

LECTURE NOTES

Cost Estimation – How to and Suggestions

Learning objectives

1. **Compare** the costs of two or more alternatives.

Motivation

- Your PBL-2 client has asked you to estimate the costs of your conventional and LID designs
- You will do this a lot as an engineer
- Your financial success as an engineer will largely depend on your ability to provide potential clients with competitive, transparent cost estimates

The Cost Estimation Problem

- Communicate the actual costs and still leave some room for profit
- Too conservative (high cost estimate) means you won't win the bid
- Too low means you win the bid but lose money (because your actual costs are higher than the contracted bid amount)
- Prices fluctuate between when you submit the bid and do the work

How to Estimate Project Cost

- a. Think back to engineering economics – list out the project fixed start up (capital) and operating costs over the time horizon of interest
- b. Use the same common time horizon for all projects/alternatives under consideration
- c. Disaggregate costs to the level of detail appropriate for each project component
- d. Use unit prices and scale by the quantity required
- e. If needed, add contingencies as a multiplier on sub-total(s)

Potential Data Sources

In decreasing order of preference (1 = most preferable)

1. Actual costs from recent, identical (or very similar) projects
2. People who have experience building or estimating such costs
3. Prices/sales sheets/catalogues for the specific products and/or services needed
4. Cost manuals that list prices in general categories of goods/materials/services
5. Wild guesses

With experience, you'll get better at developing data sources #1 and #2.

Presenting Cost Estimates

Organize the cost estimate in a way that allows the reader to (i) understand the methods used and (ii) compare among alternatives (or competing bids) (Table 1).

Table 1. Cost Estimates for Two Options to Let a Toddler Draw (\$)

Cost Item	With Crayons	With Paint
1. Table (1 ChildPlay, \$100 each, at Stork Landing)	\$ 100.00	\$ 100.00
2. Child seat (1 ChildSafe seat, \$50 each, at Stork Landing)	\$ 50.00	\$ 50.00
3. Paper (1 ream, \$2.50 per ream, at Smiths)	\$ 2.50	\$ 2.50
4. Crayons (1 Crayola 12-set, \$1.42/box, at Smiths)	\$ 1.42	
5. Paint (1 4-color set, \$2.86 each, at Hobby Lobby)		\$ 2.86
6. Water, to clean up paint mess (2 gallons, \$0.00099/gallon, from Logan City)		\$ 0.002
7. Frames (simple, 3, \$0.75/each, at Hobby Lobby)	\$ 2.25	\$ 2.25
8. Contingency (5% of items #1 to 7)	\$ 7.81	\$ 7.88
Total	\$ 163.98	\$ 165.49

In some instances, it may be OK to only provide cost estimates for the items that differ among the alternatives (e.g., items #4, 5, and 6 in Table 1). However, to do this, the costs for excluded items must be small and negligible compared to the items included. For example, only listing items #4, 5 and 6 in the Toddler Drawing example would lead a parent to incorrectly conclude that painting is twice as expensive as crayoning (Table 2) when the total costs are actually very similar (Table 1).

Table 2. Partial Cost Estimates for Toddler Drawing Options (\$)

Cost Item	With Crayons	With Paint
4. Crayons (1 Crayola 12-set, \$1.45/box, at Smiths)	\$ 1.42	
5. Paint (1 4-color set, \$2.25 each, at Hobby Lobby)		\$ 2.86
6. Water, to clean up paint mess (2 gallons, \$0.00099/gallon, from Logan City)		\$ 0.002
8. Contingency (5% of items #4 to 6)	\$ 0.07	\$ 0.14
Subtotal	\$ 1.49	\$ 3.01

Wrap-Up

Example 1. What cost items will you have in your PBL-2 conventional storm water system design?

Example 2. What data sources will you use in your PBL-2 cost estimates?