

Barricades in Implementation and Adoption Level of ISO-9001 in Construction Industry of Pakistan

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Abstract

The quality of construction projects and products is purely dependant on the development of such industry and is associated with the implementation of Quality management system in this industry. From the last two decade the certification of ISO- 9001 has been taken up in construction industry at the international level. Many benefits gathered throughout the globe by its effective implementation. The awareness of adaptation is weak in the developing countries and is unaware of the everlasting benefits of this standard. Pakistan is also one of the developing countries which are unaware of its benefits specially gathered in foreign countries such as UK, United States, Australia and Japan etc. ISO which stands for International organisation for standardization is alliance of global standards. There is a special technical committee which is TC-176 which formulates all the standards of ISO-9001. Draft is circulated through technical members of board for approval of standards which requires 75% minimum votes for approval as a standard. There are more than 2100 companies which are certified with ISO-9001 in Pakistan and over 200 auditing agencies which time to time audit the certified firms. The study draws attention to the advantages, disadvantages and barricades facing by construction firms by the implementation of ISO-9001 in construction industry of Pakistan. Also some beneficial suggestions for better adopting ISO-9001 is given with the help of this research which can be helpful for the future of Pakistan's construction Industry. The research highlights that construction firms of Pakistan should gain from the advantages gathered by the construction firms of developed countries and take apt measures for implementing ISO-9001 standards. The government as well as public sector should ensure its implication by all firms before tendering any project for better quality works.

Keywords: ISO-9001, implementation, standard, auditing agencies

Introduction

ISO explains the quality in level of excellence in a competitive sense, individual uniqueness, and consistency. We usually define the quality in terms of a product which fulfills our desires. These desires are usually depends on the intended cost and its use. According to Bestfield (QC, a practical approach, 7th print, 2004) Quality is defined as

Quality = Performance/Expectations

Which means if the value of quality in terms of above equation is greater than one (1) then the customers has a great satisfaction because the performance being greater than the customer expectation. Also if the value decreases from the one (1) then the quality is low and the expectations are more from the customer but the performance is not greater than expected.

Quality can also be,

- ✓ The degree of excellence.
- ✓ Fitness for its purpose.
- ✓ The requirement fulfillment.
- ✓ Meeting customer's satisfaction.

Quality in terms of general context of management can be defined as:

"The totality of features and characteristics of a product that bears on its ability to satisfy stated or implied needs." (ISO-1994, Cheng, 1999). Despite of so many working on the relevant topic but still quality is defined differently in context of business situations, organization or customer satisfaction.

Quality management is a process of finding and solving problems followed by improving performance. For better quality assurance quality awards are given at National level in Japan through "Deming Quality Award", in USA "Malcolm Baldrige National Quality Award" and in European Union "European Quality Award". A large number of countries have initiated such efforts, some organized and some unorganized. In Pakistan, an effort was initiated in 1999 but did not take-off.

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 (Harington, Frank Voehl, Hal Wiggin, 2012).

The study is restricted to only the construction industry of Pakistan. All types of contractor's views and

opinions are gathered and an effort is made to reach to as many professionals linked to the construction firm of Pakistan. Descriptive quantitative approach of study is used for analysis of the sampling frame which consists of every field of construction industry like building firms, telecom related firms, highways, irrigation, structure designing firms etc have been tried to be incorporated so as to make the survey very near to accurate. The main purpose was to look insight the core of the firms and setup a result that what can be the main hurdles which prevents them for adopting the best internationally recognized management standard.

Objectives

The objectives of this study are the barricades faced in the Implementation of ISO-9001 in the construction companies of Pakistan and also to examine the level of adoption of ISO-9001, if already a certified company.

Methodology

In research methodology the researchers showing layout how they perform their study to obtain and answer questions of the research (Sunder 2003). This research design comprises of sampling from Pakistani construction industry, a questionnaire development based on previous studies, data collection and taking in view the research constraints. In construction management three approaches are considered to be acceptable. They are: Quantitative methods, Qualitative approach and mixture of both qualitative and quantitative. In this research a quantitative approach is selected for better results to questionnaire data. A preliminary study was performed for the authenticity and applicability of questionnaire in Pakistani construction industry. The pre-study consisted of randomly selected respondents of the concerned industry. It gave clear guidelines for editing and modifying the sample questionnaire based on Pakistani construction industry.

The best sample size was 128 from population of 45,000 using formula as suggested by Dillman 2007 given below:-

$$N_s = \frac{N_p (P) (1-P)}{(N_p - 1)(B/C)^2 + (P)(1-P)} \dots \dots \dots \text{Eq-1}$$

Where:

- 'N_s' represent the sample size of desired population.
- 'N_p' represents the population size i.e. 45,000
- 'P' Proportion of population (p=0.5)
- 'B' is the sampling error which is -10% to +10%
- 'C' z statistics associated to CI. (1.96 = 95% confidence interval).

The questionnaire of had three Parts. The first part contains the personal information of respondent mentioning his/her experience in the field of construction industry, qualification, designation, nature of executed projects of the company and importantly is company certified to ISO-9001.

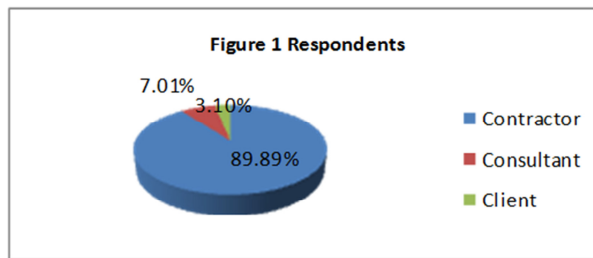
The second part emerges when the company is not certified with ISO-9001. This part plays role in evaluating the different barriers regarding ISO-9001. This part contains ten (10) observations. A five point likert scale shows the barriers faced by the company regarding implementation of ISO-9001 QMS standard. Likert scale was from poor to extreme rating.

The third part of questionnaire was about the level of adaptation, if the firm is ISO-9001 certified. This part was also on the likert scale showing options from poor to excellent usage of the standard. To increase accuracy, it is beneficial to select a relatively large sample size. If a large enough sample size is obtained and potential problems related to coverage, non response, and measurement errors have been minimized, the sample data may be representative of and generalize to the target sample population. The sample data, however, may not estimate the entire population. Therefore, in this research sample size is minimum 96 by calculation from Dillman's equation but 128 samples taken to increase accuracy of the survey data.

Response rate of 64% achieved valid out of 200, presenting clients is 3.1 %, consultants 7.0% and contractors 89.8 %. The respondents are grouped and frequencies (percentages) of respondents are shown in Table 1 and Figure 1:

Table 1 Respondents

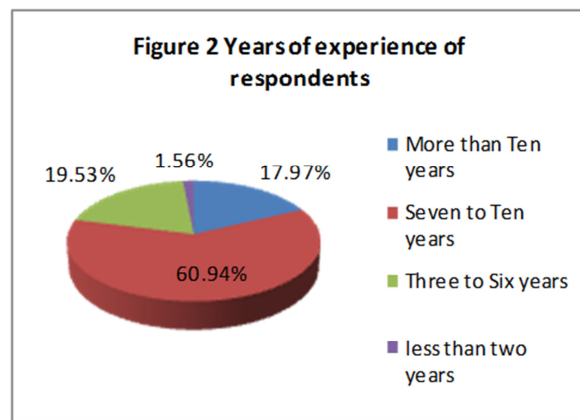
	Frequency	Percent	Cumulative Percent
Client	4	3.1	3.1
Consultant	9	7.0	10.2
Contractor	115	89.8	100.0
Total	128	100.0	



The maximum respondents had huge experience in the construction industry as shown in Table 2 and Figure 2. Approx 18% (23) of the respondents had over 10 years of construction experience, 60.9% (78) have seven to ten years of construction experience, and 25% (19.5) had experience of three to six years, whereas only 1.6% (2) has less than two years of construction experience. Therefore, in terms of experience, the information provided by these professionals can be considered authentic and reliable.

Table 2 Years of experience

	Frequency	Percent	Cumulative Percent
less than two years	2	1.6	1.6
Three to Six years	25	19.5	21.1
Seven to Ten years	78	60.9	82.0
More than Ten years	23	18.0	100.0
Total	128	100.0	

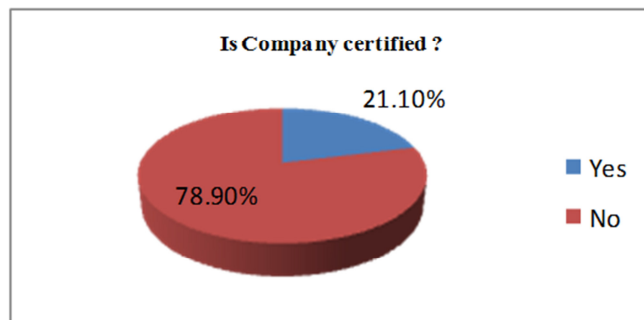


Analysis and results (Barriers in implementation of ISO-9001)

PASW-18 was used for statistical analysis and MS Excel was used to systematize the received data. The data was organized in such a way that the ISO-9001 certified companies were isolated from the non-certified companies. Data was then organized in such a way the certified firms (Part-3) were isolated from non-certified firms (Part-2) of questionnaire and then it was assigned numeric values from 1 to 5 on the basis of likert scale for each response of poor to extreme case. Main question from the respondents was that if there firm is ISO-9001 certified or not in the construction industry. Responses were tabulated in Table 3 and Figure 3 shows the percentages of different firms who responded to this survey. 78.9 % (101) of the respondent's firms were not certified, 21.1 % (27) were from the ISO-9001 certified companies.

Table 3 (Is your company certified)

	Frequency	Percent
Yes	27	21.1
No	101	78.9
Total	128	100.0



Likert scale was used in Part 2 of the questionnaire to measure the different perceptions of stake holders (Client, Consultants, Contractors) about the barricade faced by them for implementing the ISO-9001 QMS in their organizations. Likert scale is shown below with different views about barriers to the stake holders in the construction industry.

S.no	Items	Answers Frequency				
		1	2	3	4	5
1	Lack of support from the top management.	02	12	31	36	20
2	Skills required for executing the ISO Standards.	10	46	20	18	07
3	Sub-Contractors attitude towards ISO standards.	08	43	18	22	10
4	Lack of awareness in benefits of QMS.	03	06	35	41	16
5	Demands from the clients.	06	49	22	15	09
6	High cost to implement QMS.	05	09	71	11	05
7	Lack of understanding in the process requirement.	03	06	10	31	51
8	Lack of time to implement QMS/Time consuming.	05	07	46	34	09
9	Lack of QMS exposure among workers.	06	10	23	15	47
10	Lack of documentation for suppliers, materials and services.	04	49	23	18	07

Reliability and Validity analysis Part II:

The most common measure of internal consistency is Cronbach's Coefficient Alpha method. If the value is higher than 0.7 for Cronbach's Coefficient Alpha, the data is suitable for further analysis. For Part 2 data, its overall value is calculated as 0.740 using SPSS-18.

Table 4 Reliability and Validity analysis results

Test Type	Case Processing Summary				Cronbach's Alpha .740
Cronbach's Coefficient Alpha			N	%	
	Cases	Valid	98	100	
		Excluded	0	0	
		Total	98	100	

Normality check of Part II:

For normality check the "Shapiro Wilk normality test" is performed for the collected data because sample size is less than 2000 (sample size more than 2000 Kolmogorov-Smirnov test is used). It is performed to know whether the data parametric or non-parametric in nature. Value of Significance should be higher than 0.05 for sufficiently normal data. Significance values found are 0.000 which are less than 0.05. The collected data is not normally distributed and for further analysis non-parametric tests are required. Table 5: given below shows the Shapiro-Wilk test regarding normality of data.

Table 5 Normality of data Part II

Description	Shapiro-Wilk		
	Statistic	df	Sig.
Lack of support from Top management	.895	101	<.001
Skill required to run ISO	.870	101	<.001
Sub-Contractor attitude towards ISO	.873	101	<.001
Lack of awareness in benefits of QMS	.876	101	<.001
Demand from clients	.843	101	<.001
High cost to implement	.751	101	<.001
Lack of understanding in process	.753	101	<.001
Time consuming	.869	101	<.001
Lack of QMS exposure among workers	.810	101	<.001
Lack of documentation	.839	101	<.001

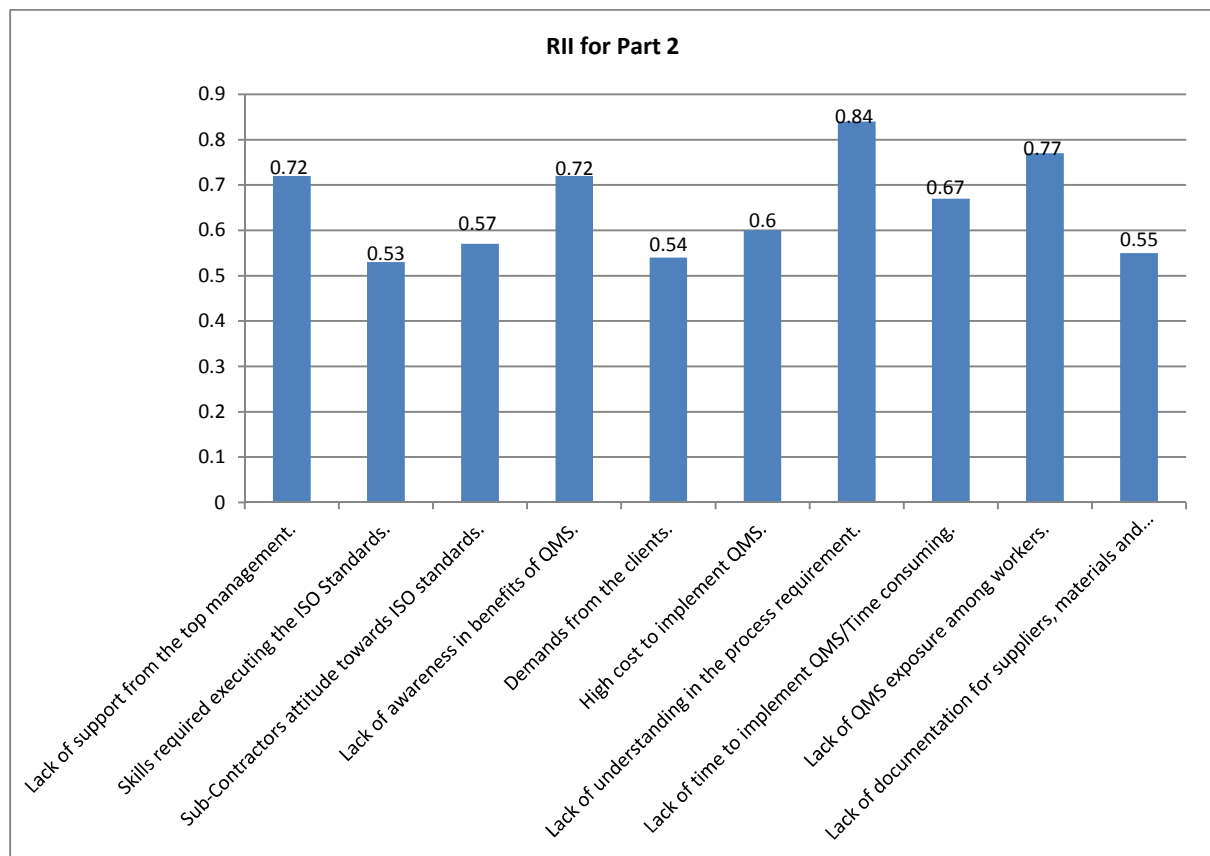
RII for Part II:

By the help of relative importance index RII, the top barriers which creates hurdle in the way of implementing international standard ISO-9001 are given in the following Table 6.

From the data given below it is obvious that top four barriers are the lack of understanding, lack of quality management exposure, lack of awareness of benefits from ISO-9001 QMS and lack of support from the top management.

Table 6 RII of data Part II

S.no	Factors	RII
1	Lack of support from the top management.	0.72
2	Skills required executing the ISO Standards.	0.53
3	Sub-Contractors attitude towards ISO standards.	0.57
4	Lack of awareness in benefits of QMS.	0.72
5	Demands from the clients.	0.54
6	High cost to implement QMS.	0.60
7	Lack of understanding in the QMS process requirement.	0.84
8	Lack of time to implement QMS/Time consuming.	0.67
9	Lack of QMS exposure among staff.	0.77
10	Lack of documentation for suppliers, materials and services.	0.55



Analysis and results (Level of adaptation of ISO-9001)

Likert scale was used in Part III of the questionnaire to measure the level of adaptation ISO-9001 QMS by different organizations in construction industry Pakistan. Likert scale is shown below has some clauses of ISO-9001 manual which is essential for its adaptation. Below statistics shows the level of adaptation in Pakistani's construction industry.

No	Remarks with ISO clauses	1 Poor	2 Fair	3 Good	4 Very Good	5 Excellent
1	Use of Plan-Do-Check-Act (PDCA) to manage processes (ISO 9001:2008 Clause 4.1)	00	00	04	16	07
2	Organization's Quality Policy and Objectives. (ISO 9001:2008 Clause 4.2.1)	00	01	02	03	21
3	Organization's Quality Manual. (ISO 9001:2008 Clause 4.2.2)	00	01	03	17	06
4	Control of Documents and Records. (ISO 9001:2008 Clause 4.2.3, 4.2.4)	00	01	02	09	15
5	Management commitment. (ISO 9001:2008 Clause 5.1)	00	01	02	19	05
6	Customer focus and satisfaction. (ISO 9001:2008 Clause 5.2)	00	00	14	09	04
7	Responsibility and authority. (ISO 9001:2008 Clause 5.5.1)	00	01	06	13	07
8	Internal communication. (ISO 9001:2008 Clause 5.5.3)	00	03	12	08	04
9	Internal Audits. (ISO 9001:2008 Clause 8.2.2)	01	03	03	15	05
10	Monitoring and measurement of product. (ISO 9001:2008 Clause 8.2.4)	00	00	11	10	06

Most of the ISO certified companies were reluctant to answer my questionnaire due to audit reasons but total of twenty seven (27) ISO-9001 certified companies were questioned about the level of adaptation of ISO-9001 and promised them not to share their data with any firm or audit. In twenty seven firms 2 were Clients, 5 were consultants and 20 were contractors.

Reliability and Validity analysis Part III:

To measure the internal consistency of part 3 (the level of adaptation) Cronbach's Coefficient Alpha method is used. If the value is higher than 0.7 for Cronbach's Coefficient Alpha, the data is suitable for further analysis. For Part 3 data, its overall value is calculated as 0.788 using SPSS-18.

Table 7 Reliability and Validity analysis results

Test Type	Case Processing Summary			Cronbach's Alpha
Cronbach's Coefficient Alpha			N	
	Cases	Valid	27	100
		Excluded	0	0
		Total	27	100
				.788

Normality check for Part III:

Shapiro-Wilk test is performed to know whether the data parametric or non-parametric in nature. Value of Significance should be higher than 0.05 for sufficiently normal data. Significance values found are 0.000 which are less than 0.05. Therefore, data is not normally distributed and non parametric tests are required for Part III.

Table 8 Normality of data Part II

Description	Shapiro-Wilk		
	Statistic	df	Sig.
Use of PDCA to manage the process	.785	27	<.001
Organization's quality policy and objectives	.543	27	<.001
Organization's quality manual	.785	27	<.001
Control of documents and records	.732	27	<.001
Management commitment	.722	27	<.001
Customers focus and satisfaction	.753	27	<.001
Responsibility and authority	.853	27	.001
Internal communication	.872	27	.003
Internal audits	.819	27	<.001
Monitoring and measurement of product	.794	27	<.001

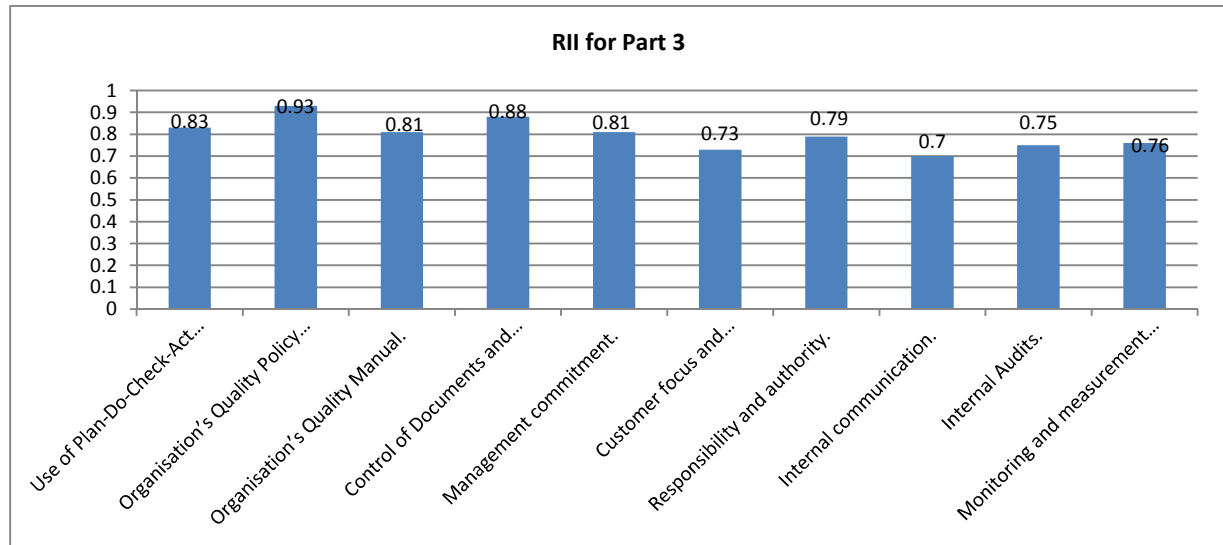
RII for Part III:

Relative importance index RII is used for part 3 of questionnaire to evaluate the level of adaptation of international standard ISO-9001 by the construction firms already certified.

From the data given below it is obvious that top three options i.e. Organisation quality policy and objectives, Organisation quality manual and use of PDCA to manage process are high priority of the organisation which are certified in construction industry of Pakistan.

Table 6 RII of data Part III

S.no	Remarks with ISO clauses	RII
1	Use of Plan-Do-Check-Act (PDCA) to manage processes (ISO 9001:2008 Clause 4.1)	0.83
2	Organisation's Quality Policy and Objectives. (ISO 9001:2008 Clause 4.2.1)	0.93
3	Organisation's Quality Manual. (ISO 9001:2008 Clause 4.2.2)	0.81
4	Control of Documents and Records. (ISO 9001:2008 Clause 4.2.3, 4.2.4)	0.88
5	Management commitment. (ISO 9001:2008 Clause 5.1)	0.81
6	Customer focus and satisfaction. (ISO 9001:2008 Clause 5.2)	0.73
7	Responsibility and authority. (ISO 9001:2008 Clause 5.5.1)	0.79
8	Internal communication. (ISO 9001:2008 Clause 5.5.3)	0.70
9	Internal Audits. (ISO 9001:2008 Clause 8.2.2)	0.75
10	Monitoring and measurement of product. (ISO 9001:2008 Clause 8.2.4)	0.76



Recommendation and Conclusions

Lack of understanding in the process, lack of exposure among workers and lack of support from the top management create difficulties in implementing ISO standard. Quality management system (QMS) of ISO-9001 could be a key of problems for the construction industry but the construction industry's problems are themselves barrier for better ISO-9001 implementation. One can take an example of the way in which project bids, the traditional bids are evaluated with the main stress on lowest price. The contractor is mainly selected widely on the basis of the lowest price with less concern for current workload, his past experience work, and reputation for quality. In such a scenario where price counts rather than quality, it is difficult to implement such quality international standards. But the companies who are following the ISO-9001 standards in construction industry of Pakistan are giving the best of quality management in their organizations.

The companies who embraced the QMS of ISO-9001 have achieved some of the great achievements such as,

- ✓ Organization enhanced reputation and image.
- ✓ Improved performance and increased customer satisfaction.
- ✓ Established clear instructions and documented procedures.
- ✓ Consistency in quality of services.
- ✓ Clear line of duties.
- ✓ Efficiency of work on site.
- ✓ Quality Cost reduction.
- ✓ Prevention of errors from the start.
- ✓ Improved relationship between all the stakeholders.
- ✓ Completion of project is on time..

ISO-9001 has brought about positive changes in the new Pakistani Construction Industry but still facing problems in its implementation. The application of ISO-9001 also can influence the organization to improve their performance. Organizations that follow the standard are also able to establish clear documented procedures and instruction that includes the documented statements of policy and objectives quality, quality manual, documented procedures, effective planning, operation, record and control of the processes.

Organizations in the construction industry of Pakistan faced problems in the implementation of QMS. The problems are lack of awareness in benefits of ISO-9001, lack of ISO quality management system QMS exposure among workers, lack of understanding of ISO-9001 management system and which eventually reveals lack of continuous professional development.

In Pakistani construction industry to ensure the success of implementing ISO 9001:2008 standard, the management struggle towards implementation should be focused and systematic. The implementation of ISO-9001 QMS into an organization requires fundamental organizational culture change. Changing an organization's culture is a very difficult task, which often faces resistance. The challenge of implementing ISO-9001 QMS results from the fact that ISO is not a slogan, nor a tool, nor a program; it is an organization model.

Furthermore, the efforts should be to increase management effort and leave the conventional approaches to management, to train all organization management for better understanding of the standard, to ensure proper documented management system, to increase the level of ISO-9001 QMS understanding among the workers, to promote management participation in training and motivation programs and last but not least, government should establish such an authority or department which could provide Pakistani construction industry the guidance for ISO-9001 QMS and keep checks of its implementation.

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