CRITICAL SUCCESS FACTORS FOR VALUE MANAGEMENT WORKSHOPS IN MALAYSIA

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ABSTRACT

The application of Value Management (VM) in Malaysia increased dramatically after it was made a mandatory requirement for public projects exceeding 50 million Malaysian Ringgit (MYR). This paper reports the findings of an empirical study to determine the critical success factors (CSFs) for VM workshops in the Malaysian construction industry. Data were collected using a questionnaire survey of public- and private- sector players in the industry, and analyzed using descriptive analysis, the Mann-Whitney U test, and scale ranking. The results reveal that clear objectives, client participation and support, discipline and attitude, team mix, and a decision making authority are critical components for successful VM workshops. Other factors include the participation of end users during the workshop, background information, input from relevant government departments, and the facilitator's VM workshop experience. The CSFs determined by this study provide a framework for successful VM workshops in the Malaysian construction industry and may be applicable to construction industries in other similar jurisdictions.

Keywords: Value management, construction, critical success factors, workshops.

INTRODUCTION

Since Value Management (VM) was originally introduced to the manufacturing industry in 1940s by Lawrence Miles (Shen and Yu 2012), it has emerged in other industries (construction, defense, systems and services, transportation,

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19   organizational management) and across different levels of decision makers within organizations (Fong, 2004).

20   Dell'Isola introduced VM to the construction industry back in the 1960s for a project in the UK (Dell'Isola 1982). At

21   that time, the primary reason for its application was to help construction projects deal with the challenges of cost,

22   time, and quality (Ali and Rahmat, 2010). Among the well-known definition, Male et al. (1998) defined VM as a

23   proactive, creative, problem-solving or problem-seeking service that maximizes the functional value of a project, by

24   using structured, team-oriented exercises with reference to the client's value system. Kelly et al. (2004) added that

25   VM as whole is a kind of facilitated team activities that enables a good and effective decision-making process.

26   Although it has been more than two decades since VM was first introduced into Malaysia, it has not been embraced

27   by construction-industry players in Malaysia. Jaapar and Torrence (2009) found that only 16% of respondents to their

28   survey had sufficient knowledge of VM. This is in line with Cheah and Ting's finding in 2005 that a lack of

29   knowledge and awareness is the major cause of its limited application (Cheah and Ting 2005).

30   There have been a growing number of applications and increasing interest within the Malaysian construction industry

31   since the government mandated VM for all public projects MYR50 million (USD28 million). To assist the

32   implementation of VM, Economic Planning Unit (EPU; the central agency responsible for overseeing development

33   projects) published the VM implementation guidelines. The guidelines specified the following three stages of VM;

34   value assessment (VA), value engineering (VE) and value review (VR). These three stages of a workshop will be

35   implemented at different stages of a project-development cycle (Economic Planning Unit 2011) with a specific

36   objective to be achieved. Hence, it is important to distinguish the type of VM study, as worldwide practices use

37   different terminologies related to VM.

38   Implementation of VM workshops play an important role in managing the performance of projects, and critical

39   success factors (CSFs) are essential to their success. Research into this area was pioneered by Romani (1975), but it

40   was Shen and Liu (2003) who identified CSFs by comparing different practices in the UK, the USA and Hong Kong.

41   However, no data have been collected to look into this matter from the perspective of the Malaysian construction

42   industry. Pasquire and Maruo (2001) and Hunter and Kelly (2007) argue that differences in political, economical,

43   cultural and project-delivery systems may result in different CSFs for the same industry in different geographical

44   locations.

45   This study sought to fill the gap by determining the CSFs of VM workshops within the context of the Malaysian

46   construction industry, because the VM practices in Malaysia are different from other countries. Using a questionnaire

47   survey as the primary source of data collection, the research examined the various factors that were crucial for

48   successful implementation of VM workshops on construction projects in Malaysia.

BACKGROUND OF THE STUDY

A considerable amount of research has been conducted into the area of learning. Learning has always been associated with the competitive level of an organization and how organization learns for better improvement. Yeo (2003) explored the link between organizational learning and organizational performance, and Lopez et al. (2005) discovered the correlation between the learning processes of an organization and how it relates to the betterment in terms of the performance.

Performance may include inputs, outputs, intermediate outcomes, end outcomes, net impacts, and unintended outcomes (Folan et al. 2007). In most circumstances, performance is measured and compared against accuracy and completeness to achieve the agreed or acceptable level of one or more variable (cost, time, quality). Phusavat et al. (2009) suggested that performance is critical to the success or failure of an organization. However, success is highly dependent on the overall process and is influenced by several success factors. Therefore, to achieve better performance and for the organization to remain competitive, it is important to ensure that appropriate processes and success factors are in place.

Among the success factors that affect performance, several may be considered to be CSFs. Many scholars have shared their thoughts and findings relating to the factors that determine the successful implementation of VM workshops (Table 1). Chau et al. (1999) claimed that various kinds of recourses can be utilized efficiently by determining the CSFs and assigning them appropriately. The project team can also overcome problems by clearly identifying and understanding CSFs (Shen and Liu 2003).

<Table 1>

Previous work on CSF of VM by Shen and Liu (2003) identified the CSFs according to their importance in relation to the success of the VM studies. They performed extensive reviews and shortlisted 23 factors that may affect the successful implementation of a VM workshop. The surveys were conducted for experienced construction practitioners in Hong Kong, the USA and the UK, from which 15 CSFs for VM workshops were identified. For continuity with the previous research, the authors decided to build on the findings of Shen and Liu (2003), because they have extensively covered the literature in this subject. However, it was subject to an additional review of the recent relevant works. Those CSFs were revisited and cross-checked with the recent work (e.g Chen et al. 2010), because there is no other work of a similar scope as that study. To ensure the applicability of the factors within the scenario of VM applications within the Malaysian construction industry, the pilot surveys were carried out in Malaysia. As the result, 19 new success factors were selected in this study, which represents the identification of new success factors that were not

78 previously identified by Shen and Liu (2003). There were additional factors identified, and the success factors were

79 rephrased to reflect the real practice during the VM workshop. Hence, it is clear that this study is unique in nature

80 because the data, respondents, and findings are different from those of previous studies.

81 <Table 2>

82 **RESEARCH METHODOLOGY**

83 This research was carried out to determine the CSFs for VM workshops in the Malaysian construction industry. The

84 CSFs should be a manageable number of success factors that are considered as critical for the successful

85 implementation of VM workshops. In this research, a conventional approach was followed as recommended by Lu et

86 al. (2008) (Figure 1). The first step was to discover a comprehensive range of success factors by conducting a

87 thorough literature review. This was followed by a questionnaire survey of experienced practitioners in the Malaysian

88 construction industry to determine their level of agreement with each of the success factors. Finally, as suggested by

89 Yu et al. (2006), the data collected from the survey was statistically analyzed to determine the CSFs. According to

90 Chau et al. (1999) the last step is particularly effective when factors were subjective in nature and when hard

91 performance data were not available.

92 <Figure 1>

93 **Questionnaire Design**

94 The survey questionnaire consisted of five parts. Part A was designed to elicit the knowledge and experience of the

95 respondents in the best possible way. Part B sought the views of respondents with respect to performance

96 measurements in VM studies. Part C required respondents to rate each one of the 19 success factors, listed in Table 2,

97 which may affect the performance of VM workshops. Part D sought respondents' agreement or disagreement with a

98 number of VM workshop performance indicators. Part E asked respondents to provide their professional background

99 information.

100 Part C and D adopted a four-point Likert scale; 4 denoted strongly agree, 3 denoted agree, 2 denoted disagree, and 1

101 denoted strongly disagree. Even point scales were considered necessary to determine the respondents tendency to

102 agree or disagree with the identified success factors, because they are all important factors and the survey aimed to

103 determine the most critical ones (Bell 2010).

104   To ensure that the questions in the questionnaire were phrased appropriately to achieve the purpose, a pilot survey was

105   conducted in May 2012. It was given to potential respondents from various backgrounds with sufficient career

106   experience. On the basis of feedback from sixteen construction professionals, the questionnaire was revised where

107   considered necessary before the full survey was implemented.

108   **Sample and Population**

109   Because VM is relatively new in Malaysia, stratified sampling was considered to reach the specific subpopulation. It

110   was expected that this method able to help the authors obtain the most valid and credible results, given that this survey

111   is related to a specific topic on VM. The potential respondents for the survey were determined from the member

112   directory of the Institute of Value Management Malaysia (IVMM), government officers from the VM section of the

113   Economic Planning Unit (EPU) and the VM & Partnering unit of Public Works Department (PWD), participants of

114   five VM workshops, and fellow researchers in the field of construction management from the public universities in

115   Malaysia. The survey was administered by e-mail and by face-to-face interviews with the respondents. To encourage

116   participation, it was conveyed that the findings would be shared with respondents who provided their e-mail address

117   (Knight and Ruddock 2008; Li et al. 2011). During June to July 2012, 420 questionnaires were e-mailed to potential

118   respondents and 85 were distributed by hand at the end of the workshops as presented in Table 3.

119   **Data Analysis**

120   A normality test was conducted to determine whether the data fitted a normal distribution. The result revealed that the

121   data collected through this survey were not modelled by a normal distribution, in which the sigma value of Shapiro-

122   Wilk test is below t0.05 (Chen and Chen 2007). This is not unusual in these kinds of studies because respondent views

123   in terms of agree or disagree tend to push the mode to one end.

124   Descriptive analysis was conducted on the collected data to determine the main features such as frequency, mean, and

125   standard deviation. This provided simple summaries about the samples in the form of an initial description and as part

126   of a more extensive statistical analysis.

127   On the basis of the prediction that the samples will fall into different clusters, Mann-Whitney U tests were conducted

128   to examine whether statistically significant differences existed among the different clusters. According to Love et al.

129   (2004), this test was suitable for data that were not classified into the normal distribution and were measured using an

130   ordinal measurement scale. Finally, scale-ranking analysis was conducted to rank the success factors on the basis of

131   the mean value of each factor. In the case where two or more success factors had an equal mean value, the standard

132 deviation of each success factor would determine the ranking. Factors with the lowest standard deviation were

133 assigned the highest ranking (Field, 2005) because the value indicated that the data points tend to be very close to the

134 mean. The statistical analysis was performed using the *Statistical Package for Social Sciences* (SPSS 20.0).

RESULTS AND DISCUSSION

136 This section presents the survey and a discussion of the results.

Respondents' Profile

138 Of the 505 questionnaires that were distributed for the survey, 195 completed questionnaires were returned,

139 representing a 39% response rate. The return rate was low as anticipated for these kinds of questionnaires. However,

140 the analysis can still be conducted by considering the background of respondents who participated. The response rate

141 was higher than the 7.5% response rate for a survey on the application of VM conducted by Jaapar and Torrence

142 (2009). It was also higher than the average of a 20-30% response rate for questionnaire surveys in the construction

143 industry (Akintoye 2000).

144 The respondents' profiles show that 94% possess an undergraduate degree, 19% possess a Master's degree, 3% have a

145 Ph.D., and 1% hold a professional certificate. They also were well experienced; 35% had more than 10 years of

146 experience and 41% had 5-10 years of experience in the industry. In terms of VM knowledge, 3% of the respondents

147 claimed to have a very good level of knowledge on VM, 25% good, 57% fair, 11% poor, and 4% very poor. These

148 figures were similar to those found in a previous survey on VM by Jaapar and Torrence (2009). In response to

149 whether respondents had previously participated in VM workshops, 59% had participated in a workshop, 14% had

150 facilitated a workshop, and 9% had facilitated more than five workshops.

151 <Table 3>

152 The first part of the questionnaire was designed to assist the screening process before performing the detailed

153 analyses. The screening was deemed necessary to ensure that the data collected through this survey were meaningful

154 and well-justified because the samples were identified using a stratified sampling method. The following two

155 important variables were used to sift through the respondents: (1) VM workshop, and (2) VM formal training. The

156 VM workshop referred to the real practice of VM into construction projects. Hence, the respondents were classified

157 into two major clusters on the basis of their involvement in any VM workshop. The second variable assessed

158 enrolment in formal training on VM. The contents of the formal training were cascaded primarily from practices in the

159 US, UK and Australia. As a result, formal training on VM focused on VM methodology and its practices. To further

160 enhance the knowledge, workshop simulation usually became part of the training modules. Therefore, the respondents

161 could be divided into four clusters as shown in Table 4

162 <Table 4>

163 *Cluster A*

164 Respondents in cluster A were considered the strongest in terms of their VM knowledge, because all had received

165 some form of VM training and participated in a VM workshop, and a third of them had facilitated a VM workshop.

166 The training included programs run by the Society of Value Engineers (SAVE International) (25 and 2% for Module I

167 and II, respectively), the Institute of Value Management Malaysia (35 and 21% for Module I and Module II,

168 respectively), internal programs of an organization (52%), VM subjects at tertiary-education level (38%), and other

169 VM-related training programs (10%).

170

171 *Cluster B*

172 Respondents in cluster B had participated in a VM workshop in the past without having obtained any kind of VM

173 training. In Cluster B, 16% of the 56 respondents had facilitated a workshop.

174 *Cluster C*

175 Respondents in cluster C had received VM training. Of the 25 respondents in this cluster, 4% has undertaken internal

176 training organized by their organization, and the remaining 96% had taken a VM course at tertiary level. However,

177 none of these respondents had participated in a VM workshop.

178 *Cluster D*

179 The 56 respondents in cluster D were considered the weakest in terms of their VM knowledge. None had received any

180 VM training or participated in a VM workshop.

181 **Initial Descriptive Analysis**

182 The initial descriptive analyses are presented in Table 5, which includes the initial findings of the surveys.

183 Surprisingly, the findings from different cluster are essentially similar, despite the different VM background of the

184 respondents. The five success factors from each cluster that obtained the highest mean value are shown in Table 6.

185   The top three success factors were as follows: clear objectives provided for the VM workshops, client support of the

186   VM workshops, and client participation (representation) during the VM workshops. All three fall within the client's

187   influence as found by Simister and Green (1997) and Shen and Liu (2003). Previous works by Simister and Green

188   identified that client participation during the workshop was important to ensure that the workshop's decision aligned

189   with the client organizational objectives. Similarly, Shen and Liu (2003) identified factors such as client's support and

190   active participation, and provided clear objective that impeded the successful implementation of the VM workshops.

191   As the project's main stakeholder, the client should initiate VM workshops and determine workshop objectives in

192   consultation with the workshop facilitator. As various processes within the VM workshop involved important

193   decisions that often needed to be made immediately, the presence of a client representative was vital to ensure that the

194   direction of the workshops was geared toward the agreed objectives. Other factors found to be critical include

195   background information collected, discipline and attitude of workshop participants, the facilitator's academic and

196   professional qualifications, and the facilitator's previous experience in facilitating workshops.

197   <Table 5>

198   <Table 6>

199   Previous research (Male et al. 1998; Shen and Liu 2003; Fong et al. 2001, Chen et al. 2010) did not include the end-

200   user's participation in VM workshops. However, this study considered that the end-user's participation was vital,

201   because they will occupy and use the building. Taking a hospital project as an example, the end-users involved in the

202   daily operation of the hospital would be able to provide better views regarding the functional aspects of a particular

203   space or room. In this situation, the involvement of the management representative of the hospital, the clinical staff

204   and the maintenance company would provide fruitful input to a VM workshop. End-user participation is among the

205   critical success factors in Cluster A and Cluster B because the background and experience of the respondents in these

206   clusters has provided them with a clearer picture of who should be involved in VM workshops.

207   The CSFs for a VM workshop suggested by respondents of Cluster C and Cluster D should be considered. Although

208   two of their CSFs are related to the competency of the facilitator, very few facilitators have been certified by the

209   Construction Industry Development Board of Malaysia, which is currently working closely with the IVMM to develop

210   the framework for VM-facilitators certification. They are among the pioneers of VM applications in Malaysia.

211   **Mann-Whitney U Test**

212 Differences in scoring for each success factor by different clusters were explored further (Yuan et al. 2009). Pair wise

213 comparisons using the Mann-Whitney U test were carried out on each of two clusters (Yu et al. 2008). In total, six

214 tests were conducted on the basis of the following hypothesis [with a 0.05 ($\alpha = 0.05$) level of significance]:

215 *Null hypothesis: No difference exists between the two clusters, so they have the same mean (H0: 1 = 2)*

216 *Alternative hypothesis: A difference exists between the two clusters, so they have different means (H1:*

217 *1 ≠ 2)*

218 <Table 7>

219 However, Cluster A was treated as the best cluster of respondents to the survey because they had received formal VM

220 training and participated in VM workshops. Hence, Test 4 (between Cluster B and C), Test 5 (between Cluster B and

221 D), and Test 6 (between Cluster C and D) were discarded. The results of the tests were interpreted by the p value as

222 presented in Table 7. If the p-value is less than 0.05, H0 was rejected, and a significant statistical difference was

223 concluded to exist between the clusters. Hence, Test 2 (between Cluster A and C) was accepted and clusters A and C

224 (88 responses) were treated as one category of valid samples to represent the population for further analysis to rank

225 the success factors.

226 **Scale Ranking Analysis**

227 The final stage of data analysis involved scale-ranking analysis to rank the 19 success factors. A total of 88 survey

228 results were analyzed using SPSS 20.0 to generate the total frequencies, mean, and standard deviation of each factor.

229 The success factors were then ranked according to their mean score values (Chen and Chen, 2007; Ahadzie et al.,

230 2008; Lu et al., 2008; Yu et al., 2008; Li et al., 2011). The ranking results are shown in Table 8.

231 <Table 8>

232 Success factors with means of 3.00 or more were considered to be CSFs; 17 success factors achieved a value of ≥3. To

233 present a manageable number of CSFs, the top 10 success factors are presented at the top of the list in Table 8 (Rank

234 1-10). The top three (Rank 1-3, Table 8) are dominated by the client's influence, which shows the critical role that the

235 client plays in the successful implementation of VM workshops. According to Shen and Yu (2012), VM effectiveness

236 increases when the objectives are clearly aligned with the goals.

237 Five of the remaining seven CSFs can be categorized as participants-related factors. The participants represent

238 different stakeholders of the project. They play important roles to ensure the success level of a particular workshop in

239 achieving the goal. Typical VM workshops involved stakeholders such as end-user, consultants, government

240 departments, government agencies, and the local authorities. These stakeholders participate in the dynamic process

241 that demand their commitments (Leung et al. 2013) and active participation (Green 1999) to meet the workshop

242 objectives (Leung et al. 2002). Achievement of these objectives in the end could contribute the smooth running of the

243 project development, either directly or indirectly. Fong et al. (2007) adds that the complex nature of projects in recent

244 years demands creative and innovative ideas that depend on the participants behaviors to collectively work as a team

245 to improve the value of the project.

246 Background information refers to the project information gathered during the pre-workshop stage, and the information

247 phase of the workshop. Finally, CSFs with the lowest score are the facilitators experience in facilitating the VM

248 workshop. The best practice of VM workshop is the engagement of the facilitator to facilitate the processes according

249 to the VM job plan. Many researchers highlighted the structured process and the job plan as the core values of VM

250 that differentiate it from other management tools. The facilitation provided by the facilitator enhances the productive

251 output of every phase of the workshop (Fong et al. 2007) and keeps the essential elements within the time constraint.

252 Turnell (2004) contended beforehand that VM facilitators need to possess attributes that include leadership qualities,

253 competence in a variety of management skills related to human dynamics, and a high emotional quotient in dealing

254 with different characters and attitudes of the workshop participants.

255 The remaining two factors that scored below 3.0 were "number of VM workshops facilitated by the facilitator and

256 average duration of each workshop" and "venue of the VM workshops". It can be concluded that these two factors are

257 least critical and have minimum effect on the success of the workshop. Generally, the findings from this research are

258 in agreement with the findings of Simister and Green (1997), Male et al. (1998), Shen and Liu (2003), Fong et al.

259 (2004), and Chen et al. (2010) as presented in Table 1.

260 **CONCLUSION**

261 It is anticipated that the ever-increasing number of VM applications in Malaysia will benefit the country's

262 construction industry after more than a decade of criticisms for cost overruns, poor quality and frequent delays

263 (Ibrahim et. al. 2010; Ali and Rahmat 2010). The identification of the CSFs enables all stakeholders to systematically

264 organize the VM workshop with special attention and consideration to the related factors (Meng et al. 2011). To

265 empirically identify the CSFs, data collection through questionnaire survey were conducted and followed by the

266 statistical analyses to 195 samples obtained.

267   This study revealed 10 CSFs for VM-workshops implementation in Malaysia. Client-related success factors include

268   providing clear objectives, and supporting and participating during the implementation of the workshops. Participants-

269   related CFSs include end-user participation, discipline and attitude, the authority to make decisions, and input from

270   relevant governmental departments. The other two factors are background information collected and experience of

271   the facilitator.

272   Uniquely, this study revealed that participation of the end-users (ranked number 4) during the workshop was one of

273   the crucial factors for success. The presence of these stakeholders was vital because they provide good input regarding

274   user requirements, and it was more practical from the operational perspectives of a particular project. This factor was

275   not captured in previous relevant studies.

276   The CSFs identified by this research can benefit future applications of VM within the Malaysian construction industry

277   and that of other countries that share a similar culture. Carefully considering the CSFs during the initial stages of

278   planning VM workshops for a project will enhance the performance of the workshops and improve the chances of

279   successfully completing the project. To date, the authors have identified the key performance indicators (KPIs) that

280   serve as the guide to measure the workshop performance. Both CSFs and KPIs will be mapped into the performance

281   management framework for effective and efficient VM workshops conducted in the future, by understanding how

282   CSFs may affect the workshop performance and by identifying the critical indicators to be measured. The findings

283   from this study have been disseminated to 116 respondents who requested them.

284   This research involved four clusters of the surveyed sample. Care was taken to include all clusters when determining

285   the CSFs at the initial stage to make the sample as large as possible. However, after considering the fact that they

286   might affect the overall findings, some were excluded for detailed analysis. For instance, as respondents in cluster D

287   had limited knowledge and no experience, their feedback may have been purely on the basis of instinct without really

288   understanding the VM concept and workshop implementation in construction projects.

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297   **REFERENCES**

298   Ahadzie, D.K., Proverbs, D.G. and Olomolaiye, P.O. (2008). "Critical success criteria for mass house building projects in

299   developing countries." *Int. J. Proj. Manage.*, 26(6), 675-687.

300   Akintoye, A. (2000). "Analysis of factors influencing project cost estimate practice." *Constr. Manage. Econ.*, 18(1), 77-89.

301   Ali, A.S. and Rahmat, I. (2010). "The performance of construction projects managed by ISO-certified contractors in Malaysia." *J.*

302   *Retail Leisure Property, 9(1), 25-35.*

303   Bell, J. (2010). *Doing your research project*, McGraw Hill, Berkshire.

304   Chau, D. K. H., Kog, Y. C. and Loh, P. K. (1999). "Critical Success Factors for different project objectives." *J. Constr. Eng.*

305   *Manage.*, 10.1061/(ASCE)0733-9364(1999)125:3(142), 142-150.

306   Cheah, C.Y.J. and Ting, S.K. (2005). "Appraisal of value engineering in construction in Southeast Asia." *Int. J. Proj. Manage.*,

307   23(2), 151-158.

308   Chen, W.T., Chang, P.Y. and Huang, Y.H. (2010). "Assessing the overall performance of value engineering workshops for

309   construction projects." *Int. J. Proj. Manage.*, 28(5), 514-527.

310   Chen, W.T. and Chen, T.T. (2007). "Critical success criteria for construction partnering in Taiwan." *Int. J. Proj. Manage.*, 25(5),

311   475-484.

312   Dell'Isola, A.J. (1982). *Value engineering in the construction industry,* 3rd Ed., Van Nostrand Reinhold, New York.

313   Economic Planning Unit (2011). *Panduan perlaksanaan pengurusan nilai dalam program/projek kerajaan*, Prime Minister's

314   Department of Malaysia, Putrajaya.

315   Field, A. (2005). *Discovering statistics, using SPSS Windows*, Sage Publications, London.

316   Folan, J., Browne, J. and Jagdev, H. (2007). "Performance: Its meaning and content for today's business research." *Comput. Ind.*,

317   58(7), 605-620.

318   Fong, P.S. (2004). "A critical appraisal of recent advances and future directions in value management." *Eur. J. Eng. Educ.,* 29(3),

319   377-388.

320   Fong, P.S., Shen, Q.P., and Cheng, E.W.L. (2001). "A framework for benchmarking the value management process." *Benchmarking*

321   *Int. J.,* 8(4), 306-316.

322 Fong, P.S.W., Hills, M.J. and Hayles, C.S. (2007). "Dynamic knowledge creation through value management teams." *J. Manage.*

323 *Eng.*, 10.1061/(ASCE)0742-597X(2007)23:1(40), 40-49.

324 Green, S. D. (1999). "A participative research strategy for propagating soft methodologies in value management practice." *Constr.*

325 *Manage. Econ.,* 17(3), 329-340.

326 Hunter, K. and Kelly, J. (2007). "Efficiency in VM/VE studies and the pressure for shorter workshops." *Value World*, 30(1), 1-15.

327 Ibrahim, A.R., Roy, M.H., Ahmed, Z. and Imtiaz, G. (2010). "An investigation of the status of the Malaysian construction industry."

328 *Benchmarking Int. J.,* 17(2), 294-308.

329 Jaapar, A., and Torrence, J.V. (2009). "Contribution of value management to the Malaysian construction industry: A new insight."

330 *Proceeding Proc. of the International. Conference Conf. of Construction Industry,* Universitas Bung Hatta, Padang, West Sumatera,

331 1-9.

332 Kelly, J., Male, S. and Graham, D. (2004). *Value management of construction projects*, Blackwell Science, Oxford.

333 Knight, A. and Ruddock, L. (2008). *Advance research methods in the built environment*, Wiley-Blackwell, Oxford.

334 Leung, M.Y., Ng, T.S. and Cheung, S.O. (2002). "Improving satisfaction through conflict simulation and resolution in value

335 management in construction project." *J. Manage. Eng.*, 10.1061/(ASCE)0742-597X(2002)18:2(68), 68-75.

336 Leung, M.Y., Yu, J. and Liang, Q. (2013). "Analysis of the relationship between value management techniques, conflict

337 management and workshop satisfaction of construction participants." *J. Manage. Eng.,* 10.1061/(ASCE)ME.1943-5479.0000208,

338 04014004.

339 Li, Y. Y., Chen, P. H., Chew, D. A. S., Teo, C. C. and Ding, R. G. (2011). "Critical project management factors of AEC forms for

340 delivering green building project in Singapore." *J. Constr. Eng. Manage.*, 10.1061/(ASCE)CO.1943-7862.0000370, 1153-1163.

341 Lopez, S.P., Peon, J.M.M. and Ordas, C.J.V. (2005). "OrganisationalOrganizational learning as a determining factor in business

342 performance." *Learn. Organiz.*, 12(3), 227-245.

343 Love, P. E. D., Irani, Z. and Edwards, D. J. (2004). "Industry-centric benchmarking of information technology benefits, costs and

344 risks for small-to-medium sized enterprise in construction." *Autom. Constr.*, 13(4), 507-524.

345 Lu, W., Shen, L.Y., and Yam, C.H.Y. (2008). "Critical Success Factors for competitiveness of contractors: China study." *J. Constr.*

346 *Eng. Manage.*, 10.1061/(ASCE)0733-9364(2008)134:12(972), 972-982.

347 Male, S., and Kelly, J., Fernie, S., Grongvist, M. and Bowles, G. (1998). *The value management benchmark: Research result of an*

348 *international benchmarking study*, Thomas Telford, London.

349 Maurer, J.H. (1996). "Key factors in starting and maintaining a VA/VE continuous improvement program." *Proc. SAVE Int. 36th*

350 *Conf.,* Society of Value Engineers (SAVE International), Ohio, 147-152.

351 Meng, X., Zhao, Q. and Shen, Q.P. (2011). "Critical success factors for transfer-operate-transfer urban water supply projects in

352 China." *J. Manage. Eng.*, 10.1061(ASCE)ME.1943-5479.0000058, 243-251.

353 Palmer, A., Kelly, J. and Male, S. (1996). "Holistic appraisal of value engineering in construction in United States." *J. Constr. Eng.*

354 *Manage.*, 10.1061/(ASCE)0733-9364(1996)122:4(324), 324-328.

355 Pasquire, C. and Maruo, K. (2001). "A comparison of value management methodology in the UK, USA and Japan." *J. Financial*

356 *Manage. Property Constr.*, 6(1), 19-29.

357 Phusavat, K., Anussornnitisarn, P., Helo, P. and Dwight, R. (2009). "Performance measurement: roles and challenges." *Ind.*

358 *Manage. Data Syst.*, 109(5), 646-664.

359 Pucetas, J.D (1998). "Keys to successful VE implementation." *Proc. SAVE Int. 38th Conf.,* Society of Value Engineers (SAVE

360 International), Ohio, 333-342.

361 Romani, P.N. (1975). *The Department of defense value engineering change proposal,* George Washington Univ., Washington, DC.

362 Shen, G.Q.P. and Yu, A.T.W. (2012). "Value management: recent developments and way forward." *Constr. Innov.*, 12(3), 264-271.

363 Shen, Q. P., and Liu, G. (2003). "Critical Success Factors for Value Management studies in Construction." *J. Constr. Eng. Manage.*,

364 10.1061/(ASCE)0733-9364(2003)129:5(485), 485-491.

365 Simister, S.J. and Green, S.D. (1997). "Recurring themes in value management practice." *Eng. Constr. Archit. Manage.,* 4(2), 113-

366 125.

367 *Statistical Package for the Social Sciences 20.0* [Computer software]. Armonk, NY, IBM.

368 Thurnell, D. (2004). "Emotional intelligence and the value management facilitators." *Assoc. Res. Constr. Manage. (ARCOM), 2,*

369 915-922.

370 Yeo, R. (2003). "Linking organisationalorganizational learning to organisationalorganizational performance and success; Singapore

371 case studies." *Leader. Organ. Dev. J.*, 24(2), 70-83.

372 Yu, A. T. W., Shen, Q. P., Kelly, J., and Hunter, K. (2006). "Investigation of critical success factors in construction project briefing

373 by way of content analysis." *J. Constr. Eng. Manage.*, 10.1061/(ASCE)0733-9364(2006)132:11(1178), 1178-1186.

374 Yu, A. T. W., Shen, Q. P., Kelly, J., and Hunter, K. (2008). "Comparative study of the variables in construction project

375 briefing/Architectural programming." *J. Constr. Eng. Manage.*, 10.1061/(ASCE)0733-9364(2008)134:2(122), 122-138.

376 Yuan, J., Zeng, A. Y., Skibniewski, M.J. and Li, Q. (2009). "Selection of performance objectives and key performance indicators in

377 public-private partnership projects to achieve value for money." *Constr. Manage. Econ.*, 27(3), 253-270.