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by Herawati Zetha Rahman

Submission date: 05-Nov-2019 01:25PM (UTC+0700)
Submission ID: 1207391169
File name: 2009-Integration_Of_Value_Engineering_And_Risk_Management.pdf (304.97K)
Word count: 5068
Character count: 29155

Proceeding of the 11th International Conference on QiR (Quality in Research)
Faculty of Engineering, University of Indonesia, Depok, Indonesia, 3-6 August 2009
ISSN 114-1284

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Herawati Zetha R.[1], Yusuf Latief[2], M.A. Berawi[3]

[1]Faculty of Engineering
University of Indonesia, Depok 16424
Tel : (021) 7270011 ext 51. Fax : (021) 7270077
E-mail : zetha_r@indo.net.id

[2]Faculty of Engineering
University of Indonesia, Depok 16424
Tel : (021) 7270011 ext 51. Fax : (021) 7270077
E-mail : latief73@eng.ui.ac.id

[3]Faculty of Engineering
University of Indonesia, Depok 16424
Tel : (021) 7270011 ext 51. Fax : (021) 7270077
E-mail : ale.berawi@gmail.com

ABSTRACK

In general, Indonesian construction industry is still struggling with inefficiency and ineffectiveness which is caused by delayed sechedule and cost overrun. There is a need to improvement the performance of Indonesian construction industry by integrated value engineering and risk management to succeed in the delivery their desired outcomes by maximize value and minimize uncertainty. Value engineering and risk management can assist in creating a culture which enhances project performance by reducing risks. Value Engineering provides an effective process to maximize value in line with the owners and end users requirements; meanwhile risk management provides a process for managing risk. Both processes should be integrated on every significant design, development and construction project. Focusing on the integration of value engineering and risk management applica-tion on the other countries, this paper intends to give clear direction of the subject to be studied, by discussing the scope and approach of both value and risk management. The paper has a conclusion that there is the potential for construction industry in Indonesia to improve the effectiveness and efficiency by implementation the integration of value engineering and risk management. The result of this research is intended to contributing to national construction industry.

1. INTRODUCTION

Construction sector in Indonesia has grown since the beginning 1970's and held an important role in national development. This sector has significantly contributed to other social and economy sector growth. BPS Data 2006 showed that market share on national construction sector has grown to 8,6 % of GDP or equivalent to Rp. 52,3 Trillion in second quarter of 2006 [1]. The importance of this sector is obviously supported a conducive business environment and developed capability.

In general, Indonesian construction industry is still struggling with inefficiency and ineffectiveness during the implementation process of its constructions. Many waste in form of activities which utilizes resources cannot produce expected value, whereas construction project performance should be assessed on how those project management system could contribute added value to the related parties either cost side or time. Abduh (2007) argued that the waste of construction industry in Indonesia has reached 57% whereas the activity which gives additional value is only 10% [2]. This issue is obviously shown inefficiency and ineffectiveness. Alwi et al. (2002) identified the problem of inefficiency and ineffectiveness of Indonesia's construction industry and summed up that the main cause factor is delayed sechedule and impacted to the cost overrun [3]. This condition surely needs contractor's ability to be able to increase effectivity and efectiveness within the management of its construction's project [4],[5]. Contractor shall seek a method, concept, and program to manage project in order to be able reach his goal on vitable period, cost and quality [6].

There are 2 substantial conditions for the success of a project, first; contractor's capability to require expected value by project owner with initial agreed cost of the contract and, second; the effort of minimizing the impact of unavoidable risk and possible project loss [7]. First condition can be fulfilled by *value engineering (VE)* which provides effective ways to maximization value in certain project according to owner expectation. Whereas the second condition is overcome by implementing risk

management contributed to effective process in order to control the risk of a project. Value engineering and risk management within construction industry has been widely applied and accepted as the best tool for effectively management project [8]. The combination of value engineering and risk management within integration process is an excellent strategy which is able to maximize the project value and reduce uncertainty the agreed cost frame. This paper reports a investigated the arguments and the potential for their integration to promote effective and efficient construction industry in Indonesia.

2. METHODOLOGY

A study literature was undertaken to investigate current thinking on the applications of VE and RM in the construction industry in other countries as two discrete disciplines, and to establish the extent to which the literature address for the potential for their integration. This paper explores the procedures and process of VE and RM that has done by others researchers.

3. VALUE ENGINEERING IN CONSTRUCTION INDUSTRY

There is no single definition of VE or VM or of the other terms such as Value Analysis. The pioneer Miles (1961) defined VE as " an organized creative approach which has for its purpose the efficient identification of unnecessary cost" [9]. A definition which encapsulates the principles of VE is as value at systematic, multidisciplinary effort directed towards analyzing the functions of projects for the purpose of achieving the best value at the lowest overall life cycle cost [10]. The same definition was develop by Robinson & John (1997) that VE is a systemic process uses analytical, creative and evaluation techniques on a multi-disciplined basis to achieve the desired functions in a design or process while maximizing value and maintaining or improving required function.

The concept of function is based on the principle that the value of an object is determined by what use is fulfilled and is not related to its cost. VE use to eliminate unnecessary life-cycle costs without sacrificing safety, quality, environmental compliances or other functional requirements and it will increases innovation opportunities, improves cost effectiveness, enhances performance and fosters partnering among the owner, engineering and builder [12].

As a systematic process, VE focused on identifiable steps collectivity known as Job Plan Procedure, which was firstly founded by Miles in 1961 using 40 hour workshop. Developed from Mile's original Job Plan, 6 steps are included from information gathering and criteria setting to decision-making-related to selected options. In current practice, Hannan (1994) developed into three distinct stages of Pre-Study, Main Study (Workshop) and Post-Study activities, all focused on structured problem identification and problem solving [13]. The Society of American Value Engineers or SAVE International published its own job plan in 1997 while Male et al (1998) have their own as well. The different of job plan phases and procedures are as shown in Table 1.

VE is a multi-disciplinary approach based on an interaction of different disciplines providing a collective analysis of all aspects of a project and the cost implications of ideas so as to achieve the best value. Generally VE is applied when there is a well defined scheme in order to optimize costs and benefits. Palmer (1992) support that the earlier in the design process VE studies are carried out, the greater the potential for cost reduction and the lower the extra design cost of implementing proposals, as the majority of cost is committed during the early design stages [17].

Table 1.Job Plan Procedure [8],[15],[16]

LaMiles (1961)	Hannan (1994)	SAVE International (1997)	Male et al (1998)
Orientation Information	Pre Study Phase	Pre-study Phase	Pre-Study Phase
Speculation Analysis	Main Study Phase	Value Study Phase	Information Phase Creativity Phase Evaluation Phase Development Phase
Summary Conclusion	Post-Study Phase	Post-Study Phase	Consensus Phase

Since its introduction into the construction industry, VE has faced resistance. The same problem is happened in Indonesian construction industry. Green (1999) have founded many argue that the confused and inconsistent use the terminology and the lack of a standard definition are barriers to its widespread use [18]. VE is also associated with many misconceptions, such as VE for cost reduction exercise, somehow the aim of VE study is to lower cost whilst retaining or enhancing quality and performance requirements.

We frequently apply value management much earlier in the project lifecycle, in order to embark on the optimal project to provide an exceptionally powerful way of exploring client's needs in depth, addressing inconsistencies and expressing these in a language that all parties, whether technically informed or new to the construction industry [19]. This results in the following benefits:

1. It defines what the owners and end users mean by value and provides the basis for making decisions, throughout the project, on the basis of value. It provides a means for optimizing the balance between differing stakeholders' needs.
2. It establishes the value profile as the basis for clear briefs which reflect the client's priorities and expectations, expressed in a language that all can understand. This improves communications between all stakeholders so that each can understand and respect other's constraints and requirements.
3. It ensures that the project is the most cost-effective way of delivering the business benefits and provides a basis for retaining the business case. It addresses both the monetary and non-monetary benefits.
4. It supports good design through improved communications, mutual learning and enhanced team working, leading to better technical solutions with enhanced performance and quality where it matters. The methods encourage challenging the status quo and developing innovative design solutions.
5. It provides a way of measuring value, taking into account non-monetary benefits, and demonstrating that value for money has been achieved.

Nowadays value engineering is a contraption to render a better utilization of the financial sources, project timing and eventually the betterment of the project value. Value Engineering can be utilized as an appropriate strategy to enhance project implementation and to access the supreme purposes of the project.

4. RISK MANAGEMENT IN CONSTRUCTION INDUSTRY

Risk Management is defined as "the systematic process of identifying, analyzing and responding to project risk, including maximizing the probability and consequences of positive events and minimizing the probability and consequences of negative events to the project objectives" , and also as "an uncertain event or set of circumstances that, should it occur, will have an effect on the achievement on the project's objectives" [20],[21]. The concept of risk management is started with gambling, which is a game of chance, and makes profits based on prediction [19]. Champan & Ward (2002) implies that a source of risk is any factor that can affect project performance, and risk arises when this effect uncertain and significant in its impact on project performance [22]. Risk exists as a consequence of uncertainty while risk management describes the deliberate management of uncertainty or its effects [23],[24].

The aims and objectives of Risk management is to ensure that risks are identified at project inception, their potential impacts allowed for and where possible the risks or their impacts minimized and to improve project performance via systematic identification, appraisal and management of project related risk [22],[24],[25]. In the other word, the aim of risk management is not to eliminate risk but to control it. Successful risk management reduces the uncertainty in achieving a successful outcome to acceptable and manageable levels [19]. Risk Management ensures that risks are identified, reviewed and mitigated accordingly and key stakeholders are made aware of the risks prior to any decision making.

As a systematic process, there are many models used to manage the risks. The standard model is divided into 4 parts namely risk identification, risk analysis, risk response and risk monitoring and review. Meanwhile Baker et al (1999) developed that the methodology encompasses 5 staged: identification, analysis, evaluation, response and monitoring.

Source of risk central to construction industry activities can be grouped under the heading of physical and environmental, design, logistic, cost, legislation and constructability. Also the multiplicity of parties with different roles and aims, the project complexity and the fragmentation of the construction industry are further sources of risk. Project risks are considered to be dynamic and therefore risk assessment should be a continuous process spanning all phases [26].

A formal risk management process delivers the following benefits for the project team [19]:

1. It enables management to embark on innovative, high reward projects in the knowledge that they can control the risks.
2. It requires that the management infrastructure is in place to deliver successful outcomes. This includes setting clear, realistic and achievable project objectives from the outset.
3. It established the risk profile of the project, enabling the appropriate allocation of risk, so that the party best placed to manage it has the responsibility for doing so. Risk allocation is a key component of contract documentation.
4. It allows the team to manage risk effectively, concentrate resources on the things that really matter, resulting in risk reduction as the project proceeds. It also enables them to capitalize on opportunities revealed through use of the process.

On construction industry, risk can have a positive impact upon project performance. Although the current literature has the tendency to present risk as a negative element, but it can be argued that the main benefit of risk management is to help project managers ensure that project objectives are not

affected by adverse effects [7],[15]. Risk management is not a means of removing all the risks, but facilitates explicit decision making which will mitigate the effects of certain risks. This other benefits include: enabling decisions to be more systematic and objective, allowing comparison of the robustness of projects in relation to specific uncertainties, comparing the relative importance of each risk, providing an improved understanding of the project, promoting feedback and information transfer, and heightening awareness of the range of possible outcomes [28].

5. THE POTENTIAL OF INTEGRATED VALUE ENGINEERING AND RISK MANAGEMENT

The idea of integrating Value Management and Risk has started more than ten years ago as many professionals realized that it is impossible to separate between value and risk. Dell'Isola (1997) cited that the opportunity of integrating value management (VM) in conjunction with the formal risk assessment and analysis started in 1993 when a city port authority required a value engineering (VE) effort that would be augmented with an application of a risk assessment [29].

The main idea for integrating VM and RM is to optimize value on a project, minimize the time taken act and to produce results with optimum performance and quality. VE is about articulating what represents value in terms of projects benefits while risk management is about identifying causes of uncertainty and what can go wrong. Thus to optimize value, that is essential that the construction industry actively manage both value and risk. It is necessary to take risks to maximize value. Both activities complement each other to maximize the chances of project success, which is VE can reduce risk and risk Management provides opportunities to increase value.

Value engineering and risk management are two well-established disciplines recognized as a part of best practice [15]. The links between them are strong. Risk is managed it is possible to achieve a cost saving and an enhancement in value, while value is considered there may be risks associated with each phases. Norton & McElligott (1995) suggest that risk management may be enhanced by VE, using the VE team to either audit or produce a project's risk management plan [10]. In a combined approach there is potential to benefit from the assembled multidisciplinary team and also to promote the introduction of risk management into an organization [30]. Since the risk management is mainly perceived as a negative process a combined approach could mean that advantage could be taken of the creative, positive atmosphere of value engineering study to generate ideas to mitigate risks or identify opportunities.

In the construction industry, both VE and RM are well and widely accepted as best practice tools for effective management of projects [31],[25]. Griffin (2006) said that the issue is no longer about whether they should be used but whether the processes should be integrated [32]. The application of VE will help client to identify the best way of meeting business need while RM is used to manage the risks associated with the solution that offers the best whole-life value to the business and should not be seen as barrier to innovation [25].

It is arguable that the integration of RM and VM can be used to reduce the negative impact on projects and to assist value improvement [8]. While this is so, the risk of available alternatives will influence the decision about project objectives and preferred outline designs which strengthen the idea of combining RM and VM [30]. Furthermore, Othman (2004) supported the idea of integration of VM and RM as two complimentary disciplines, saying that best value could not be achieved unless associated risks have been managed. The reasons why there is a need to integrate between VM and RM is as follows [26], [30],[34],[35]:

1. Utilisation of the same resources/multi-disciplinary team hence avoiding duplication of effort.
2. Involvement of stakeholders in the workshops.
3. Good way of introducing VM and RM into an organization.
4. Maintain and improve future appraisals and assessment of projects.
5. Influences the VM proceeds in this case-option appraisal, by allowing the users to consider specific options used in the past similar projects.
6. Makes them aware of their weakness and strengths.
7. Shortening he time taken to develop viable solutions based on the risks facing a project.
8. Identifies specific risk allocation structures in association to contrast strategies.
9. Provides in-depth assessment process.

5.1. Advantages of Integrating Value and Risk

There are four advantages in integrating value and risk management practices [31]:

1. Integration enables value and risk issues to be considered together. From the very beginning of the project a full picture is available to help decision-makers develop an understanding of opportunities and uncertainties.
2. Integration is more efficient, not only from the depth and quality of the discussion process, but

also because fewer workshops and meetings are required.

3. The use of this integrated discourages the use of ambiguous and inconsistent language and so promote a common team understanding and coordinated effort to realize the client's objectives. This should reduce the levels of confusion in the industry and make it easier for facilitators and others to work within project team.
4. Any value management, value analysis, value engineering or risk management tool or other relevant business management tool can be incorporated where, and whenever desired.

5.2. How to Integrated Value Engineer-ing and Risk Management; Learn from Other

Workshops are useful way of identifying project risk and therefore it possible to combine risk and value engineering in the some workshop [30]. There are some papers published which strongly suggest integrating the risk management with value engineering. Kirk (1995) introduces the probabilistic estimating concept by combining range estimating and Monte Carlo Simulation instead of traditional Determining estimating [36]. This practice also gives the decision-maker a better confidence when determining the contingency for the project. Mootanah (1998) also made a very intensive study on the interactive strategy for value and risk management framework, and he proposed the possible interface as shown in Figure 1 [37].

In the UK, a general guide in integrating value and risk management is provided by OGC, identified as The Gateway Process. This process helps to reduce overall project risk by examining the project at critical stages in its life cycle to provide assurance that it can progress successfully to the next stage [25]. Kirk (1995) and Thompson (2004) suggested that value and risk management could be integrated in a workshop through the job plan process with risk considerations in each phases as shown in table 2 [35],[36].

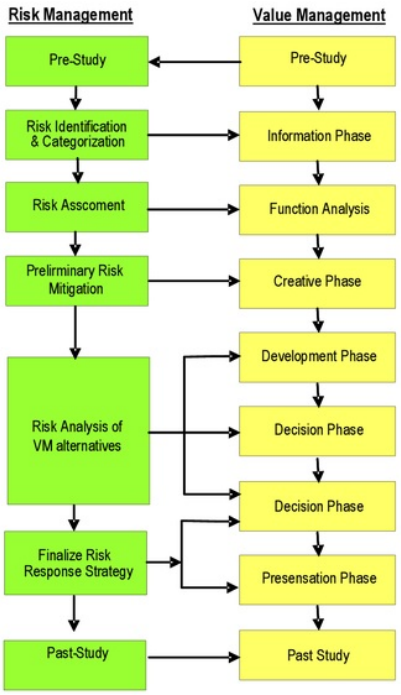

Figure 1 : Possible Interface of Value and Risk Management (Mootanah, etc)

Dallas (2006) developed the milestones for integrated value and risk management and found that to reflect project progress the objective of value and risk studies change as the project moves from stage to stage [19]. The evolution of most Development and Construction Project is, by their nature, an interactive process as shown on Figure 2 [8]

Although there are different approaches towards the use of integrated value and risk management, this literature study found out many similarities on integration (Berawi et al, 2007). The first similarity is about aims and objectives whereby all projects have clear sets of aims and objectives to be achieved after the workshop. Secondly, the workshops were conducted according to the basic principles which consist of techniques like job plan and brainstorming.

4

Table -2
Risk considerations and activities in Job Plan phases

Job Plan Phase	Risk Considerations	RM Activities
Information Phase	Listing of known risks, issues, problems associated with the project Project may have been initiated as a result of a problem or a risk	Identify risk issues Determine risk impact Perform risk analysis of designer cost estimate
Function Analysis Phase	Some functions may address or be influenced by know risks	Brainstorming Risk mitigation
Creative Phase	Ideas may address how to get around known or possible risks	
Evaluation Phase	Evaluation criteria should include risk items to eliminate ideas which have a very high risk associated with them	Consider risk as a weighted criterion
Development Phase	Risk allowances associated with each proposal at all stages of a project, especially during the construction and operation and maintenance will give a better comparison of proposals during any cost/ benefit analysis using whole life costing Time implications	Conduct RA of VA alternative design
Presentation Phase	The risk that not everyone will sign up to the preferred proposal and how to deal with it	Present RA with suggested mitigations Recommend project cost & contingency
Implementation Phase		Perform second risk analysis of final reconciled proposal

Job plan and brainstorming played vital part in conducting VE studies to generate ideas, evaluate and develop them during the workshops. The third similarity concerns on the risk aspect and risk management workshops.

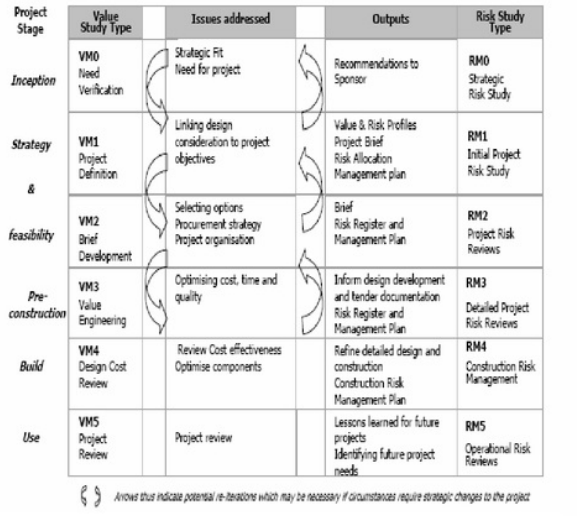

Figure 2. Milestones for Integrated Value and Risk Management Reviews

6. INTEGRATED VALUE AND RISK MANAGEMENT ON INDONESIA CONSTRUCTION INDUSTRY

VE has an important role on industry to continually improve the innovative construction management which is implemented on many construction projects and infrastructure in developed countries such as UK and Iran, especially for the high cost projects (Palmer et al, 1996, Bytheway & Charles, 1971, Berawi & Woodhead,2005). In the Indonesia construction industry, the implementation of value engineering, risk management and also infrastructure projects are still not popular (Marzuki, 2007, Soemardi, 2006). Eventually if we pointed on normative aspect, the implementation of value engineering was defined at Article 23 Law No. 18/1999 about Construction Services which declares that if it is found any inefficiency indication occurred because of unusual construction price, design construction or construction method, therefore it will be recommended to use the value engineering.

This statement is being strengthened by Peraturan Pemerintah RI Nomor 29/2000 which declares that for high risk construction project is shall be conducted a pre-feasibility study, feasibility study, general and technical planning. Meanwhile Peraturan Menteri Pekerjaan Umum no. 45/PRT/M/2007 about the Technical Guidelines of the Government Building Construcion stated that Indonesia's government wish to increase efficiency and effectiveness of construction industries by implemented value engineering. Regarding to Article 2, The technical guidance aims to render a government building accords to its function,

requirement the safety, health, convenience, easily and efficient on resource purpose with effective and efficient.

Based on the fact that the delay and cost overrun happened on many Indonesia's construction industries, this paper is aimed as a preliminary study on how the integration of VE and risk can improve the value and minimize the risk. Therefore, it will improve the eficiency and efectiveness of Indonesia construction industry as it was applied on other countries. Hereafter it will be conducted a sequel study to find how it is implemented on Indonesia construction industry as its condition and the readiness of the construction industries stakeholder.

7. CONCLUSION

This paper concerns on the integrated value and risk management that have been conducted on other countries to be studied and implemented on Indonesia construction industry. As the literature study which has been done, it is concluded that the integration of value engineering and risk management in a project at various countries was applied and widely accepted as a best tool for improvement better effective project management (Weatherhead and Griffin, 2006). Combination of both within one integration process is a good strategy to maximize value of a project meanwhile reducing risk in a cost frame that was already conducted. Thus it can be concluded that the implementation of value and risk management on a construction industry project in Indonesia should be improved the efficiency and effectiveness throughout the value maximization and the risk minimization. The next research will be focused on how to integrate the value and risk management on Indonesia construction industry as its own consideration.

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