

EVALUATION OF MAIN SUBJECTS OF VALUE ENGINEERING GUIDELINE TO IMPROVE FUNCTION FOR BUILDING DEVELOPMENT IN INDONESIA

Sesmiwati, Dwifitra Y. Jumas

*Department of Quantity Surveying, Faculty of Civil Engineering and Planning, Bung Hatta University
Email: sesmiwati@bunghatta.ac.id*

Abstract

Building as a complex entity involving various factors such as social, physical, aesthetic and environmental must be analyzed and assessed to create building that meet the needs and desires of the owner and user. Value Engineering (VE) is a systematic method and organized procedural decision-making process by using function analysis. The application has been used increasingly as the best solution to address issues in construction industry. The previous study stated that applications of VE in Indonesian construction industry have not done properly and proposed to provide VE guideline to optimize the application of VE in order to produce the best value outcome. The objective of the study is to evaluate the main subjects of VE guideline for building development. A questionnaire survey was formed to address the study objective to building construction practitioners in Indonesia. The study found that lacks of VE concept were limited to increase the efficiency of the project. Activities in VE study and function as the key foundation of VE study have not been understood, function analysis is an innovative ways to generate ideas of the project. Based on findings, VE guideline would clarify purposes of VE application, systematic process and team dynamic of VE study.

Keywords: *Value Engineering, Guideline, Function Improvement, Building Development*

1.0 INTRODUCTION

The building as a complex entity involving various factors such as social, physical, aesthetic and environmental (Shen, 1997) and has a wide range of uncertainty at the beginning of the project. Uncertainty should be managed properly or it will be a risk of the project that can improve the project failure. Problems on the implementation of building construction planning caused by ineffective project management are lack of communication and coordination among the stakeholders; alternative ideas were not formed and did not meet the requirements or wishes of the client/user. Without a proper methodology, it will be difficult for the planning team to meet the needs of the client to achieve the best value.

Value Engineering (VE) using value-based approach has been used as the best solution to solve complex problems in the construction industry (Dell'Isola, 1997; Shen & Liu, 2004;

Kelly et al., 2004). VE was formed to meet the client's desire of building development to be more economical and functional, while the contractor will has competitive strengths. VE is a decision-making process based team that are systematic and structured aiming to achieve the best value through the design and construction process to meet the needs of clients (Jaapar et al., 2009) or a process which defines the functions required to achieve the target value with the most efficient life cycle cost and consistent with the quality and performance requirements (Hammersley, 2002).

VE is a tested method used in the construction industry to increase the value of the project through function analysis (Berawi & Woodhead 2005a; 2005b) by identifying opportunities to create innovative ideas and eliminating unnecessary costs to meet the quality (Berawi 2004), reliability (In et al., 2005; Bowen et al., 2010; Kelly & Male, 2005) efficient (Berawi & Woodhead, 2008), innovation (In et al., 2009; Berawi & Woodhead, 2008;

Venkataraman & Pinto, 2008; Zhang et al., 2009) or other requirements that have been defined. Application of VE based on international standards by following a systematic process (Dell'Isola, 1997; Kelly & Male, 2002; SAVE Standard, 2007; Lin & Shen, 2007, Zhang et al., 2009) and using the right tools will provide the maximum benefit with best value outcome (Kelly & Male, 2002). Berawi et al. (2011) stated the lack of VE understanding and process in Indonesian construction industry to international standards is still prevalent and there is no proper guideline that becomes the problems faced in VE studies. Furthermore, the results of that study suggest providing VE guidelines based on international standards. The guideline will help to avoid misunderstandings, misconceptions and confusion about VE method. VE as evolutionary approach which may increase competitiveness. Thus, the purpose of this study is to evaluate the main subjects of VE guideline that can be used to improve efficiency, effectiveness and innovation of building development in Indonesia.

2.0 VALUE ENGINEERING IN BUILDING DEVEOPMENT

2.1 Theory and Concept of Value Engineering

Value engineering focuses on the value rather than the costs and to achieve the optimum balance between time, cost and quality. VE concept considers the relationship between the value, functionality, quality and time in a broader perspective by eliminating unnecessary costs at a project/ system/facility. According to Kelly, et al (2004) stated the main concepts VE methodology express the relationship of value to function and cost as follows:

$$\text{Value} = \frac{\text{Function}}{\text{Cost}}$$

Based on the approach, the value can be increased through:

- a. Improving function but costs constant
- b. The function constant but reducing the cost
- c. Improving function and reducing the cost

- d. Improving function and also increasing the cost

According to Male et al. (2007) there are three main elements that differentiate VE with other management processes, namely: the development of a value system to reach a decision that is value for money; team-based process that involves all stakeholders in a workshop; and function analysis to improve the understanding of the value system. Measurement of VE study performance is needed to measure the effectiveness and efficiency of the implementation of workshop to determine the success of team in achieving the goals of the VE study. Kelly & Male (2002) identified the success factors of the VE study as follows:

- a. Multi-disciplinary teams/relevant expertise
- b. Skills team leader/facilitator
- c. A structured approach through the process of VE
- d. The agreement about knowledge the members of team members of VE study
- e. Have decision-takers at workshop
- f. Effort team members in the process and output VE studies
- g. Preparation of workshop in VE study
- h. Function analysis
- i. Management and team members support
- j. Planning to conduct of VE study

2.2 Value Methodology

Value methodology is a systematic process that follows the job plan. In SAVE Standard (2007) stated that VE study must meet the following requirements which are: VE study team follows an organized job plan; the VE study team is a multidisciplinary group of experienced professionals and project stakeholders, and VE team leader is trained in techniques in value methodology and is qualified to lead the team using the job plan.

Based on SAVE Standard (2007) and ASTM E-1699, VE methodology consists of three phases: pre-workshop, workshop and post-workshop stage as illustrated in Figure 1. The purpose of pre-workshop is to plan and organize the value study. The workshop/study stage is the implementation of job plan consists of the following sequential phases that are information

phase, function analysis phase, creativity phase, evaluation phase, development phase, and presentation phase. The post-workshop activities are to ensure accepted value alternatives are implemented and follow up on implementation for future studies.

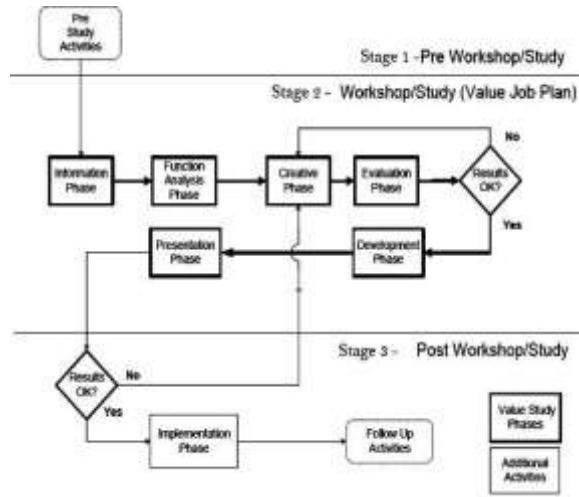


Figure 1. Vale Study Process Flow Diagram (Value International, 2007)

The activities conducted during each phase of the job plan will stimulate the team to identify ideas and develop them into alternatives to the original concept and design. The team and the project stakeholders should identify the project's basic functions and must be maintained. Otherwise secondary functions are analyzed and evaluated with regard to their contributions to the project objectives by using Function Analysis System Technique (FAST). The technique is a tool to help the team understanding the project from a functional perspective using two-word active verb/measurable noun context. The team reviews and analyzes these functions to determine which need improvement, elimination, or creation to meet the project's goals.

2.3 Value Engineering Application of Construction Projects in Indonesia

According to Djoko Ramiadji (1986) in Latief & Untoro (2009), the development of VE in Indonesia has been known and applied in the road construction in 1986 when review design of Cawang Fly Over Road Project during the

construction stage. The project has been applying the principles of VE to reduce the costs without compromising their basic functions; it has savings of billions of rupiah. Since then, efforts of VE application have been become a necessity, which means that the VE application was a new technique that applied selectively on specific projects.

The government realizes the benefits of VE applications to improve efficiency, especially in building construction by issuing various provisions relating to VE application. The local government of DKI Jakarta has issued policy about VE application at the planning and implementation stages through Jakarta Governor Decree No. 108/2003 on the implementation of the regional budget of DKI Jakarta. The policy required to implement the VE for worth of project more than Rp 10,000,000,000 (ten billion rupiah) and the activities that are strategic, monumental and special. In addition, the Minister of Public Works No 45 / PRT / M / 2007 requires the VE application at the design stage and construction of the building which has an area more than 12.000 m² or over 8 floors. Recently the policy has not been implemented to the project (Priyatno, 2010). Development of VE in Indonesia encourages the formation of the Association of Value Engineering Indonesia Experts on 17 November 2006, which aims to raise professionalism to optimize infrastructure and industrial development budget through value engineering.

3.0 RESEARCH METHODOLOGY

In order to achieve the objective of the research, quantitative method is applied through survey questionnaire distributed offline by sending mail and online distributed to mailing list of professional associations of the building construction industry. A set of questionnaire was used to identify the perception of respondents about VE and its application.

The data collected from questionnaire survey were analyzed using descriptive. Descriptive data analysis is used to describe the basic characteristics of data in the study by providing a simple conclusion about the sample and then with a simple chart analysis, measurement data (Morgan, 2004). The frequency distribution

(frequency distribution) and average (mean) are used to determine the characteristics of each variable in the study.

4.0 RESULTS AND DISCUSSIONS

Data processing was performed based on the results of the respondents' answers to the questionnaire which have been made structurally to facilitate the respondents to complete filling the survey. The questionnaire survey was conducted through offline and online to the Indonesian building construction practitioners. In the offline survey, 75 copies of questionnaires were distributed directly to sample of this study. The sample used in the study is non probability sampling design. The online questionnaire was distributed to relevant mailing list group by explaining the criteria of the respondents.

The total number of returned questionnaire are 43 in which the profession of the respondents as a contractor (65%), consultant (33%) and developers (2%). According to the profession, the majority of respondents are quantity surveyor (46.51%). The other profession are architect (16.38%), estimator (9.30%), and 6.98% is profession of project manager, civil engineer and ME engineer.

The understanding of respondent about VE application is analyzed to define the main subjects of VE guideline. Most of respondents have not fully understood about the purposes of the VE application. Their understanding is limited about increase the efficiency of the project, reduce operational cost and reduce investment cost as described in Table 1.

VE study is a systematic and structured process to increase the value of a project. Based on the result of questionnaire, there have many gaps between respondents knowledge with international standard about VE study. This found from the answer given in questionnaire about concept and activitives of the VE study as follows:

a. Information phase that aims to understand the current state of the project and constraints that influenced project decisions. Most of the respondents were not common with the some activities in this phase. Planning of design without equipped with important information

related to the project will be an obstacle to reach the optimum value.

- b. In the information phase, the majority of respondents did not know the relationship between cost, function, and value to determine the areas for increased value.
- c. Function as part of the VE concept is not understood to generate innovative ideas related with other ways to perform the functions of the project. The majority of the respondents recognize the innovation system and cost-efficiency or time efficiency becomes a factor considered in generating alternative ideas.
- d. Activities in development phase have not been understood by the majority of respondents led to difficulties in developing the best alternative that corresponds to the value or the client's needs.

Table 1. Purposes of VE Application

No	Purposes of VE Application	Total of response	%
1	Efficiency of project implementation	23	53.49
2	Reduce operational costs	20	46.51
3	Reduce investment costs	17	39.53
4	Create creative and innovative ideas	14	32.56
5	Effective risk management	14	32.56
6	Effectiveness of time project implementation	13	30.23
7	Increase the value over the life project	11	25.58
8	Improve project function	11	25.58
9	Clarify the requirements and desires of the owner	10	23.26
10	Improve the ease and comfort of the project	8	18.60
11	Increase project worth	4	9.30
12	Minimize environmental impact	4	9.30
13	Better project flexibility	4	9.30
Total		153	
Mean		11.77	

VE team is one of the critical success factors of VE studies consisting of a group of multidisciplinary professionals and involving all stakeholders in a project led by the facilitator who are trained and experienced. Project stakeholders need to be involved in the VE study especially representatives of the client who has the authority to give a decision on the implementation of the

VE study. Based on these findings as shown Table 2, the VE guideline should describes the compositions of VE teams and team dynamics to improve the effectiveness of VE study.

Table 2. Team of VE Study

No	Team of VE Study	Total of response	%
1	Coordination/teamwork	24	55.81
2	Multidisciplinary team members	19	44.19
3	The expertise and experience of VE team leader	19	44.19
4	Competence of team members	15	34.88
5	Definition of the duties and responsibilities of team members	15	34.88
6	The involvement of stakeholders in VE study	14	32.56
7	Selection of team members (independent or internal)	12	27.91
8	Leadership of VE team leader	7	16.28
9	Personality and attitude of the team members	5	11.63
10	Number of team members	3	6.98
Total		133	
Mean		13.30	

5.0 CONCLUSION

The efforts to optimize the application of VE in building development can be done by providing guideline to increase the knowledge of VE study and enhance the compatibility of the application of VE with international standards. Application of VE study conducted at the design stage will generate huge savings potential than during the construction phase. That is because at the design stage more flexible to make changes without the added time and cost to re-design.

Function analysis as a core activity in the process of VE often missed and avoided in the process of VE. The reasons because of a lack of knowledge, less experience, and training in the application of VE study. In determining the function of a project it is necessary to define the various issues related to the project and set the value of the client. The concept of function is used to determine the results (outcomes) to be achieved on a project and set as a factor of

success of the project. Project success factors can be defined through the value of client system.

VE guideline would clarify the purposes of VE study application, systematic process and dynamic team of VE study. The function analysis as the key of VE study should be performed to generate innovative ideas.

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