Week-03-L-06

Value Engineering Agricultural Plan

Function Phase Continuation

Life Cycle Costing (LCC)

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Life Cycle Costing (LCC)

- Life Cycle Costing (LCC) encompasses all expenses linked to a product or project, from conception through disposal.
- The user determines a product's value, considering factors like repairs, maintenance, utilities, and replacement costs in addition to the initial capital outlay.
- In Value Engineering (VE) studies, computing Life Cycle Costs aids in maintaining product quality, reliability, and performance.

Cost Elements

- When conducting LCC in a VE study, the focus is on creating a comparative estimate rather than developing a full budget estimate for the entire lifespan.
- The VE team should pinpoint and quantify only those cost elements they deem statistically significant for the decision-making process.
- Some of the types of costs to consider can be categorized into the following three groups:

A. Initial Cost

Item Cost

B. Annual Recurring Cost

Maintenance

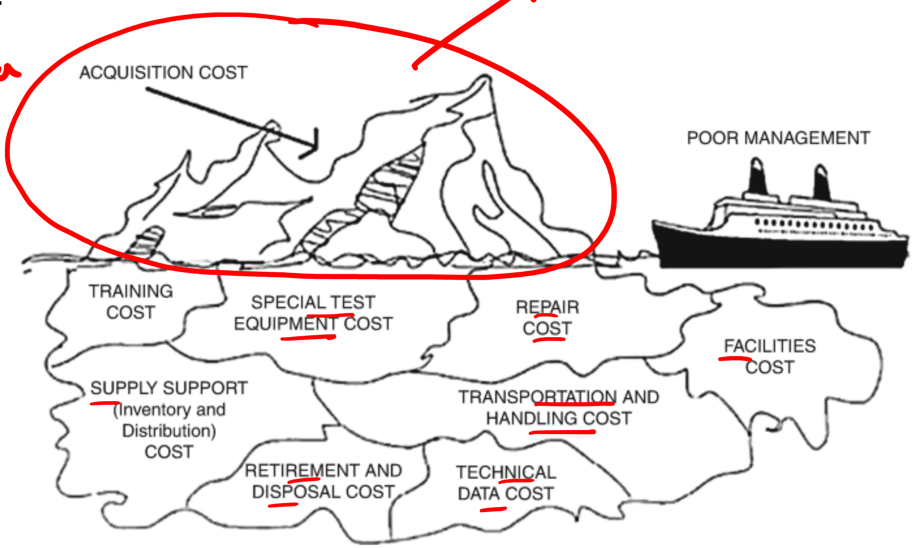
C. Nonrecurring Costs

Salvage

Iceberg analogy of LCC

- The iceberg analogy in life cycle costing emphasizes visible costs as a fraction of total expenses.

- Hidden costs are crucial, requiring comprehensive analysis.



Source:
Kara, S. (2014). Life Cycle Cost

Significance of LCC on VE

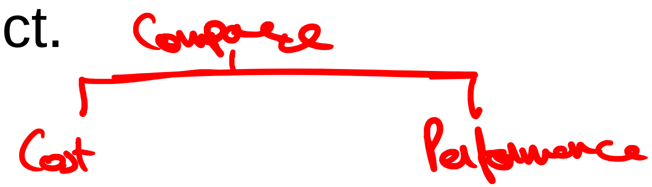
- LCC is vital in Value Engineering (VE), offering a holistic perspective to decision-making by encompassing the overall ownership costs across a project or product's entire life cycle.
- The importance of Life Cycle Costing in Value Engineering can be highlighted in several ways:

1. **Holistic Cost Assessment:** LCC facilitates a comprehensive assessment of project or product costs, covering not only the initial investment but also ongoing expenses throughout its entire life cycle.

Significance of LCC on VE

2. **Optimal Decision-Making:** LCC assists in choosing the most cost-effective option among alternatives, preventing the selection of options with lower initial costs but higher long-term operating or maintenance expenses.

3. **Performance Evaluation:** LCC serves as a foundation for assessing the overall performance and efficiency of a project or product.



Significance of LCC on VE

4. **Resource Allocation:** Understanding the life cycle costs helps in allocating resources more efficiently.

5. **Continuous Improvement:** LCC encourages a mindset of continuous improvement. By regularly evaluating and updating cost data throughout the life cycle, organizations can identify opportunities for cost reduction.

Formula

Life Cycle Costing (LCC) =

= Capital Cost

+ Lifetime Operations Cost

+ Lifetime Maintenance Costs

+ Disposal Costs

- Residual Value

Problem Statement Example – 1

- A farmer is considering the purchase of a new tractor for agricultural operations.
- The farmer is presented with multiple options, each with different initial costs, operating costs, maintenance requirements, and expected lifetimes.
- The farmer wants to make an informed decision that takes into account the total cost of ownership over the tractor's life cycle, considering not only the purchase price but also ongoing costs and potential resale value.

Source: monarchtractor.com

Solution

Reason to use Tractors in farming activities (two- word combination of functions):

- Plowing Fields
- Planting Seeds
- Cultivating Soil
- Harvesting Crops
- Transporting Goods
- Tilling Land
- Seeding Crops
- Applying Fertilizer
- Mowing Grass
- Hauling Equipment

Solution

To address this, the farmer needs to employ Life Cycle Costing (LCC) to compare the total costs associated with each tractor option. The LCC calculation includes the following components:

- **Capital Cost:**
- **Lifetime Operations Cost:**
- **Lifetime Maintenance Costs:**
- **Disposal Costs:**
- **Residual Value:**

Solution

Example Calculation: Let's consider two tractor options:

- **Tractor A:**
  - Capital Cost: $50,000
  - Lifetime Operations Cost: $30,000
  - Lifetime Maintenance Costs: $10,000
  - Disposal Costs: $5,000
  - Residual Value: $15,000

- **Tractor B:**
  - Capital Cost: $40,000
  - Lifetime Operations Cost: $35,000
  - Lifetime Maintenance Costs: $18,000
  - Disposal Costs: $6,000
  - Residual Value: $12,000

Life Cycle Cost Calculation

LCC = capital cost + lifetime operations cost + lifetime maintenance costs + disposal costs - residual value.

- **Tractor A LCC:** 50 + 30 + 10 + 5 − 15 = $80k
- **Tractor B LCC:** 40 + 35 + 18 + 6 − 12 = $87k

Inference

Decision:

- Based on the Life Cycle Costing analysis, even though Tractor A has a higher initial cost, it has a lower total cost of ownership over its life cycle compared to Tractor B.
- The farmer can make a more informed decision by considering not only the purchase price but also the ongoing and end-of-life costs associated with each tractor option.

Problem Statement Example – 2

- A farmer is contemplating two different approaches to poultry farming: traditional free-range farming and modern automated poultry farming.
- The farmer wants to determine the Life Cycle Cost (LCC) for each method to make an informed decision based on the total cost of ownership, considering factors such as initial investment, operational costs, maintenance, and potential production.

Solution

- To address this, the farmer applies Life Cycle Costing (LCC) to compare the total costs associated with each poultry farming method over the lifecycle of a specific poultry unit (let's consider broilers). Here are the components considered for each method:

1. **Traditional Free-Range Farming:**
   1. **Initial Investment:** $5,000 for basic infrastructure, feeders, waterers, and initial stock.
   2. **Operational Costs:** $2,000 per year for feed, water, and supplements for free-range broilers.
   3. **Maintenance Costs:** $1,000 per year for repairs and upkeep of basic infrastructure.
   4. **Production:** 500 broilers per year due to natural growth conditions.

Solution

2. Modern Automated Poultry Farming:

1. **Initial Investment:** $20,000 for an automated poultry house, feeding and watering systems, and initial stock.
2. **Operational Costs:** $3,000 per year for automated feeding, ventilation, and waste management systems.
3. **Maintenance Costs:** $2,000 per year for the upkeep of automated systems and equipment.
4. **Production:** 1,200 broilers per year due to controlled and optimized conditions.

5 years

Life Cycle Cost Calculation

- **Traditional Free-Range Farming LCC:**
  - **Initial Investment:** $5,000
  - **Operational Costs (5 years):** $10,000 ($2,000/year * 5 years)
  - **Maintenance Costs (5 years):** $5,000 ($1,000/year * 5 years)
  - **Total Cost:** $20,000
  - **Production:** 2,500 broilers

- **Modern Automated Poultry Farming LCC:**
  - **Initial Investment:** $20,000
  - **Operational Costs (5 years):** $15,000 ($3,000/year * 5 years)
  - **Maintenance Costs (5 years):** $10,000 ($2,000/year * 5 years)
  - **Total Cost:** $45,000
  - **Production:** 6,000 broilers

Inference

Decision:

- Despite the higher initial investment and Life Cycle Cost, the modern automated poultry farming approach results in significantly higher production, potentially leading to increased profitability over the long term.

- The farmer may decide that the additional investment is justified by the efficiency gains and higher output.

Thank You

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