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Adaptability of ISO Quality Standards in Construction Industry

[1]Muhammad Akram Akhund, [2]Shabir Hussain Khahro, [1]Fida Hussain Siddiqui and [1]Ali Raza Khoso
[1]Department of Civil Engineering, Mehran University of Engineering and Technology, Jamshoro, Pakistan
[2]Department of Engineering Management, Prince Sultan University, Riyadh, Saudi Arabia

Abstract: Quality Management System (QMS) development is prioritized demand of various firms throughout the world, especially in developing countries. This study identifies the ISO 9000 quality principles and its level of implementation in construction firms in Pakistan. These are used globally and accepted as the major principles of ISO 9000 based on QMS. This study also highlights the barriers in implementing and maintaining an ISO based QMS in construction firms of Pakistan. Structured interviews with architects, clients, consultants and constructors of ISO certified firms were conducted and ISO documents were also reviewed. The findings of this research show that company focuses on customer requirements and tries to exceed customer expectations the leaders establish unity of purpose and direct company consequently. They create and maintain integral environment make employees participate in achieving the company's objectives are most crucial factors of ISO 9000 based on QMS. Current research will help in resolving issues of implementing ISO 9000 QMS in construction firms and help Pakistani construction companies to improve their quality management standards.

Key words: Quality management system, ISO 9000, construction industry, Pakistani, company's, quality

INTRODUCTION

Quality is a necessary component for customer satisfaction, sustainability and socio economic development (Palaneeswaran *et al*., 2006). Quality is meeting the functional, aesthetic and legal requirements of any project (Arditi and Gunaydin, 1997). Since, 1980's, it has been focus of researchers and converged audience's attention to adopt QMS in the projects at global level. USA, UK and Japan introduced ISO standards in different organizations firstly. Gradually, the same system was adopted by construction sector as well. After successful implementation of ISO standards in these countries, construction firms of developing countries also started working for adopting ISO standards. Manufacturing projects are different than construction projects. Thus, the speed of implementation of ISO standards in construction sector is quite slow (Memon *et al*., 2011). International Organization for Standardization (ISO) is the world's largest non-profit organization to develop and publish international management system standards on various subjects such as ISO 14001:2004 (Requirements for an Environment Management System), ISO 9001:2008 (Requirements for a QMS), Information Security Management Standard (ISO 27001:2005), Food safety standard ISO 22000:2005. More than 180 countries from entire world are the members of ISO. Every member country has a representative, all working in a team to brainstorm the concepts and finalize it as an international standard. These standards then become applicable to all concerned organizations irrespective of their size, location and scope (ISO., 2001, 2002, 2003, 2004, 2005, 2008, 2009). Organizations possessing ISO 9001 certification are supposed to have an effective quality system and achieve maximum profit, customer satisfaction, improvements, employee motivation, minimum reworks, rejections, problems and customer complaints. As the ground reality questions this theory, current study was initiated to identify level of implementation of ISO 9000 (QMS) principles and barriers in deploying ISO 9001 (QMS) in construction firms of Pakistan.

Literature review: Quality Management System (QMS) for construction firms is a systematic strategy. The guidelines of QMS provide introduction and contents of the system for all stakeholders involved in construction firms (Sjoholt and Berg, 2003). According to 1987 bulletin from the ISO, ISO 9000 is a series of international standards dealing with QMS for external and internal quality assurance purposes (Juanzon and Muhi, 2017).

Corresponding Author: Muhammad Akram Akhund, Department ofCivil Engineering, Mehran University of Engineering and Technology, Jamshoro, Pakistan

Table 1: Literature review

Country	Researchers	Barrier
USA	Farooqui and Ahmed (2009), Chini and Valdez (2003)	Documentation, internal assessment of procedures, management attitude and purpose and insufficient resources
Saudi Arabia	Bubshait and Al-Atiq (1999)	Additional work load, increased amount of study work and high costs of certification.
Iraq	Sabah and Maha	Top management commitment, employee resistance, ISO 9001 requirements are unrealistic, absence of consulting boards, lack of human resources, financial resources, insufficient knowledge about quality programs and insufficient employee training
Malaysia	Said *et al.* (2009) and Chew and Chai, 1996)	Employee's resistance to accept change, lack of management commitment and lack of continuous training

First initiative towards standardization was achieved during World War II, problem of bomb explosions during manufacturing process was observed in factories. Then a standard was adopted to document manufacturing process and keep record that procedures were being followed accurately. That standard was called as management standard (BS 570). It specified how manufacturing process was to be managed and was not related to what is being manufactured. ISO was persuaded by the British government in 1987 to adopt BS 570 as an international standard and later on it was named as ISO 9000 series. ISO 9000:1987 had same structure as BS 570; consisting three models for QMS (Kumar, 2011).

About 1994 ISO 9000 standards focused on preventive actions for quality assurance. It required evidence of continuous compliance with documented procedures instead of just checking final product. Later, 9001, 9002 and 9003 were combined and resulted into ISO 9001:2000. The 2000 version of ISO radically brought a system of process management. No doubt, it was like previous one as an idea but more precised. Entire procedure is monitored, company's tasks and activities are optimized, instead of final product's inspection only. The new ISO 9001:2008 was published on 15 November 2008. Some important clarifications and modifications have been made like validation of software, defining the scope of control on outsourced processes, control of external documents and effectiveness of corrective/preventive action (Sharp *et al.*, 2000).

Various research studies have been conducted in global construction firms concerning various aspects of ISO certification in construction industry. In Malaysian construction industry, a research study was conducted by Said *et al.* (2009). Finding of this study is QMS in construction firms of Malaysia is very common. More than 4000 QMS certified firms are present as compared to when it was first introduced in 1987. In result, QMS has brought a positive change in Malaysian construction firms. However, few construction stakeholders of Malaysia still face problems for implementation of QMS in construction firms. Organization image, reputation enhancement, performance, customer stratification, documentation procedure and instruction establishment; All of these are the major principles of ISO-9000 in the aspect of quality system of construction firms. Quality management system (ISO-9000) standards in construction firms were not considerably implemented but it is very common in manufacturing firms. QMS have become initial point for a successful construction firm. This established systematic strategy helped many construction firms at global level, to maintain their quality according to client's requirement (Memon *et al.*, 2011; Farooqui and Ahmed, 2009). Based on literature, various researchers identified different barriers for implementing ISO quality management system in construction firms at global level. Table 1 presents most common barriers.

The existing literature review portrays that research is being carried out in different countries regarding the ISO quality standards in variety of industries. Mainly research is at peak about ISO quality standards in construction industry. It is very essential to identify the major principles of implementation and barriers for further improvement in quality of construction projects.

MATERIALS AND METHODS

Research objectives: This research aims to analyze the adoptability of ISO 9000 in various construction firms registered in Pakistan Engineering Council (PEC). This research also focuses on assessment of implementation for ISO 9000 principles and barrier faced by the construction firms in adopting a QMS system like ISO 9000.

Data collection and analysis: A comprehensive questionnaire was designed after interviews and literature review. The questionnaire was circulated among construction firms registered in PEC. The respondents were requested to rank the factor given in questionnaire on two different Likert scales. The collected data was examined with help of statistical software, i.e., Statistical Package for the Social Sciences (SPSS) Version 24.0 using Average Index (AI) method because it has been successfully used for such data nature (Sjoholt and Berg, 2003).

RESULTS AND DISCUSSION

Table 2 presents the major principles or factors of ISO implementation in construction firms in construction firms

Table 2: Respondent's views about major ISO principles implementation

Major principles	FI	PI	NI	AI	Rank
All project activities and resources are managed as a process	19	7	6	2.59	1
The leaders establish unity of purpose and direction of company They create and maintain integral environment in which people become fully involved in achieving the company's objectives	19	8	5	2.56	2
Employees of all levels are fully involved and their abilities are used for company's benefit	18	10	4	2.56	2
The company and its suppliers are interdependent and have mutually beneficial relationship	19	8	5	2.56	2
Effective decisions are based on the analysis of data and information	23	5	4	2.41	3
The company focuses on customer requirements and tries to exceed customer expectations	23	5	4	2.41	3
The company identifies, understands and manages the processes as a system	25	5	2	2.28	4
Continual improvement of company's performance is main objective of the company	24	7	1	2.28	4

Table 3: Respondent's views about barriers in Implementation of ISO quality standards

Barriers	ME	SE	VRE	NE	AI	Rank
Provision of unclear specifications from the client and main contractor	8	5	17	2	2.41	1
Lack of understanding in the quality concept	7	5	14	1	2.33	2
Difficulty in understanding ISO 9000 terminology	9	8	12	3	2.28	3
Lack of resources (money, man, machine, materials, etc.)	8	13	11	2	2.21	4
Communication barriers between department and hierarchical levels	9	10	11	2	2.19	5
Less teamwork	9	8	15	0	2.19	5
Poor performance of suppliers and subcontractors	9	11	11	1	2.13	6
Increased amount of research	10	15	6	1	1.94	7
Inadequate supervision	15	10	5	2	1.81	8
Inflexibility of employees to change and innovation	17	7	5	3	1.81	8
Lack of continuous training	11	13	8	0	1.91	9

of Pakistan. The questionnaire designed here, inquired from respondents about the major ISO principles in terms of their implementation level. Three categories were drafted in replica of a Likert scale, i.e. where principles were Fully Implemented (FI), Partially Implemented (PI) and Not Implemented (NI). The first principle "All project activities and resources are managed as a process" was preferred by nineteen people that it is fully applicable (implemented). The second major principle is leaders work effectively by creating and maintaining such an environment in which unitedly all workers move towards achievement of company objectives was assessed 19 people considering it to be FI, 8 respondents were of opinion that this principle is PI and 5 people considered it un-implemented. Another part of the questionnaire was barriers occurring while implementing an ISO quality standard in construction industry. A four point likert scale was used which includes Mostly Experienced (MS), Sometimes Experienced (SE), Very Rarely Experienced (VRE), Not Experienced (NS). Table 3 presents the barriers for implementation of ISO in construction firms of Pakistan.

The results show that provision of unclear specifications from the client and main contractor was ranked first by the experts with an AI value of 2.41. The second important barrier in implementation of ISO standards in construction industry was found to be lack of understanding in the quality concept with AI value of 2.33 in total. Difficulty in understanding ISO 9000 terminology was ranked 3rd with AI value of 2.28 in total and so on.

CONCLUSION

Numerous construction companies agreed to the major principles of ISO such as all project activities and resources are managed as a process, employee's abilities are utilized for achievement of company's objectives, efficient analysis of data and information is necessary for effective decision making. Further, the company focuses on customer requirements and tries to exceed customer expectations. This will involve all stakeholders and create integrity in projects to achieve better quality. The researchers also suggest that the company and its suppliers are interdependent and have mutually beneficial relationship is major concern for implementation of ISO principles.

The barriers are hindrances in implementation of ISO quality standards. Construction firms due to peculiar nature of projects are facing numerous difficulties. Specifications are prepared to have better quality in products made in manufacturing industry but unluckily it is not given major focus in construction industry. Due to unclear specifications in early stage, quality suffers a lot. Lack of understanding quality concept is another barrier.

It is also analyzed that Provision of unclear specifications from the client and main contractor is top most barrier followed by Lack of understanding in the quality concept".

RECOMMENDATIONS

Achieving high quality standards in construction projects is much difficult than of manufacturing industries. Quality and to meet its standards in construction projects is still a challengeable concern for its stakeholders, especially in developing countries like Pakistan. This study is a footstep in developing countries to start adopting implementation of ISO quality standards. This study is an addition in the existing body of knowledge in QMS for construction industry of developing countries. This study is a roadmap for construction firms to successful implementation of quality standards in firms to achieve successful completion of projects and quality requirements.

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