents are established for implementing and compliance towards ISO 9001:2008. Management Representative (MR) is appointed for all activities related to ISO 9001:2008 Quality management system and certification. The Management Representative (MR) prepares and the Executive Director reviews and approves quality manual. The purpose of quality manual is to achieve consistency and continual improvement in various activities for satisfying the customer with quality product/service at right time. It also forms the basis for audit / evaluation of system for carrying out further improvements. To be used as a tool to help new incoming personnel to understand policy, procedures, and methodology followed within the organization to deliver quality product / services consistently. .[9] analyzed microwave waveguides and components such as microwave T junctions , circulators, attenuators and Isolators.

CUSTOMER FOCUS

Organization depends on their customer and therefore should understand current and future customer needs, should meet customer requirement and strive to exceed customer expectations.

LEADERSHIP

Leaders establish unity of purpose and direction of the organization. They should create and maintain the internal environment in which people can become fully involved in achieving the organizations objective.

INVOLVEM ENT

People at all levels are the essence of an organization and their full involvement enables their abilities to be used for the organizations benefit.

PROCESS APPROACH

A desired result is achieved more efficiently when activities and related resources are managed as a process.

SYSTEM APPROACH

Identifying, understanding and managing inter related processes as a system contributes to the organizations effectiveness and the efficiency in achieving its objectives.

IN PROCESS INSPECTION PLAN

Construction projects involve the co-ordination of a great number of people, materials and components. Regular inspection is a crucial part of ensuring that the works progress as intended both in terms of quality and compliance. Inspection will be carried out for a number of different purposes throughout the duration of a project. The inspection process is a separate from the contractors own supervision of works. Inspection is carried out purely to give an independent view of the works either for the client or a third party. In process inspection plan deals with inspecting the work throughout the work progress to ensure the quality of work. The results of the inspection are documented for further audits which serve as an evidence.

RECEIVING INSPECTION PLAN

Construction work deals with the involvement of more number of materials and equipment,,s. The quality of work executed depends on the quality of material used, so whenever a material is received inside a site it should be checked for its quality. This inspection is carried out by personnelfromquality control and quality audit department. The results are documented for further reference; the documentation consists of the following material, section, and parameter to be checked,

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method of testing, sampling procedure, acceptance criteria, responsibility, record no / document number.

FINAL INSPECTION PLAN

The final inspection plan provides us the information about the quality of work executed. In case of any defective work is been found during inspection corrective and preventive action is to be done. Corrective action is initiated to eliminate the cause of non – conformities and to prevent reoccurrence of the same. Corrective actions are taken appropriately depending upon the impact of problems encountered.

RFI & RFA

RFI stands for request for inspection and RFA stands for request for acceptance, whenever a material enters into the site, site engineer or the stocking in charge sent RFI & RFA to the quality department requesting them to test and approve the material for their quality. Only when the test result is satisfying with some acceptance criteria the material is allowed to enter into the site otherwise the material is rejected.

CHECK SHEETS

he check sheet is a form (document) used to collect data in real time at the location where the data is generated. The data it captures can be quantitative or qualitative. When the information is quantitative, the check sheet is sometimes called a tally sheet. The check sheet is one of the so-called Seven Basic Tools of Quality Control. In ISO certified company for each and every part of work check sheets are used to find the accuracy of work carried out.

VI. SUGGESTION AND IMPLEMENTATION

Suggestions are prepared based on the result obtained from questionnaire survey using RII method. When these suggestions are implemented, the fifteen quality factors listed in the consolidated output will definitely be improved from its current factor value. The suggestions are given below,

Quality circle

Quality department

Continual improvement

Systematic work

Check sheets

QUALITY CIRCL E

A quality circle is a group of workers who do the same or similar work, who meet regularly to identify, analyze and solve work-related problems. Normally small in size, the group is usually led by a supervisor or manager and presents its solutions to management; where possible, workers implement the solutions themselves in order to improve the performance of the organization and motivate employees. Typical topics for the attention of quality circles are improving occupational safety and health, improving product design, and improvement in the workplace and manufacturing processes.

QUALITY DEPARTMENT

Quality management ensures that an organization, product or service is consistent. It has four main components: quality planning, quality control, quality assurance and quality improvement. Quality management is focused not only on product and service quality, but also on the means to achieve it. Quality management, therefore, uses quality assurance and control of processes as well as products to achieve more consistent quality. Establishing quality department with experts for controlling and assuring quality is very important in all organization.

CONTINUAL IMPROVEM ENT

A continual improvement process, also often called a continuous improvement process, is an ongoing effort to improve products, services, or processes. These efforts can seek "incremental" improvement over time or "breakthrough" improvement all at once. Delivery processes are constantly evaluated and improved in the light of their efficiency, effectiveness and flexibility. The business world is highly competitive and dynamic. Customers increasingly demand better quality products, service, support and costs. They will go elsewhere, if your organization cannot keep pace with their expectations and requirements. The expectations of other shareholders are equally demanding in terms of increasing profitability and rewards. If businesses stand still, they will lose their competitive edge, so improvements must be made to keep pace with stakeholder demands and expectations; and to be viable and grow.

The following steps provide a practical approach to undertaking continualimprovement

1. Identify the opportunity - using the tools identified above

2. Evaluate the current situation - existing controls, resources, risks, etc.

3.Select appropriate diagnostic and problem-solving tools

4. Analysis - the root cause of the problem should be identified and evaluated.

5. Where possible, do a cost/benefit analysis to establish economic feasibility

6. Obtain management and process owner commitment, adequate resources; and define the improvement objective.

7. Identify solutions and implement the optimal solution to achieve improvement objective

8. Evaluate the effects of the implemented solution - has root cause been eliminated and improvement objective achieved?

9. Standardize and formalize the change - implement new technology, training, communication, documentation, records, change management, etc.

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ISSN 2394-3785 (Online)
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l. 4, Special Issue 11, March 2017

10. Apply successful improvements to other similar products, processes and situations in the organization.

SYSTEMATIC WORK

Each and every work should be carried in a systematic work which is described below,

i) Core processes

Core process deals with customer related process, design and development, project execution, project planning, construction and quality control activities are identified as core process.

ii) Support process

Purchase, control of measuring and monitoring equipment, vendor development- subcontractors and service providers, storage and preservation, maintenance, housekeeping and training are some of the support process.

iii) Management process

Management process involves planning, QMS planning including internal audit and management review meeting, delegating of responsibility and authority, resource mobilization and infrastructure development.

CHECK SHEETS

Check sheets are to be used for each and every activity. Data collected using check sheets can be used for further improvement in quality.

After implementing the above mentioned suggestions in one of the non ISO certified construction firm some of the problems were rectified to improve the quality which is described below, the firm faced a problem with unloading of materials, i.e. whenever materials enter into the site in lorries the drivers used to unload only half of the material and they will take back remaining. To solve this issue workers formed a quality circle and came out with a solution. They have implemented a system in which there is weighing system along with cameras which will take photos focusing the lorry registration number along with time of weighing. After unloading the lorry again goes to weighing system now weight of the lorry along with photo and time is recorded. After implementing this system more cheating have been rectified and right quantity of material is being delivered at right time.

Since the firm is a developing one, separate quality department cannot be established so site engineer have been instructed to act as quality engineer. Site engineer is testing the material for quality control and quality assurance subjecting to some acceptance criteria.

Three types of communication system have been implemented for the purpose of continual improvement. Communication type are mass communication, customer feedback, customer enquire, customer compliant. With the help of this type of communication feedbacks are received from customers which include additional wash basin must be provided in dining area in hall since it is a hall attached dining hall which is not provided now. It is going to be included from next villa.

V.RESULTS AND ANALYSIS

The population targeted was professional working on construction projects.with an experience of more than 4 years. The respondents were approached over the internet and personal meetings depending upon the availability and location of the projects. The questionnaire is distributed to around 25 companies and the data is collected. The respondents are mainly from private sector and having satisfactory working experience. Among them major of the engineers are having a bachelor degree in engineering. Some of the respondents also have additional post graduate qualification.

Ranking

To assess the likelihood of each identified factor in the construction projects five point likert-scale of 1-5 was used, where scale of 1=very low,2=low,3=moderate,4=high and 5=very high. All the respondents were asked to rank each factor as per degree of important. The identified factors were then ranked on the basis of relative importance Index(RII). The equation used for RII is

$$RII=\sum$$

W is the weight given to each factor by the respondents and ranges from 1 to 5.

A is the highest weight=5

N is the total number of responses collected for the ordinal scale.

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S NO	QUALITY FACTOR	RII	
		ISO	NON ISO
1	Do all the technical persons involved in the project are skilled and have wide experience?	0.95	0.65
2	Is the drawing are clear and have full furnished details along with detailed specifications?	0.95	0.76
3	Do you test the materials before using in site to ensure the quality?	0.95	0.76
4	Do you follow any management system for controlling labor work?	0.95	0.52
5	Do your employees are given training according to their requirements?	0.95	0.64
6	Do you giving incentives and rewards for your employees for their better performance?	1	0.72
7	Does the company encourage innovation ,creativity and smart work in employees?	0.95	0.68
8	Is the company‟s process is managed systematically and improved regularly?	0.95	0.72
9	Is the company‟s performance is measured?	0.95	0.76
10	Do you have check list procedure for doing each and every item of work?	0.95	0.76
11	Do you implement systematic quality control, quality assurance and quality police in your site?	0.95	0.64

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VI. CONCLUSION

This thesis was studied and gathered information regarding quality issues and problems that vary between ISO certified Construction Company and non ISO certified construction company. Literatures have been collected and studied regarding quality management, ISO and related issues. The questionnaire was prepared based on literature collection, real time issues existing in site and with Juaran,,s quality policy as a base. Questionnaire survey, analysis, identification of quality issue has been done and suggestions have been given to non ISO certified company and the result was traced.

After applying the suggestions in order to improve the quality of non ISO certified firm a weighing system along with camera system has been executed. Site engineer is instructed to act as quality engineer and also to test the materials before accepting. From the suggestion got from customer an, extra washbasin is going to be provided in fore coming villas for comfort. Check sheets have been prepared with the help of site engineer which will be followed from next project. By implementing these suggestions quality factors will definitely be improved.

This thesis will be helpful in identifying how the quality varies between ISO certified construction company and a non ISO certified construction company, and how the quality can be improved , this also helps the customer in choosing construction firm to execute their construction work in a qualitative way.

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ISSN 2394-3777 (Print)
ISSN 2394-3785 (Online)
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International Journal of Advanced Research Trends in Engineering and Technology
ET)
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