

Review of Value Engineering in Indian Construction Industry.

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Abstract

This paper presents overview of Value Engineering and its different phases that can be implemented to a product/process for its optimization in construction industry. Because of poor value and time management, currently the construction business is facing huge cost problem. It's known fact that a number of infrastructure projects in India are delayed because of various problems. To overcome these problems, study has been carried out by VE process to achieve the product/ process optimization.

Keywords: Value Engineering, Job Plan, Time, Cost, Quality

Introduction of Value Engineering

Value Engineering is a technique for defining the developed requirements of a product, it is concerned with its calculation and finally the selection of less costly conditions. Value Engineering is techniques to improve function of products, services & reduce Cost while assuring quality. It is Multidisciplinary group of Designer, Project Manager & Consultants. ⁽¹⁾

VE is a process of for realizing the optimal result in a way that quality, safety, reliability and convertibility of every regulatory unit are improved. Value engineering is usually useful in the analysis and design of a service. In, Fundamental terms, VE is an organized way of thinking or looking at an item or a process through a functional approach ⁽²⁾.

Society of Japanese Value Engineering defines VE as: 'A systematic approach to analyzing functional requirements of products or services for the purposes of achieving the essential functions at the lowest total cost'. ⁽³⁾

History of Value Engineering

During the World War II, General Electric Company (GE) faced the problem of shortage of critical materials to fulfill the demand of the war equipment. To overcome that problem, GE had to use substitute materials for those in shortage. Many of the substitutes were less expensive and better in performance. In 1947, Lawrence D. Miles, a staff engineer for GE developed a number of ideas and techniques to select alternative materials that could be used internationally. His main attitude was to search for value in a product and he developed a function-based methodology that was successfully proven. The new methodology was so successful that it was possible to produce goods at greater production and operational efficiency and at lower costs. As a result of its success, GE formed a special group led by Larry Miles to refine the methodology. They called it "Value Engineering". ⁽⁴⁾

The U.S. Army and Navy, and other companies, soon realized the success of Larry Miles' methods. As the application of value analysis expanded, there was also a change in context—from review of existing parts to improving conceptual designs. This was one of two factors that marked the emergence of value engineering. The other was a

desire by the U.S. Navy to use the Value Analysis techniques for project improvement in the early 1950s when there was a moratorium on hiring “analysts.” Since engineering positions were available, individuals practicing this new discipline were employed as “Value Engineers.”⁽⁴⁾

In 1954, the U.S. Navy Bureau of ships used the Value Analysis process to cost improvement during design. They called it ‘Value Engineering’. The Value engineering was used formally in the U.S Department of Defense in 1961. (U.S. ARMY PEOSTRI).⁽⁴⁾

The Federal-Aid Highway Act of 1970 made the first Federal Highway reference to VE, requiring that "in such cases that the Secretary determines advisable plans, specifications, and estimates for proposed projects on any Federal-Aid system shall be accompanied by a value engineering or other cost reduction analysis."⁽⁴⁾

Definitions of Value Engineering.

Value Engineering is a management technique that seeks the best functional balance between cost, reliability and performance of a product, project, process or service. Value Engineering is a powerful problem solving tool that can decrease costs while maintaining or improving performance and quality requirements.⁽⁵⁾

The value engineering is a serious, interdisciplinary problem solving activity that focuses on improving the value of the functions that are required to accomplish the goal, or objective of any product, process or services.⁽⁴⁾

Value Engineering is a systematic application of recognized techniques which identify function of a product or services, establish the worth of those functions, and provide the needed functions to meet the required performance at the lowest overall cost.⁽⁶⁾

VE is a process for completing the optimal result in a way that quality, safety, reliability and convertibility of every monetary unit are improved.⁽²⁾

When to Apply Value Engineering.

VE is applied when,⁽⁷⁾

- New designs are being presented.
- Reduction in sales of the product manufactured by the company.
- The cost of manufacturing per unit is increasing.
- Rate of return on investment is reducing.
- Competitor’s products are sold at comparatively cheaper rates.
- Cost of raw material is increasing excessively to the volume of production.
- The firm is unable to meet delivery promises.
- Complaints from the customers regarding performance of the product.

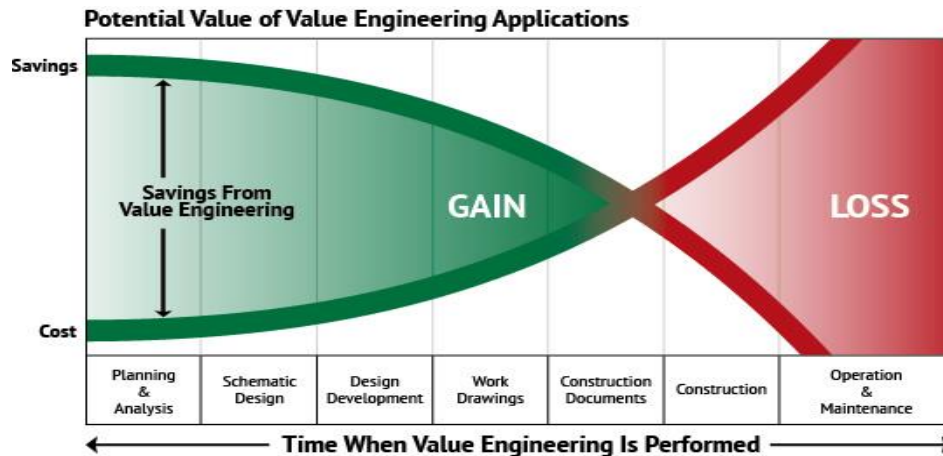


Figure 1 : When to Apply VE

Source: <https://architizer.com/blog/for-manufacturers/get-specified-value-engineering>

Reason for Poor Value

VE simply recognize social, psychological and economic conditions happen that may break good value. The following are some of the more common reasons for poor Value. ⁽⁸⁾

- **Shortage of Information:**
Usually caused by a shortage of time. Too many decisions are based on moods rather than facts. Insufficient data on the functions of the user wants or needs information on new materials, goods and developments that it can encounter these needs, within the required cost range.
- **Lack of Ideas:**
Insufficiency to develop different solutions. In many cases, decision makers accept one of the first practical solutions that come to mind. This tendency invariably causes unnecessary costs which can be eliminated by requiring the development of additional alternate ideas and then making choices based on economics and performance.
- **Wrong Belief:**
Tolerance to public needs or unfortunate experience with products or process used in unrelated prior applications.
- **Variations Idea of User, Organization or Owner:**
Often, the owner's new requirements force changes during design or construction that increase costs and alter the schedule. In too many cases, the owner is not aware of the impact of the desired change.
- **Truthful Incorrect Politics:**
Unnecessary costs are often caused by decisions based on what the decision maker believes to be true, rather than on the real facts. Honest wrong beliefs can impede a good idea that would otherwise lead to a more economical decision or service.
- **Shortage of Coordination:**
Lack of communication and coordination are principal reasons for unnecessary costs. VE opens channels of communication that facilitate discussion of subjects and allows the expression of opinions without undue concern about acceptability. Also, it creates an environment that promotes listening and responding to varying points of view without becoming defensive.

How Value Engineering Works.

VE follows a structured thought process to evaluate options as follows. ⁽⁹⁾

- **Gather information:**
 - ✓ What is being done now?
 - ✓ Who is doing it?
 - ✓ What could it do?
 - ✓ What must it not do?
- **Measure:**
 - ✓ How will the substitutes be measured?
 - ✓ What are the alternate ways of meeting requirements?
 - ✓ What else can perform the desired function?
- **Analyze:**
 - ✓ What must be done?
 - ✓ What does it cost?
- **Generate:**
 - ✓ What else will do the job?
- **Evaluate:**
 - ✓ Which Ideas are the best?
- **Develop and expand ideas:**
 - ✓ What are the impacts?
 - ✓ What is the cost?
 - ✓ What is the performance?
- **Present ideas:**
 - ✓ Alternative options are presented to the client, a recommendation is made for the best alternative and presented to the client for a decision.

VE Tools and Techniques

Value Engineering includes many tools and techniques....

1. Functional analysis
2. Creative analysis
3. **VE job plan**
4. Life cycle costing
5. Functional analysis system technique (FAST)
6. Cost and worth

VE Job Plan

➤ What is Job Plan?

Job Plan is an organized and logical approach of the Value Engineering. It helps to identify the key areas of unnecessary cost and seeks new and creative ways of performing the same function as the original part, process or material. There are several version of VE Job Plan. The procedures are all similar in their approach.

- Job Plan Consist of Various Phase ...
 1. Information Phase
 2. Creative Phase
 3. Judgment Phase
 4. Development Phase
 5. Recommendation Phase

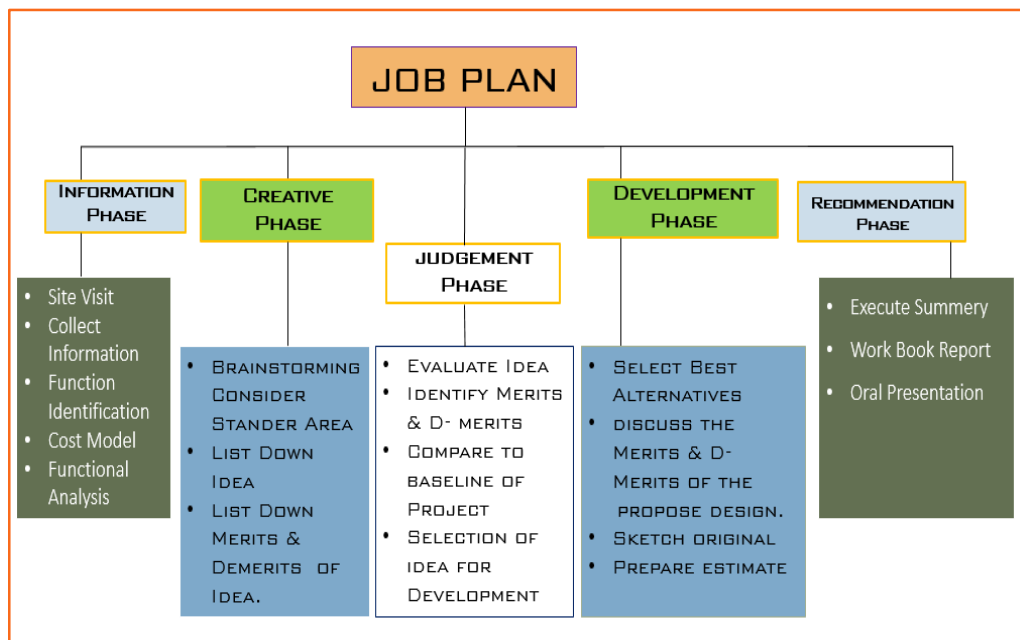


Figure 2 : Steps of Job Plan

Benefits of Value Engineering

Benefits of VE are following as under, ⁽¹⁰⁾

- Lowering O & M costs
- Improving quality
- Improving resource efficiency
- Simplifying procedures
- Minimizing paperwork
- Developing value attitudes in staff
- Higher productivity
- Simplified manufacturing process
- Overall cost reduction
- Better presentation
- Higher reliability
- Reduction in lead time
- Higher market share
- Higher profit
- Reduced down time of process
- Decision on to-make-or-to-buy, easy and correct
- Application of group technology possible

Different Tasks That Are Undertaken by Value Engineer

Preparing and administering Maintenance Programs ⁽¹¹⁾

- Calculating Expenditure Flows.
- Recommending On Cost Limits and Arranging Budgets.
- Guiding On Cash Flow Forecasting.
- Advising On Life Cycle Costing.
- Cost Analysis.
- Cost Benefit Analysis.
- Estimating Alternative Designs.
- Undertaking Feasibility studies.
- Investment Assessment
- Problems involved
- Various data

Conclusion

Value Engineering is a powerful methodology for improvement of value, cost saving and quality. This technique is derived from General Electrical Companies of engineer L.D. Miles who face the problem of war equipment during World War – II. This paper concludes that how Value Engineering technique works and also shows benefits of application of Value Engineering in Construction Industry. It is not applied in proper way in India and it is usually confused with the concept of cost saving. To overcome this Value, cost, quality problem one can use many cost reduction techniques like Material Management, Budgetary Control, Waste Management, Value Engineering. Amongst all the techniques Value Engineering is most widely used technique and gives enormous result in cost reduction. But it is not that well known in India.

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