

## **Quality Culture Auditing for Construction Contractors in Pakistan**

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### **Abstract**

Quality management has been one of the research focuses in construction management for at least two decades and extensive literatures have been written in areas related to the quality of construction works. Most agree that a change in culture, or a creation of a quality culture, is the key to the success of any quality initiatives made by contractors. To achieve cultural change, one must be able to measure the magnitude of any change, positive or negative, against a pre-determined benchmark. In other words, the existing quality culture of a contractor must first be audited so that it can be used for further reference. Through the use of a Quality Culture Auditing (QCA) questionnaire, this paper develops a pragmatic tool enabling construction contractors to measure the quality culture quantitatively using a scoring system. A total of 42 construction contractors completed the QCA questionnaire and the scores obtained were analyzed. The results indicate that QCA can be used to reflect the existing quality culture of a construction contractor, who can hence make improvement on the areas which are weak as indicated by the QCA.

### **Keywords**

Quality management, Quality culture, Quality culture auditing, Contractors, Pakistan

### **1. Introduction**

The construction industry is being viewed as one with poor quality emphasis compared to other sectors like the manufacturing and service sectors (Kubal, 1994; Kanji and Wong, 1998; Wong and Fung, 1999). Many criticisms have been directed to the construction industry for generally shoddy workmanship. It is not only the final product that is subject to criticisms but the processes, the peoples, the materials etc. are under tremendous pressure for better quality in construction.

Total quality management (TQM) is increasingly being adopted by construction companies as an initiative to solve quality problems in the construction industry and to meet the needs of the customer continuously (Fung and Wong, 1995; Wong and Fung, 1999; Kanji and Wong, 1998; Jido, 1996; Sommerville, 1994). When properly implemented, TQM has the potential to improve business results, greater customer orientation and satisfaction, worker involvement and fulfillment, teamworking and better management of workers within companies. However, studies have indicated that TQM is likely to fail 18-24 months into the endeavor irrespective of the approach used (Smith *et al.*, 1993). One of the common reasons for the failure of TQM is the cultural position of the company; if the TQM effort is inconsistent with the organizational culture, the effort will be undermined (Dean and Evans, 1994 in Adebajo and Kehoe, 1998). According to Atkinson (1990) and Bardoel and Sohal (1999), effective cultural change is the secret to implementing TQM successfully.

Hence one of the greatest challenges faced by construction companies worldwide attempting to implement TQM is to overcome the cultural barrier. Since different organizations have different cultural patterns regarding quality, it is essential for the top management to evaluate the company's present culture by conducting a quality culture audit (QCA) before developing any strategy to change it. This assessment of the present quality culture is the topic of this paper – quality culture auditing. The focus of the study is the construction industry of Pakistan.

The construction industry of Pakistan is generally characterized as pressured and adversarial, with long working hours comprising underpaid jobs. Further, construction projects in Pakistan generally: run over time and over cost schedules; do not necessarily meet user expectations; and often require remedial works due to construction defects. Usually finance, time schedules and quality standards of work are the main conflicting issues, leading to project disputes and thus litigation. Compared to the past, the current decade is witnessing massive infrastructure growth in Pakistan. There are numerous infrastructure development projects in progress as well as under planning. All of these projects have the potential to lead the local industry to gain glory, status and international recognition but only when appropriate efforts are extended to achieve the same. With the stage set for a golden era for development, the challenges are still higher. The “boom cycle” and corresponding shortage of labor trades has increased the need for industry participants to adopt and apply TQM philosophy, tools and techniques to help them manage the industry performance and productivity in a sustainable long-term mode. This requires a cultural change and, as a first step, a quality culture audit of the construction organizations. In other words, before cultural change is introduced to an organization, knowing the present culture of an organization can help the top management to develop appropriate strategies. Hence auditing the quality culture of the construction industry of Pakistan, particularly for construction contractors, is an extremely significant first step towards a cultural change.

Consequently, the purpose of this study is to benchmark the quality culture of construction contractors in Pakistan through the use of a QCA questionnaire. This paper first discusses the QCA questionnaire followed by the results obtained from the QCA of construction contractors in Pakistan.

## **2. Research Objective and Significance**

The objective of this study is to develop a pragmatic tool (QCA questionnaire) enabling contractors to measure the quality culture quantitatively through a scoring system. Such a system will then enable benchmarking of the quality culture in the local construction industry.

The purpose of culture auditing is to determine the predominant shared values and attitudes of the employees. Conducting such auditing at regular intervals can help management to identify positive and negative changes in attitudes, values and behavior of employees in relation to quality objectives.

### 3. Methodology

The research methodology consisted of the following steps:

1. A thorough literature review was done as well as expert opinions were taken from a selected cross-section of local industry experts to identify the quality culture criteria that may provide a good means of auditing the quality culture of local construction organizations.
2. A questionnaire was developed to elicit information about quality culture of local construction organizations.
3. A structured survey was conducted via postal mail.
4. Validation of survey was done via personal interviews with selected personnel.
5. Assessment of feedback from survey was made and responses were ranked.
6. Relevant conclusions and recommendations were drawn.

The methodology is explained as follows.

In the first step, a thorough literature review was performed to develop a preliminary quality culture audit checklist. The literature review was done through books, conference proceedings, internet, and leading construction management and engineering journals. Most useful works studied included: Goetsch and Davis (2000); Cortada and Wood (1995); Bardoel and Sohal (1999); Ahmed (2000); Ghafoor (2005); Hick (1998); Kubal (1994); Maister (2001); and Stott and Walker (1994).

Following the development of a preliminary quality culture checklist, expert interviews were conducted from a selected cross-section of local construction industry experts, including representatives from owner organizations, contractors, A/Es and construction managers. The objective was to verify the checklist as well as reach a consensus conclusion on the quality culture audit criteria. As a result of the interviews, a consensus list of fifteen (15) quality culture criteria was formed. These finalized quality culture criteria are given in Table 3.

In the next step, a structured questionnaire consisting of two parts was designed – parts A and B. Part A consisted of requesting respondent's personal information (e.g. work experience, position in company, etc.) and company information (e.g. type of organization, types of construction works performed, years in business, annual volume of work, number of employees, cities of operation etc.). Part B consisted of quality culture criteria checklist developed earlier, requesting the respondents to evaluate the importance of these measures from their perspective. Part B of the questionnaire is explained in more detail in section 4.

The data of this study were collected from the participants through postal survey. The questionnaire was circulated among general contractors, specialty contractors, construction management contractors, and design-build contractors. The surveys were aimed to be filled by the top management personnel in the target organizations. Few unstructured interviews with selected respondents from the various groups of contractors were also conducted to clarify their responses, to discuss the survey results and to validate the survey. The survey response details are given in section 5.

In the final steps, based on all the gathered information, an analysis was performed where all the fifteen (15) quality culture criteria were analyzed and ranked on the basis of mean scores received for them. The analysis of results is given in section 6. Based on the survey results and analysis, relevant conclusions were drawn and are as given in section 7.

## 4. Survey Design

As mentioned in the Research Methodology section, the QCA questionnaire used in this study had two parts. These were: Part A: Background of Company and Interviewee; Part B: Technically-Specific Quality Culture Criteria for Contractors.

Scores are counted based on the respondents' response on every single question in Part B. Major references used in the design of the questionnaire include:

1. Goetsch and Davis (2000), who proposed six characteristics of good culture,
2. Cortada and Wood (1995), who proposed five values for creating good quality culture,
3. Bardoel and Sohal (1999), who proposed four-step culture audit process.

The six characteristics listed in Goetsch and Davis (2000) are (1) open and continual communication, (2) mutually supportive internal partnerships, (3) teamwork approach to problems and processes, (4) obsession with continual improvement, (5) broad-based employee involvement and empowerment, and (6) sincere desire for customer input and feedback. The five values for creating good quality culture as proposed by Cortada and Wood (1995) are (1) a focus on customer satisfaction, (2) a focus on processes and their continual improvement, (3) a focus on teamwork and cooperation, (4) a focus on openness and sharing of information, and (5) a focus on the use of scientifically derive data for making decisions. The four-step culture audit process proposed by Bardoel and Sohal (1999) has been described in the Literature Review section and is not to be repeated here.

Apart from the above references, other references are also referred to in the design of the questionnaire, such as Ahmed (2000), Ghafoor (2005), Hick (1998), Kubal (1994), Maister (2001), Stott and Walker (1994), and so on.

Based on the above reference materials and the feedback from local industry experts, questions in Part B of the QCA questionnaire were formulated.

The format of all the questions in Part B of the questionnaire was that the respondents only needed to consider to what extent the statements were describing their organization. A response of "5" meant that the company satisfies the criterion to a great extent, and a response of "1" meant that the company does not meet that criterion at all.

## 5. Survey Response

### 5.1 Response Rate

The response rate for completed questionnaires is shown in Table 1. Since Part B of the questionnaire was developed on a single page, no questionnaires were received incomplete. The response rate was 79.2% which was good for construction industry of Pakistan. In similar construction industry surveys, Farooqui *et al.*, (2008) received a response rate of 57%, and Ahmed and Azhar (2004) received 30.4%. Baker (1998) reported that statistically reliable conclusion can be obtained from a sample size of 20 or more.

**Table 1: Breakdown of Responses**

Total questionnaires sent	Questionnaires returned incomplete	Total number of potential questionnaires	Total valid responses received	Percentage of valid responses
53	0	53	42	79.2%

## 5.2 Respondent Characteristics

The respondent firms included various types of construction industry contracting firms, including general contractors (54%), specialty contractors (26%), construction management contractors (12%), and design-build contractors (8%). The average number of years in business for the responding firms was twenty eight (28) years. These firms were involved in various types of construction works including heavy engineering/ infrastructure construction (65%), commercial building construction (48%), industrial construction (32%), institutional construction (hospitals/ schools etc.) (28%), and residential construction (24%). Note that there were overlaps in their work sector shares. The areas of construction works operation included the major cities of Pakistan.

The respondents with respect to their positions were top management personnel in their respective organizations and they had over 20 years of experience in construction industry.

## 6. Analysis and Findings

The quality culture criteria are presented in Table 2, along with the mean and modal importance scores and the satisfactory index for each criterion in the Pakistani construction industry. The importance rating for each criterion was scored on a scale of 1 to 5 with 1 meaning that the company does not meet this criterion at all and 5 meaning that the company satisfies the criterion to a great extent. The numbers in the filled cells for importance rating indicate the mean (average) and modal values of responses for that option.

To determine the satisfactory index for each quality culture criterion based on the mean score of the latter, the matrix shown in Table 3 was developed and utilized.

Table 4 shows the top 5 (most satisfactory) quality criteria with respect to the mean scores, in descending order of mean scores (most satisfactory first). Table 5 shows the bottom 5 (least satisfactory) quality criteria with respect to the mean scores, in ascending order of mean scores (least satisfactory first).

The following positive quality culture exists in most construction contracting organizations in Pakistan: 1) limiting the degree and levels of subletting; 2) making sure that specifications and drawings are consistent; 3) passing the most updated information and drawings to subcontractors and suppliers in a timely manner; 4) implementing quality schemes in their companies; and 5) maintaining a focus towards company's quality policy / mission.

The following aspects of quality culture needs the most significant improvement in construction contracting organizations in Pakistan: 1) allowing project members to easily retrieve all documents and correspondence relevant to their project easily; 2) considering suppliers and subcontractors as partners; 3) considering all parties involved in projects as partners; 4) timely record keeping; and 5) attracting adequate resources on site.

**Table 2: Quality Culture Criteria – Importance Scores and Satisfactory Indices of all 15 Criteria**

S. No.	Quality Culture Criteria	Importance Score		S.I <sup>1,2</sup>
		Mean (Max. 5)	Mode (Max. 5)	
1	Suppliers and subcontractors are considered as partners. As they play a major part in the project, their suggestions and ideas are valued and considered as ways for project improvement.	2.37	2	2
2	There is always enough resources (including manpower and plants) on site.	3.05	3	3
3	Workers are experienced and qualified such that construction productivity can be maximized.	3.19	4	3
4	My company will try to limit the degree and levels of subletting.	4.63	5	4
5	There is a quality award program on site to motivate workers to produce quality products.	3.30	4	3
6	As a contractor, we will make sure that specifications and drawings are consistent and will ask for clarification from the designer on a timely manner if it is not so.	4.29	5	4
7	As a contractor, we will pass the most updated information and drawings to our subcontractors and suppliers in a timely manner.	4.10	5	4
8	Project members can easily retrieve all documents and correspondence relevant to their project easily.	2.10	3	2
9	All shop drawings and work programs are realistic and will be submitted in a timely manner.	3.70	4	3
10	All the parties involved in the projects are considered as partners. Instead of blaming others, my company will try to find constructive ways to solve the problem and minimize waste (rework, cost, time, etc.) in case when things go wrong.	2.40	3	2
11	Records are filled out in a timely manner (instead of just prior to quality auditing) to prove that works have been carried out according to the specifications.	2.80	3	3
12	The cost of wastage (including time and cost on rework, inefficient utilization of workforce, etc.) is low in this company.	3.57	4	3
13	I look at all internal and external quality audits in positive ways. I believe they are worthwhile to the company's interest rather than consider them as time-consuming nuisance.	4.00	5	4
14	I feel positive about my company's quality policy / mission.	4.05	5	4
15	I feel positive and beneficial about the changes as a result of the implementation of quality schemes in my company.	4.10	5	4

<sup>1</sup>S.I=Satisfactory Index

<sup>2</sup>for company that does not meet the criterion=1, for company that mildly meets the criterion=2, for company that moderately meets the criterion=3, for company that meets the criterion to a great extent=4

**Table 3: Computation of Satisfactory Index**

Mean Score Range of Quality Culture Criterion	Satisfactory Index	Satisfactory Level
0.0 – 1.25	1	Company does not meet the criterion
>1.25 – 2.5	2	Mildly meets the criterion
>2.5 – 3.75	3	Moderately meets the criterion
>3.75 – 5.0	4	Company meets the criterion to a great extent

**Table 4: Quality Culture Criteria – Most Satisfactory Performance**

S. No.	Quality Culture Criteria	Importance Score		S.I <sup>1,2</sup>
		Mean (Max 5)	Mean (Max 5)	
1	My company will try to limit the degree and levels of subletting.	4.63	5	3
2	As a contractor, we will make sure that specifications and drawings are consistent and will ask for clarification from the designer on a timely manner if it is not so.	4.29	5	4
3	As a contractor, we will pass the most updated information and drawings to our subcontractors and suppliers in a timely manner.	4.10	5	4
4	I feel positive and beneficial about the changes as a result of the implementation of quality schemes in my company.	4.10	5	4
5	I feel positive about my company's quality policy / mission.	4.05	5	4

<sup>1</sup>S.I=Satisfactory Index

<sup>2</sup>for company that does not meet the criterion=1, for company that mildly meets the criterion=2, for company that moderately meets the criterion=3, for company that meets the criterion to a great extent=4

**Table 5: Quality Culture Criteria – Least Satisfactory Performance**

S. No.	Quality Culture Criteria	Importance Score		S.I <sup>1,2</sup>
		Mean (Max 5)	Mean (Max 5)	
1	Project members can easily retrieve all documents and correspondence relevant to their project easily.	2.10	3	2
2	Suppliers and subcontractors are considered as partners. As they play a major part in the project, their suggestions and ideas are valued and considered as ways for project improvement.	2.37	2	2
3	All the parties involved in the projects are considered as partners. Instead of blaming others, my company will try to find constructive ways to solve the problem and minimize waste (rework, cost, time, etc.) in case when things go wrong.	2.40	3	2
4	Records are filled out in a timely manner (instead of just prior to quality auditing) to prove that works have been carried out according to the specifications.	2.80	3	3
5	There is always enough resources (including manpower and plants) on site.	3.05	3	3

<sup>1</sup>S.I=Satisfactory Index

<sup>2</sup>for company that does not meet the criterion=1, for company that mildly meets the criterion=2, for company that moderately meets the criterion=3, for company that meets the criterion to a great extent=4

## 7. Conclusions

This study attempts to benchmark the existing quality culture in construction contracting organizations in Pakistan via a Quality Culture Auditing (QCA) questionnaire constituting key measurement aspects of quality culture, which the construction contractors in Pakistan were asked to rank and score as per current practices. There were 15 criteria identified, which the respondents were asked to assess in order to determine the quality culture in their organizations. The major findings were as follows.

Majority of the companies agree that the contractors in Pakistan generally strive to: 1) limit the degree and levels of subletting, 2) make sure that specifications and drawings are consistent, 3) pass the most updated information and drawings to subcontractors and suppliers, 4) implement quality schemes in their companies, and 5) maintain a focus towards company's quality policy / mission.

However, the current culture in majority of the construction organizations in Pakistan is not conducive to: 1) allowing project members to easily retrieve all documents and correspondence relevant to their project easily; 2) considering suppliers and subcontractors as partners; 3) considering all parties involved in projects as partners; 4) timely record keeping; and 5) attracting enough resources on site.

For a competitive industry like construction, continual improvement is necessary for company survival. The main purpose of this study is to develop a benchmark study for contractors such that the scores which determine above average, average or below average can be defined. By doing so, an organization can realize any areas where it performs not as good as its competitors in the industry so that more effort can be put in for future improvement.

Continued updating of QCA is required. Within a company, QCAs should be carried out regularly such that the quality manager can see the progress of improvement in different aspects. For such purpose, it is recommended that more employees, probably from different departments, should take part in the auditing exercise. With this company-wide auditing result, the quality manager can have a clear picture of the existing quality culture of the company and hence the potential difficulties and problems that may arise during the implementation of a quality management system. Also, the final destination of the study is to include as many construction organizations as possible.

## 8. References

- Adebanjo, D., and Kehoe D. (1998). "An evaluation of quality culture problems in UK companies", *International Journal of Quality Science*, Vol. 3, No. 3, pp. 275-286.
- Ahmed, S.M. (2000). *Measurement of Construction Process for Continuous Improvement*. Research Report, Florida International University, USA, Appendices A and B.
- Ahmed, S. M., and Azhar, S. (2004). "Risk Management in the Florida Construction Industry". *Proceedings of the 2nd Latin American and Caribbean Conference for Engineering and Technology*, Miami, Florida, June 2-4.
- Atkinson, Philip E. (1990). *Creating Culture Changes: The Key to Successful Total Quality Management*, IFS Ltd., Bedford, UK.
- Baker, S. W. (1997). *Risk Management in Major Projects*. Ph.D. Thesis, University of Edinburgh, UK.
- Bardoel, E. Anne and Sohal, Amrik, S. (1999). "The role of the cultural audit in implementing quality improvement programs", *International Journal of Quality & Reliability Management*, Vol. 16, No. 3, pp. 263-276.
- Cortada, James and Wood, John. (1995). *McGraw-Hill Encyclopedia of Quality Terms & Concepts*, McGraw-Hill, Inc., New York, USA, pp. 102.
- Farooqui, R.U., Saqib, M., and Ahmed, S.M. (2008). "Assessment of critical skills for project managers in Pakistani construction industry." *Proceedings of the First International Conference on Construction in Developing Countries (ICCIDC-I)*, Karachi, Pakistan, August 4-5, 2008, 221-234.
- Fung, P., and Wong, A. (1995). "TQM in construction industry - Hong Kong context", *Proceedings of the 1st International Conference on ISO 9000 and TQM*, De Montfort University, Leicester, pp. 29-34.
- Ghafoor, S. (2005). *Case study on planning and use of programmes in Hong Kong main contractor organizations*. [www document]: [http://www.hkca.com.hk/indnews/2005\\_0408casestudy.pdf](http://www.hkca.com.hk/indnews/2005_0408casestudy.pdf)
- Goetsch, David L. and Davis, Stanley B., (2000). *Quality Management Introduction to Total Quality Management for Production, Processing, and Services*, 3rd ed., Pearson Education Inc., New Jersey, USA, pp. 165.

- Hick, M. (1998). *Quality management*. [www document]: <http://www.eagle.ca/~mikehim/quality.html> (accessed on 20 October 2005).
- Jido, J. (1996). Quality management with TQM in Takenaka Corporation, Proceedings of International Conference on Quality, Yokohama.
- Kanji, G., and Wong, A. (1998). "Quality Culture in the Construction Industry." *Total Quality Management and Business Excellence*, Vol. 9, No. 4&5, pp. 133-140.
- Kubal, M. (1994). *Engineered Quality in Construction: Partnering and TQM*, McGraw-Hill, New York.
- Maister, D.H. (2001). *Practice what you preach! :What Managers Must do to Create High Achievement Culture*. The Free Press, N.Y., USA.
- Smith, S., Tranfield, D., Foster, M., and Whittle, S. (1993). "Strategy for managing the TQ agenda", *International Journal of Operations and Production Management*, Vol. 14, No. 1, pp. 75-88.
- Sommerville, J. (1994). "Multivariate barriers to total quality management within the construction industry", *Total Quality Management*, Vol.5, No.5, pp. 289-298.
- Stott, K., and Walker, A. (1994). *The Fabulous Manager: 20 Key Lessons Towards Management Excellence*. Prentice Hall Simon & Schuster (Asia) Pte Ltd., Singapore.
- Wong, A., and Fung, P. (1999). "Total quality management in the construction industry in Hong Kong: A supply chain management perspective", *Total Quality Management*, Vol.10, No.2, pp. 199-208.