L2 APSC221 - Cost Estimation Techniques

Cost Estimation Techniques

In engineering economic studies, there are categories of costs and revenues used, such as:

- capital investments
- types of costs
- taxes and insurance
- revenues

This data can be found internally, in accounting/finance and within the corporation, or externally, through R&D programs, consultants, or the internet.

Estimates in studies are classified in three categories:

- Order of magnitude estimate
- Semi-detailed/Budgetary Estimate
- Definitive/Detailed Estimate

Through a graph, it is understood that order-of-magnitude estimates are low-cost, high-uncertainty estimates for early project phases. Detailed estimates are high-cost and typically used in the final stages of a project. It has a high WBS, meaning more detailed breakdowns of tasks and costs.

Order of magnitude & budgetary level accuracy estimates are high-level and techniques consist of:

- **Indexes**
  They are dimensionless values used to estimate relationships of the past or future relative to a defined reference point.
  As things change over time, we need a baseline to compare all of our information to.

A common index is the Consumer Price Index (CPI)
This makes an estimate on past data to how much revenue you can make today.

$$Cn = Ck(In/Ik)$$

k is the reference year
n is the target year

c is the cost
i is the index value

- **Unit Techniques**
  Used when you have a known and reliable average per unit costs / revenues, allows for scalability
- **Parametric cost estimation**
  Based on historical data and statistical methods to develop a model, like a line of best fit. Models focus on key independent variables or cost drivers to model budget level costs.

Power-Sizing Technique

A model based on economies of scale
Fixed costs are fixed, while variable costs are variable

$$Ca = Cb(Sa/Sb)^X$$

X is the cost-capacity factor
A is the project being estimated
B is the known project
C is the cost
S is the project size

Learning Curve Model

Modelling based on assumption that there is a constant percentage reduction in input resources as the output double.

$$Zu = k(u^(logs/log2))$$

U is the uth unit of production
K is the resource value needed for first unit
S is the learning curve parameter (decimal value)
Zu is the resource value needed for the uth unit