1.0 Introduction

The concept of VM was first introduced into various organisations in Malaysia, both public and private, in the late 1980s and early 1990s (Jaapar et al., 2009) of which the idea of implementing it has been promoted by various concerned parties until today. Countless efforts were made in spreading and disseminating the knowledge, understanding and practice of VM through talks, seminars, and conferences.

Although VM was founded in the manufacturing industry way back in the 1940s (Kelly and Male, 1993), it has been widely practiced in the construction industry as well (Yue, 2005). The first thing to remember is that VM was introduced to reduce or perhaps remove unnecessary cost through a systematic process. It is worrying to note that many products contain unnecessary cost embedded in the design (Kelly et al., 2009) and such cost can be eliminated through creative thinking without compromising the functionality and performance of the product itself (Che Mat, n.d). One has to go back to the fundamental of VM exercise; as an organized approach useful to eliminate unnecessary cost of a project that does not related to its necessary function yet not compromising the quality nor quantity (Chua, 2003, Koga and Appleton, 2000).

Nevertheless, VM is not just concerned about cost, but also about the relationship between function, quality and cost; with functional analysis as its principal component (Che Mat, 1999, Chua, 2003).
2.0 Rhetoric and reality of VM

VM resides as simple rhetoric for some, being promoted in manuals, guidelines and websites. However, rhetoric alone is not enough. The rhetoric of VM has been discussed by Green (n.d) and several other authors a couple of years back. In Malaysia, the rhetoric of VM is not analogous with the reality of its application but more often than not it is tied up with the cost issues. Cost is central for every construction project; thus the professional quantity surveyors (QS) are engaged to provide cost advice to the client through cost management services. By and large, QS put emphasis on the economics of construction and the project expenditure, which may heavily rely on the cost reduction or substitution, as the focus is to save cost (Kelly and Male 1993). Conversely, Kelly and Male (1993) drawn attention to project management services, which must not only pay heed to cost management but also to VM for which the client's requirements should be achieved in value terms rather than purely monetary.

The association of VM and cost management has positioned the opportunity for QS to develop new skills and shape new images of the profession (Hogg 1999). In line with this natural progression (Ellis, Wood, & Keel, 2005), the quantity surveying courses in various public and private universities in Malaysia particularly and generally in many other countries, embraced VM as a subject. For example, VM has been introduced as a subject for the Bachelor of Quantity Surveying and Master of Project Management programmes at the Department of Quantity Surveying, University of Malaya. Such an inclusion, combined with the knowledge dissemination through talks and seminars have resulted in improved awareness and understanding of the concept and according to Hogg (1999) this has largely influence VM implementation compared to other design team members.

Notwithstanding with the above inclusion (VM as a subject) from the time when the concept was introduced to the country in the late 1980s, the take up is yet to be far and wide and do not seem to be so well embraced not only in Malaysia (Jaapar et al., 2009) but in the Southeast Asian region (Cheah and Ting, 2005). On the contrary, things are greener on the international situation, predominantly in the developed nations by which the application of VM has been widely accepted and practiced (Ellis et al., 2005). Jaapar et al. (2006) pointed out that such a deficiency of VM guideline hindered the progressing implementation for which participants of VM workshops are lacking on the know-how in putting VM into operation.

Notably, the incorporation of value engineering (VE) as part of the additional services provided by the QS in Malaysia is seen as a great move in shifting the negative perception of an "after-the-event" cost cutter (Saifulnizam et al., 2011; Green and Liu, 2007; Hogg, 1999) towards better and positive metaphors. However, although this may be true, it is important that aspiring QS must make all effort to overcome such a stereotypical image (Green and Liu, 2007) of a pseudo-practitioner in VM, who extremely claimed to apply VM or perhaps VE (Shen, 1997), as the main purpose of VM is to reduce unnecessary costs (Ashworth, 2004) and not to simply reduce cost.

3.0 Institutionalising VM

VM is important because it increases the benefits and decreases the cost, thus delivering the best solution and continuously providing good value for the projects, an essential concern to most clients or customers (Koga & Appleton, 2000). Besides, VM has been regarded as an up-and-coming concept (Ellis et al., 2005) not only in the various market sectors of the construction industry but has attracted other industries such as automotive, aerospace, construction, petroleum, process control, defence, chemicals, services, healthcare, food, communications, consumer products and government (Fong and Shen, 2000; Kaufman, 2001). Significantly, VM has been recognised through the Australian and New Zealand standards, AS/NZS 4183-1994 and followed by the relatively new European standard BS EN 12973:2000.
According to Shen and Li (2004), promoting VM applications requires continuous supports from the government besides the establishment of a set guidelines in implementing VM. By and large, in 1998, the former Minister of Finance, Tun Daim Zainuddin in his speech has called for attention to the implementation of VM in the construction industry (Che Mat, 1999). Consequently, the Institute of Value Management of Malaysia (IVMM) was founded in 2000 to promote the implementation of VM in Malaysia to both public and private sectors, as well as to spread the awareness of the benefits and importance of VM application in Malaysia. VM institutions are established not only in Malaysia but in many other countries. The following are some examples of major VM/VE institutions.

1) Society of American Value Engineers (SAVE International) – USA
2) Society of Japanese Value Engineering (SJVE) – Japan
3) Society of Korean Value Engineers (SKVE) – South Korea
4) Institution of Value Management (IVM) – UK
5) Value Analysis Canada (VA Canada, formerly known as CSVA) – Canada
6) Hong Kong Institute of Value Management (HKIVM) – Hong Kong
7) The Institute of Value Management Australia (IVMA) – Australia
8) Indian Value Engineering Society (INVEST) – India

In Malaysia, the Malaysia Airports Holdings Berhad (MAHB) was the first organization to introduce its own guideline in implementing VM. Published in 2008, the manual outlined the VM methodology framework for the organisation as a result from successful VM studies conducted for selected MAHB works, supplies, systems and facilities above RM300,000. (MAHB, 2008). Tenaga Nasional Berhad (TNB) also implement VM for projects and procurement amounting RM10 million and above (Mohamad Ramly and Shen, 2012). Meanwhile, the Malaysian government supports the implementation of VM by making it compulsory for public projects valued RM50 million and above to implement VM. It took place when the Economic Planning Unit (EPU) and the Construction Industry Development Board (CIDB), with the assistance of IVMM, have started to initiate the effort to implement VM for public projects. With this, in December 2009, EPU published a circular entitled "Value Management Guidelines Circular

Figure 1: MAHB's VM Manual (MAHB, 2008).

Figure 2: a) MAHB’s VM framework & Organisational structure for VM Implementation. (MAHB, 2008, p14-15).
3/2009" to implement VM (Jaapar, Zawawi, et al., 2012). Subsequent to this circular was the publication of VM implementation Guide for government programmes and projects in 2011, and the updated EPU Circular 1/2015 was released to replace the first circular. Additionally, the Public Works Department (PWD) has releases its own guideline for public projects in 2013, clarifying the VE governance, framework and study interventions focusing on PWD's work process (PROKOM, 2013). This guideline responds to the implementation of VE, in line with the EPU guideline.

### 4.0 Moving beyond the hyperbole

There is much noise and hyperbole surrounding the understanding and application of VM for which it has brought to various misconceptions despite its ubiquity in the global industry. It is the time to move beyond hype and of such exaggeration, to being more rational and clearly understands the notion of VM.

In spite of the misconception of VM discussed above, VM has been considered to be an emerging paradigm and is currently widely accepted in the management of construction projects (Ellis et al., 2005). It is important to realize that researchers and practitioners in VM have been working intensely in disseminating the knowledge and practice of VM for the benefit of the industry. Though VM is extensively implemented in construction projects, it is important for VM to evolve in the right manner and to be sustainable in the industry. There are three promising and viable solutions suggested which is hoped will lead to the effective implementation and vigorous progress of VM.

#### 1. VEMBOK©

The limited knowledge areas embraced by VM players hinder the progressing of VM application in the industry. Fong and Shen (2000) concur that knowledge is favourable for VM to be developed and thus a long term plan should be established (Mohamad Ramly and Shen (2012). As a respond, researchers from the University of Malaya have developed a framework indicating the various knowledge areas needed as a pre-requisite of VM implementation. Bodies of knowledge (BoKs) are generally
developed to provide areas of knowledge for the particular readers to understand the philosophy behind the concept as well tabulating the core competencies to ensure good practice. The Value Engineering/Management Body of Knowledge or VEMBOK® serves as a guidance for those interested parties prior to implementing VM in the construction industry. According to Abd-Karim and Lau (2015), VEMBOK® was developed based on the research findings for which the data was collected from various construction professionals who have knowledge in VM or actively involved in VM implementation or active researcher in field of VM.

The development of VEMBOK® is based on the critical understanding that all practicing value managers or value engineers must equipped themselves with the general knowledge of the areas. This is in response to the critics of the stereotype image of a cost cutter discussed above. The practitioners, however, can gather this knowledge prior to the implementation of VM through the related experts and to be explored further during the VM workshop session. The knowledge areas outlined in VEMBOK® is important to be included as part of the competency base or standards for VM practitioner, on top of the basic knowledge in VM itself.

VM has been considered to be an emerging paradigm and is currently widely accepted in management of construction projects.

2. IRVM®
Another novel arrangement to influence the implementation of VM is through the integration of the concept with others, in this case, risk management (RM). According to Abd-Karim et al., (2011) and Abd-Karim (2006), integrating RM with VM reduces the negative impact on projects and assists value improvement. The aspiration to reduce time taken to act and produce results motivates such an arrangement which utilises the same resources in workshop. IRVM® was developed based on four real-world international project cases in multiple industries that integrates both concepts in their workshops. The aspects of risks are taken into consideration into the phases of VM job plan (Abd-Karim et al., 2011). The aspects of value are said to be considered mainly for positive risks, which look into the opportunity management for the selected risks.

Figure 5: "VEMBOK® - The required knowledge areas prior to VM Implementation (Source: Abd-Karim and Lau, 2015)"  
"VEMBOK® is an acronym for Value Engineering/Management Body of Knowledge. Copyright owned by the author"
<table>
<thead>
<tr>
<th>Subject / Description</th>
<th>Case 1 Railway</th>
<th>Case 2 Railway</th>
<th>Case Study 3 Water &amp; Waste Water</th>
<th>Case 4 Water &amp; Waste Water</th>
</tr>
</thead>
<tbody>
<tr>
<td>Workshop format</td>
<td>Integrated VM and RM</td>
<td>Integrated VM and RM</td>
<td>Based on IVM workshop methodologies; VM 1 and VM 2.</td>
<td>No clear information</td>
</tr>
<tr>
<td></td>
<td>VE Studies conducted for the project as well as risk identification using quantified risk assessment (QRA)</td>
<td>VE Studies conducted for the project as well as risk identification using quantified risk assessment (QRA)</td>
<td>VM 2 held 3 weeks after the completion of VM 1.</td>
<td></td>
</tr>
<tr>
<td>Techniques involved</td>
<td>Job Plan, Brainstorming</td>
<td>Job Plan, FAST diagram, Brainstorming</td>
<td>Job Plan, Brainstorming</td>
<td>Job Plan</td>
</tr>
<tr>
<td>Job Plan</td>
<td>No clear information on Job Plan but the report include all 5 phase activities</td>
<td>No clear information on Job Plan but the report include all 5 phase activities</td>
<td>Introduction Information &amp; challenge phase Current business risk assessment Creative phase Evaluation phase Way forward (VM1) Recommendation and action plans (VM2)</td>
<td>Identification phase Creative phase Evaluation phase Development phase</td>
</tr>
<tr>
<td>Risk consideration in Workshop</td>
<td>Risk identified during VE studies using quantified risk assessment.</td>
<td>Risk identified during VE studies using quantified risk assessment.</td>
<td>Risk identification during business case risk studies</td>
<td>During evaluation phase, the workshop also evaluated on failure scenarios which involve business risk assessment and management for the preferred option and presented with a probability-impact tables</td>
</tr>
<tr>
<td>VE studies</td>
<td>This is a specific VE study for this particular project. Members of the workshop work through estimate developed earlier by the railway company to identify any VE opportunities or savings, complying with the objective of the workshop. Estimates prepared are exclusive of risk aspects and were based on the company's GRIP 3 procedure that is option selection.</td>
<td>This is a specific VE study for this particular project at pre-feasibility stage. Workshop studies on the original estimate as base.</td>
<td>No information on specific VE studies.</td>
<td>No information on specific VE studies.</td>
</tr>
<tr>
<td>Subject / Description</td>
<td>Case 1 - Railway</td>
<td>Case 2 - Railway</td>
<td>Case 3 - Water &amp; Waste Water</td>
<td>Case 4 - Water &amp; Waste Water</td>
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<td>-----------------------</td>
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</tr>
<tr>
<td>RM workshop</td>
<td>QRA involved generating quantitative estimates on the likelihood and cost impact of each risk including assessment of the impact of the risk.</td>
<td>QRA involved generating quantitative estimates on the likelihood and cost impact of each risk including assessment of the impact of the risk.</td>
<td>No information on specific RM workshop as risk aspects was considered in the VM workshops.</td>
<td>No information on specific RM workshop as risk aspects was considered in the VM workshops.</td>
</tr>
</tbody>
</table>

Workshop results

- The project should be allocated contingency level of 10.5% addition to the base estimate.
- Main critical risks played around the issue of sufficient water supplies & drainage for successful project delivery.
- Able to identify the overall cost savings based on the review and the VE study.

- Workshop recorded some savings based on the original estimate.
- The total exclusions as a result of VE savings was at 36% from the total base estimate.
- An additional 12% of costs incurred due to the additions of several items to the project.
- 22% of overall savings from the VE workshop of the total base estimate.

- Both VM 1 and VM 2 were very beneficial and members of the workshop agreed in choosing one best solution.
- Able to provide the best solution to the client, in terms of risk and cost whereby the options selected for the treatment works provides the client with low risk at low cost.

*IRVM® is an acronym for Integrated Risk and Value Management. Copyright owned by Abd-Karim et al. (2011).*

3. VM3®

The third viable solution suggested in ensuring the successful implementation of VM in practice is through the introduction of maturity model called Value Management Maturity Model (VM3®). Maturity model serve as means to identify the best practice and to compare the methods of working as well as the quality of outputs or outcomes (Khoshgoftar and Osman, 2009). The maturing concept is based on Deming’s process improvement and also Crosby’s quality management maturity. From the earlier discussion, it has been made known that organisations have started to implement VM since 2008 when the various guidelines by MAHB, EPU and PROKOM are made available to practice. Therefore, after nearly a decade in practice, a well-accepted instrument or technique is needed to appraise the capabilities or performance of VM implementation with the intention that appropriate actions taken in shifting into a higher level of maturity for the betterment of the organisation.

VM3® was developed based on a comprehensive review of at least twenty five available maturity models for which only the closest six were taken into further assessment. Additionally, it is also developed due to the deficiency of a specific method to measure performance of organisations that implement VM. According to Abd-Karim et al., (2014), VM3® will assist in assessing the strengths and weaknesses of the VM practice and will bring the organisation to the next level of maturity. Moving...
up the ladder of maturity requires continuous assessment and it depends highly on the capability of the organisations.

VM3® consists of 5 different levels of maturity as follows:

- **L1 - Initial level**: The organisation is aware about VM but does not have documented processes on VM.
- **L2 - Repeatable level**: The organisation has started to implement VM as a common-practice.
- **L3 - Defined level**: The organisation has defined VM within the organisation to target for improvement.
- **L4 - Managed level**: The organisation has established the effective strategies and processes in line with the medium and long-term plans.
- **L5 - Optimised level**: The organisation has the initiatives to optimise the improvement of VM practices.

At each level, the key elements of VM comprising the organised effort, analysing on the necessary function, satisfying the requirements or attributes to achieve the function with most profitable cost must be practised at every level of VM3®.

### 5.0 Conclusion

VM offers more than just merely cost management but looking at holistic view of a project. The concern over knowledge can be overcome with the introduction of VEMBOK® that outlines the elemental knowledge areas for anyone to venture into VM, together with the standard competencies of a VM practitioner. VEMBOK® is an aide memoire to all that VM does not belong to any profession although it is widely held that VM is common to QS. Meanwhile, the development of IRVM® proved that in practice, VM and RM can be conducted together using the same resources and yet provides beneficial outcome to the project. It also proves that VM exercise do away with the stereotypical image of a cost-cutter, in that the workshop conducted may result to additional costs incurred due to certain additions to the project. Additionally, VM must not only be practiced by selected group of people but nurtured as a culture within organisation in realizing its indispensable transformation with the use of VM3®. VM has been introduced into the country three decades ago and various guidelines and manuals have been made available for use for almost a decade. The industry is indeed has achieved certain level of maturity. Organisations may start to adopt VM3® as a model to facilitate their performance appraisal of VM implementation. The combination of VEMBOK®, IRVM® and VM3® initiatives will lead VM to be well embraced, progress and sustainable in the industry.

### References


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