

# 1 CRITICAL SUCCESS FACTORS FOR VALUE MANAGEMENT

## 2 WORKSHOPS IN MALAYSIA

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### 4 ABSTRACT

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

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

### 16 INTRODUCTION

17 Since Value Management (VM) was originally introduced to the manufacturing industry in 1940s by Lawrence Miles  
18 (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.

## 49 **BACKGROUND OF THE STUDY**

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

55 Performance may include inputs, outputs, intermediate outcomes, end outcomes, net impacts, and unintended  
56 outcomes (Folan et al. 2007). In most circumstances, performance is measured and compared against accuracy and  
57 completeness to achieve the agreed or acceptable level of one or more variable (cost, time, quality). Phusavat et al.  
58 (2009) suggested that performance is critical to the success or failure of an organization. However, success is highly  
59 dependent on the overall process and is influenced by several success factors. Therefore, to achieve better  
60 performance and for the organization to remain competitive, it is important to ensure that appropriate processes and  
61 success factors are in place.

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

67 <Table 1>

68 Previous work on CSF of VM by Shen and Liu (2003) identified the CSFs according to their importance in relation to  
69 the success of the VM studies. They performed extensive reviews and shortlisted 23 factors that may affect the  
70 successful implementation of a VM workshop. The surveys were conducted for experienced construction practitioners  
71 in Hong Kong, the USA and the UK, from which 15 CSFs for VM workshops were identified. For continuity with the  
72 previous research, the authors decided to build on the findings of Shen and Liu (2003), because they have extensively  
73 covered the literature in this subject. However, it was subject to an additional review of the recent relevant works.  
74 Those CSFs were revisited and cross-checked with the recent work (e.g Chen et al. 2010), because there is no other  
75 work of a similar scope as that study. To ensure the applicability of the factors within the scenario of VM applications  
76 within the Malaysian construction industry, the pilot surveys were carried out in Malaysia. As the result, 19 new  
77 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 administrated 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  $t_{0.05}$  (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).

## 135 **RESULTS AND DISCUSSION**

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

### 137 **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 ( $H_0: 1 = 2$ )*

216 *Alternative hypothesis: A difference exists between the two clusters, so they have different means ( $H_1:$   
217  $1 \neq 2$ )*

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,  $H_0$  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  $\geq 3$ . 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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