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Possibility of Using Value Engineering in Highway Projects

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Abstract

The paper deals with the possibility of using value engineering in highway projects. The reasons for criticizing highway projects are usually three. Firstly, they do not achieve expected project goals, secondly, project delivery is not within a reasonable amount of time, and finally, costs are not in line with their budget limits. The author believes that value engineering methodology can help to find ways to improve solutions to these problems by balancing cost, schedule, and scope through the generation of innovative alternatives. It was found that a project can significantly save on costs and improve performance of project functioning by using the appropriate value engineering process at the right time. The paper summarizes the benefits and effectiveness of the value engineering methodology along with recommendations.

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1. Introduction

Programs in the public works sector such as highway construction are being criticized for delivering projects that fail to hit the following targets:

- Expected project objectives
- Delivery within a reasonable amount of time
- Costs not exceeding their budgeted amounts

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In order to reach this targets, care must be taken to achieve a reasonable number of highway projects that meet the expected project goals, are completed in time, and do not exceed the planned costs. Performance-based value engineering, modified for public works applications, can help achieve this. There is the need for a project management tool that efficiently identifies and balances project scope with the schedule and costs. Furthermore, project managers need to identify and analyze a large quantity of project alternatives with an appreciable variation in scope, schedule and cost.

Escalating construction and maintenance costs, combined with reduced revenues, have led to an increased interest in value engineering by government transportation agencies [1]. All national agencies in Asia have national regulations mandating that certain projects have be value analyzed. In the USA, the Value Engineering Final Rule requires value engineering analyses of projects on the National Highway System (NHS) which receive Federal assistance reaching an estimated total cost of \$50,000,000 or more, also bridge projects on the NHS receiving Federal assistance reaching an estimated total cost of \$40,000,000 or more, and it provides for VE analysis guidance on projects [2]. There are no similar regulations in the Czech Republic.

Value Engineering helps a project to meet the customer's need for cost efficiency within a short timeframe. It is important to realize that VE tools focused on the construction sector, particularly public works construction projects, should have greater emphasis on project scope, as this aspect of public works is usually the challenging aspect of project development. VE study looks for ways to improve solutions of the problem. It is a function-oriented, systematic, team approach, used to analyze and improve value in a product, facility design, system, or service. It offers a powerful methodology for solving problems and reducing costs while improving performance and quality. Value engineering studies can provide measured balance of cost, schedule, and scope by generating multiple innovative alternatives. This requires a motivated team of professionals in cooperation with project stakeholders motivated and guided by such an appropriate process.

The main goals of this paper are to suggest a performance measurement based on the VE method for public projects and to summarize the benefits of the proposed methodology.

2. Literature review

Value Engineering is a conscious and explicit set of disciplined procedures designed to seek out optimum value for both an initial and long-term investment. First utilized in manufacturing industry during World War II, it has been widely used in the construction industry for many years.

The Society of American Value Engineers (SAVE) was formed in 1959 as a professional society dedicated to the advancement of VE through a better understanding of the principles, methods, and concepts involved. The Society of American Value Engineers defines VE as the systematic application of recognized techniques that identifies the function of the product or service, establishes a monetary value for that function, and provides the necessary function reliably at the lowest possible cost. Therefore, the purpose of a systematic VE approach is well demonstrated when the user is able to define and segregate the necessary functions from the unnecessary functions and thereby develop alternative means of accomplishing the necessary functions at a lower total cost [3].

VE in the construction industry is mainly an organized effort to challenge the design and construction plans of projects to provide the required facility at the lowest overall cost consistent with requirements for performance, reliability, and maintainability [4].

Research [5] emphasizes the "VE Job Plan" as an organized and systematic approach tool and is the key to success in VE studies. The job plan is the road map for defining the required task in determining the most economical combination of functions to complete the task. It is through the job plan that the study identifies the key areas of unnecessary costs and seeks new and creative ways of performing the same function.

Other research [6] defines VE by what is true and what is not true about the VE concept. They state that VE is a systematic and multi-disciplined management technique. On the other hand, it is not a design reviewing, cost lowering, or quality control process. The Function Analysis System Technique (FAST) diagram is a powerful tool that helps to organize the random listing of functions by answering the questions: How? Why? What does it do? What must it do? This helps the VE team to develop many verb-noun functions' structure and their interrelationships. Also, FAST diagrams aid in the identification of basic function and scope [7].

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