Ensuring Value for Money in Large and Complex Construction Projects

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1. Introduction

- Increasing construction activities
- Challenges of large and complex projects
- Growing demand for value for money
- Collaborative working is essential
- Increasing awareness and application of VM
- One useful tool in project managers’ toolbox
- Implemented in both public and private sectors

Issues to be covered

1. Introduction
2. The Value Methodology
3. Research & Development
4. Real Life Case Studies
5. Summary and Conclusions

Collaborative Construction Information Management
Applications in Hong Kong

- Technical Circular 16/98 by Works Bureau in 1998

My Involvement in VM

- Trained PhD and master students
- Undertaken a number of research projects
- Founding Fellow, Past President of HKIVM
- First batch of Certified Value Specialists in China
- Given keynotes at international conferences
- Served as a Director of Miles Value Foundation
- Designed and facilitated 30+ workshops
- Award from SAVE International

Indoor Recreation Centre in Tsing Yi

Postgraduate students at a VM workshop in 2003 (during SARS)

In-Situ Reprovisioning of Sha Tin Water Treatment Works – South Works

Development Bureau

- Architectural Services Department (ArchSD)
- Drainage Services Department (DS)
- Highways Department (HyD)
- Water Supplies Department (WSD)
- Electrical and Mechanical Services Department (EMSD)

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2. The Value Methodology

Structured and analytical process which seeks to achieve value for money by providing all the necessary functions at the lowest total cost, consistent with required levels of quality and performance.

Australian/New Zealand Standard for Value Management, AS/NZS 4183:1994

Structured and analytical process which follows a prescribed Work Plan to achieve best value or, where appropriate, best value for money.


Tribute to Lawrence Miles

Function Analysis and a VM job plan developed by Lawrence D. Miles at General Electric Company in 1947.

Value analysis is a problem-solving system implemented by the use of a specific set of techniques, a body of knowledge, and a group of learned skills. It is an organised creative approach that has for its purpose the efficient identification of unnecessary cost, i.e. cost that provides neither quality nor use nor life nor appearance nor customer features.

- L. D. Miles (1972)

Definition of Value

Function
Value = ----------------------
Cost

Satisfaction of needs
Value = -----------------------------------
Use of resources

A function is the performance characteristic of a product or a service which distinguishes it from other products or services. It answers the question: “what does it do?”.
Function Analysis

A function is the performance characteristic of a product or a service which distinguishes it from other products or services.

It answers the question: “what does it do?”.

Underpinning Principles

Function analysis
- A project/product is not an end in itself, but a means to achieving a wider purpose

Systematic approach
- Job plan, detailed procedure to conduct VM studies

Collaborative working
- Multi-disciplinary team of stakeholders working together to achieve common objectives

System thinking
- Optimisation of the system as a whole, rather than optimisation of individual elements

Collaborative Working

VM harnesses the creative powers of a group of stakeholders in harmony to achieve more than the sum total.

Acknowledgement to Christopher Alexander et al. 1975
System Thinking

Understand how different elements within a project affect each other.

Systematic Approach

Information
- What is it?
- What does it do?
- What does it cost?
- What is its worth?
- What assumptions?
- What criteria?
- Givens/constraints?

Analysis
- What must it do?
- How does it do it?
- Supporting functions?
- Is it necessary?

Evaluation
- Did it work?
- Is it compatible?
- Cost and savings?
- Implementation problems?
- Adverse risks & disadvantages?

Creativity
- What else will do?
- What alternatives?
- What if...?
- Can we...?

Development
- Implementing proposals?
- Establish action plans?
- By whom & when?

Special Characteristics

- Alignment of value systems
- Focus on strategic issues
- Early stages of the development
- Large no. of stakeholders
- Short duration, formal team
- Ownership and commitment
- Mixed culture – East and West

3. Research & Development

- A strong need for research on value management in construction, supported by the latest development of information technology.
- Secured over HK$20 million research funds including five successful RGC’s CERG projects in a row.
- High-level consultancies for the Government e.g. Housing Authority, Water Supplies Department, Drainage Services Department, and Housing Society.
- Successful supervision of research and postgraduate students including PhD, MPhil, MSc students.

Relevant RGC CERG/GRP Grants

<table>
<thead>
<tr>
<th>Project No.</th>
<th>Project Title</th>
<th>Status</th>
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<tr>
<td>PolyU524612</td>
<td>Analyzing stakeholder-organization relationships in mega construction projects: a social network approach</td>
<td>On-going</td>
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<tr>
<td>PolyU529409</td>
<td>The effect of using group support systems on virtual value management workshops for major construction projects</td>
<td>Completed</td>
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<tr>
<td>PolyU526409</td>
<td>Managing multiple stakeholders in the briefing process of large construction projects</td>
<td>Completed</td>
</tr>
<tr>
<td>PolyU525205</td>
<td>A computer-aided toolkit for using the functional performance specification in the briefing process of construction projects</td>
<td>Completed</td>
</tr>
<tr>
<td>PolyU511403</td>
<td>Measuring the Processes and Outcomes of Value Management Studies in Construction</td>
<td>Completed</td>
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<tr>
<td>PolyU511403</td>
<td>The effect of using group decision support systems on the processes and outcomes of value management studies</td>
<td>Completed</td>
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<tr>
<td>PolyU511403</td>
<td>A best practice framework for systematic identification and precise representation of client’s requirements in the briefing process</td>
<td>Completed</td>
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<tr>
<td>PolyU500702</td>
<td>Successful value management applications in China: development of a framework for implementing the best practice</td>
<td>Completed</td>
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A best practice framework for systematic identification and precise representation of client requirements in the briefing process

The effect of using group decision support systems on the processes and outcomes of VM studies

Electronic Brainstorming

Process Measures

Measuring the processes and outcomes of value management studies in construction projects

A computer-aided toolkit for using the functional performance specification in briefing

RGC-CERG 2005-06

To implement the proposed framework in a computer-aided toolkit

To develop, validate and verify a practical framework of using the FPS in briefing

To establish a theoretical foundation that underpins the use of the FPS in briefing
Managing multiple stakeholders in the briefing process of large & complex construction projects

- RGC-CERG 2006-07
- To establish a theoretical foundation that underpins the management of the value systems of multiple stakeholders in the briefing process of large and complex construction projects;
- To develop and verify a practical framework for identifying and managing stakeholders in the briefing process, and
- To develop and validate a computer-aided platform underpinned by Social Network Analysis for mapping and measuring the relationships and flows among people, groups, and organisations in the briefing process.

Managing stakeholders in mega projects: a social network approach

Case Study
- An iconic public office building development
- It was procured under the design-and-build method with a contract sum of approximately HK$5 billion
- Project scope: three office towers with a total gross floor area of around 130,000 m², two pedestrian footbridges and an open space of nearly 20,000 m² for public enjoyment

4. Real Life Case Studies

Client Organisations:
- Architectural Services Department
- Civil Engineering and Development Department
- Drainage Services Department
- Highways Department
- Water Supplies Department
- Electrical and Mechanical Services Department
- Housing Department
- Housing Society
- MTRC
- Sun Hung Kai Properties
- Hong Kong Telecom

Application Areas

- Scheme Selection
- Design Improvement
- Cost Reduction
- Problem Solving
- Enhance Communication
- …
Site Selection for Desalination Facilities

Approach:
- A pre-workshop meeting, followed by two separate one-day workshops, attended by 20+ participants from various government departments and consultants, representing major stakeholders of the project.
- Following a brief introduction on VM methodology and the arrangement for the workshop, the information phase started with a presentation given by the client’s representatives from WSD, the VM team then identified project objectives, givens and assumptions.

Major Stakeholders
- Study Management Group, Water Supplies Department (WSD)
- Environmental Protection Department (EPD)
- Agriculture Fisheries Conservation Department (AFCD)
- Planning Department (PlanD)
- Antiquities and Monuments Office, LCSD
- Lands Department (LD)
- Marine Department (MD)
- Consultant’s study manager and members
Sites for Desalination Facilities

Outcomes:

✓ Agreed criteria for assessing site options
✓ Site options have been generated and evaluated
✓ Ranked site options in order of preference.
✓ Baseline conditions provided for future references
✓ An action plan was prepared which listed actions to be taken for the project.
✓ Improved understanding of the project.

Rehabilitation of Old Housing Estate

Objectives:
The objectives of the VM workshop are to create a structured forum whereby views from all stakeholders on what why and how rehabilitation works should be implemented can be discussed openly to reach a consensus on the best value solutions for the project.

Approach:
A pre-workshop meeting in advance to plan and prepare for the workshops, followed by two separate one-day workshops, attended by 30+ participants, representing major stakeholders of the project.

Entrance to Estate - Existing

Entrance to Estate - Proposed
Participants of the Workshop

- Project management team
- Property & facility management team
- Architects
- Structural engineers
- Building services engineers
- Potential contractors

Outcomes of The VM Workshop

- Identified client value system and priorities
- Agreed criteria for assessing alternative options
- Reviewed and revised existing design options
- Agreed actions to be taken after the workshop
- Agreed the best approaches to complete the project
- Generated value proposals in five areas: transfer lift, lifts at linear blocks, covered walkways, corridors & external walls, improvement to vacant flats
- Improved understanding among project stakeholders
- Created consensus, ownership and commitment
5. Summary and Conclusions

- A very useful tool to ensure value for money.
- Increasing awareness and applications.
- Collective effort from the key players.
- A strong need for research & development.
- Your potential competitive advantage.
- Not a panacea to solve all problems.
- The proof of the pudding is in the eating!

Summary of VM Studies

- Structured,
- Multi-disciplinary,
- Professionally facilitated,
- Shared understanding, goals and objectives,
- Group process to create innovative solutions, and
- Ownership and commitment.

Benefits of using VM

- Improve value of the projects
- Challenge the status quo/conventions
- Define and clarify the needs of all involved
- Ensure project is the best way of meeting the needs
- Provide a forum for stakeholders to share information
- Improve communications and understanding
- Create ownership and commitment among stakeholders

Critical Success Factors

- The methodology
  VM job plan must be followed in the workshop
- Attitude of participants
  Right attitude, appropriate stakeholders, awareness of the process
- Executive client support
  Support to the VM workshops and implementation of proposals
- Management of process
  Clear objectives, set time, follow-up actions, review and feedback
- Professional workshop facilitation
  Probing with the right questions, use appropriate tools, managing the process, maintain the momentum of the team

Acknowledgement

- The Hong Kong Polytechnic University for the working environment.
- Research Grants Council for the generous funding in CERG and GRF grants.
- Colleagues, assistants, students for their support, collaboration, and assistance.

Thank you!
Where are we?

• Strategically located in Hong Kong - a gateway or super-connector to China Mainland

• HK is at the 5th position of the QS Best Student Cities 2015 and 1st in Asia. http://www.topuniversities.com/city-rankings/2015#sorting=rank+custom=rank+order=desc+search=

Overview of BRE

• One of the very first three departments of the University established in 1937 (over 75 years)
• Strong research activities
• Attractive teaching programmes with professional recognition
• Large number of remarkable alumni
• Strong links with the industry
• Intellectually-challenging environment

Overview of BRE

Ranked 12th in the subject ‘Architecture and Built Environment’ by QS World University Rankings by Subject 2015

Ranked 2nd in the Built Environment and Design by the University Ranking by Academic Performance (URAP) 2013-14.

Tops the world in the publication of articles related to the field of construction and building technology (Canas-Guerrero et al, 2014)

Vision and Mission

Vision

• Our vision is to be a leading academic department internationally in construction and real estate, that excels in professional education, applied research and partnership for a brilliant future.

Mission

• To nurture all-round graduates for the rapidly changing building and real estate industry;
• To advance knowledge sharing via application-oriented research and consultancy work for serving our stakeholders both locally and globally; and
• To foster close links with each of our stakeholders.
**Academic Programmes**

PhD/MPhil (50 Students)

Master programmes: (400 Students)

- Executive Master in Real Estate Finance (subject to final approval)
- Construction Law and Dispute Resolution
- Construction and Real Estate
- Project Management
- International Real Estate

Undergraduate programmes (900 Students)

- Building Engineering and Management
- Property Management
- Surveying
- Building Technology and Management

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**Professional Recognition**

**Internationally (U.K)**

- Royal Institution of Chartered Surveyors (RICS)
- Chartered Institute of Building (CIOB)

**Hong Kong**

- Hong Kong Institute of Surveyors (HKIS)
- Hong Kong Institute of Housing (HKIH)
- The Hong Kong Institution of Engineers (HKIE)
- The Hong Kong Institute of Construction Managers (HKICM)

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**The Most Outstanding PolyU Student 2010**

LEE Yeuk Ying, Krystal, BSc (Hons) in Surveying, Graduated in 2011

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**Outstanding Alumini**

- LAM Ting Fai, Richard
  - Higher Diploma in Surveying, Building Technology 1999
  - Graduated in 1999
  - Outstanding PolyU Alumni Award - 2000 Winner

- Leung Chiu On, Barry
  - Higher Diploma in Surveying, Building Technology 1999
  - Graduated in 1999
  - Outstanding PolyU Alumni Award - 2000 Winner

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**Partnership**

http://www.bre.polyu.edu.hk
Outstanding Alumni

BRE Distinguished Lecture

Outstanding Alumni

Prof. Johnny Fai Sik Kei, BBS, JP
Higher Diploma in Structural Engineering, 1973
Outstanding BRE Alumni Award – 2013 Winner

Dr. the Hon. Leung Chun Ying
Mr. Au Choi Kai, Director
Buildings, Buildings Department

Higher Diploma in Building Technology, 1973
Outstanding BRE Alumni Award – 2013 Winner

Mr. Yu Kam Hung, Former
President, HKIS

Prof. CHAN Ka Kui, BBS, JP (Central Commentary)
Higher Diploma in Surveying/Building Technology, 1973
Outstanding BRE Alumni Award – 2014 Winner

Partnership with Industry

Dr. the Hon.
Leung Chun Ying

Research / Scholarly Activities

http://www.bre.polyu.edu.hk
Ng Wing Hong Laboratory for Sustainable City

Established by the Research Grants Council (RGC) of Hong Kong in 2009, the Hong Kong PhD Fellowship Scheme (HKPFS) aims at attracting the best and brightest students in the world to pursue their PhD studies in Hong Kong's institutions.

Eligibility
Candidates who are seeking admission as new full-time PhD students in the following eight institutions, irrespective of their country of origin, prior work experience and ethnic background, should be eligible to apply.

Applicants should demonstrate outstanding qualities of academic performance, research ability / potential, communication and interpersonal skills, and leadership abilities.

Impact on Industry/Community
- International recognition by peers
- Members of editorial board of leading journals
- Keynote addresses in international conferences
- Members of scientific committees of conferences
- Technology transfer to the construction industry
- Roles played by our staff and alumni in society

Overview

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<th>Rank</th>
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<tbody>
<tr>
<td>Professor/Associate Professor/Assistant Professor</td>
<td>Construction &amp; Real Estate Economics</td>
<td>3</td>
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<tr>
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<td>Construction &amp; Real Estate Law &amp; Policy</td>
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<td>Construction &amp; Real Estate Management</td>
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<td>Information &amp; Construction Technology</td>
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<tr>
<td>Assistant Professor</td>
<td>Construction Technology and Building Maintenance</td>
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<tr>
<td>Research Assistant Professor</td>
<td>Sustainable Urban Development</td>
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Global Search for Academic Elites

http://www.bre.polyu.edu.hk

Duties

- Undertake teaching duties at various levels
- Supervise undergraduate & postgraduate research projects & theses
- Conduct research in related areas & contribute to the development of the research strengths
- Initiate, lead & participate in scholarly research in his/her area of expertise
- Be active in research leading to quality journal publications & in bidding for external research grants & applied research projects
- Engage in programme / curriculum planning, development & administration
- Undertake relevant administrative duties
- Undertake any other duties as assigned by the Head of Department or his delegates
Duties

(Research Assistant Professor in Sustainable Urban Development)

- Undertake teaching duties at both undergraduate & postgraduate levels on urban sustainability, urban development, institutional analysis, law & policy issues in the urban development industry, etc.
- Initiate, lead & participate in academic & policy research pertaining to sustainable urban development/green building, urban studies, institutional analysis of urban problems/regulations & contribute to the development of its research strengths
- Be active in research leading to quality journal publications & in bidding for external research grants & applied research projects
- Supervise undergraduate & postgraduate research projects & theses
- Engage in programme / curriculum planning, development & administration
- Provide administrative support for academic & departmental affairs
- Undertake any other duties as assigned by the Head of Department or his delegates

Qualifications

(Professor/Associate Professor/Assistant Professor)

- A PhD degree in a related discipline
- Strong commitment to excellence in teaching & research
- A proven record in research & scholarship
- Effective classroom teaching skills
- Good interpersonal skills

Qualifications

(Research Assistant Professor)

- A PhD degree in a related discipline
- Relevant postdoctoral research & teaching experience
- A good publication record in refereed journals
- Good potential in bidding for research grants & in establishing significant externally funded research programmes
- Committed to teaching & learning
- Excellent command of English

Remuneration & Conditions of Service

- Highly Competitive Remuneration Package
- Assistant Professor: a Fixed-term Gratuity-bearing Contract (Re-engagement subject to mutual agreement)
- Research Assistant Professor: a Fixed-term Gratuity-bearing Contract (up to 3 years) (Re-engagement subject to mutual agreement)

To Apply

- Detailed CV & Application Form (HR72A)
- State Rank & Discipline You Apply for
- State Current & Expected Salary

- Human Resources Office, 13/F, Li Ka Shing Tower, The Hong Kong Polytechnic University, Hung Hom, Kowloon, Hong Kong
  - hrstaff@polyu.edu.hk
  - fax at (852) 2764 3374


3 August 2015: Initial consideration of applications

Thank you very much