Value Engineering

What is Value Engineering?

Value Engineering (VE, or Value Analysis) is a management technique that seeks the best functional balance between cost, reliability and performance of a product, project, process or service.

It is conducted by a multi-disciplinary team composed of experienced and specialized professionals. The VE team is independent of the design team, but its members must have experience in the particular field of the project in question. Working as an extension of the design team, the VE team analyses the project from a function/cost standpoint, providing alternative design suggestions that may improve performance, construction and life-cycle costs. They may also improve construction methods or schedules, and may introduce flexibility into operating or maintaining the project.

What are the Benefits of VE?

Experience in the United States shows that a typical VE study may realize savings of over 5% of the capital cost of a project, and achieve a return of over ten dollars per dollar expended. Recent experience in British Columbia demonstrates similar results. VE study costs are about 0.4 percent of total construction costs, which is relatively low compared to potential benefit. Upon completion of a VE study the owner will have confidence that a cost-effective, quality design has been achieved.

Why do Projects have "Unnecessary" Costs?

The design process requires a group of skilled technical professionals to consider many variables and alternatives within a defined scope contemplated in the Terms of Reference, as set out by the owner and discussed with the consultant (see the CEY publication, Requests for Proposals). Since there is usually a limit placed on time and budget, there is a high probability that most designs will contain some costs difficult to eliminate without further examination. VE is this examination. (But it should be recognized that the optimal design may, in fact, have been identified in the original design proposal.)

Other reasons include strict adherence to the Terms of Reference without challenging their necessity; reuse of design features that have worked previously but may be out-of-date, unnecessary or inappropriate; lack of a key creative idea; technological changes in processes, products or materials; and temporary decisions that become permanent when time, budget or other constraints or factors do not present opportunity for reassessment.

What is the VE Study Approach?

A VE study combines a technical capability with a systematic and intensive approach to achieve creativity in identifying the lowest life cycle cost for the function required by the owner. The focus on total life of the project is critical, making due allowance for the impacts of the time cost of money on the one hand, and the escalating costs of labour, fuels, power and materials on the other.

The difference between a VE study and a peer or cost cutting review is the application of methodology and the coordination of activities - peer reviews are usually limited to a technical review without specific regard to costs or cost savings, while traditional cost reduction analysis generally focuses on providing smaller quantities or less expensive materials.

As mentioned, the original design process is (unavoidably) complex, involving many issues to be considered and reconsidered during planning, design, value engineering and construction. The composition of the VE team is therefore crucial to its success. Leadership of the team by an experienced Certified Value Specialist is essential, and professionals with appropriate backgrounds and experience are necessary to cover the various facets of the project. A team typically consists of between five and eight members, and they must

How is a Value Engineering Study Conducted?

VE methodology is based on three specific phases:

1 The Prestudy Preparation phase often commences with a meeting between the owner, designer and VE team leader to promote a common level of understanding on the objectives of the study, to confirm the schedule of events of the study and to review the required information. Project data provided by the owner and designer are distributed to the team for review prior to a formal workshop in order to develop relevant questions. Models of appropriate capital costs, energy costs and life cycle costs are prepared by the team leader.

2 The Project Study Workshop phase is conducted at a location convenient to the owner and designer, frequently at the owner's premises near the project site. It lasts for a minimum of three days to a maximum of five, with an agenda for the first meeting including:

- Introduction
- Briefing on Value Engineering
- Presentation of project design by project designer
- Outline of project constraints
- Questions by VE team members for the designer

After the designer's oral presentation with question-and-answer period, it is desirable for the owner and designer to escort the VE team on a brief site visit. The team then proceeds with the following basic job plan, common to all VE studies:

Information Phase: *Further familiarization of the project by the team; all team members participate in a function analysis of the project as a whole, and then of its component parts, to determine the true needs of the project. Areas of high cost or low worth are identified.*

Creative Phase: *The team lists creative ideas generated from its review of the project with the aim of obtaining a large number of ideas through brainstorming and association of creative proposals.*

Judgment Phase: *Creative ideas are analysed, and the team selects the best ideas for further development.*

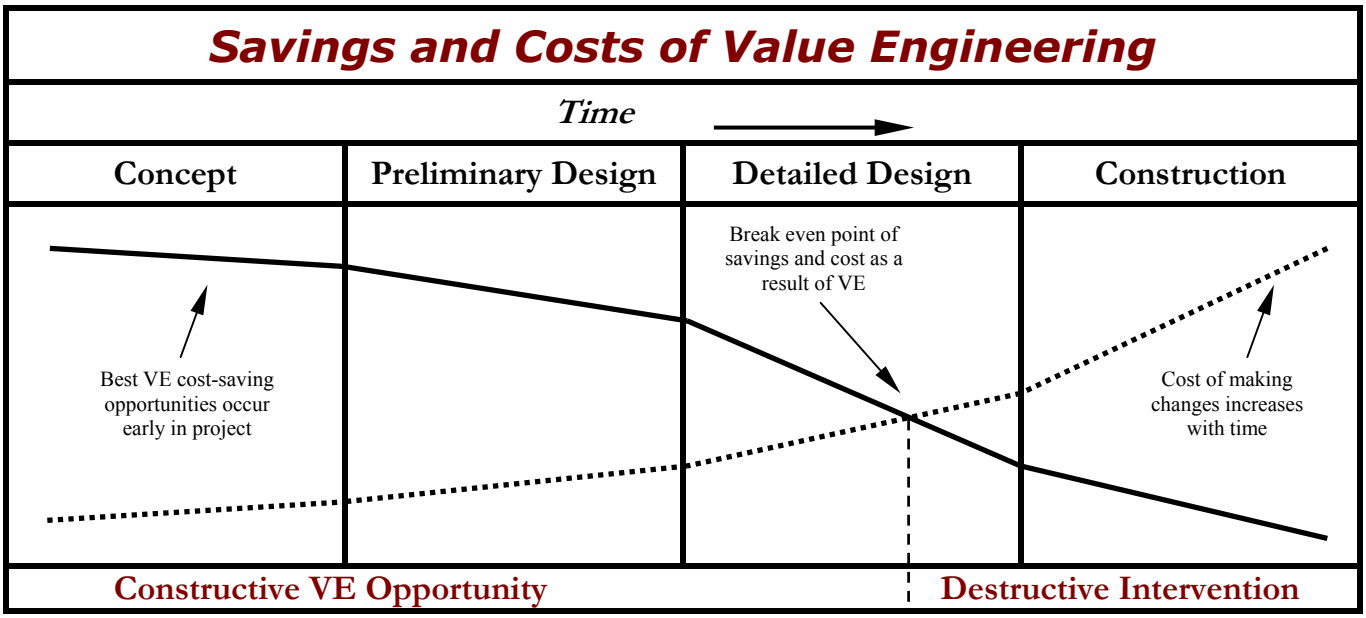
Development Phase: *The team prepares alternative designs with capital and/or life cycle cost comparisons of original designs and proposed alternatives. All recommendations are supplemented with written descriptions, sketches, basic design concepts, technical information and cost summaries.*

Presentation Phase: *The team presents an oral summary of its findings to the owner and the designer, explaining the basic ideas recommended, their cost-saving implications and their attendant rationales.*

3 In the Post Workshop phase the team prepares a report for the owner, completed and submitted in a timely manner, such that the design process may continue. The owner and designer consider the VE recommendations, and jointly decide which items have merit for implementation in a revised design.

When Should a Value Engineering Study be Undertaken?

The cost of making changes to project design depends on when VE is introduced. Early changes are naturally less expensive than later ones, as shown in the diagram below.



Owners are encouraged to undertake VE studies to enhance the cost-effectiveness and reliability of their project within the following general guidelines: from a practical point of view, the lower limit for a study would be a project capital cost of $4 million; two studies are recommended when the project cost exceeds $20 million; if only one study is contemplated, the ideal time is at the 25% detailed design stage.

The scope of a VE effort depends on the size, cost and complexity of any given project.

What Comprises a Successful VE Study?

The following elements are required:

- Top level commitment and support from the owner
- A qualified VE team leader and experienced members
- A well managed VE programme
- An appropriate project approach based on function analysis and proven VE methodology
- Cooperation between the owner, the VE team and the designer, along with empathy for the designer's position

Who Finances the VE Study?

The owner bears the cost of the VE study. The owner also recompenses the original designer for any additional cost by reason of additional work required that has not been contemplated in the original Terms of Reference and ensuing contract for the project.

Variations on a Theme

The approach described in this publication using an independent review team is widely employed, respected and advised by experienced practitioners in the field of Value Engineering, both at home and abroad.

It should be noted, however, that there are variations on this model, particularly in the building engineering field, that have proved successful in their applications. For further details please contact CEY.

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