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QUALITY COST IN THE CONSTRUCTION INDUSTRY – PRELIMINARY FINDINGS IN MALAYSIA

Mukhtar Che Ali, Rosli Md Zin, Zuhairi Abd Hamid, Abdul Rahman Ayub
Faculty of Civil Engineering, Malaysian University of Technology
Mukhtar@cidb.gov.my

Abstract

One of the key areas being emphasis in ISO 9001 Quality Management System (QMS) is performance measurement towards continual improvement. Among the primary measuring tools is quality cost approach. Quality cost has been well practice in manufacturing sector but slowly gain its importance in construction industry. In fact Project Management Body of Knowledge (PMBOK) has reckoned quality cost as one of the tool and technique in few of its management processes. In view of such circumstances that has prompted an effort to undertake a study to ascertain the level of knowledge and practice on quality cost in Malaysian construction landscape. The targeted group of respondents was the personnel in the project management team. Capitalizing Construction Industry Development Board (CIDB) National Electronic Tendering Initiatives (NETI) road shows which were held in year 2007 throughout the country, the author was able to garner 263 respondents representing the project management team. Subsequently the data gathered from the completed forms were analyzed using Statistical Package for Social Science (SPSS) software. General findings indicated that the level of knowledge and practice on quality cost among the project management team were relatively low. One of the main contributing factors was poor knowledge in the area related to quality cost. Despite of such scenario most of the respondents showed their interest in acquiring knowledge in the field of quality cost. Hence quality cost approach is at the infancy stage in Malaysian construction industry.

Keywords: Construction, Construction Industry, Quality Cost, Quality Performance, Quality Management System

INTRODUCTION

One of the key areas that has been emphasised in ISO 9001:2000 Quality Management System (QMS) is performance measurement. This is stipulated under clause 8.4 of ISO 9001:2000 requirement. Even though with the new version of ISO QMS which was issued somewhere in mid November 2008 there are no major structural changes in the standard requirements. Therefore the emphasis on performance measurement still prevails. Performance measures can be financial or non financial (Tsai, 1998). Presently the parameters employed by our ISO certified contractors to indicate their quality performance mostly are non financial e.g. number and type of Non Conformance

Reports (NCR) from Superintendent Officer (SO), percentage of repetitive NCR, number of complaints from the clients, failures in testing and commissioning, percentage of material wastage, number of rework etc (Chen, 2007). However another effective measuring tool is quality cost.

In quality management the use of cost as a measure performance has been recognized and this is usually known as the cost of quality or quality cost (Abdul-Rahman, 1993). One of the most important tools necessary for the successful implementation of a quality program such as ISO 9000 or TQM is quality cost (Lazlo, 1997). Quality costing in the manufacturing industry had proved successful and it is believes that this can serve as a model for the construction industry (Aoieong, 2004). Quality gurus such as W.E. Deming and Phillip Crosby assert that there is a direct correlation between quality and profitability (Johnson, 1995). Thus the concept of cost of quality is particularly appealing to the cost-conscious construction industry and it has already been applied to a number of construction projects (Ledbetter, 1994). Indeed Project Management Institute (PMI), 2004 through Project Management Body of Knowledge (PMBOK) has reckoned that quality cost as tool and technique for three management processes out of a total of forty four management processes. As such it is very timely that concerted effort to be made in exploring as well as promoting quality cost approach in Malaysian construction industry in particular to the ISO certified contractors. Having said that, thus this study was undertaken to seek answers to the following questions:

- To what extend the personnel at the managerial level in construction project teams have been equipped with quality cost knowledge?
- What is the current status of quality cost practice in the construction industry?
- What is the prospect of quality cost practice in the construction industry?

DEFINITION OF QUALITY COST

There are numerous definitions on *quality cost* or *cost of quality*. It started with the founder of quality cost Juran (1951) and quality guru Feigenbaum (1956) classifies quality cost into prevention, appraisal and failure costs. Prevention costs are associated with actions taken to ensure that a process provides quality products and services, appraisal costs are associated with measuring the level of quality attained by the process and failure costs are incurred to correct quality in products and services before (internal) and after (external) delivery to the customer. Later Crosby (1979) defines the cost of quality as the sum of price of conformance (POC) and price of non-conformance (PNOC). The price of conformance is the cost involved in making certain things that are done right the first time and the price of non-conformance is the money wasted when works fails to conform to customer requirements (Schiffauerova and Thomson, 2006). The quality cost approach in context to construction

according to Low and Yeo (1998) adopting to Quinn's (1989) definition and with some modifications, these terms can be defined as follows:

- *Prevention cost: costs incurred to reduce, eliminate and prevent defects*
- *Appraisal cost: costs incurred to detect errors and to evaluate the quality of the work done*
- *Internal failure cost: costs incurred in correcting errors (caught at appraisal) before handing over the completed facility to the client.*
- *External failure costs: costs incurred in correcting errors (not caught by the appraisal process) after handing over the completed facility to the client.*

Nowadays whole life costing (WLC) analysis is becoming more importance as long term building owners and clients start to demand evidence of what their cost of ownership will be (Mohamed *et. al*, 2002). However, WLC would be more meaningful for building owners if it is associated with efficiency and durability of the project i.e. quality performance. The combination of WLC with quality will give rise to the concept of whole life value (WLV). By using quality cost approach, whereby additional financial investment at the design and delivery stage in an effort to minimize operational and maintenance costs may generate added value to the project in the future. Hence there is a correlation between quality cost and WLV.

METHODOLOGY

This study employed the questionnaire survey method. The collection of primary data was carried out by using a structured questionnaire form. The later for this study consisted of a few different types of questions namely opened as well as closed ended questions. Majority of the questions comprised of closed ended questions, whereby the respondents were asked with questions which required them to answer by selecting the answers given. Prior to data analysis, all the data collected were first processed. Data processing includes checking, verifying, coding and cleaning of data. Basically, descriptive statistics were used to analyze the frequency, percentage and mean for each of the questions according to their suitability.

A pilot survey was conducted to test the questionnaire reliability and fit to the objective of the study. Generally the form was divided into 4 sections and comprised of 21 questions. The said survey was performed to the participants attending Construction Industry Development Board (CIDB) seminar on 'Awareness on Quality Management Principles and Interpreting of ISO 9001:2000' dated 24th April 2007 at M. Suite Hotel, Johor Bahru. Prior to distribution of the forms, the author explained briefly the objectives of the survey. All of the respondents were from grade G7 construction companies' viz. contractors i.e. the highest grade contractor in CIDB registration structure. Consequently the author managed to collect about 25 returned forms. After a thorough examining on the returned

forms in particular in the aspect of ambiguity then several amendments were made accordingly. This was to ensure that the final set of questionnaire before being distributed to all respondents would be fit to meet the prescribe objective of the survey.

For the main survey the author capitalized the avenue of CIDB road show on 'National Electronic Tendering Initiatives' (NETI) which was conducted almost throughout the country between July – August 2007. Upon all the scheduled events ended, the author managed to garner 379 returned forms. After the cleaning process, eventually 263 (69.0%) forms were found suitable for further analysis. As rule of thumb, Roscoe, 1975 proposed that samples sizes larger than 30 and less than 500 are appropriate for most research. The data collected was later analyzed using SPSS version 12.0. Some relevant findings are deliberated in the following sections.

DISTRIBUTION OF RESPONDENTS

As mentioned earlier, the author managed to garner about 379 returned forms. However after the cleaning process 263 (69%) forms were found suitable for further analysis. The respondents collected were represented from all over the country. From the data gathered showed that the number of respondents were almost equally distributed among the states through the country. Generally 83 % of respondents were from Peninsula while the remaining respondents 17 % were from East Malaysia. Hence this survey can reflects the result at national level on the subject matter related to quality cost knowledge and practice in construction industry.

Respondents by Organizations

In term of type of organizations involved, Figure 1 exhibited that majority (84.0%) of the respondents were from the contractors. According to CIDB registration structure, contractors are classified into seven grades. The later is categorized based on the company financial strength and its technical capability. The lowest grade is known as G1 and the highest grade is known as G7. Referring to the data in Figure 2, manifested that the largest number of contractors participated were from grade G7 i.e. 74.0 %. In fact based on the data collected about 64 respondents (28 %) were from public listed companies. Thus it can be deduced that majority of the respondents were from the construction companies of the highest grade.

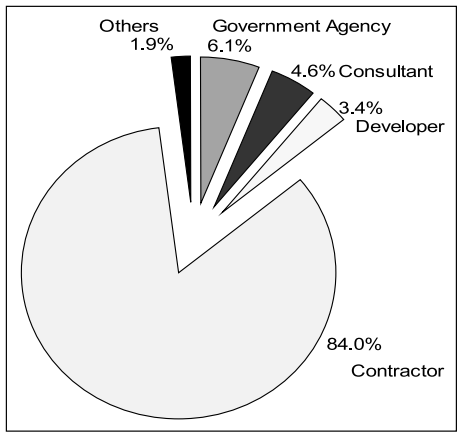

Figure 1: Respondents According To Organizations

Respondents Designation in the Company

Since the targeted group for this survey was the project management team, it would be interesting to analyze the composition of the designation among the respondents. Based on data shown in Figure 3, the highest number of respondents was Contract Manager (27.0 %), followed by Project Engineer (21.0 %), and next was Project Manager (14.0 %) and lastly Project Director (11.0 %). Hence it indicated that majority of the respondents were the key personnel who were involved directly in managing the construction projects.

In relation to the above findings, it would be quite interesting to know the academic background among the Project Managers. Taking into account the information in Figure 4, noticed that 61.0 % of them were of engineering discipline. This is an expected outcome since most of the construction activities demand the knowledge as well as the judgment of engineering principles. The next group of professionals was quantity surveyor i.e. 21.0%. This finding might not be conclusive nevertheless it deemed to construe that Project Managers in our construction realm are mainly the engineers and quantity surveyors.

Another relevant area explored was which engineering disciplines that dominated the Project Manager profession in construction. Information in Figure 5 illustrated that most of them (74.0 %) were Civil Engineers. Based on this result one can envisaged Civil Engineers are the prominent professionals that are navigating quality and productivity in construction projects.

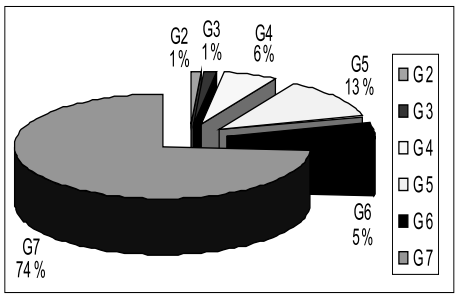

Figure 2: Distribution of Contractors

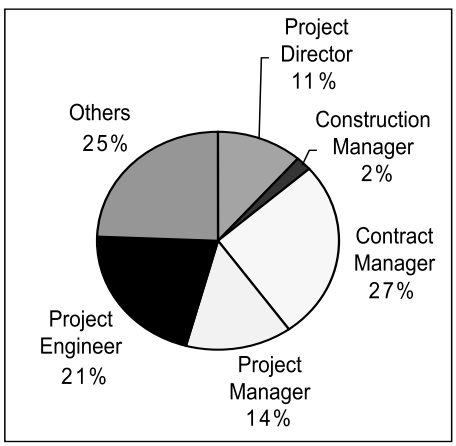

Figure 3: Distribution of Respondents Designation

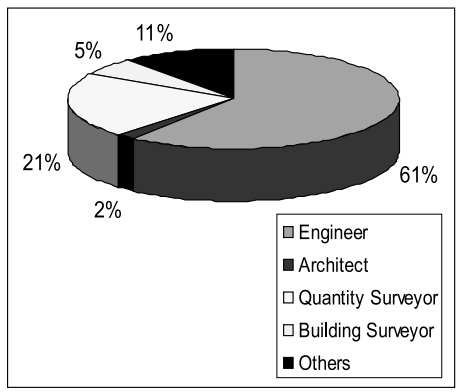

Figure 4: Academic background of Project Managers

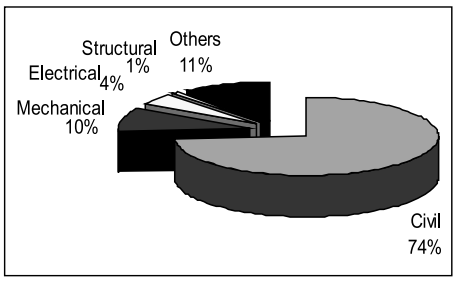

Figure 5: Engineering discipline of Project Managers

Apparently it warrants this group of professionals to be well equipped with tenets of Project Management which is instrumental in achieving the expectation of the stakeholders.

Respondents Years of Service in Construction

Next area examined was the years of service in construction sector among the respondents. The years of service is breakdown into four categories i.e. less than 2 years, 3 to 5 years, 6 to 10 years and finally more than 10 years. Referring to information in Table 1, indicated that the highest number of respondents (38.2 %) have been working for more than 10 years. Followed by number of respondents, that has been working within the range of 6 to 10 years which is 24.4%. If these two categories are to combine then it represented 62 %. Therefore it can be concluded that majority of the respondents were those that had been working in construction industry for not less than 5 years.

Status on Level of Knowledge among the Project Management Team

One of the primary objectives of this survey was to ascertain the level of knowledge among the project management team. Since knowledge is the fundamental element in human capital development in ensuring successfulness of any projects. As such a closed ended question was designed to seek the respondents' knowledge in quality cost. The question asked whether the respondents have any knowledge in quality cost. They were requested to answer 'Yes' or 'No'. The outcome was 76.4% responded 'No'. Another related question was designed in the questionnaire form to substantiate this finding. The respondents were asked whether they agreed that the level of knowledge about quality cost in our

Table 1: Distribution of years of service among respondents

Range Of Years Service	Number Of Respondents	Percentage
< 2 years	48	18.3%
3 to 5 years	50	19.1%
6 to 10 years	64	24.4%
> 11 years	100	38.2%
Total	263	100 %

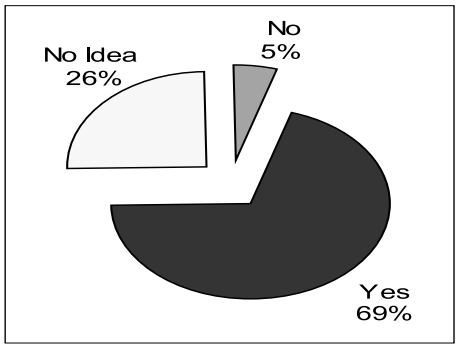

Figure 6: Low Level of Quality Cost Knowledge

construction industry is still low. They were given three choices to choose 'Yes', 'No' or 'Not Sure'. From Figure 6, noticed that 69.0 % of the respondents chose the answer 'Yes'. These findings reflected that our project management team has relatively poor knowledge in the area of quality cost.

Given such scenario the author tested on his two of his null hypotheses using chi-square value. The author adopted the practiced by Leung and Chan, 1999 in which the difference between groups in a contingency table is considered significant if it is less or equal to 0.05. The proposed hypotheses which were stated as follows:

Hypothesis I : Quality cost knowledge is independent on the designation of the personnel in the project management team

Hypothesis II : Quality cost knowledge is independent on the years of working experience by the personnel in the project management team

For Hypothesis I, the result showed that the Pearson Chi-Square value (Table 2) is 10.336 and the respective p-value is 0.242 which is greater than 0.05. Thus this null hypothesis I was not rejected. This provided an indication that there was no correlation between the knowledge and the designation of the personnel in project team. In relation to this finding enable the author to generalize that there is no difference in term of level of knowledge among key personnel in project management team i.e. Project Director, Project Manager, Project

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	10.336[a]	8	.242
Likelihood Ratio	11.249	8	.188
Linear-by-Linear Association	5.287	1	.021
N of Valid Cases	252		

a. 7 cells (38.9%) have expected count less than 5. The minimum expected count is .48.

Table 2: Chi-square result for hypothesis I

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	4.056[a]	3	.255
Likelihood Ratio	4.047	3	.256
Linear-by-Linear Association	3.580	1	.058
N of Valid Cases	254		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 11.34.

Table 3: Chi –square result for hypothesis II

Engineer and Contract Manager. Combining both results in Figure 6 with Hypothesis I, tend to support the outcome of the finding that the level of knowledge among of the personnel in construction project teams was relatively low.

With regard to Hypothesis II, the result showed that the Pearson Chi-Square value (Table 3) is 4.056 and the respective p-value is 0.255 which is greater than 0.05. Therefore this chi squared value is nor significant. This result indicated that there was no relationship between the knowledge and the years of service of the personnel in the project management team. Combining all these two corresponding findings can postulates that personnel in project management team with adequate number of years in managing the construction projects were not really well equipped with quality cost knowledge.

Subsequently a question was designed to support the preceding statements. The respondents were asked whether they agreed that the concept of quality cost is relatively new and not well understood among the project management team members in our construction industry. Based on the outcome in Figure 7, indicated that 71 % of them answered 'Yes', 6 % answered 'No' and 23 % answered 'No Idea' . This outcome is about similar to the result obtained by Abdul-Rahman, 1997. His survey unveiled that 78.3 % of his respondents agreed that quality cost in construction is vague, making the cost of quality failure relatively unknown during construction.

Potential Interest of Quality Cost Knowledge in Construction

In view of the above findings implied that the level of quality cost knowledge

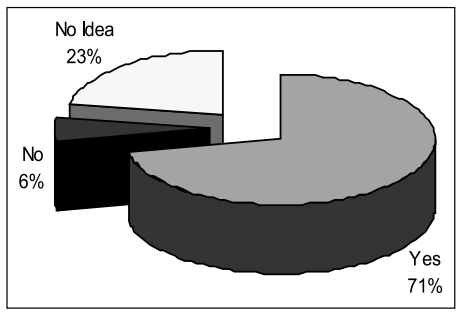

Figure 7: Quality Cost Concept Relatively New In Industry

among the project team is relatively low. In spite of it are our project management teams have any interest in enhancing their knowledge in quality cost? Having said that, thus one closed ended question was established for the said purpose. The respondents were asked whether the respondents are interested to attend any courses related to managing quality cost. The responds received (Figure 8) disclosed that 86.0 % of them replied 'Yes', 11.0 % answered 'Not Sure' and the remaining 3.0 % answered 'No' . The overwhelming result on answered 'Yes' purporting an interest among the project management personnel to pursue the knowledge in the area of quality cost.

The above finding provides an avenue to explore the potential of disseminating pervasively the knowledge on quality cost. Essentially it warrants vehement effort in developing awareness training module so as to educate the construction community in the field of quality cost.

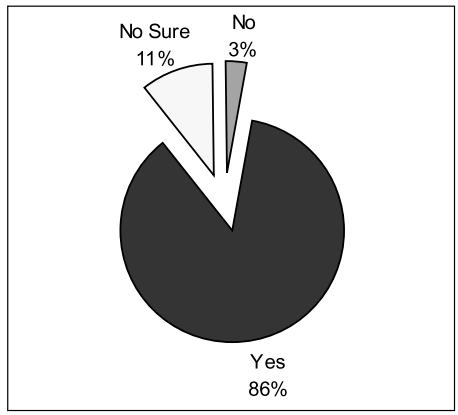

Figure 8: Interest in Attending Quality Cost Training

Status of Quality Cost Practice in Construction

Next related area explored was on the practice of quality cost in construction. As a result a closed-ended question was designed whether the respondents companies record or quantify cost related to implementing quality activities. Ironically the outcome showed that almost equal distribution of percentage between the answer 'Yes' or 'No'. This is quite a surprising result. Despite of poor knowledge in quality cost the referred information manifested that relatively high percentage of companies' record and quantifies cost related to quality activities. In contrary the author anticipated a higher percentage of the answer was 'No'. In order to validate this result the author posed another related closed-ended question. The respondents were asked whether their respective companies practice quality cost analysis in control and monitoring their quality performance and 74.2 % of them answered 'No'. It is quite absurd if companies record or quantify cost related to quality activities and they do not analyze them. Hence the author is in opinion that the respondents may be misinterpreted with the records collected for other financial analysis which lead to comparatively high percentage of the respondents answered 'Yes'.

For the balance of about 50 % that answered 'No' the author would like to probe further to know the probable reasons. As a result a related question was designed with a list of probable reasons for not recording quality cost data. The respondents were asked to select from seven main reasons given by the author.

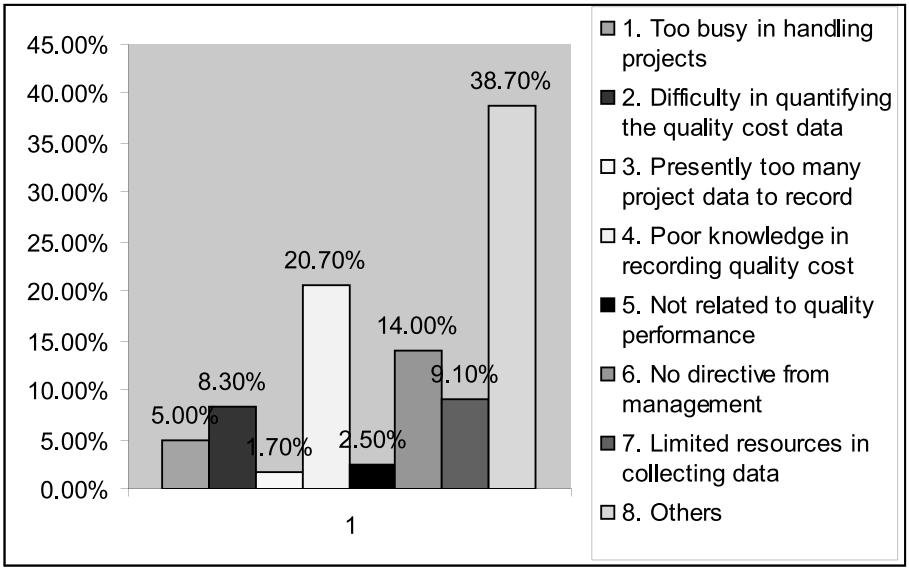

Figure 9: Reasons for not practising quality cost

From figure 9 showed that four most common reasons that were pick-up by respondents are as follows:

- Poor of knowledge in recording quality cost
- No directive from management
- Limited of resources in collecting data
- Difficulty in quantifying the quality cost data

Judging from the above result, demonstrated that lack of knowledge is the key factor that causes poor practice of quality cost. Notwithstanding that fact, another reason was no directive from the management. The later is duly unaware about the importance of quality cost. Therefore in order to ensure the successfulness in implementing quality cost priority should be given in triggering awareness among the top management.

Prospect of Quality Cost Practice in Construction

The next related question the respondents were also asked whether quality cost can be used as a good indicator to measure project quality performance. Three options of answers were provided i.e. 'Yes', 'No' and 'No idea'. Referring to the responds displayed in Figure 10 denoted that 81.0 % of them answered 'Yes', 16.0 % answered 'No Idea' and the balance 3.0 % answered 'No'. This result is also quite consistence with finding of Abdul-Rahman, 1997 whereby 78.3 % his respondents agreed that quality cost is perceived as a useful indicator of performance. With regard to this feedback whereby majority of the respondents replied 'Yes' reflects that there is a tendency of using quality cost approach by the project management team in construction. Another related question

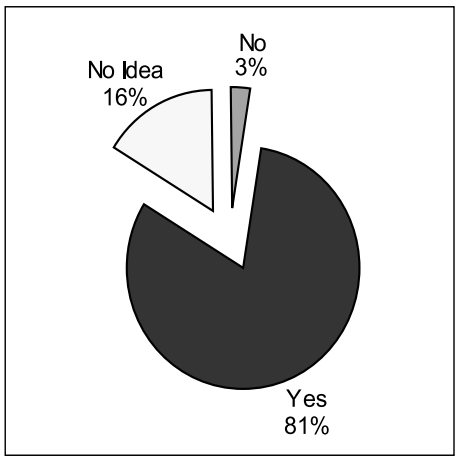

Figure 10: Quality Cost Can is a Good Performance Indicator

was designed to support this finding. The respondents were asked whether CIDB should promote of using quality cost in construction. The corresponding result manifested that 99.0 % of the respondents answered 'Yes'. It is noteworthy that all these findings provide good prospect in practicing quality cost in construction in the future. Consequently it is justifiable for more serious initiatives in formulating strategies to promote quality cost in the construction realm.

Importance of Using Quality Cost by ISO 9001 Certified Contractors.

Generally every industry players in the construction value chain have an influence in producing an exceptional quality of construction works may it be the client or developer or project owner, the consultant, contractor, supplier and manufacturer. However among those organizations which has the significant role? A questioned was asked about which party or player that plays the most important role in ensuring quality in construction project. Four organizations were listed for the respondents to select. The responds gathered (Figure 11) exhibited the highest percentage i.e. 42.0 % was directed to the contractor. Thus most of respondents agreed that contractor is the predominant industry player in propagating quality in construction industry. This result concurred with Abdul-Rahman, 1997, which states that details of the construction process are left to the contractors. The later are supposed to optimize resources effectively as well as efficiently to materialize the construction end product meeting the specification put forward by the consultants. Apparently it demands contractors' dedication in implementing quality management system. Properly implemented formal quality systems provide a vehicle for achieving quality (Battikha, 2003). An internationally recognized quality management regime is ISO 9000 series. The latest edition of ISO 9000 standard was released by ISO office based in Geneva in 15th November 2008 which is known as ISO 9001:2008 vis-à-vis

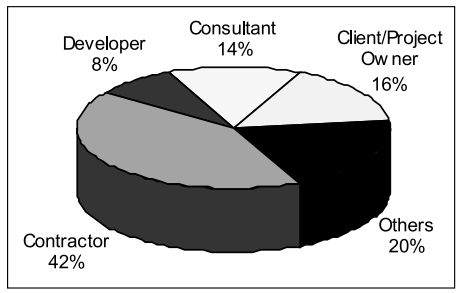

Figure 11: Parties That Have Pertinent Roles in Ensuring Quality in Construction

version 2008 (ISO, 2008). Generally there are no major changes in structural standard requirements. It stresses on the elements of control for out sourcing activities and incorporate further clarities to address several ambiguity in the previous version.

One of the fundamental tenets of modern quality management is: quality is planned, designed and built in – not inspected in (PMI, 2004). That statement implied that effort should be focus on preventive activities so as to minimize non conformance in the process of delivering the construction projects. As such it is imperative for contractors to embed sufficient amount of budget for preventive activities in their project costs. However what are the perceptions of our contractors in investing for quality management activities? The author emulated a question which was posed before by Abdul-Rahman, 1997. The respondents were asked whether they agreed that presently our contractors are still not used to the idea of investing more in preventive activities so as to minimize the failure cost. According to responds received showed that majority of the respondents (89.5 %) answered 'Yes'. This seemed to construe that the contractors are not proactive in providing financial resources so as to minimize failures or rather rework. In the nutshell, contractors were purporting maximizing a short term profit at the expense of investing in quality related activities that might induce some added value in the long run. This mindset by our contractors especially the ISO 9001 certified contractors can be changed by convincing them the advantage of using quality cost measuring tool. According to Low and Yeo, 1998 one method of determining if ISO 9000 reduces the cost of doing business is quality cost. By practicing quality cost the ISO contractors are expected to appreciate the importance of investing in preventive activities that may lead to considerable saving in reworks. Thus it can affect the profitability of the project. Besides that quality cost system concept can be applied to improve productivity (Omachonu *et. al,* 2004). In deed quality cost information can identify weaknesses, failures and their costs within a system or an operation (Abdul-Rahman, 1993).

Literature review disclosed that most of quality gurus advocated quality cost as one of the most effective measurement tool in assessing quality of project performance towards continuous improvement. Therefore contractors especially those that are certified to ISO 9001:2000 QMS are more importantly to practice quality cost. Since continual improvement is one of the areas being emphasize in ISO QMS which is reflected under clause 8.5.1 ISO 9001:2000 requirement. Furthermore CIDB has made mandatory for all G7 contractors need to be certified to ISO 9001:2000 by the year 2008. By practicing quality cost the contractors are also able to enhance their compliance to clause 8.4 of ISO 9001:2000 requirement. The referred clause stresses on performing analysis of data to check the suitability and effectiveness of the quality system as well as to evaluate where the continual improvement can be made. In view of the said effect the author opined that quality cost approach is an instrumental tool for ISO 9001 certified contractors towards continuously improving the capacity and

capability of contractors in delivering quality construction projects. It is expected that by practicing quality cost enable ISO 9000 contractors to elevate their level of competitiveness in order to survive in future highly competitive business climate especially in venturing into global market. As such CIDB craved in improving quality in construction landscape by making mandatory all the highest grade contractors to be certified to ISO 9001: 2000 by end of the year 2008 is considered justifiable.

DISCUSSION AND RECOMMENDATIONS

This exploratory survey was executed primarily to ascertain the level of knowledge and practice of quality cost in construction. The targeted respondents were personnel at managerial level in the project management team. The status on knowledge was substantiated through two chi-square tests. From the first chi-square results denoted that virtually all levels of project management team lack of knowledge in quality cost. Where else from the second chi-square result postulated that personnel in project team with adequate number of years working in construction were also relatively poor knowledge in quality cost. This phenomenon has impacted the implementation of quality cost approach in construction. In fact this was compounded through several results of findings to corresponding questions on quality cost practice which broadly indicated considerably low in practicing of using the said tool. Consequently taking cognizance of all these referred results can derive to a conclusion that quality cost approach in the construction sector throughout the country is at the infancy stage.

With regard of prospect in using quality cost measuring tool, generally the above findings deemed to provide positive indication. Majority of the respondents showed their interest in gaining knowledge in quality cost in the future. Further more they agreed in principle that quality cost can become a good indicator in assessing project quality performance. However the outcome of the study discovered that one of the main deterrent factors that impacted quality cost practice is poor of knowledge. Essentially it warrants a concerted effort to educate the construction fraternity by developing the quality cost training module tailored to the industry needs. Further education on the practical level is needed for managers to understand better the cost of quality concept in order to appreciate fully the benefits of the approach, to increase their ability to implement cost of quality measure system and to save money (Schiffauerova and Thomson, 2006). Preferably the module development is conducted in collaboration with representatives from the industry.

Another finding from this study is that contractor has been identified as the key player in ensuring quality in construction. Albeit of the fact, the related result also portrayed that the client or the project owner has a considerable role to play in instituting quality in construction. Based on result in Figure 11, the combination of the developer and the client or project owner will make up 24 % which is the second highest and

followed by the consultant 14 %. In view of this result indicated that the client or the project owner has a fair role to play in constituting quality in construction. The author opined the supervisory role of the client or project owner can contribute in strengthening project quality performance in construction. Moreover the client or the project owner being the pay master of the project has better command on the contractor in the aspect of project supervision. According to Oberlender, 1993 the owner therefore should monitor and supervise the contractor's quality plan and make a sport checks from time to time during the construction process. In short beside the contractor, the client or project owner has supervisory role to play in ensuring quality in construction industry.

CONCLUSIONS

Among the main findings from the survey are poor of knowledge on quality cost among the project management team and relatively low of practice on quality cost approach in the construction industry. However majority of the respondents agreed that quality cost can be a good quality performance indicator and showed their interest in acquiring their knowledge in quality cost. The later creates an avenue to educate the industry on the related knowledge area. As a result it warrants to develop a systematic and well structured training modules tailored to industry needs. For instance the project team at the managerial level should be exposed on the principles of quality cost so as to create their awareness on the importance the said tool. Where else the supervisory level needs to be trained in the area of capturing and quantifying quality cost data. For the workers level they should be guided in recoding the quality cost data. All these activities enable to cultivate the education culture on quality cost in the Malaysian construction realm. In addition initiatives need to be made in encouraging research in area of quality cost so as to facilitate the industry in practising quality cost.

Another finding from the survey deemed to denote that among the players in the construction value chain, contractor has the crucial role in ensuring quality in construction project. This is due to the fact that the contractor that controls the resources and construction processes during the project execution. Especially for the design and build method of procurement. However for open bidding method the consultants also have a pertinent role to play in ensuring quality in the project. In the light of improving quality in construction, it is recommended that the main contractors practice the ISO 9001: 2008 quality management system. Apart from that effort should be made to introduce a performance based assessment system on the contractors' ability to deliver exceptional quality of construction end products so as to benchmark their performance at the national level. In this regard it is expected to propagate and elevate quality in construction to a higher dimension.

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