ACCT 2121 CHAPTER 5
COST BEHAVIOR, ANALYSIS AND USE

Types of Cost behavior Patterns

Organizations have three types of costs, variable, fixed or mixed cost. The relative proportions of each type of costs are known as **cost structure**.

VARIABLE COSTS:

Variable cost is a cost whose total dollar amount varies in direct proportion to changes in the activity level. For a cost to be variable it must be variable with respect to activity base/ cost driver. (Direct labor hours, machine hours, units produced, units sold, number of miles driven, number of calls handled by technical support in a software company, or number of beds occupied in a hospital)

Extent of Variable Costs:

The number and type of variable costs present in an organization will depend in large part on the organization's structure and purpose.
Public utilities (Electricity) - fixed costs are high when compared to variable costs.
Service business (consulting, auditing, engineering) - fixed costs are high.
Service business (restaurants) variable costs are high
Merchandising Business – variable cost (cost of purchase) is high
Manufacturing business- variable costs are high.

TRUE AND STEP-VARIABLE COSTS

Not all variable costs behave in a purely variable manner (varying in proportion to the selected cost driver). Some variable costs behave in a true variable and others behave in a step variable pattern.

(a) True variable cost: direct material is a true variable cost because the amount used during a period will vary in direct proportion to the level of production activity.

(b) Step variable cost: A resource that is obtainable only in large chunks and whose costs increase or decrease only in response to fairly wide changes in activity is known as step variable costs. Example: Wages of maintenance workers are often considered to be a variable cost, but unlike direct materials the time of maintenance workers is obtainable only in large chunks. Moreover any maintenance time not utilized cannot be stored as an inventory and carried forward to the next period. Small changes in the level of production may have no effect on the number of maintenance people employed by the company.

Linearity Assumption and the Relevant Range

FIXED COSTS:

Fixed costs remain constant in total, the amount of fixed cost computed on a per unit basis becomes progressively smaller as the level of activity increases. The unit product cost for use in external financial statements, contain both variable and fixed elements. For internal uses, however fixed costs should not be expressed on a per unit basis.

Types of Fixed Costs:

a. Committed Fixed Costs: relates to the investment in facilities, equipment and the basic organizational structure of a firm. Examples- depreciation of building and equipment, taxes on real estate, insurance and salaries of top management and operating personnel. The two characteristics of committed fixed costs are that
   - (i) they are long term in nature;
   - (ii) they can't be significantly reduced even for short periods of time without impairing the profitability or long run goals of the organization.

b. Discretionary Fixed Cost: usually arise from annual decisions made by management to spend in certain fixed cost areas. Examples –advertising, research, public relations, and management develop programs.

Differences between Committed Fixed Costs and Discretionary fixed Costs.

1. The planning horizon for a discretionary fixed costs is fairly short term usually a single year. Committed fixed costs have a planning horizon that encompasses many years.
2. Discretionary fixed costs unlike committed fixed costs can be cut for short periods of time with minimal damage to the long run goals of the organization.

Fixed Costs and the Relevant Range (Refer to power point slides)

There are 2 major differences between step variable costs and fixed costs.

1. Step variable costs can often be adjusted quickly as conditions change, whereas once fixed costs have been set, they often can't be changed easily.
2. The width of the step depicted for step variable costs is much narrower than the width of the steps depicted for fixed costs

(Trend towards fixed costs/ Is labor a Variable or Fixed cost- (Refer to power point slides) **)**

MIXED COSTS:

A mixed cost is one that contains both variable and fixed cost elements and is also known as semi variable costs.
Cost function = $Y = F + V*x$

Y = total cost; F = fixed cost; V = variable cost per unit; x = level of activity.

Y is the total cost, which is the dependent variable, and x is the activity level, which is the independent variable. Cost behavior is said to be linear when a straight line is a reasonable approximation for the relation between cost and activity.

ANALYSIS OF MIXED COSTS.

Management estimates the fixed and variable components of a mixed cost using different approaches.

1. **Account analysis:** Each account is classified as variable or fixed based on the analyst's prior knowledge.
   The total fixed cost is the sum of all the costs, which have been classified as fixed.
   The variable cost per unit is estimated by dividing the sum of the costs for the accounts that have been classified as variable by the total activity. This method is subjective because the analyst decides whether each cost is variable or fixed based on judgment.

2. **Engineering analysis.** This method measures cost behavior based on what costs should be and not on what costs have been. It is based on industrial engineer's evaluation of production methods, material specification, labor requirements equipment usage, efficiency of production power consumption etc. this method can be successfully used for new products. The disadvantage of this method is that it is subjective and costly and often not timely.

3. **Scattergraph plot**:
   The first step in analyzing cost and activity is to plot the data on a scatter graph. The total cost (dependant variable is plotted on the Y axis and the activity level (independent variable) on the X - axis. The scatter graph will reveal the relation between the cost and the activity. The points plotted lie more or less along a straight line. Cost behavior is said to be linear whenever a straight line is a reasonable approximation for the relation between cost and activity. The vertical intercept where the straight line crosses the Y- axis is the rough estimate of the fixed cost.
   The total cost at any given activity level minus the fixed cost **divided** by the activity level gives the variable cost per unit.

   The scatter graph method fits in all the data the placement of the line and the measurement of the fixed and variable cost are subjective.

4. **High low method.**

To analyze the mixed cost with the high low method, the high level of activity with the related cost and the low level of activity and the related cost are identified.

The variable cost = Change in cost / Change in activity level.

If the relation between the cost and activity can be represented by a straight line, then the slope of the straight line is equal to the variable cost per unit.
Cost may not be linear outside the relevant range and managers also are interested as to how the costs behave within the relevant range not with the cost behavior at zero level or at impossible high activity level.

The high low method is not often used because (a) of its unreliability (b) it makes inefficient use of information (c) uses only two periods of cost experience regardless of how many relevant are collected.

5. **Least square regression method.**

This method measures a cost function more objectively with statistics using the same data. It measures cost function more reliable than other cost measurement methods. Regression analysis yields important statistical information about the reliability of the cost estimates, so analyst can assess confidence in the cost measures and the cost driver. One such measure of reliability or the goodness of fit is the **coefficient of determination, R squared**. It measures how much of the fluctuation of a cost is explained by changes in the cost driver.

Regression output based on computer software:

Interpreting Regression Output

Regression Statistics	
Multiple R	0.885
R Square	0.783
Adjusted R Square	0.768
Standard Error	135.3
Observations	16

	Coefficients	Std Error	t Stat	P-value
Intercept	2937	64.59	45.47	1.31E-16
Machine Hours	5.215	0.734	7.109	5.26E-06

Constant (fixed cost)
Standard error of Y estimate

R squared
Number of observations
Degrees of freedom
X coefficient(s) (variable cost)
Standard error of coefficient(s)

Fixed cost measure is labeled constant .
Variable cost measure is labeled X coefficient
Y = F + Vx

When a cost driver is better at explaining cost, the closer the data points will lie to the line and the R squared will be higher, which varies between 0 and 100%. When R squared = 0, the cost driver does not explain the cost at all, and when R squared of 100% would mean that the cost driver explains the cost perfectly.
R squared is close to 1, means that the reliability is quite high., the variation in the cost is explained by the variation in the cost driver.
The proportion of the fluctuation not explained by the cost driver = 1- R squared.
The regression method uses all the historical data to determine the cost function and is more reliable than the other methods.

For more details see the power point slides.

NEW INCOME STATEMENT FORMAT – CONTRIBUTION APPROACH (Refer to power point slides and class notes)