The UNIVERSITY of VERMONT

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Notes – Chapter 7

Cost Behavior and Estimation

I. Overview
   a. Relationship between activity and cost
   b. Cost Estimation
      i. Trying to define cost behavior
      ii. Uses a historical perspective
      iii. Look at past source documents, trends, etc.
   c. Cost Prediction
      i. Use the estimate for planning, forecasting, decision-making
      ii. Remember Ford (stupidly) ditching its cost estimation gurus!

II. Types of Cost
   a. Variable Cost
      i. *Total* cost is Linear. O(N)
      ii. *Unit* Cost is flat. d/dx = 0
      iii. Examples
         1. For merchandiser, Cost of Goods Sold
         2. For manufacturer, Direct Material, variable Manufacturing Overhead
         3. Sales Commissions
   b. Fixed Cost
      i. Total: Flat
      ii. Unit: $O(-N^2)$
      iii. Example: Property taxes, salary of VP
   c. Step Variable Cost
      i. Quantized
      ii. Relatively small increments define a step, so the cost is essentially variable.
      iii. Example: Restaurant. A waiter costs a single amount and can handle a small range of activity. Adding another waiter is a sudden jump.o
      iv. Treating as variable costs is accurate enough.
   d. Step Fixed Costs
      i. Example: Renting square footage for the factory. A particular amount will suffice for a wide range of activity, but will eventually need to be upgraded
      ii. (See long-run AVC study from Microeconomics)
      iii. Wider ranges of activity and more significant commitments in increasing one step than with step variable costs.
   e. Semi-Variable (Mixed) Costs
      i. Examples: Electric utility bills, leases.
      ii. Slope is that of a variable cost, Y-intercept is the fixed-cost level.
   f. Curvilinear
      i. Not all cost relationships are flat (d/dx is not constant)
      ii. If relationship is curvilinear, take the tangent at some point and use it for a small range.
      iii. The range where the line is accurate needs to be the same range in which management expects to operate.

III. Cost Behavior
   a. Account Classification
      i. Go through ledger accounts and put each into categories.
      ii. Break those into variable and fixed costs.
      iii. -or- Break into Engineered, Committed, and Discretionary Costs
         1. What level of control is exercised over costs?
         2. Committed → Long-term
         3. Engineering → Relationship with activity level. 70% of cost is usually engineered as soon as your product is designed.

4. Discretionary → Can be altered by managerial decisions.

b. Visual Fit Method
   i. More objective than account classification
   ii. Plot a graph of cost as a function of activity
   iii. Find the best-fit line
   iv. Y-Intercept is the estimated fixed cost. d/dx is per-unit cost.
   v. VC = Total Cost (value of Y) - Y-Intercept.
   vi. Unit Variable Cost is VC / Activity at any given activity level.
   vii. To recompose, Total Cost = FC + (Unit VC) (# Units)
   viii. Remember that estimates are valid only within your original range. Cost may not follow the same pattern in regions for which you have no data.
   ix. Downside: Subjective
   x. Upside: Uses all data points.

c. High-Low Method
   i. Based on activity level, not cost! (High and Low *activity* levels)
   ii. Find high and low activity, and get costs at those levels.
   iii. Calculate change in both.
   iv. Unit VC = Cost / Activity
   v. FC = TC – (Unit VC)(# Units)
   vi. Still based on historical data.
   vii. Downside: Uses only two data points.
   viii. Upside: Objective. Purely mathematical.

d. Least-Squares Regression
   i. Attempt to minimize the sum of the squares of the deviations from the line to the data.
   ii. An objective version of the visual fit method, essentially.
   iii. In Excel
      1. Tools > Data Analysis
      2. Y is Cost, X is Production
      3. Safe to ignore the weird values it gives – too complex for BSAD-061
      4. Intercept = FC
      5. X-Variable = d/dx(VC) = Unit VC
      6. Under statistics, R-Square is the coefficient of determination. The closer to one, the better. Under 0.5 is probably too risky to use.
   iv. In Lotus
      1. Range > Analyze > Regression
      2. Y is Cost, X is Production
      3. Constant = FC
      4. X Coefficient(s) = d/dx(VC) = Unit VC
      5. R-Square is still the coefficient of determination

IV. Learning Curve
   a. Costs tend to drop as production continues as workers learn the processes.
   b. An 80% learning curve means every time production doubles, per-unit labor time goes down to 80%.
   c. d/dx is negative and increasing. (y(x) is concave up) Big effects early, in other words.
   d. These effects must be taken into account from the outset or prices may be set too high for later production runs!