

Introduction to Value Engineering

Introduction to Value Engineering (VE)

Purpose: Maximize function while minimizing cost without compromising quality, safety, or performance.

1. What Is Value Engineering?

Aspect	Definition
Core Idea	Systematic, interdisciplinary method to improve the “value” of a product, service, or process.
Value = Function / Cost	Value increases when the functional performance rises, the cost falls, or both.
Origin	Developed during WWII by the U.S. Navy to reduce material usage while maintaining ship performance.
Scope	Applies to: design, construction, manufacturing, maintenance, services, and even organizational processes.

2. Key Principles

Principle	Explanation
Function-Oriented	Focus on <i>what</i> a product does, not <i>how</i> it is currently made.
Team-Based	Multidisciplinary team (engineers, designers, cost analysts, users) brings diverse perspectives.
Life-Cycle Perspective	Considers acquisition, operation, maintenance, and disposal costs.
Creative & Analytical	Generates alternatives (creative) then evaluates them quantitatively (analytical).
Objective Evaluation	Decisions are based on data (cost, performance, risk) rather than personal preference.

3. The VE Process (Phase-Based)

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Phase	Goal	Typical Activities
1. Information	Gather all relevant data.	• Define project scope, objectives, constraints. • Collect drawings, specs, cost data, performance criteria. • Identify stakeholder needs. • Write FAST (Function Analysis System Technique) diagram.
2. Function Analysis	Identify and rank essential functions.	• Classify functions: <i>primary</i> (core) vs. <i>secondary</i> (support). • Assign Function Cost (cost per unit of function). • Use “no?judgment” brainstorming.
3. Creative (Brainstorming)	Generate many possible ways to achieve each function.	• Encourage wild ideas. • Record all concepts for later screening. • Apply criteria: cost, performance, risk, schedule.
4. Evaluation	Screen concepts for feasibility & value.	• Use Weighted Scoring or Cost?Benefit Ratio. • Short?list viable alternatives. • Perform engineering calculations, simulations, prototypes.
5. Development	Refine selected alternatives into detailed proposals.	• Develop cost estimates, schedule impacts. • Conduct risk analysis (e.g., FMEA). • Prepare VE report (objectives, analysis, recommendation, savings).
6. Presentation	Communicate recommendations to decision?makers.	• Include Implementation Plan (phasing, responsibilities). • Execute design/modification.
7. Implementation & Follow?up	Apply approved changes and verify results.	• Track actual cost savings vs. forecast. • Document lessons learned.

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*The phases are often depicted as a **VE Job Plan** (a linear flow) but can be iterative.*

4. Function Analysis – The Heart of VE

1. Identify Functions – “What does it do?”

- Example: *Heat water* (primary), *Prevent leaks* (secondary).

2. Write Functions in Two-Word Form – Verb + Noun (e.g., *Transport fluid*, *Support load*).

3. Build FAST Diagram – Shows logical relationships (sequence,