ISSN 1029-0982 Vol. 11 No. 2, 2005

THE VALUE MANAGER

The official publication of The Hong Kong Institute of Value Management

THE HONG KONG INSTITUTE OF VALUE MANAGEMENT

THE VALUE MANAGER

Editor: Prof. Geoffrey Q.P. SHEN, PhD
Assistant Editor: Mr. Jacky K.H. CHUNG

The Hong Kong Institute of Value Management, P.O. Box No. 1358, G.P.O., Hong Kong.
Tel: (852) 2766 5817, Fax: (852) 2764 5131, URL: http://www.hkivm.com.hk

COUNCIL MEMBERS OF THE HONG KONG INSTITUTE OF VALUE MANAGEMENT (HKIVM)

AIMS AND OBJECTIVES OF THE HKIVM

- To create an awareness in the community of the benefits to be derived from the application of Value Management in Hong Kong.
- To encourage the use of the Value Management process by sponsors.
- To establish and maintain standards of Value Management practice in Hong Kong.
- To contribute to the dissemination of the knowledge and skills of Value Management.
- To establish an identity for the Institute within Hong Kong and overseas.
- To encourage research and development of Value Management with particular emphasis on developing new applications of the process.
- To encourage and assist in the education of individuals and organisations in Value Management.
- To establish and maintain a Code of Conduct for Value Management practitioners in Hong Kong.
- To attract membership of the Institute to support these objectives.

TABLE OF CONTENTS

EDITORIAL

Welcome to the 2nd issue of The Value Manager. I believe most of you are planning for holidays in the summer, may I take this opportunity to wish every one of you a wonderful holiday. Before you embark your journey, you may just have a little time to have a glance of what we have arranged for you in this issue of the journal. The first paper written by Daddow and Skitmore introduces the results of an interview survey involving 17 professionals working in the property and construction industry, mainly from Australia, concerning their actual experiences and observations of the VM process and outcomes. It reveals that VM is certainly popular among those with experience in its use, but with an average 33% acceptance of the VM workshops. The second paper written by Lim et al. introduce the Seoul Toll Plaza project, recently value analyzed by four VE teams within a VE Module I training course, which demonstrates how value management helps save time, money and increase functional performance The third paper written by Gough provides a case of relocating a historic 95-tonne brick school building by public roads, which is achieved by using facilitated value management techniques with key stakeholders to establish required outcomes and identify the best value way of achieving them. VM principles were used with powerful effect to fast track an achievement that was thought by experts to be impossible. For those who did not have the chance to attend our 7th conference, please look at Dr. Woodhead's personal reflection of the conference. Of course, we have arranged a few photos of the precious moments at the conference. Enjoy!

Geoffrey Shen

Editor, The Value Manager

VALUE MANAGEMENT IN PRACTICE: AN INTERVIEW SURVEY

Therese Daddow and Martin Skitmore
Queensland University of` Technology, Australia

ABSTRACT

The results of an interview survey are provided involving 17 professionals working in the property and construction industry, mainly from Australia, concerning their actual experiences and observations of the Value Management (VM) process and outcomes. The main finding is that VM is popular among those with experience in its use, with an average 33% acceptance of the VM workshop - its use having extended even into the area of consultant selection. Much of the interviewees' experiences are related qualitatively in terms of VM contribution to the identification and management of the risks involved in project delivery.

INTRODUCTION

In a recent Australian survey (Clark, 2000:9), 43% of industry respondents stated that contracts are commonly awarded according to the lowest up-front cost, rather than value for money – indicating a surprisingly low VM uptake in view of the potential benefits claimed. One suggestion for this is that the positive effects of VM need to be better 'sold' to the industry (Martin, 1997). Another is that the current allocation of resources by management, and the selection and training of the VM team, may not necessarily provide all the requirements necessary for successful VM.

Particular human barriers that impact on VM concern change and embracing innovation (Covey, 1989) together with the stigma attached to VM as being mainly a cost cutting exercise and an engineering derived concept (Adam, 1993; Systematic Analytic Methods and Innovations, 2001).

A major concern is the cost of the VM workshop, which has been estimated at approximately 0.3% to 0.5% of the project value including briefing, workshop and debriefing, with the target value of identified savings being approximately 1% to 5% of the project value (Dobrow et al, 1978). Another suggestion for the lack of VM take up is the endemic aversion to change in the construction industry, while yet another possibility is the client/owners' lack of support of, and integration into, the VM team (Fowler, 1990) and the clarity of their objectives. In addition, as with other such systems, ongoing audits and reviews of the practice of VM are recommended to be undertaken throughout the procurement of projects (Martin, 1998). If this is not done, it is unlikely that needed improvements of resources and the processes will be made that may impact on benefits that can be attained through VM.

From this point of departure, therefore, the research started. In particular, we asked questions relating to the current perceived inadequacies of VM - the attitudes and competencies needed of the participants and problems encountered – so that possible improvements may be identified for future development in practice.

Preliminary discussions were held with staff members in the Brisbane and Sydney offices of a major international property and construction company and staff of the same company in the USA concerning various aspects of VM in their different businesses and environments. This resulted in a set of survey questions oriented around the topics of time well spent, usefulness of the VM workshop, etc.

The interview survey itself involved a total of 17 professionals from a variety of organisations, including VM practitioners, project managers, developers, engineers, town planners, interior designers, services consultants and quantity surveyors. Though an outline of the questions was developed for the interviews, the details evolved as the number of interviews progressed.

FINDINGS

Usage

The interviewees indicated an average 33% acceptance of the VM workshop and its purpose and impact on projects. This seemingly low average is a result of the influences and

disciplines that the interviewees brought to their interviews (i.e.: the lowest acceptance was 2 % whilst the highest was 100%). One interviewee stating that Australian consultants compare well internationally in the use of VM - being reasonably focused on VM as a result of their general business practices. Another interviewee mentioned that, in order to better manage stakeholders, his organisation finds it useful to identify direct and indirect stakeholders – these being the organisation's staff and customers and the general public respectively.

In addition to achieving better value for the same money, several interviewees commented that VM decisions sometimes resulted in additional initial costs in order to achieve longer term benefits. For example, it was mentioned that for a project in Houston, USA, the quantity surveyor ascertained that including an additional $625,000 in the budget estimate to move a pool deck to another floor would allow a number of additional rooms to be constructed. This had the effect of releasing more usable floor area, which would generate sufficient future income over the life of the project to make the initial $625,000 capital outlay seem insignificant.

One interviewee's organisation also uses VM in appointing their design consultants. Instead of taking the lowest consultancy tender, they use a scoring system that takes into account methodology, cost, technical capabilities, expertise and the nominated project team - the consultant closest to the average score being the one that is selected.

The VM team

Team Attributes

A frequent assertion in the VM literature is the need for a shared commitment to achieving the project objectives. Interviewees considered the attributes needed for a successful VM workshop to be:

- A belief that there is always a better way;
- A desire to continuously and constructively challenge normal expectations;
- A co-operative approach;
- A willingness to break down barriers;
- An ability to generate enthusiasm and maintain a positive orientation;
- A readiness to seek help and advice, and reciprocate where appropriate;
- The existence of common goals;
- A good knowledge of the construction industry;
- A knowledge of the specific technical area under consideration;
- The maintenance of individual self-esteem;
- Open and free communication;
- Sufficient experience and expertise;
- A desire to achieve a quality outcome;
- A need to take ownership of the VM workshop outcome;
- A combination of professionals from different disciplines;
- Sufficient client participation and their knowledge of design, fitout and costings; and
- The presence of a team leader or facilitator to steer the VM workshop.

In respect of the need for open communication, one interviewee pointed out that, although his organisation was highly hierarchically structured, this was diluted during the VM workshop due to the input from external stakeholders and the requirements of the VM team.

Similarly, other interviewees acknowledged that care must be taken to avoid being offensive when giving feedback in the workshop. A particular example was given of an architect dictating a design without taking into account the needs of other stakeholders. As one interviewee stated, this can be compounded when sub-consultants are absent from meetings or just not engaged until later in the process. In general, however, architects do seem to appreciate the feedback provided by the VM team and the value that it will bring to the completed project.

Another interviewee also mentioned the capacity of some service consultants to represent a range of services - fire, electrical,

hydraulic and mechanical services for example – which has the practical advantage of allowing individual service consultants to attend design meetings on behalf of the services design team, thus maximising the efficiency of their service.

Personal Skill Attributes

The following ideal skills required of those participating in VM workshops were identified:

- Lateral thinking ability and intuition;
- An inquiring mind;
- Industry expertise;
- Life experiences;
- A positive, constructive approach;
- Knowledge of the client/owner requirements;
- Motivated and enthusiastic;
- Proactive;
- Attentive;
- Smart thinking;
- Having an open mind and an objective approach to communication;
- Having personal skills;
- No preconceived ideas;
- Able to bring expertise to the VM workshop;
- Ability to communicate ideas confidently and professionally;
- Confidence;
- Understanding that what people may say, may not be quite what they mean, so they need to be able to interpret and 'read between the lines';
- Recognise reactions whether verbal or physical;
- Able to listen to other ideas and relate to others; and
- Be adaptable and flexible.

It was also observed that people involved in successful VM workshops generally have a positive attitude and a desire to contribute to a successful project. They further develop an attitude that seeks to achieve a better project when placed in a focused team. In parallel, client/owners that have been involved with VM, tend to value the experience and the resultant effect not only on the project but within the project team itself.

Extent of use of VM

For one interviewee, VM is a part of the design synthesis within his organisation's Systems Management – the analysis of customer or user requirements – the synthesis being achieved by developing the design into a workable plan through the use of integrated, multi-disciplinary, product teams. These would generally comprise technicians through to LCC experts, engineers, project managers and management.

The same interviewee said that, in some instances, client/owners will forgo potential additional benefits because of the extra associated recurring costs involved and their subsequent influence on LCC. Also, occasional 'all-or-nothing' situations occur, when even partial benefits are not regarded as acceptable, irrespective of their costs.

Another interviewee, on the other hand, noted that the formal use of VM is not undertaken purely on the basis of the project's value, but on the consultant's fee value. In this case, VM workshop attendance could be justified only if this fee was sufficiently large. Though seemingly similar to project value as a criterion for the use of VM (consultant fees being usually proportional to project value), the calculation of the fee together with the level of enthusiasm for VM in general, differs between companies – making the two approaches significantly distinct.

A further interviewee related the case of a client, having witnessed the benefits of a VM workshop, targeting a 15% savings level for his own project – which was duly achieved!

The interviewees also reflected on the reasons that client/owners choose to use VM:

1. A commercial company interface where the company has an interest in VM.
2. To maximise the use of available funding in achieving operational requirements.
3. To deliver the best project possible.
4. To obtain a design that supports their corporate culture.
5. Better cohesion within the VM team.

6. Outsourcing responsibilities to privately owned companies.
7. Advances in technology.
8. Change in the end users requirements.
9. Alterations initiated through audits of VM implemented ideas.
10. Mandatory for specific capital works projects.

In contrast, identified reasons for which client/owners choose not to use VM are:

1. They have already experienced VM and it was not a good experience or it did not meet their expectations;
2. Client/owners believe they know exactly what they want in their project;
3. Lack of education on project delivery;
4. Lack of education on VM, its process and benefits;
5. Unwilling to give the time or pay for VM;
6. The client/owners are already paying for the best services of a project manager, quantity surveyor and other project consultants, so there is no need to pay any more for VM; and
7. Perception that VM will not deliver any further benefits as the same consultants are involved.

VM as a Risk Management tool

In the absence of VM or RM, project risks are seldom made explicit or considered formally and the project team have little opportunity to manage them effectively. For example, as one interviewee pointed out, if a project is to be constructed upon highly reactive soil that will provide stresses to the end structure, the design consultants would invariably consider it unacceptable to risk minor damages to internal finishes even if structural integrity is maintained. Given the choice, though, the client/owners may well accept this aesthetic risk if 1-2% of the cost of the foundations could be saved. Similarly, another interviewee observed that long term owners who want very little maintenance over the next 10-15 years are, if given the option, usually prepared to pay for the up-front costs involved in achieving this.

For all the interviewees, their primary concern underlying VM practice is in the risks involved. Some companies undertake 'trouble shooting' forums where feedback and observations on projects are shared with other colleagues. This not only provides progressive updates to the company on how projects have been successfully designed, but also focuses on the problems that occurred, the risks involved, and how they may be mitigated in future projects.

The interviewees agreed that, in general, it is the management of the three areas of cost, quality and time, and their associated risks, that ultimately determines the success or otherwise of VM and much of what the interviewees considered to be the most salient risks encountered in the practice of VM were provided in these terms.

CONCLUSION

The survey described in this paper identified the actual experiences and observations of a sample of 17 professionals working in the property and construction industry concerning the VM process and outcomes. In doing so, the main finding was that VM is certainly popular among those with experience in its use, but with an average 33% acceptance of the VM workshop. This seemingly low average is a result of the influences and disciplines that the interviewees brought to their interviews (i.e.: the lowest acceptance was 2 % whilst the highest was 100%).

In addition, in attempting to further understand the extent of VM practice, the survey established that the main reason for its cooperative support by consultants was to gain and further their competitive advantage in delivering projects to the client/owner. Conversely, it would appear that the main reason for it not being used is due to client/owners' inadequate knowledge of its potential and application.

The objectives of VM - to deliver the best project with due regard to the risks involved – compliment well with the benefits that client/owners hope to enjoy. In addition, the benefits reflect a 'win-win' scenario for the industry and the stakeholders involved, in emphasising the importance of the micro and macro relationships within the project team, advocating corporate support of the project and promoting change and progression in project delivery. Conversely, the reasons that

client/owners chose not to support VM appear to relate mainly to their reservations concerning VM being a non-mainstream management tool utilising different processes, and the performance of a VM team in not identifying the client/owners expectation initially.

A large part of the research concerned the interviewees' experiences of the risks associated with VM. Situations were identified which in themselves may be used positively within VM by firstly identifying these risks and then how they may be managed. Of course, this would not remove all risks but help in mitigating those remaining, but would also serve as 'lessons learned' for future projects.

Expertise development in VM is clearly an ongoing and tangible process. However, in the words of one of the interviewees, actual training can be viewed as "part heart and part science" – you can teach the latter but the heart component is based upon the diligence of the individual in conjunction with working effectively in a team environment. Of course, the irony of this will not be lost on client/owners who should have every right to expect such diligence and teamship as implicit under the existing fee structure. It is not for the sake of trying, though, that the industry has been unable to match these expectations. VM may yet provide the answer.

REFERENCES

Adam, E. (1993). Value Management: cost reduction strategies for the 1990s. Longman Cheshire Pty Limited, Melbourne, Australia.

Clark, L. (2000). The Need for a new VM Standard in Australia. Institute of Value Management Australia Conference, Queensland, Australia.

Covey, S. R. (1989). The 7 habits of highly effective people. Simon & Schuster, New York, USA.

Dobrow, P. V., Macedo, M. C. and O'Rourke, J. J. (1978). Value Management for construction. John Wiley & Sons Inc, Toronto, Canada.

Fowler, T. C. (1990). Value analysis in design. Van Nostrand Reinhold, New York NY.

Martin, S. J. (1997). What's the difference? SAVE International Proceedings - 1997 Annual Conference, ed. O James Vogl, Illinois, USA. Published and Presented in the Copyrighted 1997 SAVE International Conference Proceedings. Viewed 1 August 2003. http://www.value-analysis.com/whatdif.htm

Martin, S. J. (1998). Constructively measuring value programs effectiveness. Published and Presented in the Copyrighted 1998 SAVE International Conference Proceedings. Viewed 1 August 2003. http://www.value-analysis.com/measurepaper.htm

Systematic Analytic Methods and Innovations (2001). Value analysis results. Last updated at 07/18/2003. Viewed 1 August 2003. http://www.value-analysis.com/samifron.htm

KOREAN VALUE MANAGEMENT EXPERIENCE WITH HIGHWAY CONSTRUCTION

Jong-Kwon Lim
Infrastructure Asset Management Corporation, South Korea

Dr. Min-Jae Lee
Chungnam National University, South Korea

George Hunter, P.E., CVS
Global Management Systems, USA

Sung-il Kim
Infrastructure Asset Management Corporation, South Korea

ABSTRACT

Recent increases in construction costs on Korean public works projects, largely due to change orders caused by poorly elaborated design, become a motivation of applying VE process in Korean construction industry. The Seoul Toll Plaza project, recently value analyzed by four VE teams within a VE Module I training course, demonstrates how value management helps save time, money and increase functional performance. The objective of this project is to upgrade and expand existing pay and ticket booths system on "Kyungboo Express Highway", the main artery for the Korean peninsula linking Seoul to Pusan. The value management study generated several innovate alternatives capable of saving up to 50% of project cost from the baseline project plan.

INTRODUCTION

A government study titled "Strategies for Achieving Efficiency in Public Construction Projects" requires that government agencies utilize value engineering (VE) to improve project performance and reduce life cycle costs on infrastructure projects. The subsequent federal statute, "Management of Construction Technology," required that value engineering be performed on all major projects with a budget of more than USD $40 million and has subsequently been reduced to USD $10 million. This requirement has led the Korean Ministry of Construction and Transportation (KMOCT) to study the best practices and procedures, in order to standardize the implementation of the value engineering methodology into the project development process (planning, design and construction). This effort led to the KMOCT publication, titled the "Manual and Guideline for Value Engineering for Constructed Facilities" and to the development of a "Database for Value Engineering Suggestions" which will allow public/private institutions and agencies to share data. In response to these efforts, construction companies and academic institutions have actively conducted research on value engineering and life cycle cost (LCC) analyses applicable to the design and construction of public works projects.

This study required a case study to be carried out within the Korean construction industry to demonstrate the effectiveness of the VE methodology in saving lowering capital costs and increasing values.

VE METHOD AND PROCESS

The Seoul Toll Plaza Upgrade Project used the methodology developed by George Hunter, in his tenure as the Caltrans VA program manager, to analyze and reduce the traffic delay caused by the toll booth. This methodology, follows the SAVE value methodology with the addition of some unique tools that apply to public works projects. One key distinction is the measurement of the baseline project by the project stakeholder by the definition, weighting and rating of project performance criteria that explicitly measure the project scope and schedule. This "Multi-attribute Decision Making Method" accommodates project attributes that may require trade-offs.

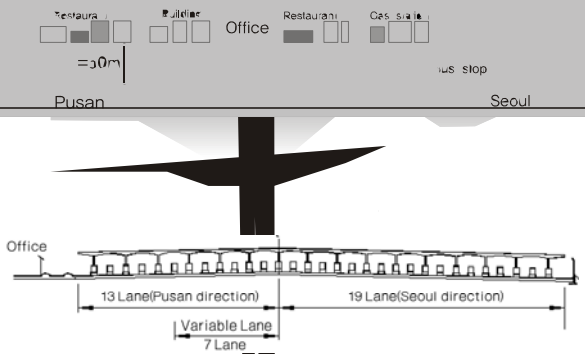


Figure 1: Seoul Toll Plaza Details

Project Performance Criteria

During the information phase the project stakeholders established 7 project performance criteria for this project in order to evaluate the effectiveness of the VE alternatives to be developed. Qualitative and quantitative parameters are used to increase the objectivity in the application. The criteria used are shown below:

- Travel delay (A): The time required to travel through the booth. Defined by the time that driver began slowing down from freeway operating speed to when driver required freeway operating speed.
- Safety (B): No. of accidents and aggregate severity of those accidents per year.
- Operational efficiency (C): Ease of operations of the pay and ticket booths, maintenances.
- Air quality (D): Amount of pollution encountered by the local community due to congestion caused by the toll booth.
- Socioeconomic (E): Farmland and other economic activities with community affected by the toll plaza (businesses, local transportation system, housing, etc).
- Project schedule (F): Time required to deliver the project (improvement in delay to highway user) to the public.
- Constructability (G): Ease of construction. The likelihood of constructing the facility with minimal impacts to the local community, existing transportation systems, highway users. Also, ease of construction for the contractors.

Once the criteria were established, the VE teams applied the Analytic Hierarchy Process (AHP) method to determine weights. Table 1 shows the weights determined by AHP analysis, including "travel delay" and "safety" carrying the highest orders of importance.

Table 1: Weight determination by AHP method

Criteria	A	B	C	D	E	F	G
Weights	26	23	20	8	5	3	15

Performance measurement for original design

Using the established definitions and weights the performance criteria, the current design was measured for project performance. The current design scored 475 performance points, out of a minimum of 100 points and an ideal performance of 1000 points. This will be used as a comparison baseline to alternative values. Table 2 shows the performance evaluation result for the current design.

Table [illegible]: Result of performance evaluation

Crite[illegible]	A	B	C	D	E	F	G	total
Weig[illegible]	26	23	20	8	5	3	15	100
Rati[illegible]	5	4	3	4	6	5	6	33
Perform[illegible]nce	156	92	60	32	30	15	90	475

Functi[illegible]al Analysis

"Redu[illegible] Storage Time" was the basic function identifi[illegible] functio[illegible] and the[illegible] on the [illegible]

Fig[illegible]

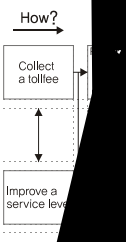


Table 4: Example of combined alternatives

	Combination of Alternatives
Original	Extend From 32 toll booths to 46 toll booths (Pusan direction.: 16, Seoul direction.: 30)
VA Set 4	·S-1 + S-5 + S-7 + S-8 + S-10
VA Set 6	·S-3 + S-5 + S-7 + S-8 + S-10

Comparison of VA sets' performance

After forming the combination of alternatives, the performance of the sets was determined. The VA sets were measured against the criteria and weights established for the baseline project. Table 5 indicates that VA Set provides a 44% improvement and a 19% improvement for VA Set 6 when compared to the current design.

Table 5: Comparison of performance

	Origin	VA Set 4	VA Set 6
Total Performance	449	645	532
% Change	-	+44%	+19%

Comparison of Cost

After the comparison of performance, we need to consider LCC for different ideas. Because of the uncertainties and noisiness of input variables, this study applied Monte Carlo Simulation (MCS) method. From this analysis, we found that VA Set 4 has 12 %, and VA Set 6 has 31 % lower LCC when compared to original plan. So, the result shows VA Set 6 is better in cost. Table 6 shows the comparison of LCC cost between origin and alternatives. Notice that the spread between the original and proposed VA recommendations were narrowed when the maintenance costs were accounted fore.

Table 6: Comparison of LCC (Billion won)

	Original	Alt. 4	Alt. 6
Initial cost	315	242	157
% Change I.C.	-	23%	50%
Maintenance cost	133	151	154
NPV	448	393	311
% Change NPV	-	12%	31%

Comparison of alternative value

Finally, this study compares the values between original plan and alternatives. VA Set 6, based on established performance measurement and cost differences, is identified as the better value choice. Table 7 shows the comparison of values between the original design and the VA alternatives.

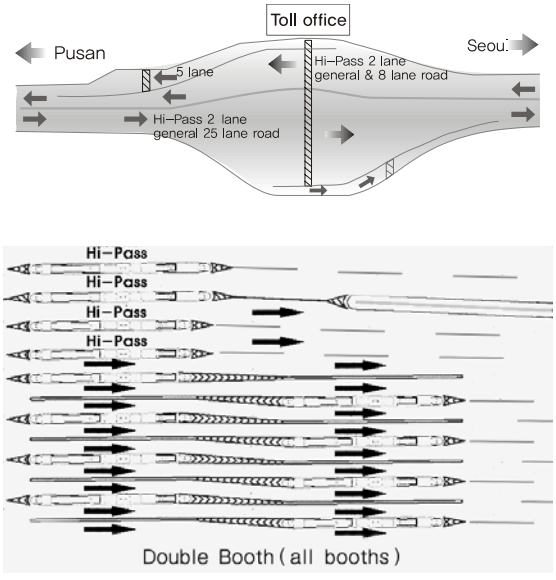
The change in spread between the LCC analyses, indicated in Table 6, and the Value Indices, shown in Table 7, can be explained by the more comprehensive list of attributes accounted for in the performance measurements. This delineates the difference in approach in project analysis using value indices versus life cycle costing. The project performance measurements are well suited for project-decision making in the earlier project development stages to define and measure large variances in project scope and schedule.

Table 7: Comparison of values

	Original	VA Set 4	VA Set 6
Performance	44.9	64.5	53.2
Initial Cost	315	242	157
% Change	-	23%	50%
Value Index (P/C)	0.14	0.27	0.34
Value % Change	-	87%	138%

Figure 3 shows the layout of recommended design for VA Set 6 for upgrading Seoul Toll Plaza project. The solution stresses that projects can be improved by not just removing project costs but by improving performance of the project objectives.

Figure 3: Recommended design



CONCLUSION

The quality and costs of highway and other public work sector projects can benefit by the application of well-elaborated VA methodologies. Specifically the VA methodology provides a sound methodology for analyzing the project objectives and attributes which, in turn, focuses the development of alternatives in the value study. This study applied methodology espoused by George Hunter (Caltrans' VA Methodology) to analyze the project, establish a value baseline and generate competing alternatives.

As a conclusion, the authors found that alternative ideas obtained from VE analysis provided up to 50% of project cost comparing to baseline project plan while significantly increasing the performance of the project functions In conclusion, the authors offer the following suggestions to implement a successful value engineering program in the public works sector:

- VE responsibilities must be clearly delineated within the organization.
- VE guidelines and manuals should be developed, used and maintained.
- VE training should being provided.
- VE specialists and consultants should be utilized.
- Program evaluation and auditing must be provided.

REFERENCE

Caltrans, Value Analysis Team Guide, 2003

Dell'lsolla, A. J., Value Engineering: Practical Application for Design Construction, 1997

Khorramshahgol, R. and Moustakis, V. S, "Delphic Hierarchic Process (DHP): A Methodology for Priority Setting Derived from the Delphi Method and Analytic Hierarchy Process," European Journal of Operational Research, 37, 1988

VALUE MANAGEMENT – ACHIEVING THE IMPOSSIBLE ON TIME

Henry J Gough
Australasian Value Management, Australia

ABSTRACT:

This paper would also be at home at an engineering conference because it uses, as an example, the relocation by public road, of an historic 95 tonne, brick school building. Some of the complex engineering problems are explained but although the achievement was significant from an engineering perspective, its success depended more on the bringing together of enabling resources to produce a team effort. This was achieved using facilitated value management techniques with key stakeholders to quickly establish required outcomes and identify the best value way of achieving them. VM principles were used with powerful effect to fast track an achievement that was thought by experts to be impossible. The paper emphasises the use of value management techniques to bring a wide range of stakeholders and volunteers together to manage a crisis and solve a complex set of problems within an impossibly short time frame. Function analysis, creative thinking, development and selection of options were all important in addressing the need to get it right - the first and only time. The paper deals with a feat of engineering that had never been successfully achieved in Australia or, as far as can be ascertained, in the World. It is concluded the use of value management tools and techniques not only add value but also increase the chances of success for high-risk projects such as this.

INTRODUCTION

Clients rightly expect Value Management (VM) and Value Engineering (VE) to add value and generally expect to get more functionality for the same or less cost. To identify costs and hence savings, a project must have reached an appropriate level of development - usually part way through design development.

However, the absence of reliable cost estimates need not limit the application of VM to achieve significant project benefits.

Important benefits can be achieved through increased communication, commitment to project purpose, team building, reduced rework, getting it right first time and developing risk and crisis management procedures. These and

other benefits of VM are available at any time in the life of a project.

This paper addresses the case of a project that had very high community and stakeholder support but at the 11th hour a lack of key essential resources meant almost certain abandonment. If this were to happen, costs would be expended but the project objective would not be achieved; thus a very poor value outcome would be the result.

In 1987, VM was just emerging as a respected problem solving and value adding method in Australia. Based on facilitated stakeholder participation, function analysis, lateral thinking and innovation, VM seemed an appropriate tool to reaffirm this project's objective and to look for alternative ways of making it happen. VM tools were used to effectively solve problems as they arose, normalise the crisis at hand and turn the project around to be an outstanding success.

Although a small, low cost community project, its success has fostered interest in Australia and around the World.

BACKGROUND

Armadale is a pleasant village community with a population of 54,000 and located approximately 30km south of Perth in Western Australia (WA).

The original Armadale Primary School was built in 1900. The building has double brick cavity walls laid in lime mortar and the roof is framed in West Australian Jarrah timber, as are the floor and floorboards. Construction was typical of the time due to the abundance of these materials; the building is approximately 11m long, 9m wide and 8m high.

Generations of Armadale people had their formative schooling in this building and had developed a strong attachment to the school - the original building symbolised their attachment. In 1987 when a new school was built and the old site sold to allow a new supermarket to be built, a dedicated group of local people took on the commitment to save the old building.

Also to be bulldozed was the old congregational church, which was located opposite the school. The Armadale School and Congregational Church Relocation Trust was formed to save both buildings and have them relocated to Minnawarra Park, which is about 1.5 km away.

Money was raised, sufficient for demolishing the church brick by brick with each component carefully marked so that it could be re-built in an authentic way. However, the process of demolishing the church and preparing it for rebuilding on a new site was time consuming and expensive.

When the time came to consider the school there was insufficient funding to allow it to be relocated in the same way but more importantly there was not enough time. The fallback plan was to try to relocate the building in one piece by using a complex system of jacks to raise it onto a suitable truck but the necessary jacks were not available. Moreover, there was little understanding of the engineering problems to be faced in lifting and transporting a building of this type in one piece.

Demolition of the school was scheduled to take place in just a little over two weeks time so with lack of time, lack of money and no jacks for lifting the building in one piece, a crisis was at hand for the Trust.

Understanding the problem situation

The Trust manager set up a crisis meeting and invited all key stakeholders. Principle of which were the project manager, key supporters in money and other resources, the local authority and the designers of the intended new site and facilities. The Trust manager and other stakeholders explained that there was no time or money to relocate the school building in the same way as the church had been. The meeting heard that consideration had been given to raising the building using a set of jacks so that it could be set down on a truck and transported to its new site; however, the necessary jacks were not available.

The trust had also approached the West Australian State Government for assistance and they sent along a structural engineer who happened to have an interest in VM. He saw the use of VM tools as an appropriate method to determine if an alternative means could be found to deliver the project objective.

As time was about to run out, it was clear that if the building was to be removed from the site and saved, then the only option was to relocate it in one piece. This had been done before with

brick buildings by utilising multiple jacking systems. Generally the building was moved on rails and in a straight line over short distances. This method took time this project did not have since the jacking process and the journey needed to be taken very slowly to avoid damage.

The meeting heard that because the bricks were laid in lime mortar, they were very weak and even small movements could cause significant cracking and probable collapse. If an attempt were to be made to move the building in one piece then it would have to be temporarily strengthened.

Adding to the problems of moving the building without collapse was the knowledge that the walls were not of uniform mass. Both end walls were solid but the side walls were very different. One sidewall had six almost full height windows; the other was solid with a doorway, a chimney and fireplace. Hence, determining the centre of mass for individual elements and the building as a whole required time consuming investigation and calculations.

On the plus side, there was a very high level of commitment to the project from the local community and from key contributors. The enabling resources that had been promised included: heavy-duty transport and earthmoving equipment, materials, cranes, labour and specialised services such as welding.

Analysing the purpose

The key output function was agreed to be "relocate the school building". The "how to do this" in the time available presented the problem to be solved.

It was clear that if the project was to succeed in the time available then the only answer to "how it could be achieved" was: "lift the building in one piece, place it on a vehicle, transport the building by road approximately 1.5km, lift the building off the vehicle and place it onto new foundations at the new site". As far as could be determined there were no previous success stories for relocating brick buildings without the use of jacks and rails – at least in Australia.

It was resolved that the meeting should adjourn overnight so the structural engineer could consider if an alternative way of lifting and transporting the building could be found. All participants were asked to reassess the resources, consider the time available and use their lateral thinking powers to develop ideas that could rescue the project.

It was agreed that if a solution could be found it would likely involve the use of new, unproven methods and therefore entail a level of risk.

Proposals

When the meeting resumed, ideas that may make the project possible were sought from all stakeholders.

The engineer had developed a proposal he felt could allow the building to be successfully relocated in one piece. His method involved the use of four, 50 tonne cranes and a powerful low loader capable of transporting several hundred tonnes along a public road. In addition the engineer proposed several wall strengthening measures and a prestressed steel platform to support the old building as it was lifted off its existing foundations.

For this method to work it would mean that all enabling resources would have to be marshalled to follow a coordinated process, provide their services on time and work to very fine tolerances.

Facilitated problem solving using VM methods would be needed to keep stakeholders focussed and responsive during the two weeks that were available for the work to be carried out.

A timely decision

The stakeholder meeting agreed that the only method likely to succeed in the time available was that proposed by the engineer, i.e. to raise and lower the building by cranes and use a suitable truck to transport it.

All of the required enabling resources were checked for availability and found to be adequate. A program of work and resources was suggested which would be monitored and managed every day by the hour. The structural design effort and the building modifications required by the engineer would become the critical tasks. A risk assessment was also carried out so that potential problems could be highlighted in advance and given special prominence in the work program.

Identified risks included: incorrect assumptions and calculations, inappropriate or inadequate equipment, poor workmanship and event dependent issues such as the lifting process, the

initial movement off site, uneven roadways, unnecessary stresses and general access.

The proposed method was given little chance of success by most engineering authorities and stakeholders acknowledged there was a high risk that the old building could collapse during the lifting and transportation process. Even so, the decision was made that the proposal should proceed.

The engineering problem – simply put

The structural engineer was faced with a complex problem of many dimensions including:

- Brick walls laid in weak lime mortar;
- The mass to be lifted was considerable;
- The building was considered brittle;
- Deflection had to be minimised;
- The mass to be lifted was uneven;

And in addition;

- Lifting the building would impose a different set of stresses and support reactions to those imposed when the building would be set down on the truck and different again to when the building was set down onto new foundations.

The structural solution required the construction of a lifting platform underneath the building. This comprised a grillage of steel beams that were pre-stressed and pre-cambered to become flat precisely as the full load was transferred from the foundations to the cranes.

However, other dynamic and inertia forces would come into play as soon as the building began its journey by road, including starting and stopping and undulations in the road surface.

To support the walls laterally, a light steel frame was constructed inside the building and attached to the supporting steel grillage.

The building was almost three times as wide as the truck that would transport it and so two massive steel beams had to be welded to the truck to provide the right support in the right places to prevent the building collapsing when it was set down on the truck.

To maximise the chances of success the engineer aimed for construction tolerances and deflection of steel supports of less than 1mm.

Preparing for success

The Trust realised that if the project was to succeed then time and accuracy were the essence. Only two weeks were available before bulldozers moved in to clear the site for the new shopping centre.

Almost continuous collaboration occurred between the stakeholders responsible for key milestones. Whiteboard brainstorming and problem solving techniques were used to develop the most effective solution to "roadblocks" or crises.

Crises were overcome by workshopping the issues, with key stakeholders considering emerging risks and choosing solutions that were functionally appropriate and able to be achieved in the time available. Without this continuous sharing of information and resolution of issues the project would not have succeeded.

The team that carried out the modifications met frequently to make sure that critical path items were on schedule. An ongoing update on changes that would affect others was required and compliance with the engineer's design had to be reinforced on an hourly basis, as lack of time did not permit any rework.

Making it happen

Modifications and preparations for the relocation were achieved on time and the engineer gave the go-ahead for the building to be lifted. It was planned to lift it and place it on the truck late one day and move it to the new site early the next day (Sunday) to avoid traffic. The following Monday was the day the site was to be turned over to its new owners.

Before the building could be lifted and moved, stakeholders met to work through the procedure, function by function. New stakeholders had joined the team for the move including the electricity authority and police to clear hazards and facilitate transportation.

Workshopping of the relocation procedure assisted stakeholders to determine what they had to do and how they would achieve it in a way that facilitated the responsibilities of others.

A final risk assessment was made and issues that could impact on the project's success were given special consideration – including the safety of people.

The lifting took place on schedule. Four 50 tonne cranes were brought into position and connected to the lifting rig. As the cranes took up the load, careful attention was paid to the planned crack that would open between the building and its old foundations.

The engineer's calculations were proved correct. The building lifted off at precisely the predicted load and the separating cracks remained even in width as the pre-stressed steel grillage deflected under the increasing load.

The building was raised high enough for the truck to be backed underneath. It was then set down on the truck and secured to wait out the night.

Next morning the truck moved the building to its new site where it was lifted off and placed onto new foundations.

Why VM techniques were important

Prior to VM being employed it appeared the project was doomed to failure. In addition, although the Trust and the local community were committed, expert opinion was divided as to whether a brittle brick building could be relocated successfully in one piece.

For the champions of the project and the Trust, the realisation of these facts presented a crisis.

VM allowed the rapid sharing and analysis of information and assisted stakeholders to sort facts from assumptions.

Function analysis was used in a group situation to reaffirm project objectives and facilitate suggestions for alternative ways of achieving the project's objectives.

VM techniques encouraged ideas and commitment from team members; both for the project and for the work they were responsible for. The latter being extremely important to following trades and to the overall success of the project, as everything had to be right first time.

VM techniques were used to build teamwork and a commitment to solve problems and overcome crises as they arose. In this way it was fundamental to the success of the project.

CONCLUSION

Generally speaking, clients expect VM to add value by saving cost or; by achieving additional functionality at the same cost or; proportionally greater functionality for additional cost.

However, experienced practitioners argue that VM offers greater benefits that cannot readily be assessed in cost terms.

The project outlined in this paper illustrates this view. The problem situation involved a crisis that threatened the viability of the project and no clear way forward could be seen. No amount of money could resolve it in time.

VM provided the necessary methodology and framework for stakeholders and participants to share skills and information and develop a workable solution to the crisis. The success of VM in achieving a very high level of teamwork meant this project was given the best chance of success.

Improved communication, teamwork and getting things right first time benefit all projects. For those where a crisis or new direction requires the use of new untried methods then VM is capable of adding great value to outcomes but the improvement may not easily be expressed in terms of cost.

The project outlined in this paper illustrates a situation where VM methods were used to assist stakeholders to overcome a crisis and made the difference between success and failure. What value would the Armadale community and the project champions put on this outcome?

ACKNOWLEDGEMENTS

- History House Museum, Minewarra Park Armadale Western Australia.
- Mr Jeff Green – Architect

THE 7TH INTERNATIONAL VM CONFERENCE "WHY RE-INVENT THE WHEEL"

Message from the Conference Moderator - Dr Roy Woodhead, Oxford Brookes University, UK

The plane landed after a twelve hour flight from London. I was dreading the queues through passport control and baggage reclaim. I had to meet a friend in two hours and as the plane door opened. I worried I'd not be able to make it on time. Then I discovered why Hong Kong is special. Within twenty minutes I was on the express train to Hong Kong and within an hour having a wash before my friend arrived at the hotel. I even had to wait for him. This super efficiency was not confined to this episode and was experienced in many other adventures during my week here. So the first impression I have of Hong Kong is that it is effective and efficient and is full of adventures whilst also being a very safe place to be; a theory of value seems embedded in the whole concept of Hong Kong and its people.

The conference was planned and carried through with a combination of efficiency and effectiveness of the highest standard. Vaughan Coffee chaired the first day with a friendly and effective manner that put everyone at ease and at the same time brought the focus to the contributions being made. Later in the first day Roy Barton, Stephen Kirk, Martyn Phillips Peter Reid and I helped to bring about Tony Wilson's vision of a facilitated session that encouraged audience participation and interaction. The second day was chaired by Emma Harvey and she brought a professionalism that straddled keeping to time and allowing quality dialogue, whilst also summing key points in order to keep the momentum of the day's sessions going. Backstage the conference organisers also worked very hard and through their hard work a very successful conference was had by all. Congratulations to all who have made this a wonderful conference and I'm told the Hong Kong Institute of Surveyors and City University of Hong Kong should also receive special mention for their active support.

What I liked about the conference was that it was very friendly and there was a willingness to share ideas in the spirit of learning rather than defending position. I have been to quite a few conferences and usually find consultant dominated conferences more about selling services than trying to share ideas and move a whole society forward. Roy Barton's attempt to craft a new version of the old "Value= Function / Cost" formula is a case in point. Roy Barton was listened to and people mulled over his arguments; I'm still mulling them over. The point is that because of a certain attitude or culture, new thinking was aired and that made this gathering alive and current; that's what the cutting edge is about! Hong Kong is a very special place in the world of Value Management because of this environment where new ideas can emerge. Too many conferences have the usual suspects singing different versions of the same songs year in year out. This conference was different. The only way I can explain it is to use the word 'tolerance' but that somehow undermines what I mean. Perhaps the relationships between different cultures means Hong Kong has itself had to accommodate different views? I think here about mainland China, Hong Kong's people, the British and all the other cultures that now reside in this vibrant place. For a Community of Practice that questions 'Value' and tries to both define and achieve it in the context of projects and stakeholders, what better culture to have than one that is more than tolerant and accommodative.

The challenge for VM in Hong Kong is to grow and raise its profile globally. It can do this in a number of ways such as widen its community of interest to include more manufacturers and other industries such as the shipping and container industry. As the old economics built around the ownership of the means of production give way to new economics based on the value of knowledge and 'know-how', a community that enables social networks which unites innovators from different sectors, will become a key player in the evolving Global Economy.

CONFERENCE PHOTOS

Opening speech by the President of HKIVM

Opening speech by the President of HKIS

Conference Venue

Interactive Session

Tony Toy Memorial Award Winner (Merit Award)

Post-Conference Programme at Shenzhen

Welcome Reception at The Hong Kong Jockey Club

Conference Dinner at the Dynasty Club

TONY TOY MEMORIAL AWARD 2005

The Tony Toy Memorial Award 2005 was presented to the following recipients during the HKIVM 7th International VM Conference.

Award Category	Name	University	Title of Thesis
Distinction Award	Zhang Cai Jiang	South China University of Technology	Research on System Decision Complexity and Its Methodology
Merit Awards	YU Tsz Kit	The University of Hong Kong	A New Value Management Methodology for the Hong Kong Construction Industry
	LEE Koon Shing	The Hong Kong Polytechnic University	Knowledge Sharing in Value Management Studies

HKIVM NEWS

- **02-03 June 2005**, The HKIVM 7th International VM Conference "Why Re-Invent the Wheel" was successfully organised. This conference was held in the Hong Kong Convention and Exhibition Centre and there were over 150 delegates. Please visit our website at http://www.hkivm.com.hk/conference/7th_conference/index.htm for photos and details.
- **29 June 2005,** a one-day training workshop called "Value Briefing" was held by Professor John Kelly, Professor Steven Male, and Professor Geoffrey Shen at The Hong Kong Polytechnic University, attended by around 20 local construction professionals.

FORTHCOMING EVENTS

- **01 Sept 2005**, Gaining a Competitive Edge through Value Management Conference, jointed organized by IVM Scottish Brank and Quality Scotland will be held at the Glasgow University, U.K (http://digitalnation.fileburst.com/ivm/ivm_scotland_conference_2005.pdf).
- **8-9 Sept 2005**, the 38th SJVE Conference will be held in conjunction with "2005 AICHI EXPO", which will take place in Nagoya, Aichi Prefecture. The City of Nagoya is recognized as one of the major industrial centres of Japan, especially for Manufacturing Industry. This conference will also celebrate the 40th Anniversary of the founding of SJVE under the three keywords: "Manufacturing", "Environment" and "Excitement". For further information about the conference, please visit http://digitalnation.fileburst.com/ivm/the_38th_sjve_conference.pdf