

Optimal Implementation of the Value Management Processes for Capital Facility Projects

건설산업에서의 가치경영 프로세스 효율적 활용 방안

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Abstract

Many innovative management processes, which are also termed as *best practices* or *value improving practices*, have been proven to successfully improve the value of capital facility projects. With a lack of any guidance on how to implement the most suitable value management process for a particular project, the objective of this paper is to facilitate the VMP implementation. A CII (Construction Industry Institute)'s recent study, titled as "Development of the Value Management Toolkit," encompasses a comprehensive structure of value management and provides a new methodology in optimizing the implementation of the value management processes in order to leverage the unique project circumstances, such as project objectives, resource availability, and site limitations, etc. As a pioneering study, the findings contribute to the expedition of implementing value management processes in the industry and maximize the potential benefits in applying the most beneficial value management process for a particular capital facility project.

Key words: Capital Facility Project; Project Value Objective; Value Management; Value Management Process.

I. INTRODUCTION

Maximizing value of a project has been a great concern among project stakeholders in the construction industry. Succinctly put, the value of a project is meant by project objectives, such as capital cost efficiency, security or safety, schedule optimization, and risk containment. Value management is an alternative strategy for an organization to break through any challenging barriers in a highly competitive business environment. As value is a "buzzy word" and should be defined by project owner or customer, value management efforts are needed in order to maximize the potential of a project team and to achieve higher levels of performance pertaining to the owner's project value objectives. As such, value management can be referred to as the collection of processes or efforts by which organizations can proactively pursue one or more project value objectives. Any of these processes or efforts can be

referred to as Value Management Process (VMP).

Common challenges confronted by industry in successfully implementing or applying VMPs include the following:

- Too many VMP options to choose from
- Difficulty in understanding which VMPs are best for a particular project
- No guidance for making such a decision

The purpose of this study is to facilitate the VMP selection for implementation on particular capital facility projects. The three primary objectives of this study are as follows:

- To establish VMP selection principles and selection algorithm
- To identify project characteristics that require the implementation of one or more VMPs and to investigate their relative importance
- To develop and validate a computerized Selection Tool to effectively elicit the most suitable VMPs for

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a particular project.

II. DEFINITIONS

In the book of “Value Management in Design and Construction,” Kelly and Male (1993) defined “Value Management” as “a systematic approach to maximize a client’s value by continuously auditing throughout all project phases.” Value Management, however, is often used interchangeably or synonymously with Value Analysis and Value Engineering in various literatures (Clough and Sears 1994, Dell’Isola 1982, Mudge 1971, O’Brien 1976). Zimmerman and Hart (1982) effectively defined each of these terms in the context of value programs.

In the definitions, both Value Analysis and Value Engineering are regarded as the subsets of Value Management. Additionally, while Value Analysis or Value Engineering must include a disciplined job plan, a key step in Value Management is to set objectives for meeting owner and project requirements (Leung, et al. 2002). Value Management can also be regarded as a dynamic concept and an ever-evolving science (Macedo 1978).

Leung and Liu (1998) developed a “Value Management Model” as depicted in Figure 1.

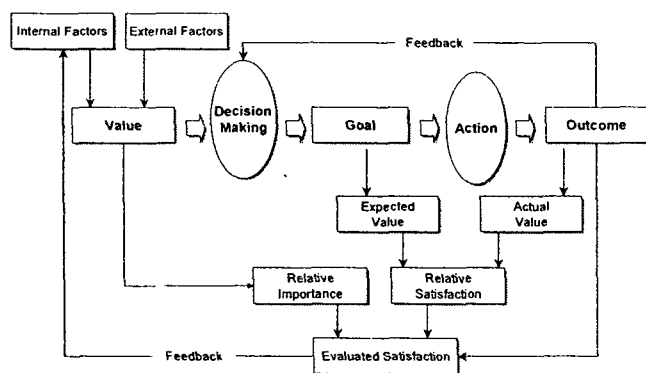


Figure 1. Value Management Model (Source: Leung and Liu, 1998)

The model emphasizes that value should be transformed into goals to achieve required outcomes. The goals that link value with terminal outcomes are crucial elements in Value Management. The transformation of

value into goals enables the realization of value that relates the achievement of outcomes, that is, articulated project objectives. As such, Value Management can be rather effectively defined as “management processes or efforts by which organizations can proactively pursue one or more project value objectives.”

An industry-wide data collection (CII 2003) was conducted to identify and define these project value objectives and 12 widely accepted project objectives were finally considered as value objectives. They include the following:

- Security of personnel and facilities.
- Operations/maintenance safety and health
- Construction safety and health
- Regulatory compliance
- Capital cost efficiency
- Maintenance cost efficiency
- Project/service quality
- Schedule optimization

As such, Value Management Process (VMP) can be defined as “an innovative and optional management process that is significantly beneficial for achieving one or more of the project value objectives.”

III. VALUE MANAGEMENT PROCESS (VMP) and VMP IMPLEMENTATION

Beginning with approximately 60 management processes, a recent CII (Construction Industry Institute) study screened out 44 management processes as their set of optional VMPs. These processes were regarded as either successfully proven or demonstrable processes in an effort of CII Research Team (RT) members. The RT consisted of both project practitioners and academia, and the team was initiated with the mission of facilitating the awareness and the implementation of VMPs in capital facility projects. Once the VMPs were identified, most of these VMPs were relatively new and even some VMPs were not well-defined in the literature. For the purpose of providing key elements

of the VMPs, the “descriptive profiles” were developed from an intensive literature review. Additionally, case studies, how-to-examples, and performance data were collected and documented from an industry-wide investigation. Based on face-to-face interviews with VMP experts, VMP implementation guidance was developed from both organization-level and project-level.

As for organization-level guidance, Value Management (VM) Program is a management initiative that provides leadership for and integration of multi-project VMP implementation efforts. The key purpose of such programs is to provide a cohesive approach to VMP initiation, integration, and continuous improvement. Such programs also provide a central focus for accountability and quality assurance. The elements of Value Management programs that are crucial for maximizing overall success include the following:

- Corporate commitment, including adequate program funding and human resources
- Designated Value Management champion
- Widespread program visibility and awareness within the organization
- Value Management training programs
- Policy and procedural documentation
- Tracking of implementation metrics
- Periodic reporting of program efforts and quantified benefits
- Appropriate and timely recognition of successful efforts, including awards and incentives
- Sharing the details of past successes and lessons learned

Project-level guidance in implementing the VMPs within the context of a specific project should entail successful execution of the following 11 steps:

1. Form the core project team.
2. Orient and align the core project team on project business goals and drivers, project goals and drivers, and the current status of the project

3. The corporate Value Management champion kicks off the initiative. The core project team should then confirm the owner’s commitment to Value Management. The core project team should also discuss project value objectives and the importance of VMPs to overall project success.
4. Use the VMP selection to determine the best VMP options for the project
5. Thoroughly discuss the VMP selection and finalize the selection of the commitment to targeted VMPs.
6. Develop plans for implementing each selected VMP.
7. Assess the adequacy of the implementation teams’s resources, familiarity with targeted VMPs, and commitment to Value Management objectives. Also, formally assess barriers to successful VMP implementation.
8. Train VMP participants and resolve any resource/training/commitment gaps and barriers.
9. Perform the individual VMP.
10. Track and document VMP implementation progress and results.
11. Provide feedback to Value Management Program leadership.

IV. VALUE MANAGEMENT TOOLKIT DEVELOPMENT

For the purpose of facilitating the usage of VMPs for the industry, VM Toolkit was developed in the form of web-based publication. The toolkit covers the current state-of-the-practice VMPs and provides the comprehensive research findings conducted by CII RT 184. (See Figure 2.)

The contents of VM Toolkit is divided into three sections, including VMP overviews, VMP tools, and VMP implementation guidance, each of which is further described below.

VMP Overviews: the definitions of Value, Value Management, and Value Management Process are provided in this section. The set of 44 VMPs is addressed and further

characterized in terms of primary benefits, timing of initiations and relative impact. The resulting data collection is also included in this section.

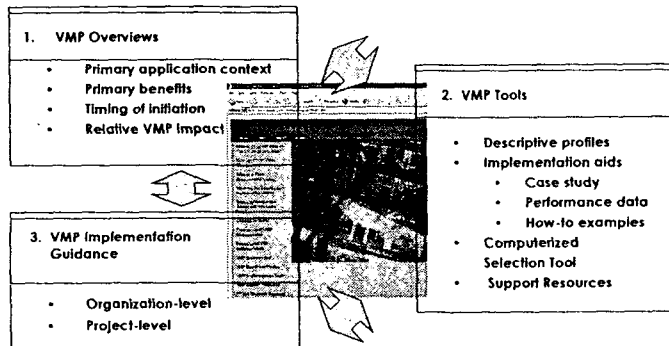


Figure 2. Contents of Value Management Toolkit

VMP Tools: The VMP tools are useful for project practitioners to briefly understand and be aware of the particular VMPs. In the VMP tools, descriptive profiles, implementation aids (i.e., case studies, how-to-examples, and performance data) and the automated selection tool are included and easily can be downloaded in the format of electronic files. The Selection Tool is the premier feature in this section. The tool was originally designed for the purpose of expediting the VMP selection process to facilitate the VMP usage.

VMP Implementation Guidance: Both the program-level and project-level guidance are provided in this section. Organization-level support is crucial factor in enhancing the benefits of VMP implementation. To maximize the value of a project, both the program-level and project-level implementation should be balanced. The detailed guidance from both levels is provided in the previous chapter.

V. VMP SELECTION TOOL

By evaluating the project characteristic VMP factors, the magnitude of benefit in implementing any particular VMP option can be determined. Not only the VMP factors, the tool has also three other selection principles; primary objectives, timing and relative impact. In selecting the

VMPs, these four principles are involved in establishing the ranking of the VMPs, which eventually determine the degree of maximum benefit for the target project. The selection tool logic consists of four primary steps: VMP Screening, Project Characterizing, Score Calculating, and VMP Ranking. To effectively apply the selection principles in the Tool, each selection principle is transformed into a “matrix” format (e.g., Project Objectives matrix, Timing Score matrix, Impact Score matrix, and Project Characteristics Score matrix). The system users are first asked to limit the number of VMPs by ruling out inappropriate VMPs or by selecting Project Objectives preferences. Then, the current project phase is required to be inputted into the system. Based on this input, the Timing Scores are computed for each VMP, and “zero”-scored VMPs are eliminated from the system at the same time. Second, the system automatically generates the list of project characteristics pertaining to one or more VMPs. The system users are asked to characterize the subject project with either an “Agree” or “Disagree” response. In the third step, the system automatically calculate the VMP scores by combining each selection principle. In the fourth and final step, the candidate VMPs are rank-ordered by Composite Score.

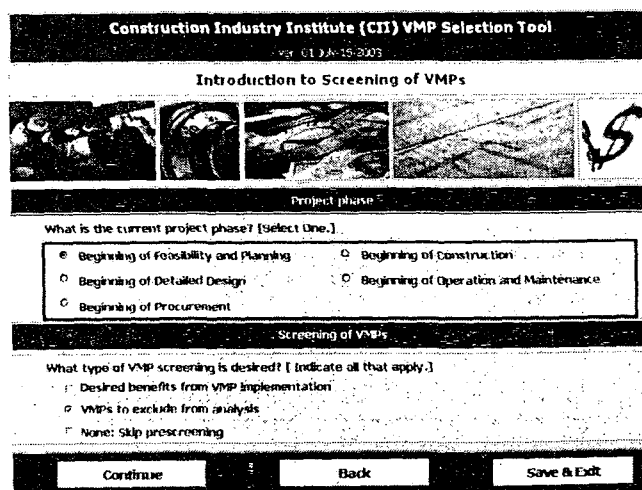


Figure 3. VMP Selection Tool Screen Shot

VI. TOOL USAGE GUIDANCE

Participants in the VMP Selection Process: While it is recommended that the Selection Tool be applied by individuals, it is also recommended that all members of the core project team individually apply the Tool and then compare results. The core project team includes all the key individuals assigned to the project at the outset of the project and may include both owner and contractor members.

Information Needed to Complete the Selection Assessment: The information needed to complete the selection process relates to three of the four selection principles identified above: desired project objectives, timing of implementation, and the project characteristics. Built-in to the system (with no responses required) are relative measures of VMP significance.

How to Interpret the Output of the Tool: To provide guidance on the output of the Selection Tool, three different scenarios were developed based on pilot tests of the Tool. Each breakpoint of the VMP Composite Score was computed using these scenarios as provided in Table 1.

Table 1. Scenario-based Breakpoint VMP Scores

Category	Timing Score	Project Characteristics Score	Impact Score	Approximate Composite Score
	(0-10)	(0.0-1.0)	(0.6-1.0)	(0-10)
High Recommendation	9	0.7	0.9	7
Moderate Recommendation	8	0.4	0.8	5
Low Recommendation	6	0.3	0.7	3

Format of the Output from the Selection Tool: The selection process output provides rank-ordering of the VMPs on four different bases: Composite Score (upon which the final recommendations are made), Impact Score, Suitability Score, and Timing Score. Output on primary suitability factors, or “drivers” is also provided.

VII. CONCLUSIONS

Beginning with the recognition that there was little awareness and implementation of Value Management Processes (VMPs) in the construction industry, this paper provided a new research area that, with further analysis, may lead to a deeper understanding of Value Management. The fundamental conclusions from this study are the following:

- A Wide range of VMPs should be more frequently considered for application on projects; most project teams give consideration to only a few limited VMPs.
- The selection of the VMPs should be a rigorous and thorough undertaking that considers various factors such as targeted project value objectives, timing of initiation, project characteristics, and relative VMP impact.
- There are dominant project characteristics that drive the implementation of one or more VMPs, and their respective weights as drivers of VMP applicability, in large part, establish the magnitude of benefits from implementing associated VMPs.
- The computer-based VMP Selection Tool is an effective tool for selecting the most applicable VMPs for particular project and thereby increases the optimal value of a project.

REFERENCES

- Clemen, R. T. and Reilly, T. (2001). *Making hard decisions*, Duxbury, Pacific Grove, Ca.
- Cha, H. S. (2003). *Selecting value management processes for implementation on capital facility projects*, Ph.D thesis, University of Texas, Austin, Tex.
- Construction Industry Institute (CII). (2003). *Introduction to the value management toolkit*, Austin, Tex.
- Koga, J. E. (2000). “Does Value Management Have a Place

in Project Management?," SAVE International Proceedings, Dayton, OH.

Leung, M. Y., Ng, S. T., and Cheung, S. O. (2002). "Improving satisfaction through conflict stimulation and resolution in value management in construction

projects." *J. Manage. Eng.*, 18(2), 68-75.

Macedo, M. C., Dobrow, P. V., and O'Rourke, J. J. (1978). *Value management for construction*, John Wiley & Sons, New York.

APPENDIX I. 44 Value Management Processes by Primary Application

Broad Application	Organizational	Planning	Design/ Construction	Operations/ Maintenance
Activity-Based Costing	Chartering Project Teams	Classes of Facility Quality	Construction Simulation	Post-Occupancy Evaluation
Choosing By Advantages	Knowledge Management/ Lessons Learned System	Constructability	Design Effectiveness	
FAST Diagrams		Design to Capacity	Design for Maintainability	
Individual Value Engineering	Minimum Standards & Practices	Function Analysis Concept Development	Design to Cost	
Life-Cycle Costing	Partnering	Mechanical Reliability Modeling	Energy Optimization	
Peer Review	Quality Functional Deployment	Modularization/ Mass Customization	Lean Construction	
Risk-Based Estimating	Sourcing Strategies	Owner's Values & Expectations	Predictive Maintenance	
Risk Management	Technology Gatekeeper	Planning for Startup	Value Engineering Change Proposal	
Six Sigma	Total Quality Management	Pre-Project Planning		
Successive Estimating		Process Simplification		
Technology Selection		Project Delivery Methods		
Value Engineering		Project Execution Plan		
		Schedule Optimization		
		Sustainable Design & Construction		
		Waste Minimization/ Pollution Prevention		