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Status of Value Management Implementation in Small and Medium Construction Projects in Malaysia

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Abstract: Value management (VM) should be implemented in construction projects to achieve the best value-for-money for clients, irrespective of project size. However, its regular implementation in Malaysia appears mostly in large projects driven by legislation. Negligence was therefore aroused towards implementing VM for smaller projects and the specific status remains ambiguous to date. This paper aims to investigate the current status of VM implementation in small and medium construction projects in Malaysia with a view to exploring the challenges and measures in improving the status. A total of 162 construction organizations directly involved in small and medium projects were surveyed using a structured questionnaire. The findings revealed that the execution of VM by organizations for smaller construction projects is relatively low and significantly subject to project size regardless of project type. Practitioners' levels of frequency and awareness towards implementing VM in small and medium construction projects remain low and unsatisfactory. Also, VM implementation in smaller projects was found significantly correlated with the experience of organizations and practitioners. Challenges and measures in ameliorating the observed status were explored. The findings contribute to a clear understanding of VM in small and medium construction projects in Malaysia and call for more attention from both academia and industry on VM for smaller sizes of projects.

Keywords: project management; value management; implementation status; construction industry; small and medium projects; Malaysia

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1. Introduction

Today, value management (VM) is growing in global popularity and expanding among a variety of sectors including automotive, aerospace, construction, energy, process control, military, services, healthcare, food, communications, consumer products, and government [1]. It is a systematic, function-oriented, and multidisciplinary team approach that intends to analyze and optimize the functions and costs of a system, project, supply, service, or facility with the goal of increasing value by achieving the required functions specified by clients at lowest possible overall cost, without sacrificing quality and performance standards [2]. As the construction industry has consistently strived to satisfy clients' needs, VM has been widely adopted in the industry and recognized as an effective method for attaining the best value-for-money for clients since 1963, when it was first presented to the construction industry [3].

VM was reported to be in its infancy in Malaysia early this century, while organizations are now gradually advancing towards greater deployment of it [4]. The government noted that the practice of VM in the construction industry recorded savings on the initial project cost by around 10–30% [1]. The approach has been treated as one of the supporting pillars for national advancements, and promoted as an integral process for the construction projects to seek and maximize returns for clients from properly managing costs and value. Since 2009, the Economic Planning Unit (EPU) of the Malaysian government has mandated VM for all public projects costing over MYR 50 million (≈USD 12 million) [5]. Such a move has therefore led to a visible disregard for the adoption of VM in smaller, lower-cost construction projects around the country.

VM is always advocated for any size of projects rather than focusing on large and costly projects [6]. Such advocacy has been well exhibited in many developed countries. The US government has mandated VM for its projects with a budget of reaching USD 2 million, whereas the figure for projects of transportation sector is even stringent, as low as USD 100 thousand [7]. In Korea, Tier 1 construction projects costing over KRW 0.5 billion (≈USD 420 thousand) must conduct VM to eliminate potential inefficiencies and make certain cost-cutting factors, while the value has been revised and tightened to KRW 0.1 billion (≈USD 84 thousand) in accordance with the latest regulation [8]. VM has evolved into a well-established service with commonly understood tools, techniques, and styles among the UK's construction industry, as well as being widely accepted in managing projects of various sizes [9]. In Singapore, VM usage in smaller building projects was found more than three times greater than that in larger ones [10]. These reflect the necessity and importance of using VM in smaller projects that appears to be typically overlooked in underdeveloped nations such as Malaysia.

The delivery of smaller projects in Malaysia tends to accomplish the most basic/minimal standards while lacking adequate emphasis on systematic management to improve project performance and deliverables [1]. Various challenges including cost overruns, schedule delays, poor deliverables, and insufficient sustainability could be incurred without organized and diligent management, negatively impacting project success and clients' satisfaction [11]. VM has proven to be one of the viable options in curbing such menace, with numerous benefits that can be conveyed in smaller, lower-cost projects. It aids smaller projects in alleviating the dilemma of limited resources by identifying and eliminating unnecessary costs, materials, processes, and worker time [12]. The optimization of project functionality through VM would yield better deliverables, leading to the enhancements of smaller projects' value and clients' satisfaction. The approach is well-established for attaining value-for-money as it stresses decreasing costs but not by sacrificing benefits [13]. Consequently, the use of it aids construction enterprises in balancing the time, cost, and quality of smaller projects, where the factors are recognized as the popular iron triangle in considering project success [14]. Meanwhile, it assists enterprises, particularly small and medium enterprises (SMEs) that primarily contract smaller projects, to better manage the low profitability of smaller projects and enhance self-competitiveness to stay upfront among the industry [15]. VM is also a kind of facilitated team practice that assists participants of smaller projects in developing their relationships and managerial abilities [16]. The implication of achieving maximum value for the least amount of money becomes more pronounced when VM is employed in smaller, lower-cost projects [6].

In Malaysia, pioneers have already emerged to enforce VM in smaller projects. The Tenaga Nasional Berhad (TNB, Malaysia's largest power provider) and Malaysia Airport Holdings Berhad (MAHB, Malaysia's biggest airline company) have mandated the use of VM in projects with a cost achieving MYR 10 million (≈USD 2.4 million) and MYR 300 thousand (≈USD 72 thousand), respectively [1]. No such case has been reported in the construction industry by far. According to Jaapar et al. [4,5], VM embracement was observed prevalent in large construction projects in Malaysia driven by the legislation. The receptiveness of the approach in large contractors was revealed relatively positive [17]. However, such information still remains hazy for the case of smaller construction projects (i.e., small and medium construction projects) to date. Abd-Karim et al. [17] claimed that smaller projects would encounter more challenges than large ones concerning VM implementation due to their innate characteristics such as a tight schedule, restricted budget, limited staff, etc. Based on this knowledge, this study aims to investigate the current status of VM implementation in small and medium construction projects in Malaysia with a view to exploring the challenges and measures in improving the status.

Following the introduction to this study, the characteristics and demarcations of small and medium construction projects are provided. Subsequently, the methodology employed in the study is elaborated. In the result and discussion section, status of VM implementation in small and medium construction projects are examined at the levels of organization, practitioner, and project, as well as discussing certain challenges and potential improvement measures. Finally, the study is concluded along with the limitations and recommendations for future research to address.

2. Defining Small and Medium Projects

Small and medium projects typically refer to those with smaller sizes that are not deemed large and costly. Small and medium projects have been the subjects of a number of studies, while consensus on their formal definitions is yet to achieve [18]. The Construction Industry Institute (CII) revealed a difficulty in broadly and acceptably defining a smaller project owing to the wide variations in relative size, complexity, schedule, duration, and cost of projects executed by an even less homogeneous cross-section of owners, architects, engineers, and constructors [19]. Similarly, Griffith and Headley [20] discovered, despite the fact that the terms "small/medium/large projects" are commonly used across the construction domain, a wide diversity remains in the understandings of these expressions. Nonetheless, characteristics of small and medium projects that differentiate from large ones still can be gleaned from literature.

It was recognized that projects are typically smaller-sized when they do not involve a heavy investment [21]. The CII indicated that judging the size of a project mainly relies on intuition that reflects the organization's scale and present work volume [19]. Also, the CII revealed that smaller projects tend to have less personnel involved, lower inputs, higher unpredictability, and more standardized processes [22]. Moreover, scholars added that smaller projects are more likely to possess short duration, low cost, less complexity, limited formal documentation, and occur in active environments [23,24]. Their common types of work include repetition, routine, maintenance, renovation, remodeling, and upgrade, which can cost under USD 1 million [25]. Summarized by Liang [26], smaller sizes of construction projects are commonly worth in the range of USD 0.1–5 million based on a global context. Evidently, it can be seen that project cost serves as one of the overt indicators in demarcating the size of a project. This was also endorsed by Abdullah et al. [27] and Memon and Rahman [28] who defined smaller construction projects in Malaysia as those with a contract sum below MYR 5 million. Based on that, Chuan et al. [29] and Mohamed et al. [30] further subdivided these projects into small and medium ones according to the tender limits of contractors set by the Construction Industry Development Board (CIDB) of Malaysia. Referring to CIDB's contractor classification (Table 1) [31], the tender limits for small and medium contractors are up to MYR 1 million and MYR 5 million, respectively.

Table 1. Contractors' classification in Malaysia (adapted from Reference [31]).

Grade	Size	Tendering Capacity
G1	Small	Not exceeding MYR 0.2 million
G2	Small	Not exceeding MYR 0.5 million
G3	Small	Not exceeding MYR 1 million
G4	Medium	Not exceeding MYR 3 million
G5	Medium	Not exceeding MYR 5 million
G6	Large	Not exceeding MYR 10 million
G7	Large	No limit

Accordingly, the scope of this study is confined to the construction projects worth under MYR 5 million, i.e., small projects (under MYR 1 million), and medium projects (MYR 1–5 million). Such demarcation was in line with previous studies as well as reflecting the characteristics of SMEs in the country.

3. Methodology

The study began with a review of relevant literature to gain insight into the topic as well as define the objective and scope for the study. To achieve the objective, the methodology of questionnaire survey was employed as the instrument for data collection in the study. An initial questionnaire was designed and subsequently sent to five construction experts from both industry and academia for content validation. According to experts' feedback, the survey questionnaire was modified and finalized with three sections composed. An introduction letter was provided prior to the questionnaire's main body to clarify the definitions of small and medium projects as well as the survey purpose. Section A of the questionnaire was designed to gather demographic information of respondents and respective organizations. Section B asked respondents to provide the numbers of small and medium projects that respective organizations had been engaged in during the former three years, as well as the numbers of projects with VM implementation. The amounts of projects are stratified according to project cost and type. Section C was to assess respondents' frequency and awareness towards implementing VM during their former experience in delivering small and medium projects. A five-point scale was employed by adapting Oke's [32] methodology to provide respondents with an elaborate scale for measuring their levels of frequency and awareness of VM (i.e., 1—very low/No, 2—low, 3—medium, 4—high, 5—very high). Additionally, open-ended questions were also included in the section. The questions were designed to solicit respondents' views on the challenges and measures that are perceived prominent in promoting a wider application of VM in smaller projects. Answers to the questionnaire were requested to derive from respondents' knowledge and experience in respective organizations.

The dissemination of the questionnaire was on the basis of three major groups of construction organizations in Malaysia (i.e., contractors, consultants, and clients) via emails. Only responses explicitly specified with experiences in smaller projects (i.e., projects costing under MYR 5 million) during the past three years were included in the study. To improve efficiency, SMEs were primarily considered as they mainly contract smaller projects [18]. A pre-approach to the organizations was performed via phones to solicit the willingness of participation and confirm recent engagement in smaller projects prior to questionnaire distribution. A total of 400 questionnaires were distributed, while 162 were retrieved and ascertained appropriate for analysis. A return rate of 40.5% was indicated, which surpassed the average of 20–30% reported among research used questionnaire surveys in the construction industry [33]. Also, such a return rate was regarded as sufficient for the study as Olatunde et al. [34] and Aghimien et al. [35] stated that results of a survey could be biased and of little significance if the return rate did not approach 20%. The time span of the data gathering was four months (June–September 2021), while respondents representing respective organizations self-administered most of the questionnaires.

For data analysis, descriptive analysis including frequency, percentage, and mean was used to analyze respondents' demographic data and status of VM implementation in small and medium construction projects. The status of VM implementation was examined based on the levels of organization, practitioner, and projects. Meanwhile, the Spearman correlation test and the chi-square (χ^2) contingency table analysis were adopted to examine the relationship between VM implementation and demographic characteristics. Such methods were frequently used for testing the correlation of two variables while selected according to the natures of the tested variables [36,37]. The software of Statistical Package for the Social Sciences (SPSS) version 24.0 was employed for the analysis as it's easy to use, flexible, scalable, accessible to users, and adaptable for projects of any size and complexity [38]. In addition, content analysis was conducted to examine and conclude respondents' viewpoints on the challenges and measures in improving the current status of VM in smaller construction projects. Such technique allows researchers to compress numerous textual data into fewer content categories and identify the focus of the subject matter [39]. The methodological framework employed in this study was summarized in Figure 1.

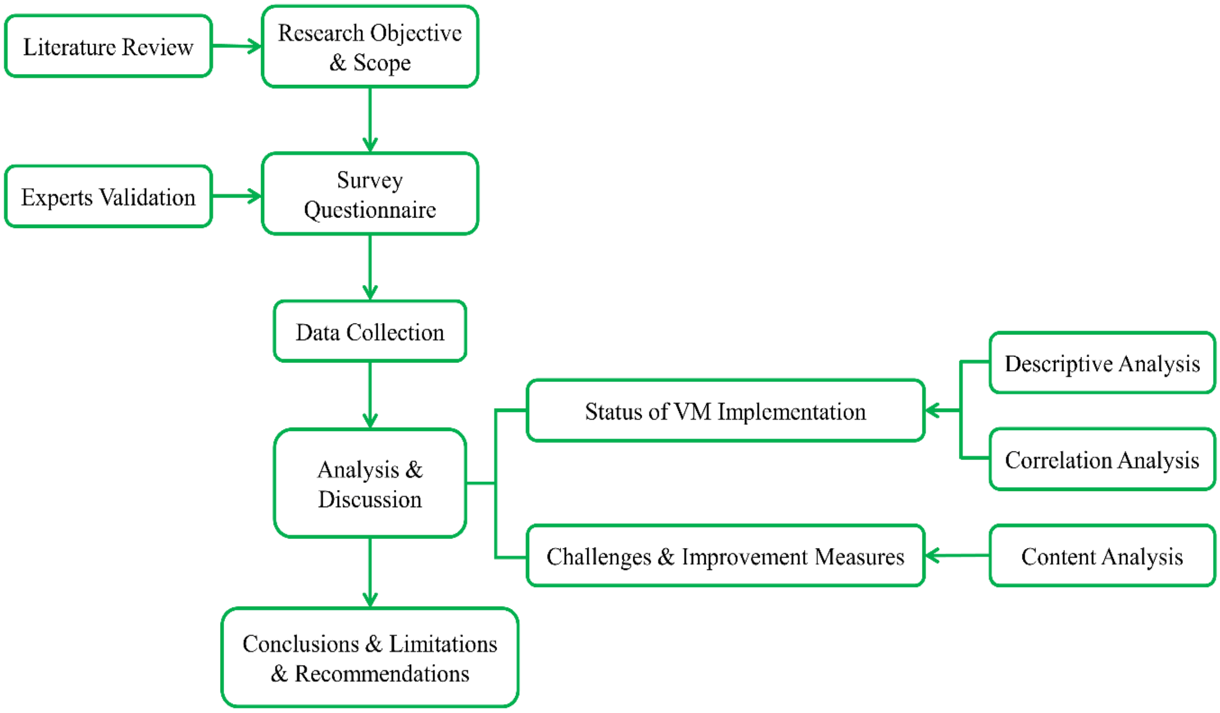

Figure 1. Methodological framework of the study.

4. Analysis and Discussion

4.1. Demographics

Figure 2 depicts the demographic information in terms of the surveyed organizations, practitioners (i.e., respondents), and smaller projects undertaken by the organizations. In terms of respondents, five professions of construction practitioners were recorded. The majority of respondents were civil engineers (28.4%), followed by architects (25.9%), quantity surveyors (19.1%), project managers (15.4%), and mechanical and electrical (M&E) engineers (11.1%). Organizations represented by the respondents accounted for 38.9% of contractors, 48.1% of consultants, and 13.0% of clients. It is understandable that contractors and consultants have higher proportions as they are mainly responsible for successfully delivering projects and hence prone to more opportunities and interests in accessing VM [10]. Notably, 71.0% of surveyed organizations and 61.8% of surveyed practitioners have industry experience of more than 10 years, which ensures the reliability and trustworthiness of the responses collected. Furthermore, a total of 1768 smaller construction projects engaged by the organizations were noted along with various sizes and types. The sample size employed herein is larger than that in previous similar studies [10,18,38,40–43], which aids in improving the accuracy of results.

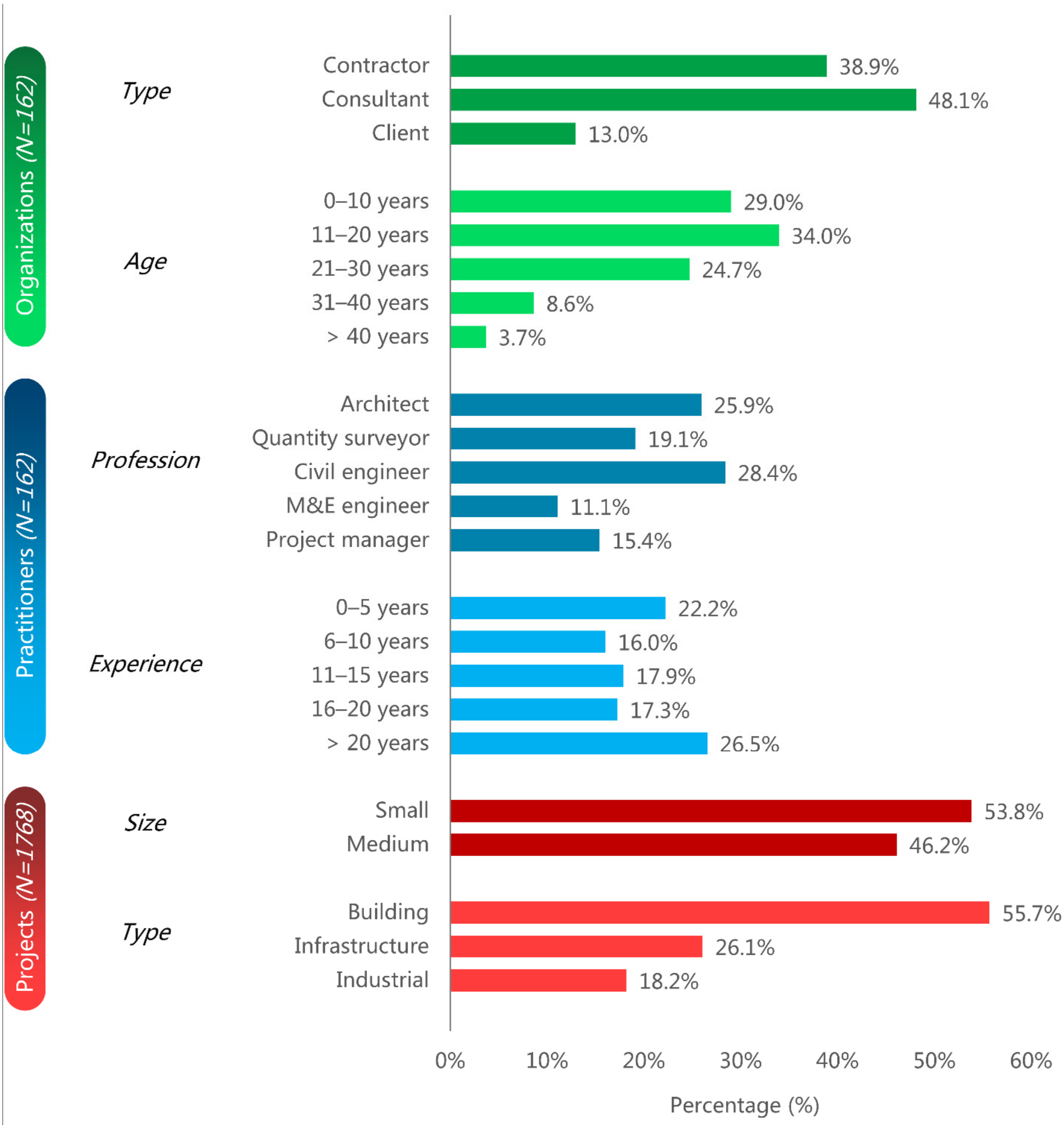

Figure 2. Profile of the surveyed organizations, practitioners, and projects.

4.2. Status of VM Implementation

4.2.1. Status of VM Implementation: Organization Level

To examine the status of VM implementation in small and medium construction projects, respondents were asked to provide projects under MYR 5 million with VM implementation in respective organizations. Equation (1), adapted from Hwang et al. [18], was proposed to generate the VM Implementation Index (VMII) for measuring the extent of VM implementation in smaller projects within an organization.

$$\text{VMII} = (\text{N}/\text{T}) \times 100\% \tag{1}$$

where N is the number of projects under MYR 5 million with VM implementation in an organization, and T is the total number of projects under MYR 5 million in an organization. The index is based on a scale of 0–100%.

Table 2 sums up the calculated results of VMII of the organizations surveyed. The analysis indicated that 47.5% of organizations did not implement VM (i.e., VMII = 0%) for any of their smaller construction projects, while the remaining 52.5% had such experience (i.e., VMII > 0%). The study recognized a VMII of 50% as the moderate level of VM implementation in smaller projects. The number of organizations with a VMII less than 50% is more than eight times of those with VMII higher than 50%. That is 89.4% of the organizations possess a VMII for smaller projects below 50%, while only 10.6% with that above the moderate level. Among the organizations that have practiced VM for smaller projects over moderation, the VMII ranges between 50% and 80%. None of contractors and consultants has reached a VMII exceeding 80%, while none of clients has achieved it above 60%. This indicates that in Malaysia, less construction organizations have practiced VM for their smaller projects in a high-frequency manner. Meanwhile, the VMII has obtained an overall mean of 19.4%, whereas respective means in contractors (20.4%), consultants (19%), and clients (18.2%) were found similar and also low. This suggests a similar status of VM implementation in smaller projects among contractors, consultants, and clients. That is, the overall execution of VM for small and medium projects by different types of construction organizations in Malaysia remains low and unsatisfactory. The findings affirmed the assertion of Abd-Karim et al. [17] that construction enterprises face a grimmer dilemma in terms of VM usage in smaller projects than the larger ones in Malaysia.

Table 2. Status of VM implementation: organization level.

VMII	Organization			Overall		
	Contractors	Consultants	Clients	N	%	Cumulative%
0.0%	33	33	11	77	47.5	47.5
0.1–10%	1	9	1	11	6.8	54.3
10.1–20%	3	6	1	10	6.2	60.5
20.1–30%	3	5	0	8	4.9	65.4
30.1–40%	6	11	3	20	12.3	77.7
40.1–50%	10	6	3	19	11.7	89.4
50.1–60%	4	4	2	10	6.2	95.6
60.1–70%	1	3	0	4	2.5	98.1
70.1–80%	2	1	0	3	1.9	100.0
80.1–90%	0	0	0	0	0.0	100.0
90.1–100%	0	0	0	0	0.0	100.0
Total	63	78	21	162	100.0	-
Mean	20.4%	19.0%	18.2%	19.4%	-	-
Spearman correlation test between VMII and organizational age (correlation coefficient = 0.394, *p*-value = 0.000 *)						

* *p*-value of the Spearman correlation test is significant at the level of 0.01.

In addition, the relationship between VMII and organizational age was examined by the Spearman correlation test. Such measure is widely adopted for evaluating correlations involving ordinal variables [44]. Results in Table 2 show that the Spearman correlation coefficient is 0.394 with a significant *p*-value at the level of 0.01. The null hypothesis of VMII being independent of organizational age was hence rejected, suggesting a significant relationship between VM implementation and organizational history. That is, the longer history the organization possesses in the industry, the more VM practices the organization tends to execute for smaller construction projects.

It is praiseworthy to mention that organizations with VM experience in smaller projects were found mostly with a VMII around 30–50%, irrespective of organizational type. It appears to reflect that the use of VM in smaller projects was not an incidental nor singular phenomenon in these companies, while challenges may exist to significantly obstruct a wider application of VM. The more severe circumstance of VM observed from the side of clients also echoes Al-Yami's [45] view that one of impediments to preventing a broad VM application in developing nations/regions is the inadequacies of clients' awareness and active participation in VM. The necessity to explore potential measures herein for improving the current VM deployment in smaller construction projects was therefore elicited.

4.2.2. Status of VM Implementation: Practitioner Level

In terms of practitioner level, respondents' levels of frequency and awareness of VM in small and medium construction projects were assessed. As a five-point scale was used, the mean of the assessment among respondents of different professions was also calculated. Similarly, whether practitioners' working experience is significantly associated with the levels of frequency and awareness of VM in smaller projects was checked using the Spearman correlation test. Table 3 presents the analysis results of status of VM implementation in small and medium construction projects based on practitioner level.

Table 3. Status of VM implementation: practitioner level.

Category	Level	Practitioner					Overall		
		Architect	Quantity Surveyor	Civil Engineer	M&E Engineer	Project Manager	N	%	Cumulative%
Frequency of VM	1—Very low/No	18	16	20	9	10	73	45.1	45.1
	2—Low	15	10	18	4	7	54	33.3	78.4
	3—Medium	4	3	3	2	4	16	9.9	88.3
	4—High	3	2	5	3	2	15	9.3	97.5
	5—Very high	2	0	0	0	2	4	2.5	100.0
	Total	42	31	46	18	25	162	100.0	-
	Mean	1.952	1.710	1.848	1.944	2.160	1.907	-	-
	Spearman correlation test between level of frequency of VM and practitioners' working experience (correlation coefficient = 0.203, *p*-value = 0.009 *)								
Awareness of VM	1—Very low/No	12	5	9	5	2	33	20.4	20.4
	2—Low	10	7	13	6	3	39	24.1	44.5
	3—Medium	14	19	18	5	12	68	42.0	86.5
	4—High	6	0	6	2	6	20	12.3	98.8
	5—Very high	0	0	0	0	2	2	1.2	100.0
	Total	42	31	46	18	25	162	100.0	-
	Mean	2.333	2.452	2.457	2.222	3.120	2.500	-	-
	Spearman correlation test between level of awareness of VM and practitioners' working experience (correlation coefficient = 0.236, *p*-value = 0.003 *)								

* *p*-value of the Spearman correlation test is significant at the level of 0.01.

In terms of the level of frequency of VM, the majority of respondents (78.4%) cited implementing VM in smaller projects less frequently than average. Only 11.8% of respondents stated the most frequently adopted VM for their small and medium construction projects. Therefore, it can be inferred that most participants of smaller construction projects still lack experience concerning VM practices. According to Kim et al. [46], such a lack could largely affect the implementation and success of VM in construction projects. As revealed in Table 2, fewer organizations possess a high VMII. Hence, it is foreseen that participants of smaller projects are granted fewer opportunities from respective organizations to gain experience in VM. This makes the broad application of VM in smaller projects become challengeable. Also, the mean values evaluating the VM frequency level were found similar and relatively low among respondents of different professions. No engineers and surveyors surveyed indicated to adopt VM for smaller projects at a very high frequency. In an overall view, construction practitioners of different professions in Malaysia still fall short in adopting VM for small and medium construction projects. Results of the Spearman correlation test also suggest a significant association between the frequency of using VM in smaller projects and practitioners' working experience. Such outcome was in line with Abd-Karim et al. [17] that the more the industry experiences of the practitioner, the more the VM adoption of him/her in construction projects.

Regarding practitioners' awareness of VM in smaller projects, most respondents (44.5%) claimed to have such awareness lower than the medium level. Only project managers surveyed claimed to possess an overall awareness of VM in smaller projects above moderation. It reflects the higher sensitivity of project managers in being aware of project value and cost that are deemed appropriate to be the facilitator for VM processes [5]. Other professions of practitioners still fall short in this regard, while awareness should be raised. The overall practitioners' level of awareness of VM in smaller construction projects was observed still low and unsatisfactory. Same to the case of VM frequency, the Spearman correlation test results also revealed a significant relationship between VM awareness and practitioners' working experience. The findings revealed that the awareness and adoption of VM in small and medium construction projects in Malaysia are significantly impacted by practitioners' experience in the industry. It conforms to the views of Mohamad Ramly et al. [33] that experience and knowledge of the stakeholders is one of the critical success factors for VM workshops in Malaysia. Therefore, to assure the success of VM in smaller projects, the selections of participants/facilitators shall be made referring to the experience and expertise of stakeholders.

4.2.3. Status of VM Implementation: Project Level

Table 4 presents the number and proportion of construction projects with and without VM implementation. Among the smaller projects recorded, 21.9% of them were found with VM experience. This also points out a relatively low level of VM adoption observed from the project level. To examine the relationship between VM implementation and project characteristics, the chi-square (χ^2) contingency table analysis was conducted with the significance level of 0.01. Such a method determines the extent to which a statistical correlation exists between unordered/binary variables and has been viewed as one of the most widely used statistical tools for categorical data analysis [37,47].

Table 4. Status of VM implementation: project level.

Category	Characteristics	No. of Projects	Projects with VM		Projects without VM	
			N	%	N	%
Project size	Small	952	150	15.8	802	84.2
	Medium	816	238	29.2	578	70.8
	Total	1768	388	21.9	1380	78.1
	Chi-square (χ^2) contingency table analysis between VM implementation and project size (χ^2 = 46.130, p-value = 0.000 *)					
Project type	Building	985	220	22.3	765	77.7
	Infrastructure	461	98	21.3	363	78.7
	Industrial	322	70	21.7	252	78.3
	Total	1768	388	21.9	1380	78.1
	Chi-square (χ^2) contingency table analysis between VM implementation and project type (χ^2 = 0.222, p-value = 0.895)					

* p-value of the chi-square (χ^2) contingency table analysis is significant at the level of 0.01.

In terms of project size, 29.2% of medium projects had experienced VM, while such percentage was only 15.8% for small projects. The discrepancy implies that the relatively higher-cost projects were prone to more VM, conforming to the common perception of larger projects receiving more VM [10]. It also echoes the submissions of Alshehri [48] and Olawumi et al. [6] that strong application of VM in developing countries still remains unsatisfactory and confined by project size/cost. Hence, it can be inferred that project size/cost can serve as an ostensive factor that significantly affects the adoption of VM in the Malaysian construction industry. Such inference was also endorsed by the significant result of the chi-square (χ^2) contingency table analysis. The null hypothesis that VM implementation is independent of project size was rejected (p-value < 0.01), revealing a significant association between VM implementation and project size.

Moreover, whether VM implementation is affected by project type as another major project characteristic was examined. Building projects, infrastructure projects, and industrial projects were found with similar and low percentages of VM implementation, i.e., 22.3%, 21.3%, and 21.7%, respectively. The slight variances in proportions lacked statistical significance as confirmed by the non-significant result of the chi-square (χ^2) contingency table analysis (p-value > 0.01). The null hypothesis was hence accepted, revealing that VM implementation in smaller construction projects is independent of project type. The current level of VM adoption in three major types of projects were observed all similar and unsatisfactory. Project type was proven as not a determinant when it comes to the adoption of VM in smaller construction projects in the country.

It is worth noting that VM practices documented by this study appear across a wide variety of projects with different types and sizes. Such a scenario effectively supports the broad applicability that VM owns [6]. The observed status from project level suggests that VM adoption in small and medium projects in Malaysia remains inadequate and significantly associated with project size, irrespective of project type. Improvements for such a situation are worth exploring.

4.3. Challenges and Improvement Measures

Opinions were provided by respondents on the challenges and measures perceived prominent in improving the status of VM in smaller projects based on their knowledge and experience. Content analysis was carried out to understand the textual data gathered from the questionnaire survey. The status analysis of VM in smaller projects was conducted from three levels (i.e., organization, practitioner, and project), whereas deficiencies were observed remaining in all levels. Undoubtedly, the implementation of VM inevitably involves construction organizations, practitioners, and projects. It is imperative to coordinate and work in parallel at the three levels if the objective and success of VM to be achieved. Based on this, a schematic was proposed in Figure 3 with regard to promoting a wider application of VM in smaller sizes of construction projects.

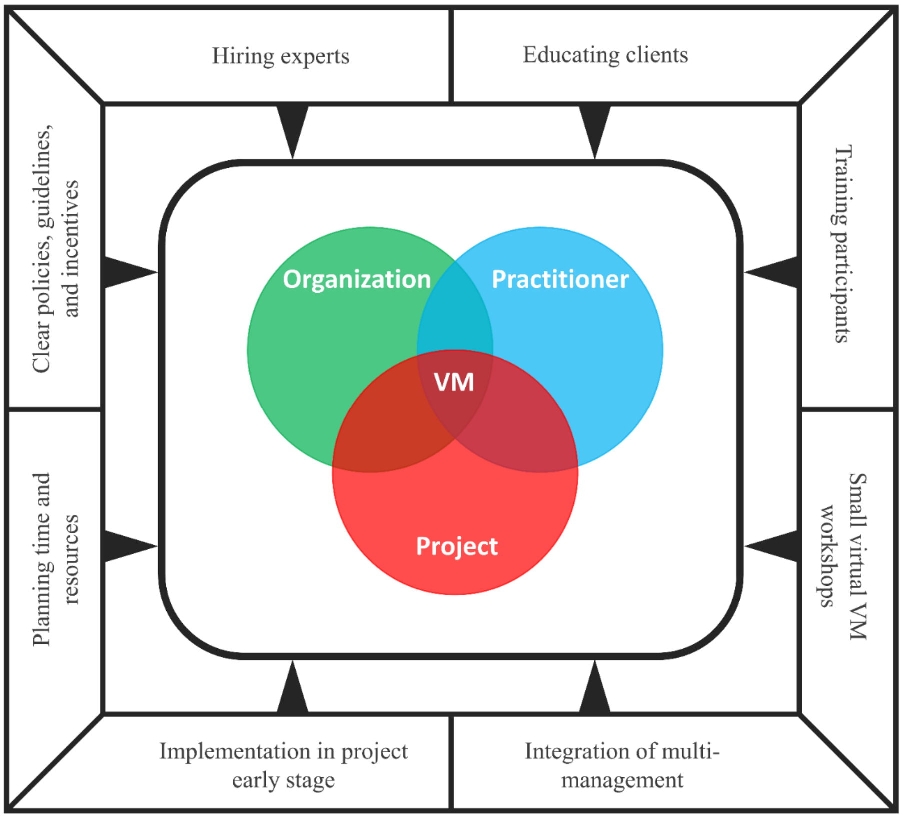

Figure 3. Schematic to promote VM in small and medium construction projects.

A lack of VM experts was cited as one of the salient challenges of expanding VM within organizations. Including expertise and competence in relation to the VM domain is recommended as one of the metrics in recruitment for easing such a lack. The implementation of VM is frequently hampered by the inadequacies of awareness and experience about the practice, as confirmed by the study. The necessity is therefore elicited for organizations to provide regular training and practices for participants of smaller projects on VM principles, techniques, and facilitation skills. It also facilitates practitioners with necessary skills and experiences that are deemed favorable in convincing clients to appreciate and invest in VM [49]. This is owing to the frequent adoption of VM in smaller projects that was observed scarcer among clients. Educating clients about VM and its benefits is praiseworthy and deemed critical aids in promoting the approach in small and medium construction projects. In addition, it was perceived as challenging to facilitate a broad application of VM in smaller projects without corresponding policies, guidelines, and incentives provided. It conforms to the fact that the current legislation and local guidelines from the government remain confined to large projects [50]. A prospect to this would be to follow the footstep of developed nations (e.g., the US, Japan, Korea, etc.) and expand the scope of VM regulation to smaller, lower-cost projects. Also, the provision of clear policies, guidelines, and incentives is widely acknowledged as a favorable means in popularizing and driving new initiatives [41].

For smaller projects, challenges posed by their non-superior inherent characteristics on VM activities were also stressed (e.g., lack of time for VM, lack of excess disposable cost for VM, lack of available personnel/team with the right skills for VM, etc.). One of options perceived viable in curbing such menace is the appropriate planning of smaller projects' schedules and resources for VM. This was also endorsed by Phyo and Cho [51], who believed the duration, scale, and specialization level of VM workshops to be adapted according to the size of the project. Since VM is a proactive approach, its implementation in the project's early stage was highly advocated as the maximum benefits tend to yield [52]. Also, the integration of VM approach with other managerial activities is an ingenious strategy that could make better benefits of VM convincing to the stakeholders of smaller projects. The inadequacy of management inputs in smaller projects is always one of the major issues in these projects [18]. The integrated implementation of multi-management aids in alleviating such inadequacy, while also saving time and improving efficiency [53]. Additionally, it is worth mentioning that the study was conducted in the context of COVID-19 outbreak. Respondents mentioned that the form and commitment of VM activities could be impacted by the unexpectable pandemic circumstances and response measures. Small virtual VM workshops are highly supported as one of the best solutions to this issue. Such form not only complies with the requirements of epidemic prevention, but is also accessible, inexpensive, and efficient that appears suitably catering to the conditions of smaller projects [54]. However, the corresponding technical support and participation enthusiasm should be emphasized.

5. Conclusions

This study identified the current status of VM implementation in small and medium construction projects in Malaysia as well as explored the challenges and measures in improving the situation. The VMII was proposed to measure the status quo of VM implementation in small and medium projects within organizations. The analysis results implied that nearly 90% of the organizations surveyed had a VMII below the moderation (VMII = 50%). Thereby, the execution of VM by organizations for smaller construction projects is still at a relatively low level (overall VMII = 19.4%), while also significantly associated with organizational age. The majority of practitioners surveyed indicated to possess relatively low levels of frequency and awareness of VM in small and medium projects, revealing a short in these regards. Such frequency and awareness were also found significantly correlated with the practitioners' experience in the industry. In addition, among the total 1768 projects surveyed, only 21.9% have experienced VM, which confirmed the findings that VM implementation in smaller projects in Malaysia remains low. Meanwhile, a relatively lower proportion was found in small projects (15.8%) with VM experience than that in medium projects (29.2%), while such proportions were similar among projects of different types. The implementation of VM in Malaysia was further revealed to be more subject to project size/cost, irrespective of project type. Smaller, lower-cost projects are prone to fewer exposures to the VM approach.

The status observed by the study suggested that the deployment of VM in smaller construction projects in Malaysia remains in its infancy to date. Deficiencies still exist at all levels of organization, practitioner, and project. In order to improve the status, some challenges and potential measures were discussed. This study adds literature by providing a thorough picture of the current status of VM in Malaysia's small and medium construction projects. Also, its suggestions aid stakeholders of smaller projects in better promoting VM in their projects as a favorable tool to attain the best value-for-money. VM is one of the important terms used in project management. As little VM research emphasized smaller construction projects, this study also contributes to enriching the current body of knowledge related to small project management. More attention from both academia and industry is urged to raise on VM in smaller, lower-cost construction projects.

6. Limitations

Although the study contributes to an in-depth understanding of current VM deployment in smaller projects, there exist some limitations. The study is limited to the Malaysian construction industry. Thus, the results may differ in other countries. Due to the lack of a consensus on the definitions of small and medium projects, this study identified the scope of smaller projects through one of the most dominant characteristics, i.e., project cost. Hence, the small and medium projects investigated may not be fully exhaustive. Lastly, the numbers of smaller projects with and without VM, challenges, and improvement measures were assessed by respondents according to their knowledge and experience in respective organizations. Hence, the data gathered from the survey inevitably involved subjectivity and remembrance. Actually, this is a common problem for most studies using questionnaire surveys. The use of relatively larger samples herein was therefore designed to diminish the impact from this problem.

7. Recommendations for Future Research

Future research is recommended to examine the implementation of VM in smaller projects in other nations/regions. Also, it is laudable to study and formulate proper strategies and guidelines that exclusively cater to the characteristics and conditions of smaller projects to successfully implement VM. In addition, investigations on the improvements in smaller projects' performance (e.g., quality, cost, schedule, safety, productivity, efficiency, sustainability, customer satisfaction, etc.) generated by VM are also praiseworthy, as well as the underlying causal relationship between the VM implementation and performance improvements. Also, it is interesting to compare the implementation and performance of VM in smaller projects with that in larger ones.

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