



INTERNATIONAL CONFERENCE ON
VALUE ENGINEERING
AND MANAGEMENT 2012

PROCEEDINGS OF THE **INTERNATIONAL CONFERENCE ON** **VALUE ENGINEERING AND MANAGEMENT**

The Hong Kong Polytechnic University, Hong Kong
6th-7th December 2012

“Innovation in the Value Methodology”

Conference Organisers



INTERNATIONAL CONFERENCE ON VALUE ENGINEERING AND MANAGEMENT

“Innovation in Value Methodology”

6th – 7th December 2012
The Hong Kong Polytechnic University
Hong Kong

CONFERENCE PROCEEDINGS

Organised by
The Hong Kong Polytechnic University
Zhejiang University
Hong Kong Institute of Value Management
China Society of Value Engineering

EDITORIAL BOARD

Prof. Geoffrey Q.P. SHEN

The Hong Kong Polytechnic University, HKSAR

Prof. Qingguo MA

Zhejiang University, China

Dr. Jacky K.H. CHUNG

The Hong Kong Polytechnic University, HKSAR

Dr. Ann T.W. YU

The Hong Kong Polytechnic University, HKSAR

Dr. Maggie L.Y.N. TANG

The Hong Kong Polytechnic University, HKSAR

Mr. Zuhaili M. RAMLY

The Hong Kong Polytechnic University, HKSAR

DISCLAIMER

All contents included on this booklet, including text, graphics, logos, button icons, images, photos are the properties of the conference organisers or its content suppliers and protected by Hong Kong and international copyright laws. No part of this booklet may be reproduced in any form without prior written consent from the copyright owner. Commercial use or publication of any contents in this booklet is strictly prohibited without prior authorization from the conference organisers. Some text, graphics, logos, images, photos are published on the documentation in this booklet with the permission of the relevant copyright owners, other than the conference organisers.

For inquiries regarding copyright permissions please contact:

*The Department of Building and Real Estate,
The Hong Kong Polytechnic University,
Hung Hom, Kowloon, Hong Kong SAR.*

Tel: (852) 2766 5807, Fax: (852) 2764 5131.

Website: www.vmconference.org

Email: info@hkivmconference.org / tyln.tang@connect.polyu.hk

All rights reserved. Copyright © 2012

Value Management in Malaysia: Past, Present and Future

Zuhaili MOHAMAD RAMLY¹ Geoffrey Qiping SHEN²

Abstract: Value management (VM) encapsulate the other related terms such as value planning, value engineering, value analysis, and value review where it was used interchangeably. The introduction of VM can play vital roles as a specific management tool in putting together the problems encountered in the construction industry from the technical, managerial, and also human aspects. VM has been brought into the construction industry since 1960s to attain the best value for money. However, the level of acceptance, development and to what extent the applications are varies throughout the world. Particularly in Malaysia, VM was introduced since 1986 but the take up is relatively low by various stakeholders due to several reasons. Since it was introduced, not so much development in term of applications until recently, VM seems to be a new phenomenon within the Malaysia construction industry (MCI) when the government instructed mandatory applications for the public projects. With limited explicit, tacit and embedded knowledge, expertise, and experience, the VM applications seen to be received various feedback, which is yet to be discovered.

This paper reviews relevant works on the development and applications of VM within the MCI. To achieve this, a thorough literature review and document analysis has been conducted on journal articles, conference papers, government circulars and guidelines, supported by an informal discussion with stakeholders in Malaysia. It reviews and synthesises the relevant and critical information and highlights major milestones to provide clear and better understanding of VM development in the past, current, and future applications. The future of its applications focuses more on the initiatives to promote the applications of VM. Several issues such as the awareness, knowledge, training, certification, procurement and focus toward to place VM ahead in the future are also discussed. The work described in this paper provides a sound foundation for the author to understand and explore further. This is part of the ongoing doctoral research which focuses on performance management of the VM studies based on the international practices.

Keywords: Value Management, Applications, Development

1. INTRODUCTION

Malaysia economic records have been one of Asia's best grew since independence in 1957 to date with multispectral economy based on services and manufacturing. Malaysian construction industry (MCI) is among the sectors which received a lot of demand due to the primary concern to fulfil the needs and inadequacy of infrastructures. It considered being a prime productive sector among the top three, other than manufacturing and agriculture (Abdul Razak *et al.*, 2010). Despite small contribution to GDP, the MCI is crucial due to its role as a leading indicator and determinant of domestic performance by providing the physical infrastructure for industrial production and reproduction.

Moving into the globalisation era, recognition and promotion of new a method and approaches are required to improve the image of the industry. Aspects of construction practices, management, and technology must be enhanced and upgraded to meet the exacting standard. At this juncture, it is clear that fundamental changes are now needed in order for the MCI to achieve greater efficiency and address the overarching challenges and demands. Moreover, clients nowadays concern on value matters to achieve the best from their investments.

This paper aims to reviews the development and applications of value management (VM) in Malaysia. Critical information and major milestones are discuss to provide clear and better understanding of VM in the past, current and future direction.

2. VALUE MANAGEMENT: HISTORY AND DEVELOPMENT

VM become a blanket term and encapsulate the other associated terms such as value planning, value engineering, value analysis, and value review, where it was used interchangeably. For the sake of simplicity, the term VM will be used in this paper.

Lawrence D. Miles was first introduced VM then as value analysis (VA) in 1942, when he was assigned to look into the problem of materials shortage during the Second World War. Miles analysed the primary function of a product by examined several alternatives to perform the same function without compromising the quality aspect. After 1970s, it is getting more famous and adopted in various countries from different continent such as in Europe, Australia, Japan, and India as the term value engineering (VE). However, it is not well embraced in the Southeast Asian (SEA) even though it was in Australia (1970) and Hong Kong (1988) (Yu, 2006).

VM was applied in construction industry by Dell'Isola in 1960s. This is relevant to in response to several issues and constraint faced by the construction industry, and also the world economic in general. This has pushed the client to ensure that their project can be completed within the agreed budget and duration, at the acceptable quality in term of the specifications and workmanship (Fong and Shen, 2000). Hence, VM provides the basis for improving value for money in construction to satisfy clients' needs and requirements (Jaapar & Torrence, 2009).

Although many definitions used to describe the nature of this subject matter, the basic premise of it which mainly serves to improve value without sacrificing intended purpose still underpins as it was introduced. After so many years adopted in various industry, it is good to see how VM developed and remain competitive. With the continuous supports and applications from the industry and also research activities conducted, it can be seen that VM will remain relevant and bring benefits in various areas. For instance, the development of Group Decision Support System (GDSS) (Fan *et al.*, 2010) to support the VM workshop is timely to

1 PhD Student, Department of Building and Real Estate, The Hong Kong Polytechnic University, Hung Hom, Kowloon, HKSAR PH (+852) 2766 5876 ; Email: 11901329r@connect.polyu.hk

2 Chair Professor, Department of Building and Real Estate, The Hong Kong Polytechnic University, Hung Hom, Kowloon, HKSAR. Email: bsqpshe@inet.polyu.edu.hk

improve the decision making process compared to the traditional workshop.

3. VALUE MANAGEMENT IN MALAYSIA

It is claimed that, Professor Roy Barton of Australia was first introduced VM in Universiti Teknologi Malaysia (UTM) in 1986. Since then, it slowly progress with efforts to promote these new applications to organisations such as Ministry of Defence and PETRONAS (Che Mat, 2010). In order to further introduce and increase the awareness towards VM, national seminar on VM was successfully organised in 1999, followed by awareness road tour to several capital cities in Malaysia.

After more than 20 years being introduced, Jaapar and Torrence (2009) conducted survey and found that 78% of the respondents have knowledge about VM. However, only 16% of respondents having a good understanding on VM after attended the training. In term of the VM workshop conducted, most of it occurred within the project cost range of RM11-50m which last for three days and mainly facilitated by internal facilitator. The workshop was conducted at the outline proposal stage of the project development cycle.

A number of organization claimed that they have applied VM before, but it did not sustain long due to the failure of the VM workshop to achieve the objectives. This reason explain why the take up of VM practices in Malaysia has not been large. However, the conclusion made without proper assessment whether the VM was conducted by means of proper VM methodology to assess the performance. According to Shen (1997), it is extremely often people claimed they have applied VM, but what they did was mere a cost cutting. VM puts more focus to both cost and function (including performance), while cost cutting is more toward reducing the cost through taken out part of the scope of the project or function and reducing performance of specific item.

Nevertheless, there are several success implementations of VM in Malaysia. According to Che Mat (2010), VM has proof not only reducing the cost, but also by improving the effectiveness of design, improving the return of investment (ROI), and identifying areas for improvement for the whole project. For instance, Malaysia Airport Holding Berhad (MAHB) wholly adopts VM in the organisation since 1994 for project above RM 300,000.00. The applications is not limited to the new project, but extended to the facilities management and procurement chain. While Tenaga Nasional Berhad (TNB), adopted VM to their projects and procurement amounting RM10 million and above. Both organisations claimed to achieve cost optimization in their business activities.

In order to strengthen the efforts of disseminating and promoting VM locally, the Institute of Value Management Malaysia (IVMM) was established in May 2000. The establishment of the institute is among others aimed to promote the value culture and to create a widespread awareness of VM in Malaysia. Since then, the institution conducted a series of professional training, conference and publishes material for references (<http://www.ivmm.org.my>).

Despite the continuous efforts to further promoting VM applications, the take up by the industry at whole are still low. Jaapar *et al.* (2009) did highlight some of the barriers of further applications of VM within Malaysia scenario. Knowledge and practice found to be the major issues. In addition, the mentality and perceptions which resistance to change by the parties need serious attention. This is consistent with previous findings by Hogg (1999) that the main reason for low take up into VM by clients would be low awareness level of VM.

Having said that, MCI professional recognise VM and foreseen that VM will be gaining support and interest in near future. Jaapar *et al.* (2009) concluded that there is a positive future for VM in which the construction professionals were keen to adopt

VM in their future projects. However, this is much subject to the strong support from the top management, as top management support and commitment is critical not only for applying the VM, but to what extent of ensuring the continuity of VM in a particular organisation Fong *et al.* (2001).

As highlighted by Cheah and Ting (2005), government as the policy maker, together with the other construction-related authorities should develop the strategies to promote VM comprehensively. According to Dell'Isola (1975), the obligatoriness of VM by government have made valuable contributions. The same goes to VM development in China in the late 1980s, Navy Bureau of Ship of US in 1954 and Architectural Services Department of Hong Kong in 1996 (Shen, 1997; Yu, 2006).

Table 1: Government policy/instruction in relation to the VM applications

| Country | Year of 1 st Introduced | Government Policy/Instruction | Guideline/Standard |
|-----------|------------------------------------|--|--|
| USA | 1947 | US Congress Bills (1993) | Value Standard & Body of Knowledge (2007) |
| UK | 1960 | HM Treasury Guidance Publication No.54 (1996); and Cabinet Office - Management of Value Initiative (2010) | European Standard – BS EN 12973 : 2000 |
| Australia | 1960s | Australian Capital Territory Associations Incorporation Act (1991); and Total Asset Management System Manual : NSW Government (1993) | Australian Standard – AS 4183 (2007) |
| Hong Kong | 1988 | Work Bureau Technical Circular (1998 and 2002); and The Construction Industry Review Committee (2001) | Nil |
| Malaysia | 1986 | Economic Planning Unit Circular No.3 (2009) of Prime Minister's Department | VM Implementation Guidelines for Public Projects and Programs (2011) |

VM practices are somehow different in term of its approach and to what extent it is emphasizes in different countries (Woodhead, 2000). According to Yu (2006), Roy Barton determined that VE in the US will be applicable in Australia, but subject to some changes where necessary to reflect cultural differences. Similarly in Hong Kong (HK), Fong *et al.* (1998) suggested that VM had a place within the industry, but it needs to be adapted to suit the local practices. For examples, most of the VM workshop in HK conducted within two days because the rental rate for organising the workshop is extremely expensive if it will as 40 hours workshop in the US (Shen, 1997).

Research by Lin and Shen (2005) discovered that lack of national VM standard is among factors of difficulties in applying VM. The existence of the guidelines helps to sustain the superiority in its applications (Fong *et al.*, 2001). Until 2005, Jaapar and Torrence claimed that there is no specific guidelines on VM exist in Malaysia and proposed the VM guidelines to help the MCI to adapt well within the local context in near future (Jaapar *et al.*, 2009).

EPU recently published the VM Implementation Guidelines for Public Projects and Programs in May 2011 as the main reference with regard to the circular issued previously. The guidelines serves as in providing overall concept of VM

applications from Malaysia perspective, the methodologies and techniques, processes and also roles of every participant (EPU, 2011). Other than the first batch of 55 projects undergo VM studies stated previously, it is reported that another series of VM workshop has been carried out for another 99 projects in March 2011, bring a total number of 154 projects that has been conducted prior to the establishment of these guidelines.

Table 2: Comparison of main VM practices

| | US | Australia | Malaysia |
|-----------------------|--|--|--|
| Job Plan | Information, Function Analysis, Creativity, Evaluation, Development Presentation | Information, Analysis, Creativity, Judgement Development | Information, Function Analysis, Creativity, Evaluation, Development Presentation |
| Duration | 40 hours | 8-24 hours | Not specify |
| Stage of applications | Sketch or Detail design | Feasibility or Concept design | VA : Feasibility VE : Design development VR : After project completion |
| Facilitation | Not essential | Essential | Not essential |
| Participants | 5 - 8 | 15 - 30 | 8 - 10 |

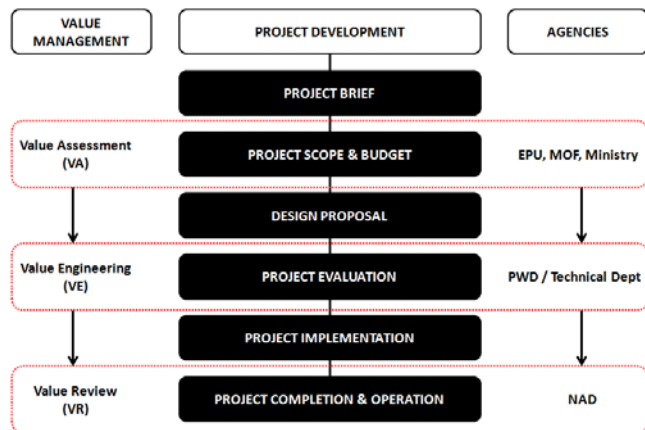


Figure 1: Mapping of VM applications into project development cycle

The approach on VM adopted in Malaysia consisting of three stages; value assessment (VA), value engineering (VE) and value review (VR). These three stages of workshop will be implemented at different stage of project development cycle (EPU, 2011). Hence, it is important to distinguish the type of VM studies as practice worldwide used different terminologies related to it.

4. THE WAY FORWARD AND FUTURE

As quoted by Shen (1997), challenges can always coexist with opportunities. There are many hurdles ahead for VM to flourish in Malaysia from its infancy stage. Hence, it is critical to line up priority actions as experienced of other countries previously embark on VM. Jaapar *et al.* (2005) indicated that the level of awareness are low, the applications are not much and very little experience twithin the industry. Therefore, Jaapar *et al.* (2009) presented the WH (What, Why, How, When, Who, Where, and How much) questions as the roadmap of the value management implementations guidelines.

Table 3: Three stages of VM application in public project in Malaysia

| | Value Assessment (VA) | Value Engineering (VE) | Value Review (VR) |
|----------------|---|--|---|
| Leading Agency | Economic Planning Unit (EPU) | PWD or Technical Department | National Audit Unit (NAD) |
| Objective | To determine projects scope and budget allocation and ensure the objectives of the ministries/agencies with the optimum cost. | To evaluate and finalise design to achieve the determined functions and objectives | To learn and continuously improve the weaknesses and effectiveness for projects in the future |
| Participants | Representative from EPU, MOF & Ministry (Owner/Stakeholder), External VM Facilitator, Design Team, Relevant Expert | Representative from EPU, MOF & Ministry (Owner/Stakeholder), External VM Facilitator, Design Team, Relevant Expert | Representative from NAD, EPU, MOF, ICU, Ministry & End User, External VM Facilitator, Design Team, Owner/Stakeholder, Relevant Expert |

4.1 Knowledge

According to Fong and Shen (2000), knowledge and understanding is favourable for VM to be developed in the future. However, it may not adequate to ensure the correct applications and implementations to maximise the potential benefits of VM. Hence, long-term plan should be established to disseminate the knowledge. The introduction of VM courses in tertiary education is relevant to future graduates (Shen, 1997).

For instance, Universiti Teknologi Malaysia (UTM) offered an elective two credits course on VM to quantity surveying and construction students since 1993 (Che Mat, 2010). The subject aims to equip the future graduates with knowledge on VM applications, particularly in construction industry. However, the delivery method of the course is mainly based on lecture and group assignment. In contrast, City University of Hong Kong (CityU) adopted project-based approach with action-learning method since 2002 (Leung, 2006). The students assigned to play various roles in project team to solve problems for a real construction project as case studies. In addition, the course is equivalent to Module I and recognized by SAVE International. This is a good selling point for the course as future graduates may have an interest to gain extra benefits.

Therefore, it is recommended that the universities in Malaysia should look at the possibility toward developing such courses. On the other hand, there is a need to ensure that the syllabus of the course is relevant to the international practices. IVMM should step in and accredit such courses. It can also be offered at higher degree level where the potential students among those with industrial experiences as conducted in few universities in Hong Kong (Leung, 2006).

On the other perspective, the input of VM that has been introduced in several universities in Malaysia and HK for instance, are limited to students majoring in courses primarily quantity surveying, building surveying, building, and construction (Leung (2006; Che Mat, 2010). According to Fong *et al.* (2001), VM concept is relatively general and can be applied in various nature of industries. It is possible then, to introduce the VM course as an elective that can provide opportunities for those who have interest and intend to specialize into VM in their own field.

4.2 Training

Knowledge serves as the theoretical and practical basis with something which inclusive of the facts, information, descriptions or skills into a particular subject. Jaapar *et al.* in their survey in 2005 found that some of them may have heard about VM before, but only few had a comprehensive knowledge on VM.

Table 4: Formal VM professional training

| Country | Training Program(s) |
|------------------------|--|
| USA - SAVE | Module I : Fundamental concept Module II : VM Application |
| Australia - IVMA | Module I : VM course Module II : Advance VM Facilitation course |
| United Kingdom - IVMUK | VM Foundation course VM Advance course I & II Train the Trainer course |
| Hong Kong - HKIVM | Module I : VM Methodology course Module II : Advance VM course |
| Malaysia - IVMM | Module I : VM Methodology Module II : VM Workshop & Facilitation |

Training and Continuous Professional Development (CPD) is part of the continuous process to enhance the understanding and mastering a particular knowledge. Basic training designed for individual to acquire knowledge and understanding on VM, while professional training designed leading to a particular certification system to be recognised VM practitioner by a particular VM societies.

At the best of authors' knowledge, private organization such as MCM Value and Value Management Academy (VMA) in Malaysia provides extensive courses related to VM applications to feed the increasing demand. This provides a good opportunity for those who seek to have a better understanding of VM applications. To further promote the VM, IVMM may jointly organise the training with the other professionals' bodies and institutions (e.g. Board of Quantity Surveyors Malaysia (BQSM), Institution of Engineer Malaysia (IEM)) as part of their CPD programs. By doing so, it is possibly can increase the awareness and knowledge by narrow down the target to the construction professionals as the strategic action plan.

4.3 Certification

The unique approach of the VM is that the whole process are facilitates by the facilitator. The roles of the facilitator are extremely important to ensure the smooth running and achievement of the workshop objectives. It is a fact that VM facilitator is one of the Critical Success Factors (CSFs) for the workshop implementations (Fong *et al.*, 2001; Shen and Liu, 2003; Lin *et al.*, 2011). The approach of having unqualified and less experience facilitators would lead to unsatisfactory outcomes of the workshop (Jaapar and Torrence, 2009). In addition, the use of internal facilitators should be avoided to alleviate bias and conflict of interest between responsibilities and power.

Hence, the establishment of the certification system is indeed crucial for certifying the competency of the VM facilitators (Shen, 1997; Leung, 2008). This is necessary to ensure that those facilitators are equipped with the necessary knowledge and have ample experience and exposure. Based on the discussion with the advisor of the IVMM, the institution is currently working in hand with the Construction Industry Development Board of Malaysia (CIDB) in developing the certification system of value manager in Malaysia. The framework of the certification has been approved by the council members of IVMM. It is hope that in will be in place very soon.

4.4 Procurement and Incentive clause

Procurement is an important aspect that will influence the practicality of applying VM because such arrangement that is not flexible will not favour VM applications. Fong *et al.* (1998) concluded that it was very challenging to implement VM in HK since conventional procurement are dominant. It is the same situation in Malaysia as at the best authors' knowledge. Conventional arrangement split two major process of pre and post construction in which the contractor is not involved with the design. According to Shen (1997) and Cheah and Ting (2005), the presence of the contractors is vital in improving the buildability of the projects through their experience and expertise.

Meanwhile, flexibility in contract provision is also important factor during the initial selection of procurement methods. Cheah and Ting (2005) added that the more flexible the contractual provision, the higher possibility of engagement into VM. To start with, the policy makers need to consider the possibility of incorporating the VM incentives clauses into the standard condition of contract. Reasonable incentives also can be offered to various stakeholders involved to motivate them. Since the private sector may opt to avoid this by considering the risk and profit issues, the Government then can take the lead to propose the VM incentive clause within the provision of the public contract.

4.5 Research and Development (R&D)

Research and Development (R&D) is one of the significant areas to be explored. The exploration will give an opportunity to do better, gain more benefit from it (Fong *et al.*, 2001) and lead Malaysia on forecasting trend in the future. There are areas that can be improved and it is good to learn from other developed countries which had a long time ago apply VM. For examples, there is a strong debate on whether the VM is standalone knowledge or it is just another branch of management aspect (Fong, 2004).

However, it is important to ensure that the gap between academic research carried out and applications is at minimum level. This is to avoid the rejection by the potential applications in the future. To deal with, joint-research between the academics and industry players sound to be more practical in approaching research in VM area (Shen, 1997). Malaysia should consider adopting and exploiting previous research findings overseas, and see how it can be implemented in local scenario and perspective.

4.6 Professional Institution

Most of the professional in Malaysia govern by the statutory regulation to invigilate the overall aspect of the profession. Since VM is not widely recognise as a profession (Fong, 2004), IVMM was established to play the same roles in embracing VM in Malaysia. With an increasing VM community, it is the time for IVMM to set blue print strategies to continuously promote VM. Among other areas that need to be focused are welcoming more membership and increase the awareness via organizing seminar, conference and learning workshop (Shen, 1997). The best possible way is to jointly organise such activities with the other professional institutions as discussed before. This includes collaboration with the other VM societies from different regions.

At present, the institution is suggested focusing on the following matters to further transform VM into developed stage in Malaysia.

4.6.1 Standard / Guidelines

Standard and guidelines will drive to a consensus effect of a particular process. From the academic research point of view, Jaapar and Torrence (2009) have proposed the VM implementation guidelines. EPU on the other hand published the guidelines for the

implementations in public projects. While, MAHB also have their own guidelines to be used in their business activities towards optimising value (<http://www.malaysiaairports.com.my>).

The existing guidelines only used for public projects and MAHB respectively, and it needs to be reviewed from time to time based on the effectiveness of the applications in previous workshop. A special working group may possibly establish to study and proposed the common standard based on the core VM methodology. A detail and specific guidelines might be further scrutinized to suit specific need based on the nature of the industry.

4.6.2 Publication, Promotion and Marketing

Institutional publication is one of the medium to spread knowledge and related information. Comprehensive and interesting contents are necessary to be provided to gain interest of the reader. IVMUK published the "Value News" as their monthly publication. This similar as the "Value World" by SAVE, "The Value Times" by IVMA, and "The Value Manager" by HKIVM. While the web contents should be updated and maintained from time to time. It can serve as a "one-stop" data centre to obtain information related to VM, its application, activities, and related project. Both publication and website will put the light toward the profession and embrace a good image to the public.

Promotional and marketing activities are amongst the best approach to disseminate knowledge and increase the awareness on VM. Fong and Shen (2000) further stressed that it is crucial and indispensable. Various channels can be used to achieve this such as the internet web based. And again, collaboration with other professional institutions and approaching the government department and agencies are the quickest way to achieve the target and potential users.

4.6.3 Conference and Seminar

Conference and seminar are among the common approach for knowledge sharing. According to IVMM advisor, there are several conferences held in the past. However, it is required more and more nowadays since the current situation is demanding. In later years, it is good to see that the private entities also would gain interest and can see how VM can help them in achieving better value of their investments, not particularly in construction, but also some other industries.

On the other perspective, Cheah and Ting (2005) suggested the development of precedence database to track the success and failures of VM applications. This is possible in Malaysia where the IVMM may collaborate with CIDB. The mechanism is there as all construction projects in Malaysia should be registered with CIDB after the award. Through this channel, information on the VM applications on a particular project can be determined.

5. CONCLUSION

There is no doubt that VM studies solely cannot guarantee successful outcomes to the project (Simister & Green, 1997). Constructions projects are inherently uncertain process and variables, despite that there is no project that is totally similar in nature. The success of construction projects depends on various critical factors from the project management actions, project-related, project procedure and external environment perspectives (Chan and Chan, 2004).

This paper reveals the summary of available literature on VM applications in the past, the current state of applications and also the future of VM applications in Malaysia. It is derived from an ongoing research which aims to develop a framework for performance management of VM studies in construction. Among others, the objectives of the research are to measure and evaluate

the performance of VM studies for public projects in Malaysia. The findings will be part of the framework to manage the performances in attaining the maximum potential benefits of VM. It is expected that the overall findings of this research would give a clear and better understanding towards VM studies and its performance in contributing to the successful implementation of construction projects.

6. ACKNOWLEDGEMENT

The authors would like to thank the Government of Malaysia and Universiti Teknologi Malaysia (UTM) for the scholarship granted for this PhD study.

References

- Abdul Razak Ibrahim, Roy, M.H., Ahmed, Z. and Imtiaz, G. (2010) An investigation of the status of the Malaysian construction industry. *Benchmarking: An International Journal*, Vol. 17, No.2, pp 294-308.
- AS/NZS 4183. (1994) *Value Management Standards Australia and Standards New Zealand, Australia and New Zealand* (available online www.value-management.com.au/ [accessed on 03/10/2011])
- BS EN 12973. (2000) *Value Management*. British Standards Institution (available online www.ivm.org.uk [accessed on 03/10/2011])
- Chan, A.P.C. and Chan, A.P.L. (2004) Key performance indicators for measuring construction success. *Benchmarking: An International Journal*, Vol.11, No.2, pp 203-221.
- Che Mat, M.M. (2010) *Value Management - The Way Forward. National Seminar Achieving Better Value in Construction Industry through Value Management and Life Cycle Costing, Putrajaya*
- Cheah, C.Y.J. and Ting, S.K. (2005) Appraisal of value engineering in construction in Southeast Asia. *International Journal of Project Management*, Vol.23, pp 151-158.
- Dell'Isola, A.J. (1975) *Value Engineering in Construction Industry* New York: Van Nostrand Reinhold
- Economic Planning Unit. (2010) *10th Malaysia Plan* Putrajaya: Prime Minister's Department
- Economic Planning Unit. (2011) *Garis Panduan Perancangan dan Penyediaan Program dan Projek Pembangunan* Putrajaya: Prime Minister's Department
- Economic Planning Unit. (2011) *Panduan Perlaksanaan Pengurusan Nilai Dalam Program/Projek Kerajaan* Putrajaya: Prime Minister's Department
- Fan, S.C., Shen, Q.P. and Luo, X. (2010) Group decision support systems in value management. *Construction Management and Economics*, Vol.28, No.8, pp 827-838.
- Fong, P.S. (2004) A critical appraisal of recent advances and future directions in value management. *European Journal of Engineering Education*, Vol.29, No.3, pp 377-388.
- Fong, P.S., Shen, Q.P., and Eddie, W.L.C. (2001) A framework for benchmarking the value management process. *Benchmarking: An International Journal*, Vol.8, No.4, pp 306-316.
- Fong, P.S., Shen, Q.P., Chiu, W.E and Ho, M.F.C. (1998) *Applications of value management in the construction industry in Hong Kong*. Hong Kong: The Hong Kong Polytechnic University
- Fong, P.S.W. and Shen, Q.P. (2000) Is the Hong Kong construction industry ready for value management. *International Journal of Project Management*, Vol.18, pp 317-326.
- Hogg, K. (1999) Value management: A failing opportunity? *Construction, Building and real Estate Research (COBRA) Conference, United Kingdom*, pp 133-140.

- Hong Kong Institute of Value Management. (2011) (available online www.hkivm.com.hk [accessed on 03/10/2011])
- Institute of Value Management Malaysia. (2011) (available online www.ivmm.org/v1 [accessed on 23/10/2011])
- Institute of Value Management Malaysia. (2011) *Value Methodology Standard*. (available online www.value-eng.org/ [accessed on 03/10/2011])
- Jaapar, A., and Torrence, J.V. (2009) Contribution of value management to the Malaysian construction industry: A new insight. *Proceeding of the International Conference of Construction Industry, West Sumatera*, pp 1-9.
- Jaapar, A., Endut, I.R., Ahmad Bari, N.A. and Takim, R. (2009). The impact of value management implementation in Malaysia. *Journal of Sustainable Development*, Vol.2, No.2, pp 210-219.
- Jaapar, A., Torrence, J.V., and Yusuf, F. (2005) A proposed value management framework for the Malaysian construction industry: A qualitative and quantitative investigation. *Proceeding of the International Conference on Construction and Real Estate Management, Penang*, pp 1-6.
- Leung, M. (2006) Why offer VM at universities? The Hong Kong experience. *Value World*, Vol.29, No.1, pp 20-24.
- Leung, M. (2008) Improving value management practice in Hong Kong via International value management study process and qualification system. *Survey Report of City University of Hong Kong*, pp 1-8.
- Lin, G. and Shen, Q.P. (2005) Value management in China: Current state and future prospect." *Management Decision*, Vol.43, No.4, pp 603-610.
- Lin, G., Shen, G.Q.P., Sun, M. and Kelly, J. (2011) Identification of Key Performance Indicators for measuring the performance of value management studies in construction. *Journal of Construction Engineering and Management*, Vol.137, No.9, pp 698-706.
- Malaysia Airport Holding Berhad. (2011) *Value Management Manual*. (available online www.malaysiaairport.com.my/ [accessed on 17/10/2011])
- SAVE International. (2011) *Value Methodology Standard*. (available online www.value-eng.org/ [accessed on 03/10/2011])
- Shen, Q.P. (1997) Value management in Hong Kong's construction industry: Lesson learned. *SAVE International Conference Proceeding, Hong Kong*, pp 260-265.
- Shen, Q.P. and Liu, G. (2003) Critical success factors for value management studies in construction. *Journal of Construction Engineering and Management*, Vol.129, No.5, pp 485-491.
- Simister, S.J. and Green, S.D. (1997) Recurring themes in value management practice. *Engineering, Construction and Architectural Management*, Vol.4, No.2, pp 113-125.
- Woodhead, R.M. (2000) Investigation of the early stage of project formulation. *Facilities*, Vol.18, No.13, pp 524-535.
- Yu, A.T.W. (2006) *A Value Management Framework for Systematic Identification and precise Representation of Client Briefing in the Briefing Process*. Doctoral dissertation, Hong Kong Polytechnic University.