

Research Article

Exploring the Barriers and the Level of TQM Implementation in Malaysian Construction Industry

¹Tey, Lian Seng and ²Ooi, Teck Loon

¹Department of Business Strategy and Policy,

²School of Business, Faculty of Business and Accountancy, University of Malaya,
50603 Kuala Lumpur, Malaysia

Abstract: More and More construction firms are engaging in Total Quality Management (TQM) to improve the quality of their products which, in hope of, ultimately lead to higher level of customer satisfaction. However, there are still a number of players in Malaysian construction industry refused to implement TQM. This study aimed at identifying the barriers for construction firms to engage in TQM and tested its relationship with the level of implementation of TQM. Based on data collected from 138 engineers from Malaysian construction firms, the results showed that there were six barriers of implementation of TQM in Malaysian construction industry, which were lack of knowledgeable personnel, low bid mindset, lack of effective communication, extra cost and time consuming, lack of top management support and difficulties in measurement. The results also showed that only lack of effective communication and lack of top management support were not significantly associated with the level of implementation of TQM.

Keywords: Construction industry, Malaysia, total quality management

INTRODUCTION

Total Quality Management (TQM) is a guideline in improving a firm's overall planning process in a continuous basis by integrating fundamental management knowledge/techniques and technical instruments (Abdullah, 2010). It is broadly accepted as the stimulator for performance improvement in the construction industry (Koh and Low, 2010; Love *et al.*, 2004). In the construction industry, firms commonly adopted TQM through employee empowerment, Just-In-Time (JIT), quality circles, Six Sigma, ISO9000 and extreme quality assurance (Hoonakker *et al.*, 2010; Koh and Low, 2010; Ngowi, 2000). The benefits of construction firms which successfully implemented TQM include reduced rework, reduced nonconformities, reduced workforce, reduced cost, improved overall project schedule, improved client satisfaction, increase in staff morale and increase of market share (Islam and Mustapha, 2008; Love *et al.*, 2004; Low and Teo, 2004; Polat *et al.*, 2011).

In Malaysia, the construction industry contributes significantly to the national Gross Domestic Product (GDP). Under the 10th Malaysia Plan, RM130 billion funds will be expended for developing infrastructure which includes schools, roads, highways and railways. Furthermore, Vision 2020 stated that Malaysia will need at least 8.8 million houses including 5 million new

houses to be in line with the increase in population (Nawi *et al.*, 2010). However, as in 2009, only 4.32 million houses have been built and there are still 4 million houses that need to be in place in order to achieve the vision. This means that about 400,000 units of houses need to be built every year and this figure is unpractical for conventional construction methods. One of the solutions to achieve the goal is by implementing TQM in the construction industry. TQM is well known and recognized as a working method to improve the overall construction performance in terms of speed and quality in many countries (Harrington *et al.*, 2012). However, the industry still refused to fully adopt TQM system due to several barriers.

Extensive studies have been carried out to find solutions for the possible barriers of TQM implementation (Ahmed *et al.*, 2005; Hoonakker *et al.*, 2010; Lam *et al.*, 2008; Love *et al.*, 2004; Projogo and Sohal, 2004; Shibani, 2010). However, few studies have conducted in Malaysian context. According to Meschi and Riccio (2008), every emerging market is specific. The degree of "emergence" or transition varies greatly from one country to another. Generalization cannot be done on single emerging market. Thus, it would be necessary to extend the research to other emerging markets. Hence, it is crucial to identify the barriers of TQM implementation faced by Malaysian construction industry in order to resolve the problem

Corresponding Author: Tey, Lian Seng, Department of Business Strategy and Policy, Faculty of Business and Accountancy, University of Malaya, 50603 Kuala Lumpur, Malaysia

This work is licensed under a Creative Commons Attribution 4.0 International License (URL: <http://creativecommons.org/licenses/by/4.0/>).

faced by Malaysian construction firms. The findings of the study might point out the possible barriers faced by Malaysian construction industry while implementing the TQM system. It can shed light for existing construction firms and firms who are going to engage in implementation of TQM on the possible barriers of implementation of TQM and the solution on how to enhance the level of TQM implementation. Based on these arguments, this study was carried with the two following objectives, from the perspective of Malaysian construction industry:

- To identify the barriers in the implementation of quality management in Malaysian construction firms
- To examine the relationships between the barriers and the level of implementation of TQM in Malaysia's construction industry

The barriers and the level of implementation of TQM: Majority of firms are actually suffering from lack of skilled workers during the implementation of TQM (Hoonakker *et al.*, 2010; Lakhe and Mohanty, 1994; McCollough and Benson, 1993). Unskilled worker is the critical barrier affecting the implementation process. For a firm to produce high quality product, employees need to know how to do their job (McCollough and Benson, 1993). In other words, employees need to possess necessary knowledge on how to do their job effectively and efficiently. Based on the argument, it is hypothesized as:

H1: Lack of knowledgeable personnel negatively associated with the level of implementation of TQM.

Low bid mindset or the traditional bidding process has actually prevented the implementation of TQM (Harrington *et al.*, 2012; Jennings and Holt, 1998). The construction firms' projects are gained based on competition. Clients always pay more attention to the price and not the value. They will look for those construction firms who can perform the task at the cheapest cost. As a result, it is very common that the ranking of low pricing was top among other criteria including reputation and experience in construction industry. In order to gain the project, construction firms have to minimize the cost to compete with rivals. Therefore, it is hypothesized as:

H2: Low bid mindset negatively associated with the level of implementation of TQM.

Effective communication plays an important role in implementation of TQM (Harrington *et al.*, 2012). Relying on the internal information/knowledge is not sufficient to help the firm to enhance the quality of the

product. Firm needs to share information/knowledge with all stakeholders, especially with its suppliers and customers, in order to produce high quality product that can best satisfied their customers. However, firms often lack of effective communication among the internal and external team stakeholders which ultimately hinder the implementation of TQM (Lakhe and Mohanty, 1994; Low and Teo, 2004; Polat *et al.*, 2011; Shibani *et al.*, 2012; Toor and Ogunlana, 2009). Hence, it is hypothesized as:

H3: Lack of effective communication negatively associated with the level of implementation of TQM.

Extra cost and time consuming on the project due to TQM implementation is a common perception from most firms (Elghamrawy and Shibayama, 2008; Tan and Hamzah, 2011). Furthermore, Blismas and Wakefield (2009) also found that cost is always taken to be more important than any other factors during the project life cycle. The main reason is that contractors perceive that resources and time used to implementation of TQM is totally a waste. Consequently, it is hypothesized as:

H4: Extra cost and time consuming negatively associated with the level of implementation of TQM.

Implementation of TQM becomes difficult because the benefits and the cost reduction were never recorded statistically. This is cause by the difficulty in measuring the results (Ahmed *et al.*, 2005). Therefore, the effectiveness of TQM is hardly seen by those firms (Lakhe and Mohanty, 1994; Low and Teo, 2004; Hoonakker *et al.*, 2010). In addition, Leonard (2010) stated that benchmarking for TQM is hardly found in the construction industry. This has been putting off the industry development and it is essential for successful TQM implementation. Hence, it is hypothesized as:

H5: Difficulties in measurement negatively associated with the level of implementation of TQM.

Top management support is the important element in TQM implementation. Most of the researchers found that lack of top management support was the top barrier in TQM implementation (Hoonakker *et al.*, 2010; Lakhe and Mohanty, 1994; Lam *et al.*, 2008; Low and Teo, 2004; Polat *et al.*, 2011; Tan and Hamzah, 2011; Yusoff *et al.*, 2006). Top management often control the critical resources for implementation of new system. Without the top management support, it is impossible to get the needed resources to implement TQM. In addition, top management often set the model for other employee. If top management are not committed in implementation of TQM, the employee will not be

motivated or put in their effort to help firm to achieve its goal. Thus, we hypothesized it as:

H6: Lack of top management support negatively associated with the level of implementation of TQM.

METHODOLOGY

To ensure that data are accessible and representative, the respondent of the study consisted of engineers who attach to construction firms in Malaysia. Convenience sampling method was adopted for this study. A total of 138 engineers in the construction industry in Malaysia were approached. The model variables of the study include the barriers to implementing TQM (Hoonakker *et al.*, 2010; Polat *et al.*, 2011; Tan and Hamzah, 2011; Shen and Liu, 2004) and the level of implementing TQM for Malaysian construction firms (Shibani, 2010).

RESULTS

A total of 138 questionnaires were collected. Table 1 presented the normality test for each of the variables. This study first tested the normality for model variables. The skewness and kurtosis for all variables in the model were fall between the rage of -2.00 and +2.00, thus there were normally distributed (Sekaran and Bougie, 2010).

Reliability and validity: Prior to conducting more in-depth analysis and discussion, this study eliminated items with poor reliability and validity by using confirmatory factor analysis and Cronbach's Alpha. A confirmatory factor analysis was employed to assess individual items reliability (Burns and Burns, 2008). This study consists of 53 items measuring seven variables including five independent variables and one dependant variable. Based on result of confirmatory factor analysis, four items were deleted due to cross loading and low factor loading.

Conbrach's Alpha was employed to measure the internal consistency of various variables of the questionnaire. Rule of thumb for the acceptable value of the Cronbach's Alpha is above 0.7 (George and Mallery, 2003). Table 2 illustrated the Cronbach's Alpha for each of the variables and the total items adopted. Overall, the scale employed by this study demonstrated considerably high internal consistency.

Correlation analysis: Table 3 showed the correlation among the model variable. The correlation among the model independent variables were less than 0.80 demonstrating that the model independent variables were not affected by extreme multicollinearity effect (Malhotra, 2007). Further examination of the table also revealed that all the independent variables were significantly and negatively correlated with dependent variable. It showed that all the barriers to implementing the TQM negatively affect the level of implementation of TQM in Malaysian construction firms.

Table 1: Normality test for model variables

Variables	Skewness		Kurtosis	
	Statistic	S.D.	Statistic	S.D.
Lack of knowledgeable personnel	-0.9390	0.2060	1.3200	0.4100
Low bid mindset	-0.2710	0.2060	1.8150	0.4100
Lack of effective communication	-0.2560	0.2060	0.7950	0.4100
Extra cost and time consuming	-0.8550	0.2060	1.3220	0.4100
Lack of top management support	-0.2190	0.2060	0.0750	0.4100
Difficulties in measurement	-0.2020	0.2060	0.3500	0.4100
Level of implementation of TQM	0.1210	0.2060	-0.0590	0.4100

S.D.: Standard deviation

Table 2: Summary of the Cronbach's alpha of model variables

Variable	Cronbach's alpha	Cronbach's alpha	No. of items
Lack of knowledgeable personnel	0.853	0.853	5
Low bid mindset	0.764	0.773	5
Lack of effective communication	0.719	0.719	3
Extra cost and time consuming	0.728	0.725	6
Lack of top management support	0.875	0.874	4
Difficulties in measurement	0.783	0.783	4
Level of implementation in TQM	0.946	0.945	22

Table 3: Correlation results

	Mean	S.D.	1	2	3	4	5	6	7
Lack of knowledgeable personnel	3.515	0.680	1.000						
Low bid mindset	3.352	0.553	0.421**	1.000					
Lack of effective communication	3.478	0.594	0.434**	0.331**	1.000				
Extra cost and time consuming	3.305	0.540	0.219**	0.114	0.250**	1.000			
Lack of top management support	3.380	0.766	0.395**	0.436**	0.211*	0.199*	1.000		
Difficulties in measurement	3.427	0.583	0.554**	0.390**	0.504**	0.272**	0.510**	1.000	
Level of implementation in TQM	2.865	0.623	-0.331**	-0.411**	-0.268**	-0.212*	-0.330**	-0.172*	1

*: p<0.05 level (2-tailed); **: p<0.01 level (2-tailed); S.D.: Standard deviation

Table 4: Multiple regression results

Variables	Implementation of TQM
Lack of knowledgeable personnel	-1.8570*
Low bid mindset	-3.1410***
Lack of effective communication	-1.6470
Extra cost and time consuming	-1.6660*
Lack of top management support	-2.2660**
Difficulties in measurement	2.4210**
Model F	7.9530***
R ²	0.4267

*: p<0.1; **: p<0.05; ***: p<0.01

Multiple regression analysis: As shown in Table 4, H1 the relationship between lack of knowledgeable personnel was found to be significantly and negatively associated with the level of implementation of TQM (t = -1.857, p<0.1). H2 low bid mindset was also found to be significantly and negatively associated with the level of implementation of TQM (t = -3.141, p<0.01). H4 extra cost and time consuming was found to be significantly and negatively associated with the level of implementation of TQM (t = -1.666, p<0.1). H6 lack of top management support was significantly and negatively associated with the level of implementation of TQM (t = -2.266, p<0.05). However, for H5 the difficulties in measurement was significantly and positively associated with the level of implementation of TQM (t = 2.421, p<0.05). The hypothesis was not supported because the relationship was found adversely with the hypothesized relationship. H3 the relationship between lack of effective communication and the level of implementation of TQM was not significant with p>0.1.

Table 4 also showed that the relative impact level of independent variables to the dependent variable. Out of the six independent variables, low bid mindset has the higher impact on the level of TQM implementation. It followed by difficulties in measurement, lack of top management support, lack of knowledgeable personnel, extra cost and time consuming and lack of effective communication.

DISCUSSION

The barriers in implementing TQM in Malaysian construction industry: Six barriers have been identified from literature review, namely, lack of knowledgeable personnel, low bid mindset, lack of effective communication, extra cost and time consuming, difficulties in measurement and lack of top management support. Multiple regression analysis result showed that five barriers have significant relationship with the level of implementation of TQM. Low bid mindset is the most significant variables among the six barriers in affecting the implementation of TQM. It is in line with Harrington *et al.* (2012) which showed that low bid mindset or traditional practice is the major problems in implementation of TQM. The main reason might be people tend to accept

second class quality with lower price and this has indirectly encourage the construction firms to compromise the quality with lower cost. Another reason could be the impact of recent economic downturn. During economic downturn, most company try to lower the operation cost in order to sustain which have aggravated the situation (Harrington *et al.*, 2012).

The relationships between the barriers affect the level of implementation of TQM: The findings show that lack of knowledgeable personnel negatively affects the level of implementation of TQM in Malaysian construction firms. This is in line with Blismas and Wakefield (2009), Hoonakker *et al.* (2010), McCollough and Benson (1993), Polat *et al.* (2011) and Shibani (2010). Lack of knowledgeable personnel/workers in the organisation will lower the level of implementation of TQM. This is because TQM has been well known as enhancer in construction project. Skilled worker/knowledge personnel, who possessed the needed knowledge to do their work effectively and efficiently, are needed not only to enhance the efficiency of all the value chain activities in construction industry, but also to contribute on the continuous improvement of the quality of the products.

Results also revealed that low bid mindset negatively affects the level of implementation of TQM. The result is in line with Hoonakker *et al.* (2010). The reason might be Malaysian tend to acceptable quality at lower cost.

As for the relationship between extra cost and time consuming and the level of TQM implementation, result showed that extra cost and time is one of the reasons that hinder the implementation of the TQM. The result is consistent with Blismas and Wakefield (2009), Moatazed-Keivani *et al.* (1999), Polat *et al.* (2011) and Tan and Hamzah (2011). The reason might be firms focus on profit maximization. Whenever firms perceive that it will increase the operation cost, they will hesitate to implement the TQM.

Lack of top management support was found negatively affected the level of implementation of TQM. This is consistent with Lakhe and Mohanty (1994). The reason might be management commitment and support is one of the important attribute because TQM emphasized on continuous improvement which need fully support from the top management who control most of the resources in implementing new system.

Lack of effective communication was found not significantly affect the level of TQM implementation. This means that lack of effective communication has no impact on the level of TQM implementation. The result is contradictory to Hoonakker *et al.* (2010), Lakhe and Mohanty (1994) and Polat *et al.* (2011). The main reason might be caused by the different demographic and different working culture.

Surprisingly, difficulties in measurement are found to be positively affect the level of implementation of TQM. The result is not in line with Bhat and Rajashekhar (2009). The main reason might be firms may perceive it is challenging to overcome the measurement difficulties and the construction firms have to fulfil some other accreditation requirements which have the similar measuring and recording system. Thus, it is not a barrier to Malaysian construction firms to implement the TQM.

CONCLUSION

Several conclusions can be drawn from this study. The study concluded that lack of knowledgeable personnel, low bid mindset, extra cost and time consumption and lack of top management support have been identified as the barriers to the implementation of TQM in Malaysia's construction industry. Although some of the studies from other countries show different relationship among the barriers, this would be different in Malaysia context as of different cultures and different perception in term of quality and management system.

Low bid mindset has been found as the most significant barrier in affecting the implementation of TQM. Traditional practice in the construction need to be changed and continuous top management support plays an essential role in promoting the implementation of TQM. Organisation culture with more emphasised on quality need to be build to ensure that TQM could be implemented. The industry cannot stick to the traditional bidding process if needs of their clients have changed. Therefore, understanding their clients' perception on rectification cost and quality cost is very important in order to resolve the problems.

It is also very important to ensure that the project personnel possess the needed skills/knowledge. The industry is lack of skilled personnel, especially personnel who are familiar with TQM. As a result, it is also very important to ensure that the project personnel possess the needed skills/knowledge. Training needs to be provided to project personnel to ensure that they have the needed skills and knowledge to carry out their job more effectively and efficiently. To achieve Vision 2020, the country still short of millions of houses (Nawi *et al.*, 2010).

Implication of the study: The findings of this study could contribute several theoretical and managerial implications for Malaysia's construction industry and academic research. First, the finding of this study has broadened the knowledge based of TQM from Malaysian construction industry context. Second, the identified barriers could provide a precaution to the organisation that decided to implement TQM in their organisation. This could help them to prevent from

burst budget when implement TQM concept in their project. For instance, lack of top management support has been identified as one of the barrier in implementation of TQM. To ensure the successful implementation of TQM, top management must give their full support. Last but not least, the culture of the construction industry could be enhanced when the client realised the cost of quality and compromise in the starting point. Study has found that low bid mindset is the main problem when dealing with the implementation of TQM. Therefore the implication of the study may change the client's view point in the bidding process. For instance, competitive bidding process and pre-qualification process will be introduced for the new project. Quality of the project can be improved while in the same time maintaining a competitive cost through pre-selection of contractor (Hoxley, 2000).

LIMITATIONS AND RECOMMENDATIONS

There are few limitations in this study that need to be highlighted. First, the sample size of 138 respondents might not sufficient to represent the whole construction industry in Malaysia. Future research needs to test the model with a larger sample size. Second, the samples capture in a single period but not in the longitudinal method that could include time factor. This study only carried out in a single period and therefore future research could focus on longitudinal study so that time factor can be considered.

ACKNOWLEDGMENT

This study was supported by RMGS Fund (BK014-2013) of University of Malaya.

REFERENCES

- Abdullah, A., 2010. Measuring TQM implementation: A case study of Malaysian SMEs. *Measuring Bus. Excellence*, 14(3): 3-15.
- Ahmed, S.M., R.T. Aoieong, S.L. Tang and D.X.M. Zheng, 2005. A comparison of quality management systems in the construction industries of Hong Kong and the USA. *Int. J. Qual. Reliab. Manag.*, 22(2): 149-161.
- Bhat, K.S. and J. Rajashekhar, 2009. An empirical study of barriers to TQM implementation in Indian industries. *TQM J.*, 21(3): 261-272.
- Blismas, N. and R. Wakefield, 2009. Drivers, constraints and the future of offsite manufacture in Australia. *Constr. Innov.*, 9(1): 72-83.
- Burns, R.B. and R.A. Burns, 2008. *Business Research Methods and Statistics Using SPSS*. Sage Publications Ltd., London.

- Elghamrawy, T. and T. Shibayama, 2008. Total quality management implementation in the Egyptian construction industry. *J. Manage. Eng.*, 24: 156-161.
- George, D. and P. Mallery, 2003. *SPSS for Windows Step by Step: A Simple Guide and Reference 11.0 Update*. 4th Edn., Allyn and Bacon, Boston, MA.
- Harrington, H.J., F. Voehl and H. Wiggin, 2012. Applying TQM to the construction industry. *TQM J.*, 24(4): 352-362.
- Hoonakker, P., P. Carayon and T. Loushine, 2010. Barriers and benefits of quality management in the construction industry: An empirical study. *Total Qual. Manage.*, 21: 953-969.
- Hoxley, M., 2000. Are competitive fee tendering and construction professional service quality mutually exclusive? *Constr. Manage. Econ.*, 18(5): 599-605.
- Islam, R. and M.R. Mustapha, 2008. Organizational approach to total quality management: A case study. *Asian J. Bus. Acc.*, 1(2): 19-38.
- Jennings, P. and G.D. Holt, 1998. Prequalification and multi-criteria selection: A measure of contractors' opinions. *Constr. Manage. Econ.*, 16: 651-660.
- Koh, T.Y. and S.P. Low, 2010. An empiricist framework for TQM implementation in construction companies. *J. Manage. Eng.*, 26(3): 133-143.
- Lakhe, R.R. and R.P. Mohanty, 1994. Total quality management: concepts, evolution and acceptability in developing economies. *Int. J. Qual. Reliab. Manag.*, 11(9): 9-33.
- Lam, K.C., D. Wang and M.C.K. Lam, 2008. The TQM journey of Hong Kong building contractors: From a self-assessment perspective. *TQM J.*, 20(6): 556-569.
- Leonard, D., 2010. Quality management practices in the US homebuilding industry. *TQM J.*, 22(1): 101-110.
- Love, P.E.D., D.J. Edwards and A. Sohal, 2004. Total quality management in Australian contracting organisations: Pre-conditions for successful implementation. *Eng., Constr. Archit. Manage.*, 11(3): 189-198.
- Low, S.P. and J.A. Teo, 2004. Implementing total quality management in construction firms. *J. Manage. Eng.*, 20(1): 8-15.
- Malhotra, N.K., 2007. *Marketing Research: An Applied Orientation*. 5th Edn., Prentice, Hall Upper Saddle River, NJ.
- McCullough, M. and M. Benson, 1993. Five Barriers to TQM in Construction. Retrieved from [http:// www. Concreteconstruction.net/construction/five-barriers-to-tqm-in-construction.aspx](http://www.Concreteconstruction.net/construction/five-barriers-to-tqm-in-construction.aspx).
- Meschi, P.X. and E.L. Riccio, 2008. Country risk, national cultural differences between partners and survival of international joint venture in Brazil. *Int. Bus. Rev.*, 17: 250-266.
- Moatazed-Keivani, R., A.R. Ghanbari-Parsa and S. Kagaya, 1999. ISO 9000 standards: Perceptions and experiences in the UK construction industry. *Constr. Manage. Econ.*, 17: 107-119.
- Nawi, M.N.M., A. Lee and M. Arif, 2010. The IBS barriers in the Malaysian construction industry: A study in construction supply chain perspective. Proceedings of the 18th CIB World Building Congress. Salford Quays, Salford.
- Ngowi, A.B., 2000. Impact of culture on the application of TQM in construction industry in Botswana. *Int. J. Qual. Reliab. Manag.*, 17(4/5): 442-452.
- Polat, G., A. Damci and Y. Tatar, 2011. Barriers and benefits of total quality management in the construction industry: Evidence from Turkish contractors. Proceeding of the 7th Research/Expert Conference with International Participations (QUALITY 2011).
- Projogo, D.I. and A.S. Sohal, 2004. The multidimensionality of TQM practices in determining quality and innovation performance: An empirical examination. *Technovation*, 24: 443-453.
- Sekaran, U. and R. Bougie, 2010. *Research Methods for Business: A Skill Building Approach*. 5th Edn., John Wiley and Son Ltd., United Kingdom.
- Shen, Q. and G. Liu, 2004. Applications of value management in the construction industry in China. *Eng., Constr. Archit. Manage.*, 11(1): 9-19.
- Shibani, A., 2010. Implementation of total quality management in the Libyan construction industry. *Int. J. Proj. Org. Manag.*, 2(4): 382-403.
- Shibani, A., M. Saidani and N. Gherbal, 2012. An evaluation of obstacles preventing implementation of TQM in Libyan organisations. *Bus. Manage. Res. J.*, 1(3): 84-91.
- Tan, C.K. and A.R. Hamzah, 2011. Study of quality management in construction projects. *Chinese Bus. Rev.*, 10: 542-552.
- Toor, S.U.R. and S.O. Ogunlana, 2009. Construction professionals' perception of critical success factors for large-scale construction projects. *Constr. Innov.*, 9(2): 149-167.
- Yusoff, W.M.W., A.H. Mohammed, M.S. Misnan, M.Y. Zakaria and A. Bakri, 2006. Development of quality culture in the construction industry. Proceeding of the 5th IEEE International Conference on Cognitive Informatics.