ENGINEERING COST
&
ESTIMATION MODELS

TYPES OF COST

- 1. FIXED COST.
- 2. VARIABLE COST.
- 3. INCREMENTAL COST.
- 4. DIRECT COST.
- 5. INDIRECT COST.
- 6. BOOK COST.
- 7. SUNK COST.
- 8. OPPORTUNITY COST.

FIXED, VARIABLE AND INCREMENTAL COST

- 1. FIXED COST: **Fixed cost are those unaffected by change in activity level over a feasible range of operations for the capacity or capacity available.**
- **Eg: Insurance & Taxes on facilities.**

- 2. VARIABLE COST: **These are the cost associated with an operation that vary**

DIRECT AND INDIRECT COST

- DIRECT COST: **These are the cost that can be reasonably measured and allocated to a specific o/p or work activity.**
- **Eg: labour and material cost.**

- INDIRECT COST: **These are the cost that are difficult to attribute and allocate to a specific output.**
- **Eg: Maintenance cost.**

BOOK, SUNK AND OPPORTUNITY COST

- 1. BOOK COST: **A cost that doesn't involve a cash transaction and is reflected in the accounting system is called book cost.**

- 2. SUNK COST: **A sunk cost is one that has occurred in the past and has no relevance to estimate of future costs and revenues related to an alternative course of action.**

- 3. OPPORTUNITY COST: **An opportunity**

COST ESTIMATION TECHNIQUE MODELS

PER-UNIT MODEL

- The Per-Unit Model involves using a per unit factor that can be estimated effectively.
- It can be used to find:

a) Capital cost of plant per kilowatt of capacity.

b) Revenue per mile.

c) Capital cost per installed machine.

d) Revenue per customer served.

Segmenting/ Factor model

- The Factor/Segmenting Model is the extension of the Per-Unit Model in which we sum the product of several quantities or components and add these to any component estimated directly.
- Represented by:

$$C = \sum_{d} C_d + \sum_{m} f_m U_m$$

Where, C = cost being estimated.

COST INDEXES MODEL

- **Cost and Price vary with time for a number of reasons, including:**

  1. **Technological Advances.**
  2. **Availability of labour & materials.**
  3. **Inflation.**

Index is a dimensionless number that indicates how a cost or a price has changed with time with respect to a base year. Indexes provide a convenient means for developing present & future cost & price estimates from historical data.

$$C_n = C_k(I_n/I_k)$$

EXAMPLE

- A certain index for the cost of purchasing and installing utility boilers is keyed to 1988, where the baseline value was arbitrarily set at 100. Company XYZ installed a 50,000 lb/hr boiler for Rs. 5,25,000 in 2000 when the index had the value 468. This same co. Must install another boiler of the same size in 2007. The index in 2007 is 542. What is the approximate cost of the new boiler?

- **Ans. Here, n=2007, k=2000.**

- **Now, $C_{2007} = C_{2000}(I_n/I_k)$**

- **$= 5,25,000(542/468)$**

- **$= 6,08,013.$**

POWER-SIZING MODEL

- The Power-Sizing model is also known as exponential model, is frequently used for developing capital investment estimates for industrial plants and equipment. This model recognizes that cost varies as some power of the change in size or capacity. That is:

$$C_A/C_B = (S_A/S_B)^x$$

$$C_A = C_B (S_A/S_B)^x$$

Where, C_A = cost for plant A

C_B = cost for plant B

S_A = size of plant A

EXAMPLE

- An aircraft manufacturer desires to make a preliminary estimate of the cost of building a 600-MW fossil fuel plant for the assembly of its new long-distance aircraft. It is known that a 200-MW plant cost Rs.100million 20 years ago when the approx cost index was 400, and that cost index now 1200. The cost capacity factor for a fossil-fuel power plant is 0.79.

- Sol: We know, $C_B = C_A(I_n/I_k) = 100\text{million}(1200/400) = 300$ million.

Now, $C_A = C_B (S_A/S_B)^x$