

QUALITY MANAGEMENT SYSTEM IN CONTRACTOR ORGANISATIONS: AN EMPIRICAL STUDY ON COSTS AND BENEFITS OF ISO 9001:2008 IMPLEMENTATION

Nursyamimi Shaari¹, Mat Naim Abdullah², Su Zheng Sheng and Muhamad Amir Afiq Lokman

*Department of Real Estate, Faculty of Geoinformation and Real Estate,
Universiti Teknologi Malaysia, 81310 Skudai, Johor, Malaysia
Email: ²matnaim@utm.my; ¹nsyamimishaari.utm@gmail.com*

Abstract

The main objective in implementing quality management is to enhance product quality and continuously improve a service. Quality Management System is among the important managements in construction industry. However, there are still questions regarding the effectiveness of this system in construction industry. Therefore, this study was conducted to investigate the perceived benefits and costs of implementing ISO 9001:2008 series certification in Malaysian construction industry. Literature reviews were used to construct the questionnaire. A total of 200 copies of questionnaire form were distributed to construction firms. However, only 44 questionnaires were successfully collected. Response rate in this study was 20%. Four out of 20 benefits were listed out, which are the improved quality of product or service, better control of subcontractors, clearer working procedures and increased efficiency. For the perceived cost, the top three costs are known as expenditure on providing the ISO 9001 training, additional time spent by existing staff to setup ISO 9001 system and cost to establish documentation system.

Keywords: *Quality Management System, ISO 9001: 2008, Costs, Benefits, Contractor*

1.0 INTRODUCTION

Implementation of Quality Management System (QMS) is one of the responses to criticisms on the construction industry due to poor performance with several identified issues such as delayed project completion, increased cost, increased defects and failure to achieve the specification (Al-Kharashi & Skitmore, 2009; Ibrahim *et al.*, 2010; Sambasivan & Soon, 2007). To date, QMS is perceived as the critical component to the success of management of the construction industry (Ahmed *et al.*, 2005; Cachadinha, 2009; Elghamrawy & Shibayama, 2008). QMS implementation can be conducted based on ISO 9001, Total Quality Management (TQM) or Business Process Reengineering (BPR). Most construction companies have adopted the ISO 9001 certification as the quality approach for their companies. Recently, ISO 9001 certification has become acceptable worldwide with the constant increase in number of companies

seeking for ISO certification (Llach, Marimon, & Bernardo, 2011).

The advantages from the implementation of ISO 9001:2008 have been proved by many studies. By being certified with ISO 9001, many construction companies have increased their business performance (Zeng *et al.*, 2007), which was shown by the increase in customer satisfaction, reduced rework, noncompliance items and less wastage and improved profits margins as well as increased business opportunities (Beattie, 1999; Karim *et al.*, 2005; Ofori, Gang, & Briffett, 2002; Palaneeswaran, Ng, & Kumaraswamy, 2006; Turk, 2006).

Although the benefits of ISO certification have clearly identified, there are yet a number of construction organizations still reluctant to be certified. As reported by CIDB (Construction Industrial Development Board) in 2010, there is a low number in registration of contractors for ISO 9001:2008 certification. As stated by Baiden *et al.* (2006), the main reason for this is because of higher cost on obtaining the ISO certification.

This is parallel with the results obtained by Karim *et al.* (2005) studying the Australian construction industry, which discovered the barriers in implementing the QMS as more time is required to be spent in management, requirement of more staff, less operational flexibility that indirectly lead to a high overall project cost. This is might be due to some of them could not clearly see the relationship between costs and benefits. As mentioned by Palaneeswaran *et al.* (2006), most contractors are having misconception over costs and benefits. Therefore, there is a need to analyses the costs and benefits to prove that benefits can outweigh the costs (Ng *et al.*, 2012).

This paper attempts to estimate to the extent possible, the costs and benefits of ISO 9001 to a contractor. This paper addresses two objectives. The first objective is to investigate the perceived benefits of implementing ISO 9001:2008 certification. The second objective is to determine the perceived costs of implementing ISO 9001:2008 certification for the construction firms. The implication of this study can serve as guidance for the Construction Industry Development Board (CIDB) to formulate a quality promotional strategy in increasing the number of G7 contractors pursuing the ISO 9001:2008 certification. In the following sections, the definitions of quality, costs and benefits of the ISO 9001:2008 are further explained in the literature review. Next, study methodology selected to collect and analyze the data is described. This is followed by the findings and discussion section. Finally, the last section presents the conclusions made and recommendations stated for future studies.

2.0 LITERATURE REVIEW

2.1 Definitions of Quality, Quality System and Quality Management System

In construction perspective, quality is referred to as meeting the client's requirement based on the contract specification (Gibson & Hamilton, 1994). Similarly as defined by Jha and Iyer (2006), quality in construction is achieved by "meeting the customer expectation" or "compliance with customer's satisfaction". Since customers can be classified into internal and

external customers, it can be said that the quality of construction project depends on meeting the requirements of each party involved in the construction project such as contractors, consultants as well as the project owners (Arditi & Gunaydin, 1997). On the other hand, ISO 8402 defined quality system as "the organization structure, responsibilities, procedure and resources needed to implement quality management". Meanwhile, quality management involves all activities of the overall management function determining the quality policy, objectives and responsibilities and implements quality planning, quality assurance, quality control and quality improvement within quality system. So, it can be concluded that the QMS is the interaction between people, processes and documentations to meet the requirements and satisfaction of customers (Abdul Hakim Mohamed, 2006).

2.2 Background of ISO 9001:2008

ISO 9001 QMS series standards have been applied in almost all sectors such as manufacturing, medical, transportation as well as construction. ISO 9000 was first established in 1987 with the basis of the UK quality management system standard BS5750 aiming at promoting the quality services and products provided by different sectors (Chin and Choi, 2003). This quality system is based on the quality management principles (QMP) namely customer focus, leadership, involvement of people, process approach, system approach, continual improvement, factual approach to decision making and mutually beneficial supplier relationship. Among these eight principles, five of them are considered as the main clauses, which are quality management system, management responsibility, resource management, product realization, as well as measurement, analysis and improvement.

On the other hand, the implementation of ISO 9001 series in contractor companies is encouraged by several factors. As mentioned by Chini & Valdez (2003), the adoption of ISO 9001 in the US construction industry is to implement better quality management, quality control and quality assurance for organizations. Meanwhile, the UK construction industry is motivated to

adopt the ISO 9001 as the basis to achieve the clients' requirement, improve the quality of management and product/services, and sharpen the competitive market (Moatazed-Keani IV & Ghanbari-Parsa Sechi, 1999). Besides, the establishment of ISO quality series is also driven by the government, which utilizes the ISO 9001 quality system as prequalified for public sector projects (Karim *et al.*, 2005) as the guarantee to raise quality standard at all project levels and to ensure that project operations are based on a proper quality planning (Trigunarsyah *et al.*, 2011).

Malaysian construction industry has also adopted the same quality standards. Construction Industry Development Board (CIDB) in Malaysia has put a mandatory requirement for the Grade 7 contractors to obtain ISO 9001 certification before January 1, 2009. If they fail to do so, their grade will be downgraded, which adversely affects their ability to run business operations (Din, Abd-Hamid, & Bryde, 2011). Since 2000, the CIDB Malaysia has introduced a scheme of Do-It-Yourself (DIY) to all contractors to help them get the certification of ISO 9001. This scheme helps the contractors to obtain ISO 9001 at an affordable cost and time (Abdullah, 2012).

2.3 Costs of ISO 9001:2008 Implementation

Costs of quality represent a considerable proportion of a company's total costs. In construction industry, quality costs as a whole are relatively high in terms of total project costs (Aoieong *et al.*, 2002). The cost of implementing ISO 9001 in construction organization can be divided into two groups, which are internal and external costs (Rahhal & Madhavji, 1996). External costs include all fees for consulting, registration and audit, which are predictable, quotable, contractual and often fixed. Whereas internal costs include the cost on defining, developing and implementing the processes and procedures for the quality system in compliance to the requirements of the ISO 9001 standards (Rahhal & Madhavji, 1996).

Leung *et al.* (1999) in their survey have classified cost into two categories, which are cost during the implementation and the cost on maintaining ISO 9001 implementation. Costs involved during the implementation are included

the consultant fees, certification audit fees, equipment calibration fees, purchase of additional equipment/facilities, cost of establishing the documentation system, staff training, recruiting additional staff and additional time spent on setting up the ISO system. On the other hand, the costs involved in maintaining the ISO 9001 system are surveillance audit fees, equipment calibration fees, cost of maintaining the documentation system, staff training and the additional time spent on maintaining the ISO 9001 system (Leung *et al.*, 1999). Besides that, Ng *et al.* (2012) separated the costs of ISO 9001 into three categories; 1) Initial costs (the development of quality manual and procedures for certification); 2) Running costs (how much the contractor has to spend to keep the ISO 9001 running); 3) The change in running costs between different versions of ISO 9001. Based on these studies with respect to the adoption of ISO 9001, it can be concluded that the general costs involved on ISO 9001 system are:

Table 1: Cost of ISO 9001

Costs of ISO 9001 Implementations	
Consultants fees	Certification audit fees
Equipment calibration fees	Purchase of additional equipment
Cost of establishing the documentation system	Expenditure of providing the ISO 9001 training
Cost of recruiting additional staff for implementation of ISO 9001	Additional time spent by existing staff on setting up ISO 9001 system
Additional investment on information technology	Purchase of software for ISO 9001
Surveillance audit fees	Equipment calibration fee
Cost of maintaining the documentation system	Expenditure of providing ISO 9001 training for staff
Cost of recruiting additional staff for maintaining ISO 9001	Additional time spent by staff on maintaining the ISO 9001 systems

Sources: Aoieong *et al.*, 2002; Leung *et al.*, 1999; Ng *et al.*, 2012; Rahhal & Madhavji, 1996

2.4 Benefits of ISO 9001:2008 Implementation

The benefits of implementing the ISO 9001 in the construction industry have been reported by a number of previous studies. Moatazed-Keani IV and Ghanbari-Parsa Sechi (1999) discovered that the adoption of ISO 9001 has given the positive impact by showing less failure work, better management, retained business, enhanced satisfaction of the customers and less wastage on site. Furthermore in Hong Kong, ISO 9001 implementation has showed its improvement from the customers' satisfaction perspective with the contractors benefitted through reduced rework and non-compliance items, less wastage, improved profits margins and business opportunities (Palaneeswaran *et al.*, 2006). Besides, Turk (2006) reported that ISO 9001 has made a positive impact to the Turkish construction industry.

Additionally, Ofori *et al.* (2002) identified that lessons learned from adoption of ISO 9001 ensures that a construction company can be more efficient in its subsequent projects using material resources developing better internal communications and increasing productivity as well as improving its standard operating procedures. Based on the study carried out by Karim *et al.* (2005), most Australian construction companies had enjoyed the advantages of adopting the ISO 9001. These benefits are reported as follow:

- i) Majority of the respondents indicated that quality assurance system resulted in less rework and repair along with fewer problems in the defect liability period;
- ii) Increased operational efficiency with respondents believing that quality system can result in continual improvement of operation;
- iii) Improved internal performance appraisal systems resulted from the implementation of QMS.
- iv) Improved internal communication;
- v) Achievement of a greater customer satisfaction;
- vi) Achievement of better management, and;

- vii) Documentation provided indicating a more systematic record keeping of companies.

In Malaysia, Said *et al.* (2009) listed several advantages of ISO 9001 implementation in Malaysian construction industry, which are:

- i) Enhanced image and reputation of organization;
- ii) Performance improvement and increased customers' satisfaction;
- iii) Establishment of clear documented procedures and instructions, and;
- iv) Efficiency of operations in construction site.

Based on these studies with respect to the adoption of ISO 9001, it can be summarized that the general practice of ISO 9001 can provide advantages as follows:

Table 2: Benefits of ISO 9001

Benefits of ISO 9001 Implementations	
Improved team spirit	Less staff conflicts
Clearer working procedure	Lower staff turnover rate
More suggestion from staff	Improved internal communication
Reduced wastage of materials	Shorter delivery lead time
Increased efficiency	Improved quality of product or service
Better control of subcontractor	Reduced operational cost
Increased quantity of production	Reduced defects
Increased sales with existing customers	Attract more new overseas customers
Less complaints	Increased profits
Customers exercising less control on process	Improved supplier relationship

Sources: Karim *et al.*, 2005; Moatazed-Keani IV & Ghanbari-Parsa Sechi, 1999; Ofori & Gang, 2001; Palaneeswaran *et al.*, 2006; Turk, 2006

3.0 STUDY METHODOLOGY

This paper focuses on the benefits and costs of ISO 9001:2008 certification as perceived by the construction companies. The questionnaire was divided into two main sections. Section A

concerns on determining the costs of implementing ISO 9001:2008 Quality Management System in construction firms. Section B investigates the benefits of implementing ISO 9001:2008 Quality Management System in construction firms. The objective of this paper depends very much on the selected sample, which is important to ensure that the samples can represent the targeted population. Thus, it is important that the targeted contractors have been certified under ISO 9001:2008. Since those certified as Grade 7 must have an accredited ISO 9001:2008, the contractor lists maintained by the CIDB were selected as the starting point for sample selection. Then, contractors in Johor Bharu were selected as the respondents for this study. The selection of Johor Bharu as the scope of study is because it is one of the regions that are highly active on construction activities. Furthermore, time and financial factors are the constraints in comprehensive study on the entire cities in Malaysia.

A total 429 construction companies were registered with CIDB in Johor Bharu. By referring to the table by Rea and Parker (2014), the minimal sample for the total of 500 populations was 217. Therefore, for the purpose of this study, about 200 copies of questionnaire were distributed to construction companies around Johor Bharu. All the variables were adapted from various literatures related to QMS in construction industry. Questionnaire using 5-point Likert type scale was used to gather data for the construct of the study. The scale is on the integer number from “strongly disagree” (1) to “strongly agree” with “neutral” (3) as the middle point. The respondents were required to indicate their views by indicating or marking one of the integer numbers. Then, mean rank was used to get a clearer picture on their most preferences regarding costs and benefits on ISO 9001 implementations to their firms. To rank the items, the rating scale formula was used as follows:

$$\frac{X_1 W_1 + X_2 W_2 + X_3 W_3 + \dots + X_n W_n}{Y}$$

Where:

- X = Weight of answer choice
- W = Response count for answer choice
- Y = Total respondent

The weights assigned to each answer are shown in parentheses:

- Strongly Disagree = 1
- Disagree = 2
- Neutral = 3
- Agree = 4
- Strongly Agree = 5

4.0 RESULTS

A total of 200 questionnaires were distributed via mail and hard copy to the selected contractor firms in Johor Bharu. However, only 44 questionnaires were successfully collected. The response rate in this study was 20%, which is considered acceptable according to Akintoye (2000) and Dulaimi, Ling, and Bajracharya (2003) stating that the normal response rate in the construction industry is between 20-30%. This section discusses the results based on the survey conducted.

4.1 Costs on Implementing of ISO 9001:2008

There were 16 costs involved on the ISO 9001 implementation as identified from the previous study. As mentioned earlier, Likert- Scale was used for this study to get the view from contractor firms regarding which items impacted them the most.

Table 3 shows the classification of five categories (Strongly Disagreed, Disagreed, Neutral, Agreed and Strongly Agreed) based on the responses on the costs and required resources. It can be observed that majority of the respondents “strongly agreed” (31.8%) that expenditure on providing the ISO 9001 training is the highest cost involved in the implementation of ISO 9001. Meanwhile, 25% total respondent strongly agreed that additional time by existing staff on setting up ISO 9001 system gave the significant impact on implementation costs. While comparing to the “agreed” scale, 61.4% of total respondents agreed that equipment calibration fees is the one of the costs frequently involved in the ISO 9001 implementation followed by “cost of establishing the documentation system” with 56.8%.

To get a clearer picture regarding the cost, mean rank was used. Based on this analysis, the costs incurred by the construction firms were arranged according to preference. Table 4 lists the ranks and mean scores of the 16 items' costs on implementing ISO 9001:2008 to the construction firms. "Expenditure of providing the ISO 9001 training" was ranked first among 16 items, whereas "Additional time spent by existing staff on setting up ISO 9001 system" and "Cost of establishing the documentation system" were ranked second and third, respectively. "Purchase of software for ISO 9001" was ranked as the last cost involved in the implementation of ISO 9001.

Table 3: Frequency of costs in implementing ISO 9001 Quality Management System

Costs	SD	D	N	A	SA
Consultant fees	0%	4.5%	31.8%	47.7%	15.9%
Certification audit fees	0%	0%	31.8%	50%	18.2%
Equipment calibration fees	0%	0%	29.5%	61.4%	9.1%
Purchase of additional equipment	0%	4.5%	27.3%	52.3%	15.9%
Cost of establishing the documentation system	0%	2.3%	20.5%	56.8%	20.5%
Expenditure of providing the ISO 9001 training	0%	0%	15.9%	52.3%	31.8%
Cost of recruiting additional staff for implementing ISO 9001	0%	2.3%	36.4%	45.5%	15.9%
Additional time spent by existing staff on setting up ISO 9001 system	0%	0%	27.3%	47.7%	25%
Additional investment on information technology	0%	6.8%	31.8%	50%	11.4%
Purchase of software for ISO 9001	4.5%	15.9%	25%	40.9%	13.6%
Surveillance audit fees	0%	4.5%	29.5%	52.3%	13.6%

Equipment calibration fee	0%	6.8%	31.8%	50%	11.4%
Cost of maintaining the documentation system	0%	4.5%	34.1%	45.5%	15.9%
Expenditure of providing ISO 9001 training for staff	0%	6.8%	36.4%	38.6%	18.2%
Cost of recruiting additional staff for maintaining ISO 9001	0%	9.1%	31.8%	45.5%	13.6%
Additional time spent by staff on maintaining the ISO 9001 system	0%	4.5%	27.3%	52.3%	15.9%

Note: SD-Strongly Disagree; D-Disagree; N-Neutral; A-Agree; SA-Strongly Agree

Table 4: Mean Score of Costs for ISO 9001 Quality Management System

Costs	Score	Rank
Expenditure of providing the ISO 9001 training	4.16	1
Additional time spent by existing staff on setting up ISO 9001 system	3.98	2
Cost of establishing the documentation system	3.95	3
Certification audit fees	3.86	4
Additional equipment purchased	3.80	5
Equipment calibration fees	3.80	5
Additional time spent by staff on maintaining the ISO 9001 system	3.80	5
Cost of recruiting additional staff for implementation of ISO 9001	3.75	6
Consultants fees	3.75	6
Surveillance audit fees	3.75	6
Cost of maintaining the documentation system	3.73	7
Expenditure of providing ISO 9001 training for staff	3.68	8
Additional investment on information technology	3.66	9
Equipment calibration fee	3.66	9
Cost of recruiting additional staff for maintaining ISO 9001	3.64	10
Purchased software for ISO 9001	3.43	11

4.2 Benefits on Implementing of ISO 9001:2008

Having examined the cost of developing and implementing an ISO 9001:2008, it is crucial to determine the benefits that can be obtained from using a system. There were 18 items presenting the benefits of using the ISO 9001 system. Table 5 illustrates the classification of five categories (Strongly Disagreed, Disagreed, Neutral, Agreed and Strongly Agreed) based on the responses on the benefits and required resources. From the Table 5, majority of respondents “strongly agreed” that ISO 9001 implementation can improve their quality of products or services with 34.1%. Meanwhile, 29.5% strongly agreed that their companies have seen an increase in efficiency of their services after the ISO 9001 implementation. This was followed by “acquired a better control of subcontractor” and “attracted more new overseas customers” with 27.3%. However, when comparing with the “agreed” scale, it can be said that the result is slightly different with the highest percentage on “agreed” is “clearer working procedure” (68.2%), “Increased quantity of production” (63.6%), and followed by “improved team spirit” and “received less complaints” with 59.1%, respectively. Therefore, the mean score was calculated for each item to identify the most important benefits in implementing ISO 9001:2008 in contractor firms. Table 6 shows the ranking of these benefits.

Table 5: Results on Benefits of ISO 9001 Implementation

Benefits	SD	D	N	A	SA
Improved team spirit	2.3%	6.8%	20.5%	59.1%	11.4%
Clearer working procedures	2.3%	2.3%	6.8%	68.2%	20.5%
Less staff conflicts	2.3%	6.8%	34.1%	43.2%	13.6%
Lower staff turnover rate	4.5%	18.2%	40.9%	27.3%	9.1%
Received more suggestions from staff	2.3%	4.5%	47.7%	31.8%	13.6%
Improved internal communication	0%	4.5%	27.3%	52.3%	15.9%

Reduced wastage of materials	0%	4.5%	27.3%	52.3%	15.9%
Shorter delivery lead time	0%	6.8%	27.3%	52.3%	13.6%
Increased efficiency	0%	6.8%	15.9%	47.7%	29.5%
Improved quality of products or services	0%	2.3%	15.9%	47.7%	34.1%
A better control on subcontractors	0%	0.0%	18.2%	54.5%	27.3%
Reduced operational costs	0%	9.1%	36.4%	47.7%	6.8%
Increased quantity of production	0%	9.1%	11.4%	63.6%	15.9%
Reduced defects	0%	4.5%	25%	45.5%	25.0%
Increased sales with existing customers	2.3%	0.0%	25%	54.5%	18.2%
Attracted more new overseas customers	2.3%	2.3%	31.8%	36.4%	27.3%
Received less complaints	0.0%	11.4%	15.9%	59.1%	13.6%
Increased profits	2.3%	2.3%	34.1%	47.7%	13.6%
Customers exercising less control on your process	6.8%	4.5%	36.4%	47.7%	4.5%
Improved suppliers' relationship	0.0%	6.8%	38.6%	38.6%	15.9%

Note: SD-Strongly Disagree; D-Disagree; N-Neutral; A-Agree; SA-Strongly Agree

Based on Table 6, improved quality of products or services was ranked first as the benefits in implementing ISO 9001 systems (mean: 4.14). Then, better control on subcontractors was ranked second (mean: 4.09) with clearer working procedure as the third (mean: 4.02). Increased efficiency was the fourth important benefit (mean: 4.00) perceived by the contractor on implementing ISO 9001 systems, then increased quantity of product or services on the fifth rank with mean score of 3.91. Lower staff turnover was ranked last as the benefit that can be obtained by the contractors upon the ISO 9001:2008 implementations.

Table 6: Mean Score of Benefits of ISO 9001 Quality Management System

Benefits	Score	Rank
Improved quality of product or service	4.14	1
A better control on subcontractors	4.09	2
Clearer working procedures	4.02	3
Increased efficiency	4.00	4
Reduced defects	3.91	5
Increased quantity of production	3.86	6
Increased sales with existing customers	3.86	6
Attracted more new overseas customers	3.84	7
Improved internal communication	3.80	8
Reduced wastage of materials	3.80	8
Received less complaint	3.75	9
Shorter delivery lead time	3.73	10
Improved team spirit	3.70	11
Increased profits	3.68	12
Improved suppliers' relationship	3.64	13
Less staff conflicts	3.59	14
Reduced operational costs	3.52	15
Received more suggestions from staff	3.50	16
Customers exercising less control on your process	3.39	17
Lower staff turnover rate	3.18	18

5.0 DISCUSSIONS OF THE RESULTS

From the respondent's point of view, expenditure of providing the ISO training was the highest cost involved in the ISO 9001 implementation. At the initial stage, it is important to make all the parties familiarized with the quality concept; how the system is implemented and who is responsible for it. Providing the training is the best way to gain significant impact on ISO 9001 implementation. Moreover, it has been mentioned by previous study that training is one of the success factors in implementing quality management system (Abdul Hakim Mohamed, 2006; Abdullah, 2012; Pheng & Hwa, 1994). Thus, it is crucial for construction firms to allocate a large budget to provide training to the entire parties. Besides, additional time required to setup the ISO 9001 is one of the costs that should be considered by the contractor companies. This was followed by the cost of establishing the documentation system, certification audits fees, purchased additional equipment and equipment calibration fees. Based on the findings, it can be noted that the most relevant costs are the ones related to the implementation as mentioned by Leung *et al.*

(1999) and Ng *et al.* (2012) that there are some costs that contractors should bear on the initial stage to setup the ISO 9001 to their companies. Moreover, based on the comparison on benefits section, it can be seen that 'reduced operational cost' is among the unpopular answers chosen by the respondents. This current results are similar to those found by Ofori and Gang (2001) in Singapore where the companies did not experience significant cost saving from ISO 9001 implementation.

While contractor organizations need to incur several costs in implementing ISO 9001, they expected that it can bring some benefits. The questionnaire sought to examine the benefits that can possibly be obtained by companies deriving this quality system. From the analysis, the three most important benefits enjoyed by contractor are improved quality of products or services, better control on subcontractors and clearer working procedure. Also ranked in high position are the increased efficiency and decreased defects. It is clear that ISO 9001:2008 implementation can help the contractors in improving their internal activities and interphase with external business by improving their operational performance and guaranteeing their customers and the general public on the quality of their products and services. This finding was similar with that obtained by Ng *et al.* (2012), Karim *et al.* (2005) and Said *et al.* (2009).

6.0 CONCLUSION

ISO 9001 has been used and accepted throughout the world. Besides, it has become the subject of focus by many industries including construction. Although the ISO 9001:2008 implementation has been studied by many previous studies, there are yet inadequate numbers of them focusing on costs and benefits especially in Malaysia. Therefore, this study was carried out to identify the costs and benefits of ISO 9001:2008 implementation for contractor companies in Malaysia. A response rate of 20% was obtained from 200 certified contractor companies in Johor Bharu. Based on the mean rank analysis, it can be noticed that the majority of respondents agreed that the expenditure of providing the ISO 9001 training consumes the highest cost, followed by

“additional time spent by staff on setting up the ISO 9001 systems” and “cost of establishing the documentation system”, respectively. Meanwhile, “Improved quality of product or service”, “Acquired a better control of subcontractor”, “Clearer working procedure”, and “Increased efficiency” were found among the benefits that could be gained by the contractors from implementing ISO 9001 system. Besides, the study also pointed out several limitations or problems. In the process of completing this study, primary data collection requires co-operation from the contractors. However, only a limited number of respondents were willing to get involved in this study. Some of the contractors were busy with their heavy daily tasks, which led them unable to spare their time to fill in the questionnaire. Therefore for further study, it is suggested that the sample size should be increased as the response rate for this questionnaire survey was not very high and a more accurate conclusion can be drawn from a larger sample size when a detailed study is conducted. Moreover, since this study only determine the perceived costs and benefits, it is advisable that a study identifying whether or not the benefits of ISO 9001 can outweigh the cost of implementing ISO 9001 and investigating the problems faced by contractor in implementing the ISO Quality Management System is carried out.

REFERENCE

- Abdul Hakim Mohamed, M. N. A. (2006). Quality Management System in Construction *Paper presented at the International Conference on Construction Industry 2006*.
- Abdullah, M. N. (2012). *A Structured Critical Success Factors Model For Implementing Project Quality Management System in Construction*. (PhD), Universiti Teknologi Malaysia.
- Ahmed, S. M., Aoieong, R. T., Tang, S. L., & Zheng, D. X. M. (2005). A comparison of quality management systems in the construction industries of Hong Kong and the USA. *International Journal of Quality & Reliability Management*, 22(2), 149-161. doi:10.1108/02656710510577215
- Akintoye, A. (2000). Analysis of factors influencing project cost estimating practice. *Construction Management & Economics*, 18(1), 77-89.
- Al-Kharashi, A., & Skitmore, M. (2009). Causes of delays in Saudi Arabian public sector construction projects. *Construction management and economics*, 27(1), 3-23. doi:10.1080/01446190802541457
- Aoieong, R. T., Tang, S., & Ahmed, S. M. (2002). A process approach in measuring quality costs of construction projects: model development. *Construction Management & Economics*, 20(2), 179-192.
- Arditi, D., & Gunaydin, H. M. (1997). Total quality management in the construction process. *International Journal of Project Management*, 15(4), 235-243.
- Baiden, B. K., Price, A. D. F., & Dainty, A. R. J. (2006). The extent of team integration within construction projects. *International Journal of Project Management*, 24(1), 13-23.
- Beattie, K. R. (1999). Implementing ISO 9000: A study of its benefits among Australian organizations. *Total quality management*, 10(1), 95-106. doi:10.1080/0954412998090
- Cachadinha, N. (2009). Implementing Quality Management Systems in Small and Medium Construction Companies: A Contribution to a Road Map for Success. *Leadership and Management in Engineering*, 9(1), 32-39. doi:doi:10.1061/(ASCE)1532-6748(2009)9:1(32)
- Chini, A., & Valdez, H. (2003). ISO 9000 and the U.S. Construction Industry. *Journal of Management in Engineering*, 19(2), 69-77. doi:doi:10.1061/(ASCE)0742-597X(2003)19:2(69)
- Din, S., Abd-Hamid, Z., & Bryde, D. J. (2011). ISO 9000 certification and construction project performance: The Malaysian experience. *International Journal of Project Management*, 29(8), 1044-1056.
- Dulaimi, M. F., Ling, F. Y., & Bajracharya, A. (2003). Organizational motivation and inter-organizational interaction in construction innovation in Singapore.

- Construction management and economics*, 21(3), 307-318.
- Elghamrawy, T., & Shibayama, T. (2008). Total Quality Management Implementation in the Egyptian Construction Industry. *Journal of Management in Engineering*, 24(3), 156-161. doi:10.1061/(ASCE)0742-597X(2008)24:3(156)
- Gibson, G. E., & Hamilton, M. R. (1994). *Analysis of pre-project planning effort and success variables for capital facility projects*: The Institute.
- Ibrahim, A. R. B., Abdul Razak, I., Matthew, H. R., Zafar, A., & Ghaffar, I. (2010). An investigation of the status of the Malaysian construction industry. *Benchmarking : an international journal*, 17(2), 294-308. doi:10.1108/14635771011036357
- Jha, K., & Iyer, K. (2006). Critical factors affecting quality performance in construction projects. *Total Quality Management and Business Excellence*, 17(9), 1155-1170.
- Karim, K., Marosszeky, M., & Kumaraswamy, M. (2005). Organizational effectiveness model for quality management systems in the Australian construction industry. *Total quality management & business excellence*, 16(6), 793-806.
- Leung, H. K., Chan, K. C., & Lee, T. (1999). Costs and benefits of ISO 9000 series: a practical study. *International Journal of Quality & Reliability Management*, 16(7), 675-691.
- Llach, J., Marimon, F., & Bernardo, M. (2011). ISO 9001 diffusion analysis according to activity sectors. *Industrial Management & Data Systems*, 111(2), 298-316. doi:10.1108/02635571111115191
- Moatazed-Keani IV, R., & Ghanbari-Parsa Sechi, A. R. (1999). ISO 9000 standards: perceptions and experiences in the UK construction industry. *Construction Management & Economics*, 17(1), 107-119.
- Ng, T., Palaneeswaran, E., & Kumaraswamy, M. (2012). *Costs and Benefits of ISO9000-based Quality Management Systems to Construction Contractors* (Vol. 8).
- Ofori, G., & Gang, G. (2001). ISO 9000 certification of Singapore construction enterprises: its costs and benefits and its role in the development of the industry. *Engineering Construction and Architectural Management*, 8(2), 145-157.
- Ofori, G., Gang, G., & Briffett, C. (2002). Implementing environmental management systems in construction: lessons from quality systems. *Building and Environment*, 37(12), 1397-1407.
- Palaneeswaran, E., Ng, T., & Kumaraswamy, M. (2006). Client satisfaction and quality management systems in contractor organizations. *Building and Environment*, 41(11), 1557-1570.
- Pheng, L. S., & Hwa, G. K. (1994). Construction quality assurance: problems of implementation at infancy stage in Singapore. *International Journal of Quality & Reliability Management*, 11(1), 22-37.
- Rahhal, S. F., & Madhavji, N. H. (1996). Estimating the effort of implementing ISO 9001 in software organizations *Software Process Technology* (pp. 125-131): Springer.
- Rea, L. M., & Parker, R. A. (2014). *Designing and conducting survey research: A comprehensive guide*: John Wiley & Sons.
- Said, I., Ayub, A. R., Abd Razaki, A., & Tee, K. K. (2009). Factors affecting construction organization quality management system in the Malaysian construction industry.
- Sambasivan, M., & Soon, Y. W. (2007). Causes and effects of delays in Malaysian construction industry. *International Journal of Project Management*, 25(5), 517-526.
- Trigunarsyah, B., Coffey, V., & Willar, D. (2011). An empirical study of applying ISO 9001 elements in large size Indonesian contractors.
- Turk, A. M. (2006). ISO 9000 in construction: An examination of its application in Turkey. *Building and Environment*, 41(4), 501-511.
- Zeng, S. X., Tian, P., & Tam, C. M. (2007). Overcoming barriers to sustainable implementation of the ISO 9001 system. *Managerial Auditing Journal*, 22(3), 244-254.