

Statistical Methods

Week 11
Construction Estimation,
Planning and Control

Uncertainty

- How to estimate the cost of a project, never been built before?
- What are the associated risks?
- How to take advantage of historical bidding data?
- How to incorporate uncertainty and risks into the final estimate?

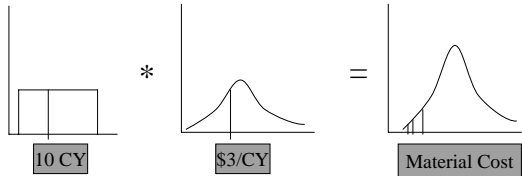
Background

- Histograms
- Mean, Variance
- Probability Distribution Functions
- Distributions
- Monte Carlo Simulations

Types of Distributions

- Uniform:
 - Uniform probability across all ranges
- Triangle:
 - Bounded by optimistic, pessimistic and mean values
- Normal:
 - Distribution of the sum of a large number of variables is normal
 - A family of distributions defined by location and scale parameters: the mean ("average") and standard deviation ("variability").
- Log-normal:
 - A variable modeled as log-normal if it can be thought of as the multiplicative product of many small independent factors.
 - Example: Long-term return rate on a stock investment: it can be considered as the product of the daily return rates.

Application



The diagram illustrates the application of statistical distributions. It shows three graphs: a uniform distribution labeled '10 CY', a normal distribution labeled '\$3/CY', and a resulting log-normal distribution labeled 'Material Cost'. The uniform distribution is multiplied by the normal distribution to produce the log-normal distribution.

Concerns

- Probability of exceeding deterministic cost
- The cost at which there is a X% chance that cost will not be exceeded
- Analyze correlations
- Sensitivity analysis
 - Contribution of variables to variability