Construction Quality Culture Auditing in Hong Kong

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The quality culture of an organization is defined as the collective habits, beliefs and behavior of employees in the organization with respect to quality. In order to evaluate the existing quality culture profiles within the construction industry in Hong Kong, the concept of quality culture audits was previously introduced together with the development of a trial questionnaire. Three trial audits were carried out on three construction contractors in 2005. Since then, the trial questionnaire has been modified substantially. The purpose of this paper is to summarize the revisions made to the questionnaire and to discuss the results obtained in 2007 from three designer firms and three contracting firms using the modified questionnaire. As indicated by the poor response rate of the companies, the companies were in general very resistant to participating in quality culture auditing. This may be due to the fact that the construction industry has not yet grasped how ~~a~~ quality culture audits can assist a company in improving its performance and thereby helping the company to become more competitive. In the future, additional information is required from more companies so that a benchmark study can be carried out from which a more solid conclusion may be made.

Key Words: Audit, Construction, Culture, Hong Kong, Quality

Introduction

Quality culture is the pattern of human habits, beliefs and behavior towards quality (Gryna 2001). A good quality culture enables quality management systems (QMS) to be implemented and maintained effectively. The information obtained from a Quality Culture Audit (QCA) can reflect the existing culture profile of an organization. It reveals how individuals work together and what

motivates them (Gancel *et al.* 2002). Because an effective cultural change is the secret to implementing QMS successfully (Atkinson 1990), a QCA also helps to assess the degree of success of the QMS implemented.

As the construction industry has lagged behind other industries in implementing QCA, a trial quality culture audit questionnaire was developed in 2005 with employees from construction contractors as its target respondents. This trial audit questionnaire was followed by a pilot audit~~ing~~ carried out on nine employees from three contractors, three employees for each contractor (Tang *et al.* 2005).

As the questionnaire used in the trial quality culture audits was only preliminary, it has been modified substantially since 2005. In addition to some format changes, some questions in the previous questionnaire were refined or deleted and a number of new questions were added. Since the modifications were made then, the original questionnaire used in the trial auditing has no longer been used. Auditing using the new (modified) questionnaire has been carried out for a number of firms, including both designer firms and contracting firms. This paper describes the amendments that have been made to the previous questionnaire and summarizes the results of auditing obtained from six companies. These six companies include three designer firms and three contracting firms of large, medium and small sizes. Future works required are also discussed at the end of the paper.

Questionnaire for QCA

Content of the Questionnaire

There are three parts in the modified version of the QCA questionnaire. They are:

Part I: Background of Company and Interviewee,
Part II: General Questions,
Part III: Industry-Specific Factors for Designers/Contractors.

Part I of the questionnaire provides basic information on the background of the company and the interviewee**.** Part II and Part III contain the main substance of the questionnaire. Scores are counted based on the respondents' responses on every single question in Parts II and III. In the modified questionnaire, the authors have included consulting firms as target respondents, whilst the previous questionnaire (the 2005 trial questionnaire) only aimed at auditing construction

contractors. Consultants are important not just in the design phase of a project, but also during the construction phase where the successful completion of the whole project, large or small, depends on the cooperation of both the consultants and contractors.

Part II contains questions that are general to both consultants and contractors. Major references used in the design of this part 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 a four-step culture audit process.

The six characteristics listed in Goetsch and Davis 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 derived data for making decisions.

The four-step culture audit process proposed by Bardoel and Sohal (1999) includes:

(1) understanding a culture audit,
(2) identifying current values and attitudes,
(3) developing organizational and human resource management strategies, and
(4) measuring performance.

Apart from the above references, other references have also been referred to in the design of this part of the questionnaire, including Ahmed (2000), Ghafoor (2005), Hick (1998), Kubal (1994), Maister (2001), and Stott and Walker (1994).

Questions in Part II and Part III of the QCA questionnaire were formulated based on the above

references as well as the authors' own experience. Questions in Part II are put under six different headings, which are:

(1) Communication opportunities between management and employees and openness of management,
(2) Mutual understanding and trust and free flow of opinions among staff,
(3) Mutual support among staff and teamwork spirit in the organization,
(4) Staff commitment and involvement,
(5) Customer relationships and customer satisfaction,
(6) Focus on continual improvement.

Part III contains questions which are specific to designers or contractors. For example, for designers, consideration of safety, health and environmental impact during design is assessed, whilst the degree of subletting is gauged for contracting firms. This part also contains questions that are believed to be more essential than those in Part II (each question in Part III has a higher score than in Part II, as discussed below). One such questions is how an employee values the quality auditing procedure of the company.

The format of all the questions in the questionnaire is such that the respondents only need to consider to what extent the statements describe their organization. A response of "five" (5) means that the company satisfies the criterion to a great extent, and a response of "one" (1) means that the company does not meet that criterion at all. The number of questions under each heading and the maximum score for each question are designed such that the maximum possible score for the whole questionnaire is 100. The maximum scores for each question in Part II and Part III are 1 and 2 respectively. There are 11 to 12 questions under each heading in Part II, making a total of 70 questions and therefore a maximum score of 70 (or 70%) in that part. Part III has 15 questions, making a maximum score of 30 (or 30%).

Due to the limit on the length of this paper, it is impossible to show the whole questionnaire to the readers. Therefore, only the questions under, say, Heading (5) Customer Relationships and Customer Satisfaction, are shown as in the Appendix at the end of this paper for readers' reference.

Target Respondents

In order to produce unbiased results, company-wide auditing is desired. However, it is very difficult to do so, especially for large companies, due to the large amount of time required.

Significant time is also necessary for subsequent data compiling and analysis. Therefore, for this study, completed questionnaires were required only from three employees of three different working levels for each company. These employees were randomly chosen from each company. Examples of personnel from the high, medium and lower levels are Director/Project Manager, Engineer, and Technician/Draftsman/Foreman respectively. In order to cope with different educational backgrounds of respondents, a Chinese version of the questionnaire was also prepared.

Method of Completing Questionnaires

Contracting firms and consulting firms were approached randomly. Responses to questionnaires were obtained in various ways. In some companies, employees completed the questionnaire because of their personal relationships with the authors or with a mutual acquaintance. Face-to-face interviews were conducted with the employees from some of these companies. However, employees in some companies considered that the interview process was too time-consuming and preferred to complete the questionnaires on their own. The authors also took the liberty in sending out invitations to some other companies with questionnaires attached through electronic mails or facsimiles. It is believed that these different ways of obtaining data will not result in different survey results.

Results and Observations

Eighteen results from six companies (three from each company) are presented and discussed in this paper. These six companies include both designer firms and contracting firms of differing sizes (small, medium and large). For this study, a small company is a company with less than 50 employees, a medium company is a company with 50 to 200 employees, and a large company is a company with more than 200 employees.

Tables 1 and 2 summarize the results from different working levels for three designer firms and three contracting firms of differing sizes. The score obtained under each heading is the sum of the weighted scores obtained from individual questions. As the maximum score for each question under headings 1 to 6 (i.e. Part II) is 1, the scores obtained for responses 5, 4, 3, 2, 1 are 1.0, 0.8, 0.6, 0.4 and 0.2 respectively. (see Appendix at the end). On the other hand, the maximum score for each question under heading 7 (i.e. Part III) is 2, so the scores obtained for responses 5, 4, 3, 2, 1 in that part are 2.0, 1.6, 1.2, 0.8 and 0.4 respectively. The total score is obtained by adding

up the scores under all headings. The maximum possible score for the whole questionnaire is 100.

From the results, it was observed that employees in director/project manager positions, especially in the contracting companies, did not necessarily give higher scores than employees in lower positions. For example, the total score obtained by the director in the medium-sized contracting firm is 12.6% (i.e. (76.4-66.8)/76.4*100%) lower than the QA assistant, and the total score obtained by the project manager in the large-sized contracting firm is 26.3% lower than that obtained by the foreman. When looking at the scores obtained under different headings, it is noticed that the director and project manager from the medium and large-sized contracting firms gave significantly lower scores in areas of communication opportunity between management and employees (Heading 1), mutual understanding and trust and free flow of opinions among staffs (Heading 2), and mutual support among staffs and teamwork spirit in the organization (Heading 3), when compared to the scores given by employees from lower working grades. For Heading 3, such difference is even up to 37% for both the medium and large-sized contracting firms.

Table 1: Total scores obtained by different designers

	Position in Company	**Score under Each Heading**							**Total**
		1	**2**	**3**	**4**	**5**	**6**	**7**	**Score**
Small	Director	8.8	6.8	8.6	7.6	8.4	7.2	19.6	67.0
Designer	Engineer	8.2	7.2	6.2	6.8	7.2	7.0	20.4	63.0
	Draftsman	6.8	6.8	5.8	6.6	6.6	6.0	17.2	55.8
Medium	Director	8.6	8.2	7.4	9.0	9.8	8.0	22.4	73.4
Designer	Engineer	8.6	8.4	6.8	9.2	8.8	7.6	22.0	71.4
	Technical Officer	7.2	7.8	7.6	7.8	8.2	6.6	22.0	67.2
Large	Senior Engineer	9.8	8.6	7.2	8.8	9.6	8.4	24.8	77.2
Designer	Engineer	11.8	9.2	7.0	8.0	8.6	7.8	23.2	75.6
	Draftsman	8.4	10.6	8.4	8.8	10.8	7.6	23.2	77.8

Table 2: Total scores obtained by different contractors

	Position in Company	Score under Each Heading							Total
		1	2	3	4	5	6	7	Score
Small	Project Manager	8.8	8.2	8.4	7.8	9.2	8.4	23.2	74.0
Contractor	Engineer	6.6	6.4	7.0	7.2	8.4	6.6	18.4	60.6
	Foreman	6.6	7.6	6.8	7.2	9.0	6.2	17.6	61.0
Medium	Director	7.2	6.6	4.8	8.0	10.0	8.2	22.0	66.8
Contractor	Engineer	9.0	9.0	7.6	8.8	10.4	7.8	23.6	76.2
	QA Assistant	9.0	8.2	7.8	8.6	9.6	8.0	25.2	76.4
Large	Project Manager	6.8	6.8	5.4	7.0	7.0	7.8	25.2	66.0
Contractor	Site Agent	8.6	9.8	8.6	9.2	9.8	7.6	23.6	77.2
	Foreman	11.2	10.8	10.0	11.4	10.8	9.4	26.0	89.6

Also, it can be seen that the large-sized and medium-sized companies performed better when compared to small-sized companies in almost every aspect for both the designer firms and contracting firms, especially in the areas of staff commitment and involvement (Heading 4), focus on continual improvement (Heading 6) and industry-specific factors (Heading 7). Small-sized contracting companies, however, felt stronger mutual support among staff and teamwork spirit in the organization (Heading 3) in general.

Another interesting observation from the auditing process is that at the beginning, it was believed that it would be easier for the foremen from the contracting companies to fill in a Chinese version of the questionnaire due to their expected educational background. However, based on the returned questionnaires from contracting firms, it is observed that some directors completed the Chinese version of the questionnaire while the foreman completed the English version.

From the quality culture auditing process, it was experienced that many organizations were very reluctant to complete the questionnaire even though they were asked to fill out the questionnaires on their own instead of participating in face-to-face interview. In fact, from mid-June to mid-October of 2007, 31 contracting firms and 24 designer firms were approached, but only 8 sets of questionnaires (4 sets from contractors and 4 sets from designers) were completed. The success rate in carrying out QCA for contractors and designers were only 12.9% and 16.7% respectively. It showed that the construction industry in Hong Kong in general still does not realize how powerful a tool QCA can be and how it can be used to improve an organization's performance and hence its competitiveness in the industry.

Conclusion and Suggestion for Further Works

As the results from only six companies were used for discussion in this paper, the sample size is too small. Only with a large amount of additional information (say, thirty companies) could a benchmark study be developed such that the scores that represent good and bad could be determined. Therefore, this is an on-going study. Additional data will be collected to increase the sample size. Furthermore, with the additional information, a more representative and realistic fingerprint could be developed for each company to show a clear picture of the quality profile of the organization as compared to other firms participating in the auditing. By doing so, the organization will be able to determine any areas where it performs less well than its competitors in the industry so that more effort can be put into those areas for future improvement.

For a competitive industry like construction, continual improvement is necessary for company survival. Within a company, a QCA should be carried out regularly so that the quality manager can see the progress of improvement in different aspects. For such purpose, it is recommended that more employees (not only three), probably from different departments, should take part in the auditing exercise. With this company-wide auditing result, the quality manager will be able to establish a clear picture of the existing quality culture of the company and from that determine the potential difficulties and problems that may arise during the implementation of a quality management system.

To conclude, the construction industry in Hong Kong is a very competitive one and only companies with good quality culture will survive. QCA is a very useful tool in assessing the quality culture of an organization. With the proper application of a QCA, valuable information can be obtained which is useful for the continual improvement of an organization as well as the whole industry. However, as observed from this quality culture audit, most practitioners in the industry in general still do not recognize the power of a QCA. Therefore, methods and techniques for implementing QCA still need to be refined and promoted so that construction organizations may become more familiar with and be willing to adopt QCA for their own organizations.

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Appendix

Heading 5: Customer Relationships and Customer Satisfaction

Please respond to each of the criteria by circling the number you think best describes your company as it is today. A "five" (5) means that your company satisfies the criterion to a great extent. A "one" (1) means that your company does not meet this criterion at all.

(1 point for each question)

		Great extent				Not at all
5.1	Customer surveys are carried out regularly during the project to obtain information on their needs/expectations.	5	4	3	2	1
5.2	Customer surveys are carried out regularly for assessment of customer satisfaction on the quality of service/product provided.	5	4	3	2	1
5.3	Appropriate actions will be taken in a timely manner after customer surveys for future improvement on the company's performance.	5	4	3	2	1
5.4	Customer relationship is good and customers are always cooperative.	5	4	3	2	1
5.5	The quality of product/service is crucial to my company.	5	4	3	2	1
5.6	My company always listens to customers' problems and complaints and reassuring its attitude.	5	4	3	2	1
5.7	The company always provides what it promised in a timely manner.	5	4	3	2	1
5.8	The company has a self-assessment system to ensure the quality of its service/product.	5	4	3	2	1
5.9	To the company, quality is defined by the customers and achieving and even exceeding customer satisfaction is the ultimate objective and focus of the company.	5	4	3	2	1
5.10	The company always has room for customer input in various processes.	5	4	3	2	1
5.11	Customers are informed from time to time of the progress of the work as well as issues affecting the work.	5	4	3	2	1
5.12	To the customers, we are approachable and easy to be contacted.	5	4	3	2	1