

The Implementation of Quality Management Systems in Construction Industry, Sindh

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Abstract: This paper explores the implementation of quality management systems (QMS) in the construction industry of Pakistan. Manufacturing companies have widely applied (QMS) to improve their organizational performance by standardizing their processes. There is lack of literature related to implementation of QMS in construction companies of Sindh. Therefore, principal objective of the study is to assess the level of implementation of QMS in construction companies of Sindh. Questionnaire survey was conducted to collect the data. The results show that the majority of firms have a quality manager in their companies and have adopted some concepts related to QMS. However formal implementation of well recognized approaches (ISO 9001, OHSAS18001, Lean Management, and TQM) is reasonably less. The study suggests that formal implementation of QMS will not only help construction organization in improving product, quality but it will also provide competitive advantage.

Keywords: Quality Management System, Construction Industry, TQM.

I. INTRODUCTION

Construction industry (CI) is the most significant industry around the globe. It heavily impacts the economy and development of the country. CI (Construction industry) is also a major contributor in the national GDP [1]. Expectations of project participants can be fulfilled by project success and achieving good quality of project [2]. This means that to understand the main concept of quality in CI, the construction companies have to implement (QMS) as a management tool for successful project delivery and customer satisfaction [3]. Current construction market is rapidly becoming very competitive and at same time highly challenging, so to overcome the challenges and to compete in international market the companies have to implement QMS [4]. Organizations aligning their business strategy by implementing QMSs methods, models and tools [5]. QMSs consist of most familiar models and methods such as Six Sigma, Lean Management, Business Process Reengineering, ISO, Business Excellence Models and Total Quality Management (TQM) [6].

II. LITERATURE REVIEW

Now a day's different QMSs were implemented in CI to increase quality performance and improvement. QMS is used to ensure best quality and successful project delivery by world class construction firms [7].

A. Total Quality Management (TQM):

Total quality management (TQM) is a philosophy of management and a set of practices whose object was to use resources of the organizations in the most effective way to achieve the goal of companies [8]. TQM also implemented in CI to increase productivity and quality, reduce defects and client complaints, work start in right manner, sub-contractors working with proper QMS, improve relationship with suppliers and sub-contractors. It also improves effectiveness, competitiveness and flexibility of the whole organization [9].

B. SIX SIGMA:

In early 1980s six sigma was originated by Motorola. After some time, the Jack Welch and Larry Bossidy, the CEO of General electric and Allied Signal successfully implemented six sigma QMS in their organizations. The six sigma uses five steps: DMAIC (define, measure, analyze, improve and control). The aim of this approach is to increase the efficiency of process and customer satisfaction. According to [10] concluded that due to six sigma implementations in construction process improves performance.

C. Business Process Re-engineering:

Business Process Re-engineering (BPR) is defined as, "The functional rethinking and radical redesign of business process to achieve dramatic improvement in critical contemporary measures of performance, such as quality, service, cost and speed" [11].

D. ISO 9000 Standards:

ISO 9000 provides the international quality standards, which are adopted by different industries an international standard. It highlights that how a sector can develop a effective QMS which will improve guarantee to quality and fulfill organization requirements [12]. Many different studies reported that, contractors are benefited by the implementation of ISO 9000 based QMS in their construction industry [13].

E. ISO 14001 Standards:

ISO 14001 is defined as, an Environmental Management System EMS which helps an organization to monitor and control its activities, services or products and their impacts on the environment (ISO 2000).

ISO 14001 was highly implemented in construction firms in all over world. As construction sector was leading sector in Turkey so ISO 14001 more implemented in construction firms. Study also concluded that ISO 14001 certification in construction firms put positive impact on construction firms in terms of environmental and corporate management [14].

F. OHSAS: 18001 standards:

OHSAS 18001 was a British Standard for occupational health and safety management systems (SMS). This approach implemented in construction organization for health and safety of staff members.

Safety management system (SMS) was enunciated in 1980's in construction industry, to minimize the injuries, material waste and reduce the fatalities. A study was in Hong Kong concluded that most significant benefits of SMS were better project management, decrease harm to workers and safer working conditions. Moreover, the significant obstacles identified were obstruction by sub-contractors, high turnover rate of workers, and due to cultural differences within organizations safety was put as a lower priority [15].

G. Management Functional Assessment (MFA):

The MFA is based upon the six functions of management as follows; organizing; motivation, forecasting and planning co-ordination, control and communication. The MFAM has been helped construction managers to find out key activities in order to improve effectiveness and corporate efficiency [16].

H. Lean Management:

Construction firms started lean management approach with learning from manufacturing industry. A study was conducted on UK based construction organizations. Study found that lean management principles were relevant to construction of building projects as well as different type of constructions. Also concluded that lean management has notable impact on project performance in construction organizations [17].

I. Business Excellence Management System:

In recent years, much attention has been given to the development and usage of excellent models in CI. UK construction industry was best industry among developed countries. The construction excellence approach has been framed to deliver world class services and products. In addition to this business excellence management system were implemented to achieve same objectives in construction companies [18].

J. European Foundation of Quality Management (EFQM):

The EFQM Excellence Model was introduced at the beginning of 1992 as the framework for assessing applications for The. A study was conducted on UK construction companies to investigate the knowledge and implementation of performance measurement frameworks and their approaches in construction firms. The study concluded that performance measurement frameworks such as Key performance indicator KPI, EFQM having gaps in knowledge and also many issues to implement newly performance measurement frameworks in their organizations [19].

From the above literature concluded that most of the construction companies working in global construction industry implementing different QMS to manage quality of project and to achieve customer satisfaction. Pakistan still counts in developing country among other countries.

Construction organizations were working in disturbing environment where every organization struggle to assure that projects were successfully completed with addition of under budget, best quality and within time. QMS has been widely implemented by top ranking construction organization to assure successful project delivery. Implementing quality management systems (QMSs) are important in helping Pakistani construction companies become more competitive, in addition to this quality in construction is a major factor in the global construction companies. Therefore, Pakistani construction industry must concentrate on higher quality product to compete both at international and regional level.

CI still facing many challenges to achieve good quality of project and fulfill needs of customer. So the purpose of the study to evaluate the current status of different quality management systems implemented in construction organizations of Pakistan. The aim of this study to identify the different QMS implemented in global construction industry and investigates the current status of different QMS in construction firms which are working in Pakistan. The objectives of study are

- 1) To identify the different quality management systems implemented in the global construction industry.
- 2) To investigate the current status of quality management systems in the construction companies of Pakistan.

III. RESEARCH METHOD

This research has been carried out into two phases, in first phase of the study, an extensive review of literature review was carried out to identify the QMS, practices and its benefits in global construction industry, specifically in context of Pakistan construction industry. In second phase of research unstructured interviews were conducted to validate the identified QMS. Respondents included senior professionals working in various construction companies. All recommended suggestions given by the experts were incorporated and, a set of modified questionnaires was designed, to investigate current level of QMS in

construction companies. IBM SPSS was used to analyze data using average index (A.1) Method. After finalizing the questionnaire, the survey was conducted.

IV. RESULTS AND DISCUSSION

From the total respondents (n=97), the majority (29.9%) were Engineering Construction Supervisor, which were directly involved in the implementation process. However, significant percentages (24.7%) of the respondents were Manager Production in the construction firms surveyed and (18.6%) respondents were Manager Project. Moreover, (12.4%) of the respondents were Manager QC. This survey also included the top management of the firms with (8.2%) and owner the firms were (6.2%) of the population. The respondent's experience was almost of equal distribution with (36.1%) respondents have professional experience as consultant, (35.1%) respondents has professional experience as contractor and (28.9%) participants have professional experience with clients.

The majority of the respondents of the survey (54.7%), has more than ten years' experience in the construction industry and (24.7%) of the participants have less than ten years of experience but more than five years' experience in the construction industry. Within the construction firms surveyed, the majority (76.9%) of the respondents are predominantly based on site.

Table 1: Profile of Organization

Position in The Company	Frequency (n=97)	Percent (%)
Owner	6	6.2
Top Management	8	8.2
Manager QC	12	12.4
Manager Production	24	24.7
Manager Project	18	18.6
Engineering Construction Supervisor	29	29.9
Professional Experience		
Client	28	28.9
Consultant	35	36.1
Contractor	34	35.1
Years of Experience		
1-5 Years	20	20.6
6-10 Years	24	24.7
11-20 Years	28	28.9
More than 20 Years	25	25.8
Main Business Activities		
Residential Constructions	17	17.5
Industrial Constructions	16	16.5
Commercial Construction	16	16.5
Roads & Highways	15	15.5
Governmental Construction	33	34.0

The respondents of the survey was all construction firms working in different domains, from Table 4.2, the majority (34%) of the surveyed firms were typically working in Governmental Construction, (17.5%) of firms were working in Residential Constructions and (16.5%) of firms were working in Industrial Constructions and likewise in Commercial Construction. However, only (15.5%) of the firms were working in Roads & Highways construction.

i. Implementation of QMS

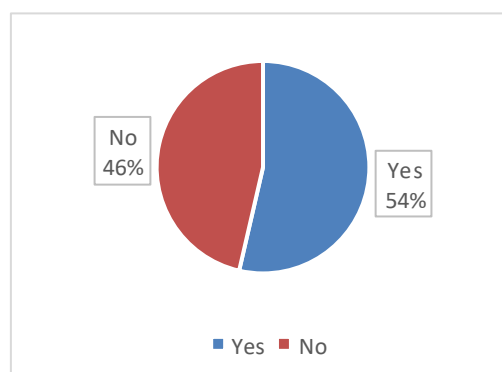


Fig. 1: QMS Implementation

In this part the implementation of any QMS asked from the respondent. The results of the study shown that 54% of the construction companies have implemented QMS where as 46% construction companies have not implemented any QMS. From the above results concluded that still Pakistani construction companies not fully implemented QMS. Due to this reason Pakistani construction companies could not compete in international market and always facing the issues related to quality of project and customer satisfaction.

ii *QUALITY MANAGER*

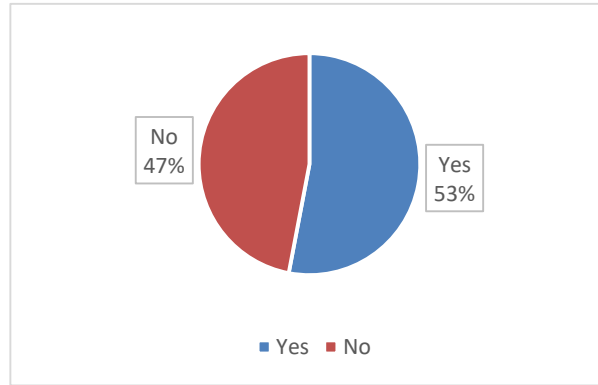


Figure 2: Quality Manager

From the surveyed firms 53% have quality manager related position and remaining 47% have no any quality manager related position in addition to this quality manager position was shown differently in client, consultant and contractor below. From the surveyed firms clients almost 79% (16 out of 28) organizations have quality manager related position.

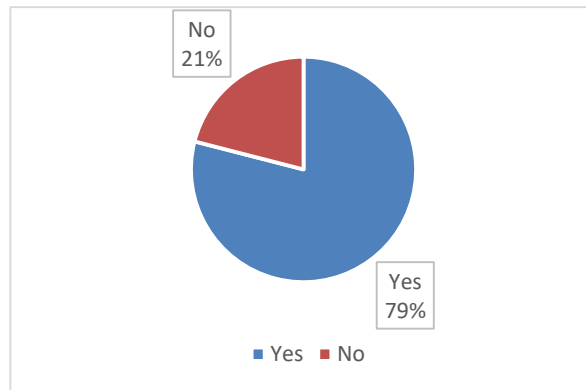


Figure 3: Quality Manager in Client

Consultant has also 59% (9 out of 35) organizations have quality manager related position

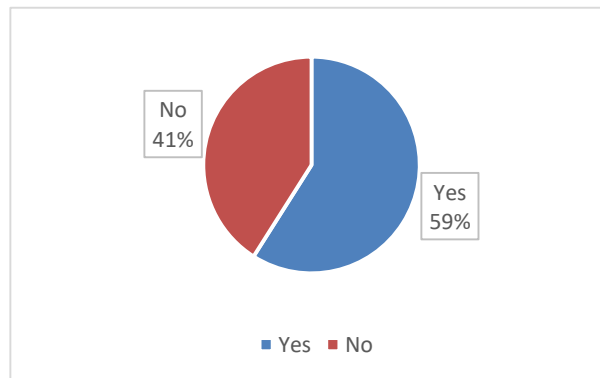


Figure 4: Quality Manager in Consultant

Contractors have 21% (4 out of 34) organizations have quality manager related position

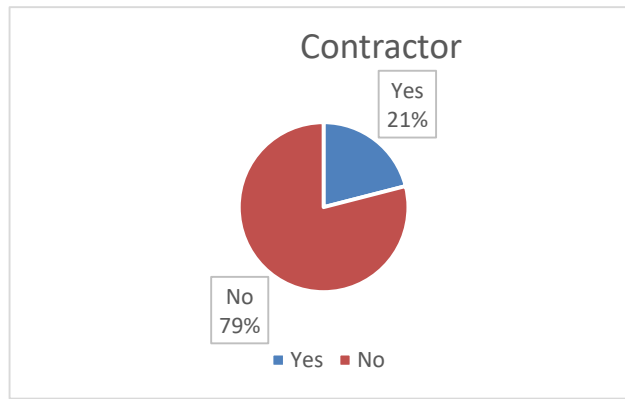


Figure 4: Quality Manager in Contractor

The results reveal that contractor related organization have significantly less percentage of quality manager related position. As a contractor also mainly involved with execution part of project. Therefore introducing the position of quality manager in contractor related organization needs considerable attention.

iii IMPLEMENTATION OF QUALITY MANAGEMENT SYSTEMS

The results show that the highest implemented system is ISO9001:2008 out of 97 have ISO9000:2008 in their organization, Second highest implemented system is ISO: 14001. 44 out of 97 companies have OHSAS: 18001 in their organizations. While ISO: 14001 is the 3rd highest certification by 33 companies. Other implemented systems in descending order are lean management, TQM, six sigma, business excellence management system, business process reengineering, management functional assessment and European foundation of quality management.

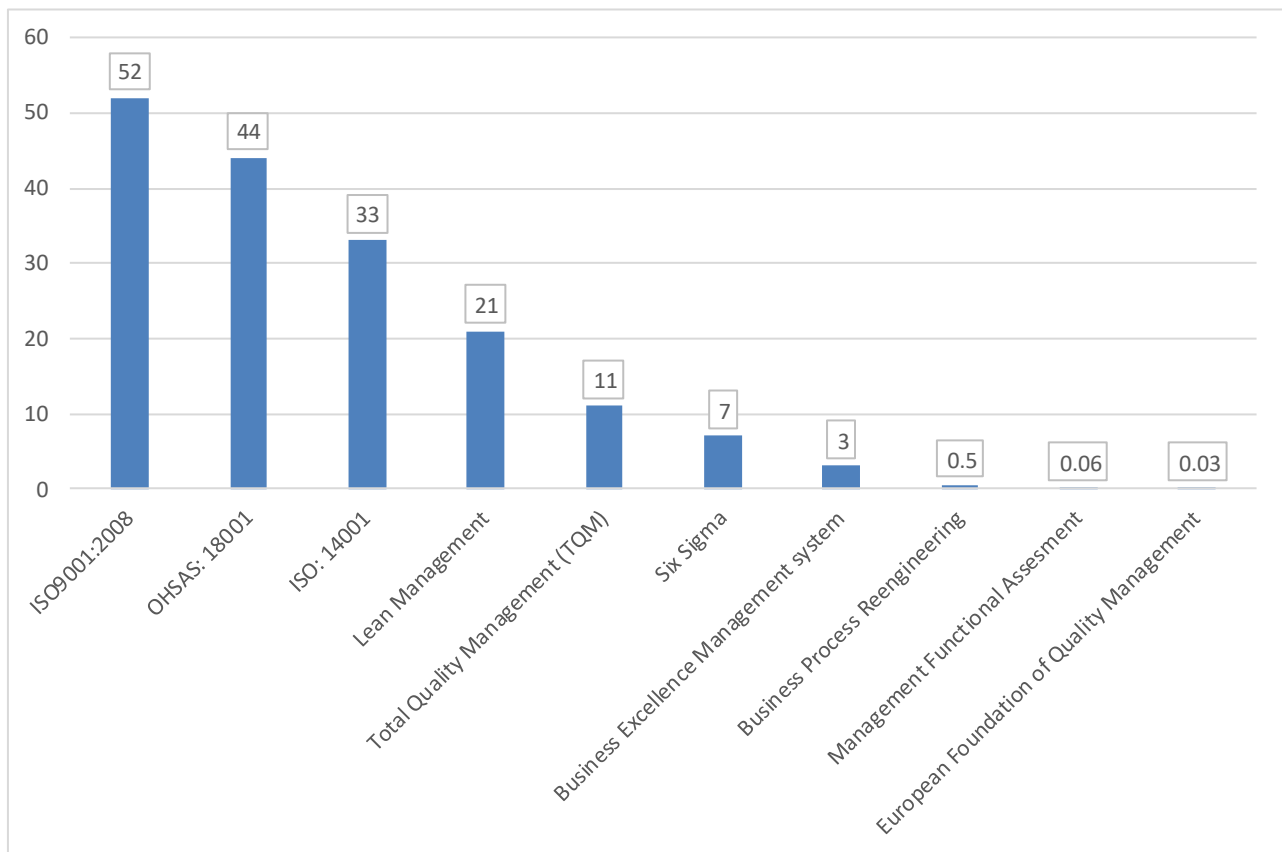


Figure 5: QMS Implementation.

V. CONCLUSION

The most important findings that emerge out of this study can be summarized as follows. The study concludes that only 53% construction companies have quality manager related position. This findings leads to conclusion that there is still lack of quality manager related position in the contractor related organization.

Based on the findings of the study it is conclude that the highest implemented management system is ISO9001. Fifty two (52) out of 97 have ISO9000:2008 in their organization, Second highest implemented system is ISO: 14001. Forty four (44) Out of 97 companies have OHSAS: 18001 in their organizations. While ISO: 14001 is the 3rd highest certification obtained by 33 companies as per survey results.

VI. SUGGESTIONS

It is suggested that to increase the level of implementation of QMS proper quality training for the management staff should be required to improve the way of managing QMS. The course of undergraduate of civil engineering consist of quality approaches so that the graduate engineers must know about quality management approaches in performing their duties in the successful project completion.

VII. FUTURE RECOMMENDATION

Due to time limitation, the study was limited to mega cities of Sindh Karachi &Hyderabad. The study can be extending to other cities and increase number of samples so to collect more data so to increase the significance of data. A comparative study of different quality management systems can help the construction companies in selecting and implements appropriate QMS in their construction companies.

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