**Chapter 6 (Activity Analysis, Cost Behavior, & Cost Estimation) Video**

Chapter 6 builds on the text, PowerPoint slides, and instructor’s notes. Students should review those materials before watching the video.

Chapter 6 is an important chapter that covers the basic vocabulary concepts on which managerial accounting is based.

**MAJOR TOPICS**

* Cost behavior patterns
* Cost categories and structures
* Cost estimation methods

**TYPES OF COSTS**

* Variable costs
* Step-variable costs
* Fixed costs
* Step-fixed costs
* Semivariable (mixed) costs
* Curvilinear costs

**Note: these behaviors are descriptive within RELEVANT RANGE**

* The range of activity within which management expects the organization to operate.
* *Span of activity over which a certain cost behavior holds true*.
* It is risky to extrapolate beyond the relevant range because there are no observations outside the range.
* Fixed costs will not change only for a specified range of volume of activity, called the relevant range.
  + Beyond this, fixed costs are not constant. <http://www.answers.com/topic/relevant-range>
* The upper and lower levels of activity within which the business expects to be operating within the short-term planning horizon (the budget period). The specified **range** of activity over which a variable cost per unit remains constant or a fixed cost remains fixed in total; it is generally assumed to be the normal operating **range** of the organization. <http://www.finance-lib.com/financial-term-relevant-range.html>

**DEFINITIONS**

**Variable costs** are costs that remain constant on a per-unit basis and fluctuate in total in direct response to cost-driver changes.

**Step-variable costs** are nearly variable, but such costs increase in small steps rather than in direct proportion to cost-driver changes.

**Fixed costs** stay constant in total but fluctuate on a per-unit basis across ranges of activity.

**Step-fixed costs** are fixed within a wide range of activity but will change outside that range.

A **semivariable cost (mixed cost)** changes in response to a change in a cost driver, but not in direct proportion. Such costs have both variable and fixed elements.

A **curvilinear cost** function cannot be represented with a straight line but instead is represented with a curve that reflects either increasing or decreasing marginal costs.

* Within the relevant range, even curvilinear costs may behave in a linear fashion.

**COST CATEGORIES AND STRUCTURES**

**Engineered cost:** one that bears a definite physical relationship to the cost driver.

**Committed vs. discretionary costs**

* **Committed costs** result from an organization's ownership or use of facilities and its basic organizational structure.
  + These costs cannot be eliminated without endangering the entity's overall health and existence.
* **Discretionary costs** exist as the result of a management decision.
  + In comparison with committed costs, such costs are more easily changed in bad economic times without doing serious long-run harm to the entity.

**COST ESTIMATION METHODS**

**Visual-fit method.** An analyst examines a cost by plotting points on a graph (called a **scatter diagram)** and places a line through the points to yield a cost function.

* The visual-fit method is useful because it helps spot nonrepresentative data points, or **outliers.**

**High-low method.**  Considers only two points of data, the highest and lowest, for activity within the relevant range.

* To estimate fixed and variable costs, this method uses data from a representative period of *low activity* and a period of *high activity*.
* This method is straight-forward and easy to use.
* High-Low estimation computes the following:

|  |  |  |
| --- | --- | --- |
| **Variable costs per unit** | = | Difference in Total Costs  (for highest and lowest levels of activity) |
|  |  | Difference in Activity  (for highest and lowest levels of activity) |

**Fixed costs = Total Costs - Variable** **Costs**

* The method first focuses on cost changes, allowing the determination of any variable cost.
* Next, fixed costs are determined by subtracting variable cost from the total cost at either of the two data points.
* The high-low method is more objective than the visual-fit method, but it is still a rough approximation because it considers only two points of data.
* The points selected should be representative of normal behavior.

|  |
| --- |
| **Use of the high-low method is common in practice and is common in testing situations.** |

**Least-squares regression method** is a statistical approach that is both objective and considers all data points.

* By using mathematical formulas to arrive at the best possible cost line (i.e., the **regression line),** the method is more accurate than the other methods.
* The regression line is in the form Y = a + bX, where X is the **independent variable** and Y is the **dependent variable.**
* The **coefficient of determination, R2,** can be used to judge the line's **goodness of fit,** or how well the line fits the data on which it is based.
* If the goodness of fit is relatively high, a large proportion of the variation in the dependent variable is explained by changes in the independent variable.
* The text's appendix shows how a spreadsheet such as Microsoft® Excel can be used to calculate various parameters related to regression analysis.

**Multiple regression** can be used to estimate a cost function when there is more than one independent variable. (For example, the fuel cost for an airline is determined by the number of miles flown and by other variables such as wind speed and load.)

**Example**

The following information is available for the Zheng Co.

|  |  |  |
| --- | --- | --- |
| **Week** | **# Units** | **Total Costs** |
| 1 | 1,100 | 25,300 |
| 2 | 1,250 | 18,125 |
| 3 | 1,300 | 28,600 |
| 4 | 1,285 | 29,555 |
| 5 | 1,200 | 27,360 |
| 6 | 1,050 | 25,800 |

Using the high/low method, determine the estimated linear cost function for Zheng.

**Answer.**

|  |  |  |  |
| --- | --- | --- | --- |
| **Week** | **# Units** | **Total Costs** |  |
| 1 | 1,100 | 25,300 |  |
| 2 | 1,250 | 18,125 |  |
| 3 | 1,300 | 28,600 |  |
| 4 | 1,285 | 29,555 |  |
| 5 | 1,200 | 27,360 |  |
| 6 | 1,050 | 25,800 |  |
|  |  |  |  |
| **High volume** | 1,300 | 28,600 |  |
| **Low volume** | 1,050 | 25,800 |  |
| **Use high volume to estimate cost function** | | | |
| VC |  | 11.2000 | (28,600-25,800) / (1,300 - 1,050) |
| FC |  | 14,040 | 28,600 - (1,300 x 11.20) |
| **Use low volume to check linear cost function** | | | |
| Check |  | 25,800 | (1,050 \* 11.20) + 14,040 |

**Linear cost function estimate. Y = 14,040 + 11.2 (x)**

Note: the problem selects high and low volume (and uses costs for those volumes), not high and low costs.