

Study on the Impact of ISO Certification on the Quality Culture of Construction Companies

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Abstract - In recent years, an increasing number of organizations are obtaining accreditation offered by the International Organization for Standardization (ISO). ISO certification may reflect an organization's pursuit of a quality-focused business strategy and a commitment to quality management practices. This study investigates whether there is significant difference in the quality of construction between ISO 9001 and Non-ISO 9001 certified companies. The purpose of this study is to compare the quality of construction in ISO and Non-ISO certified Companies, identify the quality performance of the companies which helps to improve customer service and minimize the reason behind lack of quality. Comparison between ISO and Non-ISO certified companies is done by taking various factors in to consideration and provides worthwhile suggestions to the customers. This research is based on quantitative approach. The questionnaires are based on previous literatures and the various factors influencing the quality of construction were identified. Questionnaire survey is conducted at both ISO 9001 and Non-ISO 9001 certified companies to collect data. The collected data is interpreted statistically by SPSS tool to get the differences in quality. By comparing those studies we can understand the differences in quality objective, quality policy which will imply mostly on the quality of the construction with respect to time, cost and reputation. At last suggestions have been provided to the companies which have poor quality objective, quality policy and the construction quality to improve customer satisfaction.

Key Words: International Organization for Standardization (ISO), Quality Management System (QMS), SPSS (Statistical Package for Social Science), Total Quality Management (TQM), Gross Domestic Profit (GDP)

1. INTRODUCTION

1.1 General

Construction industry is the largest contributors to the Gross Domestic Profit (GDP) of any country. In recent years, construction projects have increased rapidly, private and public sectors are investing more funds into property development. The expectation of quality product has increased, as investment increases. Now quality

management has become an integral part of construction. Acknowledging the quality issues in construction and increasing demand for quality products, specific regulations to the implementation of the Quality Management System have been framed. ISO 9001 standards were set up for this purpose [2]. Throughout the globe, the construction industry is facing problems regarding quality, time, and cost overrun. Starting of 90s several government and business organizations reported the poor performance of construction industry and low customer satisfaction. Therefore, there is a need of getting into these vital issues by initiating some alterations within the organization and such changes can be incorporated through proper implementation of QMS.

Quality is one of the critical factors in the success of construction projects. The quality in the construction industry is related with client's satisfaction and the implementation of a quality management system is a key tool in consistently and reliably managing the goal of client satisfaction. Quality management system (QMS) could be implemented either at the organization level or at the project level itself. Quality of construction projects is linked with proper quality management in all the phases of project life cycle. In the year 2000 NEDO (National Economic Development Office), London survey aimed at improving methods of quality control for building works it was found that "design" and "poor workmanship in the construction process" combined to form more than 90% of the total failure events [3].

Customers are demanding increasing levels of quality of the products provided to them. They expect higher levels of quality and are becoming intolerant of poor quality. To satisfy customers and to be competitive, managers need to find cost-effective ways to continuously improve the quality of their products [4]. The effect of quality management in any organization is directly proportionate to profit and customer satisfaction. A good quality management system will reduce deficiencies which will bring down the cost and increase customer satisfaction. Organizations depend on their customers and therefore should understand current and future needs, meet their requirements and strive to exceed customer expectations [5]. The challenge for an organization that seeks to become a total quality organization is to achieve a zero gap between customer

expectations and performance or to deliver a product or service that exceeds customer expectations.

Quality Management has increasingly been adopted by construction companies as an initiative to solve quality problems and to meet the needs of the final customer. But implementing QMS principles in construction industry is particularly difficult because of the many parties involved.

1.2 ISO Quality Standards

The International Organization for Standardization (ISO) issued a set of international standards for quality management adopted by more than (90) countries. ISO explains the quality in level of excellence in a competitive sense, individual uniqueness, and consistency. Therefore, many firms have taken the initiative of obtaining quality certification for the purpose of sustaining competitive advantage and improve their financial performance [1]. In addition, costs accountants, especially in manufacturing firms, started measuring the quality costs on a regular basis.

Failure in the quality of construction is the biggest failure of the project. Many delays, cost overruns, reworks, variations, claims and disputes are the result of poor quality in construction companies. ISO 9000 series of standards were developed to overcome these problems. ISO 9001 is one such standard followed in the construction which helps in QMS implementation. Quality Assurance, Quality Control, Quality Plan and quality improvement are the terms associated with quality management. Quality systems are defined as the organizational structure, procedures, processes and resources needed to implement quality management [7]. ISO 9001 specifies certain set of quality system requirements which has to be followed to meet customer satisfaction.

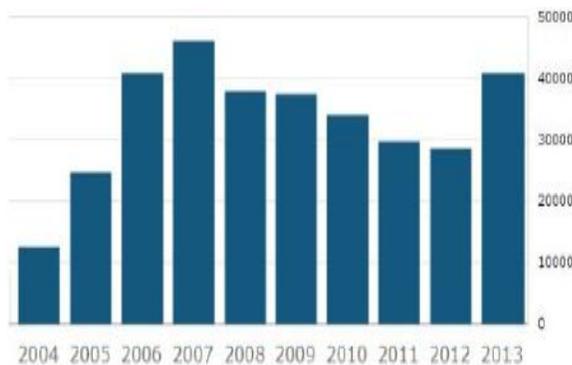


Chart – 1: Number of organizations certified to ISO 9001 in India [2]

X-axis denotes the year and the Y-axis denotes the number of certifications in India. In the year, 2004 only 10000 organizations were certified to ISO 9001 and later it is rapidly increased till 2007 where 45000 organizations are certified to ISO and then decreased from 2008 till 2012. Again from 2013, 40000 organizations are certified to ISO 9001. Thus, this chart indicates that there are nearly 40000 organizations certified to ISO. So, there is a need to check the quality of construction in both ISO and Non-ISO companies.

This study therefore, focuses on the quality of construction between ISO and Non-ISO companies. The aim of this study is to highlight the importance of quality management in construction companies which helps to improve customer’s needs, expectations and interests and minimize the reason behind the lack of quality.

1.3 Quality Management System

The results of a survey on Quality in construction by FIDIC (International Federation of Consulting Engineers) have clearly indicated that the failure in construction quality is a big problem worldwide. In order to attract customers, ISO certification has become a trend in most industries including construction industry. According to ISO organization, 178 Countries are ISO members, 3335 technical bodies are responsible for standards development and 1.1 million certificates are issued across 178 Countries and Economics [8]. By the end of the year, Quality management refers to all activities of overall management functions, especially top management leadership, that determine quality policy objectives and responsibilities for all members of the organization.

Quality Management is a complex of co-ordinate activities to lead and control an organization, as far as quality is concerned. To lead and control an organization, as regards quality, means to define-Quality policy, quality objectives, quality planning, resources allocation, quality control, quality assurance, quality improvement [6].

Therefore quality management means what the organization does to ensure that its products conform to the customer’s requirements. It is the complex of measures to ensure that the needs of the client are met.

1.4 Objectives of Study

1. To identify the performance of companies regarding construction quality.
2. To compare the quality of construction in ISO and Non-ISO Companies

3. To determine whether there is significant difference between ISO and Non-ISO Companies by statistical analysis and provide recommendations to Non -ISO Companies to improve quality.

1.5 Need for Study

1. Identify quality performance of company.
2. Helps to improve customer's needs, expectations and interests.
3. Minimize the reason behind lack of quality.

2. METHODOLOGY

2.1 General

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.

1. After title conformation relevant literatures were collected. From the literature the problem and issues were identified.
2. Framing the questionnaires based on the analysis from the various people of construction industry, literature review.
3. Group the companies based on the methodology.
4. Conduct the questionnaire survey in predefined companies.
5. Analysis the data using SPSS software.
6. Find out the factors that affects the quality of construction.
7. Determine whether there is significant difference in the quality of construction between ISO Certified Companies and Non-ISO Companies.
8. Conclusion and Suggestions.

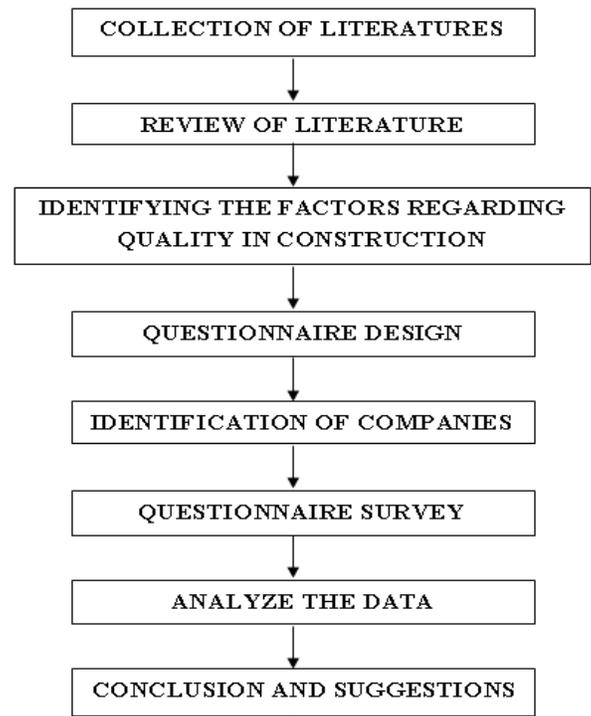


Fig - 1: Methodology Flow Chart

2.2 Design of Questionnaire

A questionnaire was designed to study more about the quality management practices in the construction industry and ways to improve quality in construction works. The questionnaires were prepared with reference of literature reviews and from the ISO standards which include the main quality principles. Questionnaires are focused from the top management to the construction part because top management plays a very important role for the implementation of quality practices. Questionnaires are prepared by the factors which have been identified. The questionnaires reliability is checked by creating the reproducible results. Each time the factors are used, to obtain similar scores. The questionnaire said to reliable if the answers are repeatedly same. Though it cannot be calculated exactly, it can be measured by estimating correlation coefficients.

2.3 Questionnaire Survey

Questionnaire survey was conducted among the construction professionals to identify the performance of quality in construction companies. The questionnaire survey is conducted both in ISO and Non-ISO companies. The study is conducted by developing a questionnaire and collecting the response from the construction firms. For the

survey, questionnaires were framed to identify the critical factors. Questionnaire survey is the source of data collection and helps to accurately identify the quality factors. Through questionnaire survey, various opinions towards quality in construction companies were collected.

2.4 Analysis

After collecting the data from different sources, the collected data with respect to the variables like Top Management Commitment, Customer Satisfaction, Customer Focus, Communication, Materials, Human Resources, Training, Workmanship and Construction were analyzed using Statistical Package for Social Sciences (SPSS). The graphical models were framed by this tool; to evaluate the quality culture and determine whether there is significant difference in ISO certified companies and Non-ISO companies. The tests performed for this study in SPSS are Reliability test, Frequency test, Independent Sample t-test and Factor Analysis.

3. RESULTS AND DISCUSSIONS

3.1 Reliability Test

Reliability test was done in SPSS tool to find out the internal consistency. It is used to determine if the scale is reliable. This test was done after the data collection from various respondents; from various companies. If the reliability value is below the limit (0.5) then the questions are said to be unreliable or invalid for this study. If the result value of this test is above the limit, then only the collected data can be used for other test purposes.

Table - 1: Reliability Statistics

Reliability Statistics	
Cronbach's Alpha	N of Items
.946	30

The above table 1 shows the alpha value and their internal consistency level. The value obtained from this test is **0.946**, which indicates a high level of internal consistency i.e. the questionnaire are said to be more reliable.

3.2 Independent Sample t-test

Independent t-test was performed for various factors like materials customer satisfaction, customer focus, communication, top management commitment, human

resources, training, workmanship and construction to determine whether there is significant difference between ISO certified companies and Non-ISO companies. The results of this test for material factor is shown in below table -

Table - 2: Group Statistics for Materials

		Group Statistics			
	Certification	N	Mean	Std. Deviation	Std. Error Mean
Procurement of construction materials is done in time.	ISO Certified	7	3.57	.872	.098
	NON-ISO Certified	9	3.65	.481	.054
		7			
		9			
Incoming building materials are inspected to check whether they are in line with specifications.	ISO Certified	7	3.76	1.040	.117
	NON-ISO Certified	9	3.95	1.011	.114
		7			
		9			
Construction materials are tested either from site-testing laboratory/external testing laboratory.	ISO Certified	7	3.71	1.052	.118
	NON-ISO Certified	9	3.38	.538	.061
		7			
		9			
Site testing laboratory is used.	ISO Certified	7	3.59	1.007	.113
	NON-ISO Certified	9	3.18	.525	.059
		7			
		9			
Materials are used effectively.	ISO Certified	7	3.56	.843	.081
	NON-ISO Certified	9	4.35	.717	.081
		7			
		9			
Materials are maintained during storage.	ISO Certified	7	3.56	1.071	.121
	NON-ISO Certified	9	3.75	.980	.110
		7			
		9			

The table 2 results the group statistics of materials for ISO certified companies and Non-ISO companies. This result concludes that there is significant difference between ISO certified companies and Non-ISO companies, since for each item of this factor, mean value differs for both ISO certified companies and Non-ISO companies which has an equal of 79 samples.

Table – 3: Significant Value for Materials

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	t	df	Sig. (2-tailed)
Procurement of construction materials is done in time.	Equal variances assumed	30.683	.000	-.677	156	.499
Incoming building materials are inspected to check whether they are in line with specifications.	Equal variances assumed	2.627	.107	1.163	156	.247
Construction materials are tested either from site-testing laboratory/external testing laboratory.	Equal variances assumed	25.478	.000	2.476	156	.014
Site testing laboratory is used.	Equal variances assumed	43.467	.000	3.270	156	.001
Materials are used effectively	Equal variances assumed	5.303	.023	-6.403	156	.000

Materials are maintained during storage	Equal variances assumed	3.353	.069	-1.162	156	.247
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The table 3 indicates the significant value of materials for ISO certified companies and Non-ISO companies. This result concludes that there is significant difference between ISO certified companies and Non-ISO companies, since the items of the shows significant value below 0.05 which indicates 1% and 5% level of significant difference between ISO certified companies and Non-ISO companies for material factor.

Similarly for all the factors, group statistics and significant value were computed and concluded as per the results found.

3.3 Factor Analysis

The most contributing factor responsible for the quality of construction in ISO certified companies and Non-ISO companies was identified by factor analysis in SPSS. Figure 6 is the descriptive statistics of each factor.

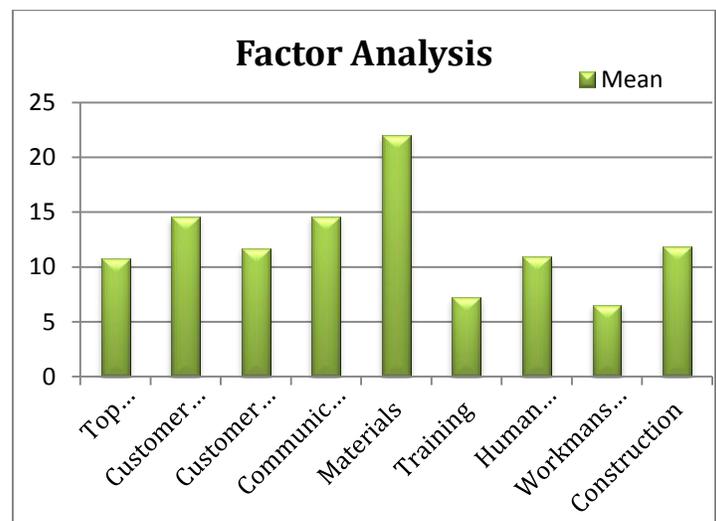


Chart – 2: Factor Analysis Graph

This result concludes that, materials play an important factor in the quality of construction, without which it leads to a poor quality of construction in both ISO certified companies and Non-ISO companies. The factor which affects the quality of construction is workmanship, it results that workmanship has to be improved in both in ISO certified companies and Non-ISO companies.

4. CONCLUSIONS

This study concludes that, there is significant difference in the quality of construction between ISO certified companies and Non-ISO companies, where the significant value for most of the quality factors range from **0.000 to 0.05**, which indicates **1% and 5%** level of significant difference between ISO Certified Companies and Non-ISO companies. Then from factor analysis, the main contributing factor for the quality of construction is material henceforth workmanship has to be improved in both ISO certified companies and Non-ISO companies, where quality awareness should be provided to the workers to improve the quality culture, customer satisfaction, customer's needs, expectations, interests, reduce the wastage cost and finally to reduce the lack of quality.

5. SUGGESTIONS

For ISO certified companies; quality policy, quality objective, quality training and paper works has to be maintained to retain the ISO certification, workmanship should be improved, to improve quality culture, customer satisfaction and reduce rework which leads to wastage of cost. Proper communication regarding the quality failures has to be made to the top management. Quality manual for the existing building should to provided and maintained.

For Non-ISO companies; competence, training and awareness have to be developed in the organization and should be given importance. Proper training has to be provided to the employees to improve workmanship and reduce rework or faulty work, maintain quality standards to avoid accidents and save human life. A skilled quality team in every firm is very useful to achieve a good quality culture. Rework has to be reduced in order to reduce time and cost overrun.

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