AIA

Using Active Value Engineering for Quality Management

By Cliff Moser, AIA, MSQA

Value Engineering (VE) for Construction, often demonized as De-Value Engineering, should function as a holistic value review of a project, including design, program, site placement, materials, constructability, life-cycle costing, and environmental sustainability. If project teams do not use all the tools that VE makes available, they miss out on current analysis opportunities as well as the body of knowledge that VE represents.

What is Value Engineering?

Value Engineering was conceived as a cost and value tool during World War II by Lawrence Miles and Harry Erlicher while working at General Electric (GE). Facing wartime shortages, they developed a process for resourcing substitutes. They examined what could be used by identifying what was available, which had the unintended consequence of recommending substitutes that reduced costs and improved the product. What began as an "accident of necessity" for substitution was developed into a systematic procedure that GE soon applied to all of its products. GE described the procedure as Value Analysis (VA). As other manufacturers and industries (including the Army Corps of Engineers) adopted VA, the more active verb, engineering, became associated with it.

Value Engineering's History in Construction

Value Engineering within construction was pioneered by Mr. Alphonse Dell' Isola in the 1960s. He focused on the same goals as Miles and Erlicher in developing a value analysis process for construction. The Federal Government Construction Value Engineering Law (Public Law 104-106) can be credited to Mr. Dell' Isola. During his career, he conducted more than 1,000 VE workshops for various organizations that resulted in savings of $2.5 billion.

Dell' Isola identifies "improving project value" as the main objective of VE. In addition to improving project value, he states that the project team should utilize VE to overcome poor project value and quality, including,

1) Lack of shared project information—insufficient data on the function of stakeholder requirements. This includes building materials and processes.
2) Lack of ideas, or failure to develop alternate solutions and then making choices based on economics and performance.
3) Temporary circumstances—urgent delivery, design, or schedule circumstances can force decisions that, while quick, are often incomplete without regard to value.
4) Honest but wrong beliefs—decisions based on what is believed to be correct rather than on facts.
5) Habits and attitudes –response to doing the same thing, the same way, under the same circumstances.
6) Changes in stakeholder requirements—new requirements may cause costs to increase without awareness.
7) Lack of communication and coordination—issues of communication and coordination have been determined to be reasons for unnecessary costs.
8) Outdated standards and specifications—VE helps isolate and focus new technologies and standards in areas where high costs with poor value may incur based on wrong or legacy information. Active VE can provide a framework for a rigorous review of project specifications (Dell'Isola, 1997).

Construction VE Today

Many VE workshops are performed as contractor-driven scope removal. In this abbreviated process, the contractor focuses only on cost removal, rather than using VE to re-evaluate and re-establish a project's goals by way of a value function review and analysis.

Design to Cost.

Architects resist an active role in costing. The fungible nature of building costs challenges designers who, in the past, have typically requested that the owner retain an estimator to cost the project at appropriate stages of design and documentation. If the estimate was found to be at variance with the owner's budget, the estimate was challenged, or additional monies obtained, or areas of the project shelled or removed. Once a decision was made, the design team marched-on, grumbling but immune to the coarser details of budgets. However, AIA B141-1997 fundamentally changed the design team's role in costs and budgeting. The last sentence of Section 2.1.7.1 states "if at any time the Architect's estimate of the Costs of Work exceeds the Owner's budget, the Architect shall make appropriate recommendations to the Owner to adjust the Project's size, quality or budget, and the Owner shall cooperate with the Architect in making such adjustments." The issues raised with this statement is that any 1) adjustments may be open ended, and 2) the architect may be bound to provide re-design services for free, even if the budget impacts were beyond the control of the architect.

Case for Proactive Cost Management

2.1.7.1 demands an integrated approach to project cost and design. By neglecting cost (and value) as one of the requirements of design, the architect runs the risk of attempting to defend the cost and value of the design after the project is complete. To mitigate this risk, the architect must identify and manage project value and cost.

Target Cost Modeling
Target Cost Modeling (TCM) is a process that is integrated into the project during its early phases. It matches the construction costs to design by creating a target model. As used in manufacturing, TCM is a structured approach to determine the lifecycle cost at which a product with specified functionality and quality must be produced to generate the desired level of profitability when sold at its anticipated selling price.

By estimating the built cost of a project, then subtracting its soft costs, the cost at which the project must be constructed—its target cost—can be identified. In manufacturing, successful target costing is to design the product so that it satisfies the customer and is manufactured at its target cost. In construction, successful target costing is to design and build the project so that it satisfies all customers and is built to its target cost.

Although it sounds impossible, each project should start with a target cost. In one successful hospital project in which successful TCM was employed, a project cost model was established and endorsed by all parties at the end of schematic design. Ongoing biweekly costing review and reconciliation workshops were iterated during the remaining phases to maintain the project within an endorsed cost model. If a reviewed system was shown to be designed out of variance with the cost model, the contracting, design and owner team, met to bring the system back into project scope, either by

1) re-analyzing the material, system, or component, as part of function analysis
2) reducing the product or system scope, as a result of the function analysis, or
3) increasing the budget available for the material, system, or component and agreeing to the added value.

This integrated model helped empower the design team as part of the costing process. Formally spectators to an arcane exercise, the TCM program integrated design as a full team member, providing a design voice to counter the construction voice. It also allowed the team, as an integrated group of designers, constructors, and owners to determine, identify and control project cost and value.

In Part 2 we'll look at new tools that can be used for value analysis of project systems and components to ensure that the best value to function is obtained.

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