



Value Engineering: An Overview

Introduction

Value engineering (VE) is a systematic method to improve the “value” of goods or services by examining their function. Value engineering seeks to optimize the cost-to-function ratio, ensuring that a product performs its essential functions at the lowest possible cost without compromising quality or performance. The main objective is to meet or exceed expectations and minimize unwanted constraints, leading to increased efficiency and competitive advantage. The concept was developed in the 1940s by General Electric, primarily to address material shortages during World War II. Today, it is widely used in various industries, including manufacturing, construction, and product design. DoD was the first federal agency to adopt a VE program. Reinvigorating the practice of VE in DoD provides a catalyst for rebuilding our military through enhanced effectiveness.

Key Concepts

- **Value:** The relationship between the performance of functions and the resources required to realize them. This can be expressed as a formula, where $\text{Value} = \text{Function}/\text{Resources}$; as such, increasing value can be achieved by either enhancing performance or reducing resources.
- **Function:** The specific purpose or performance expected from a product or service. Value engineering focuses on preserving essential functions while minimizing costs.
- **Resources:** Key inputs, such as cost and schedule, to achieve the performance and quality expected.

Statutory and Regulatory Requirements

The basis of VE requirements in DoD is 41 USC 1711: Value Engineering. The statute requires all executive agencies to establish VE Programs aimed at improving performance, reliability, quality, safety, and life-cycle costs. The President’s Office of Management and Budget Circular No. A-131 directs DoD to carry out responsibilities to ensure the appropriate use and consideration of VE as a management tool in the planning of agency programs, projects, and acquisitions.

DoD Directive 5137.02 establishes the Under Secretary of Defense for Research and Engineering (USD(R&E)) as the DoD Senior Accountable Official for VE. The USD(R&E) delegates these responsibilities to Components through DoD Instruction 4245.14 DoD Value Engineering Program, with implementation guidance in Standardization Document 24 (SD-24), *Value Engineering: A Guidebook of Best Practices and Tools*.

Applications of Value Engineering

VE is used in various fields such as automotive, aerospace, electronics, and construction. Although DoD has a statutory mandate, the private sector has long recognized the benefits of VE. Companies that use value engineering to improve their operations include Amazon, Walmart, Toyota, Tesla, General Electric, and SpaceX.

Benefits of Value Engineering

- **Improved Performance:** Enhanced product or system performance by focusing on essential functions.
- **Cost Reduction:** Significant cost savings without sacrificing functionality or quality.
- **Innovation:** Encourages creative thinking and innovation by challenging conventional approaches.
- **Reduced Risk:** VE can help teams identify and mitigate risks relative to performance, cost, and time.
- **Sustainability:** Promotes sustainable practices by minimizing resource consumption and waste.

Conclusion

VE is a useful approach for rebuilding our military by seeking to maximize product value and optimize resources. By systematically analyzing functions and costs, it improves warfighting capability through a culture of continuous improvement and innovation, resulting in better quality products and services at reduced costs.