



COST BEHAVIOR PATTERN ANALYSIS FOR DECISION MAKING PURPOSE

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ABSTRACT

Cost behavior analysis refers to management's attempt to understand how operating costs change in relation to a change in an organization's level of activity. The main objectives of this paper are to show the various types of cost that's are existed in the cost behavior pattern. Variable cost, fixed cost and mixed cost are analyzed in this paper. The process of segregation the mixed cost is analyzed. This paper investigates the foundational theories and empirical evidence surrounding cost behavior and asymmetric cost behavior, exploring their implications for managerial decision-making. Finally, the paper has shown the effect of cost changes in the management decision making probes.

KEY WORDS: Cost Behavior, Variable Cost, Fixed Cost, Mixed Cost, Decision Making.

1. INTRODUCTION

Cost behavior is the manner in which expenses are impacted by changes in business activity. Each and every manager of a business should be aware of cost behaviors when constructing the annual budget to anticipate whether any costs will spike or decline. Each manager wants to minimize the cost and maximize the profit. In order to increase the profit in the business manager should understand the changing pattern of cost. Manager should focus the variable cost because it can be controlled. Fixed cost does not change within specific period or specific level of activity. Both forms extend the traditional cost model by considering not only fixed and variable costs (as extreme cases) but also the direction of activity changes (Banker and Byzalov, 2014). Understanding cost behavior is crucial for various aspects of financial reporting, including earnings forecasting and the analysis of conditional conservatism (Zhao et al., 2014). Scorte & Udristoiu (2011) mentioned the theoretical frame regarding the CVP model. Authors expressed that the CVP analysis examine the behavior of total revenues, total costs and the result from operation under the influence of the changes in the volume of production, of the selling price, of the fixed expenses or of the variable expenses. They also focused that break even point number of clients, number of clients should have come in restaurant for the target profit into their paper. Authors concluded that CVP model can be the main key for an efficient management of a business in the hospitality industry.

The objectives of the study are given below:

- (i) To show the various types costs that are existed in the cost behavior pattern.
- (ii) To focus the various techniques to segregate the mixed cost into variable and fixed cost.
- (iii) To show the effect of cost behavior pattern in the decision-making process.

2. REVIEW OF RELATED LITERATURE

Novák, P., Dvorský, J., Popesko, B., & Strouhal, J. (2017). Stated that cost management is one of the most significant issues in company performance and company financial management which any enterprise has to solve as in the periods of declines of sales revenues, as well as during their growth. In their study they designed and tested several regression models that could be suitable for cost behavior prediction and subsequent decision-making based on these predictions. From the results of the transformed model, we believe that asymmetric cost behavior is affected by asymmetric behavior of the chosen factors.

Hamizan, M., Ananda, R., Shofa, M. K., Siagian and Hayati, I. (2023) conducted a seminar and express that the concept of cost behavior is very important for manufacturing companies to be able to make decisions about pricing, production, and other important aspects of the operations of the company. The results of this study indicate that companies adopting JIT or EMS systems may be experiencing a shift in cost behavior from fixed costs to variable costs, which can provide greater flexibility in responding to market demands and regulatory requirements.



Antonio, J. and Salle, D.L. (2022) stated that costs do not move proportionately with changes in sales, wherein the increase of costs is not proportion to the decrease in costs for every absolute change in sales revenue. This asymmetric cost behavior is known as cost stickiness. A comprehensive study was performed which investigated the presence of cost stickiness and the various factors that affect it within publicly listed firms in the ASEAN-6.

Hansen and Mowen (2005) in their book "Management Accounting" state that the concept of cost behavior is a method that takes into account the relationship between costs and other factors such as production volume, technology, and human resources. This concept helps manufacturing companies manage production costs and make better decisions. In the private sector, the cost stickiness phenomenon has been highlighted through research that has identified several determinants and is currently focused on explaining its consequences (Malik, 2012).

Sinambela, E. A. and Djaelani, M. (2022) published a paper and expressed that *Costs are classified into fixed costs, variable costs, or semi-fixed costs or semi-variable costs. Each cost category has a specific explanatory function. Accuracy in determining the cost group will determine the quality of financial reporting. In addition, it can provide valid considerations for management to make decisions.* Fabre1, V. V. and Borgert, A. (2022) conducted research and the main aims of the study was to analyze in an unprecedented way the behavior of costs in local government, since the current literature is incipient and there are still doubts about the application of the cost stickiness phenomenon to the pure public sector. The main theoretical and practical contributions were: I) proof that the contemporary approach to cost behavior applies to the pure public sector; II) proof that budget balance, a fundamental precept of the TFP, does not apply in practice; and III) identification of a new phenomenon, expanding the theoretical classification of cost behavior consolidated in the contemporary accounting approach, which can help managers in planning public actions. Musgrave (1959) reinforced an already consolidated practice in governments, which was the assumption of a balanced budget. Based on this understanding, the cost behavior in the public sector is expected to be symmetric. The contemporary approach, considered from the study by Anderson et al. (2003), is characterized by theoretical contributions in relation to asymmetric behavior. Anderson et al. (2003) proved that the proportion of cost variation, in relation to the variation in revenues, increases when revenues increase, but costs do not decrease in the same proportion when revenues decrease (this is called sticky cost).

Lohrasp, S. (2024) stated that the importance of integrating insights from cost behavior analysis into management practices to optimize resource allocation, adapt to market dynamics, and achieve strategic objectives. The findings are particularly relevant for organizations in the United Arab Emirates (UAE), offering valuable insights to support informed decision-making, enhance operational efficiency, and drive sustainable growth in a dynamic business environment.

Budugan & Iuliana (2008) conducted a study and shown many efforts to focus the use of the cost-volume-profit analysis to estimate earnings. They have stated that economic entities may use the CVP ratio to estimate the business environment of the future period and to control their operations. Into this paper they have shown the effect of four factors changes on earnings (profit/loss) before tax that are:

- (i) Changes only to the production costs.
- (ii) Changes to all the categories of costs
- (iii) Changes to the amount of manufactured and sold goods and to all the categories of costs.
- (iv) Changes to the sale price, the amount of manufactured and sold goods and the sale costs.

They have concluded that the CVP is useful since it offers an overall image of the company management. For forecasting purposes, management may use CVP analysis to calculate the profit yield by a given amount of sold goods. Based on the CVP analysis, the management may set the necessary sales level to earn the desired profit. They have also stated that CVP analysis is increasingly used in the budgeting process.

Ihemeje, Okereafu and Ogungbangbe (2015) conducted a study named "Cost-volume-profit analysis and decision making in the manufacturing industries of Nigeria". Into their study they compared between bottled and sachet water and they found that there is a strong positive relationship between sales value of bottled and sachet water will invariably increase the profit made on them. The coefficient of determination indicates that about 73.2 change in the profit made on bottled and sachet water are attributable change in the sales value of bottled and sachet water. The researcher rejects the null hypothesis and concludes that sales values of bottled and sachet water significantly affect the profit made on them.



3.METHODOLOGY OF THE STUDY

Research methodology is a way to systematically solve the research problem. It may be understood as a science of studying how research is done scientifically. (Kothari, 2004). Research is also considered as the application of scientific method in solving the problems. It is a systematic, formal and intensive process of carrying on the scientific method of analysis. (Pandey & Pandey, 2015).

3.1 Sample Size of the Respondents

Since executives and officials are working in the company so, sample has been taken from both the groups for the present study. To select this group researcher has used simple random sampling technique. A total number of 50 respondents have been selected for this study.

3.2 Sources of Data & Their Collection

The study has involved collection of data from both primary and secondary sources. But for the reasons of the nature of study the secondary data has found importance. Primary data have been collected through a different set of interview schedule. Some cases free discussion has been made with the concerned officials like manager, executive and other officer. Secondary data has been collected from the sources of official records, operational information, published financial statements, official website of the company.

3.3 Tools and Techniques of Data Processing & Analyzing

After collecting data from different sources, the Researcher has analyzed them in logical order. Segregating mixed costs, which are a combination of fixed and variable costs, involves separating them into their fixed and variable components. This is done using various methods, including account analysis, the high-low method, regression analysis, and the scatter graph method. The statistical tool ANOVA has been used to analyze data.

4.ANALYSIS AND FINDINGS

4.1 Meaning of Cost

Cost is the monetary value that a person or company has to spend in order to produce or acquire goods or services. Cost is the total of all expenses incurred whether paid or outstanding in the manufacturing and sale of product or those incurred in giving a service. Costs are calculated from the point of view of management which expects cost to perform three functions i.e. cost computation, cost control and cost analysis. (Mahesh & Suhas, 2013). A cost (such as direct materials or advertising) is usually measured as the monetary amount that must be paid to acquire goods or services. (Horngren, Datar & Rajan, 2012)

4.2 Behavior of Cost

Cost behavior indicates how cost changes when there is a change made in the company's activity level. When company wants to change their activity level from one point to another point, the total cost also changes. Company can understand the degree of changing situation by analyzing cost behavior of each element of the cost structure.

Cost behavior analysis is the study of how specific costs respond to changes in the level of business activity. A knowledge of cost behavior helps management plan operations and decides between alternative courses of action. (Weygandt, Kimmel & Kieso, 2012) Cost behavior refers to how a cost will change as the level of activity changes. Managers, who understand how costs behave, can predict how costs will change under various alternatives. Conversely, attempting to make decisions without a thorough understanding of cost behavior patterns can lead to disaster. (Garrison, Noreen & Brewer, 2011). Costing systems record the cost of resources acquired, such as materials, labor, and equipment, and track how those resources are used to produce and sell products or services. Recording the costs of resources acquired and used allows managers to see how costs behave. Consider two basic types of cost-behavior patterns found in many accounting systems. (Horngren, Datar & Rajan, 2012).

4.3 Types of Cost

Before one can begin to understand how a business is going to perform over time and with shifts in volume, it is imperative to first consider the cost structure of the business. This requires drilling down into the specific types of costs that are to be incurred and trying to understand their unique attributes. (Walther & Skousen, 2009).

There are three main types of costs according to their behavior:

1. Fixed Costs
2. Variable Costs
3. Semi –Variable / Semi-Fixed / Mixed Costs

4.3.1 Fixed Cost

Fixed costs are those which do not change with the level of activity within the relevant range. These costs will incur even if no units are produced. A fixed cost remains unchanged in total for a given time period, despite wide changes in the related level of total activity or volume. (Horngren, Datar & Rajan, 2012). Total fixed costs remain constant within the relevant range of activity. Because fixed costs remain constant in total, the average fixed cost per unit becomes progressively smaller as the level of activity increases. (Garrison, Noreen & Brewer, 2011).

(Varian, 1999) defines fixed costs as the “costs that are independent of the level of output, and, in particular, they must be paid whether or not the firm produces output.” Fixed costs are the “costs that do not vary with the quantity of output produced” (Mankiw, 1998).

Characteristics of Fixed costs:

- (i) Total cost is constant
- (ii) Per unit is changeable / variable

For example:

Fixed cost per unit decreases with increase in production. Following example of rent expenses in a factory explains this fact:

Total Fixed Cost (a)	Tk.30,000	Tk.30,000	Tk.30,000
Units Produced (b)	5,000	10,000	15,000
Fixed Cost per Unit (a / b)	Tk.6.00	Tk.3.00	Tk.2.00

From the above example we can see that when production is 5,000 units then total fixed cost is Tk.30,000, when it has increased to 10,000, total rent is also Tk.30,000 and for 15,000 units is also Tk.30,000. It has not changed in total. Per unit fixed cost is changed when volume has changed. When volume has increased then per unit fixed cost has decreased. We can interpret it with graphical presentation which is given below:

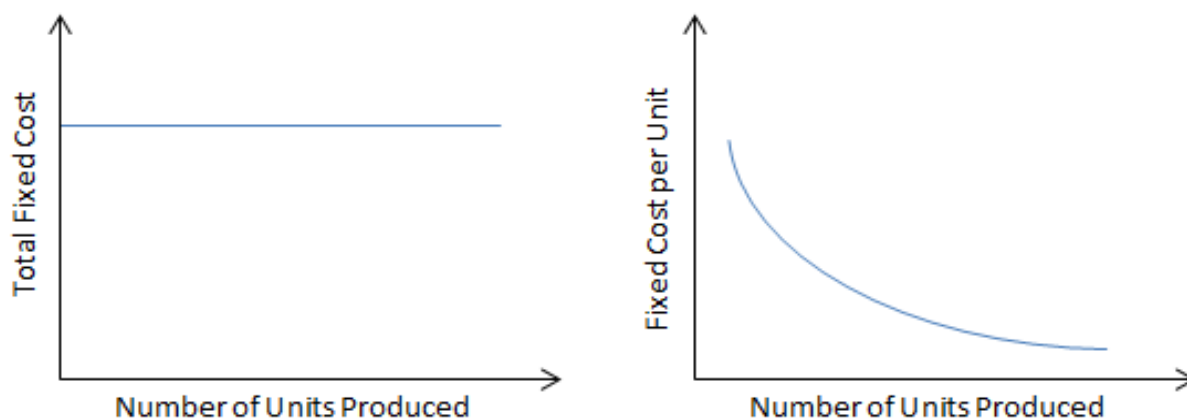


Figure # 1 Total and Per Unit Fixed Cost Behavior

4.3.1.1 Discretionary Fixed Cost

Discretionary fixed costs are a sub-section of fixed costs that a business can eliminate while still continuing production. Accountants label these expenses as discretionary because paying for them is up to the discretion of the company's executives or high-level management personnel. Discretionary costs are often business ventures intended to improve the overall profitability of a company but aren't a necessary function for operation. Here are some examples of discretionary fixed costs:

Marketing expenses, Employee training program, Research and development, Charitable contribution and Software license.

4.3.1.2 Committed Fixed Costs

Committed fixed costs, otherwise known as **capacity costs**, are the costs required to maintain current production capacity. These costs arise from long-range decisions made by top managers about the size and nature of their organization. They cannot be avoided when a company uses its existing capabilities to produce and sell its products or services.

Examples of committed costs include:

Depreciation, Rent, Supervisor salaries and Property taxes

4.3.2 Variable Cost

Variable costs vary in direct proportion to changes in the level of production. This indicates that total variable cost increases when more units are produced and decreases when less units are produced. A variable cost changes in total in proportion to changes in the related level of total activity or volume. (Horngren, Datar & Rajan, 2012). A variable cost is a cost whose total dollar amount varies in direct proportion to changes in the activity level. If the activity level doubles, the total variable cost also doubles. If the activity level increases by only 10%, then the total variable cost increases by 10% as well. (Garrison, Noreen & Brewer, 2011).

Characteristics of variable costs:

- (i) Total costs is variable / changeable
- (ii) Per unit cost is constant

For example:

Total Cost (a)	Tk.10,000	Tk.20,000	Tk.30,000
Number of persons (b)	5,000	10,000	15,000
Variable Cost per Unit (a/b)	Tk.2.00	Tk.2.00	Tk.2.00

If we assume that per cup tea of a tea stall is Tk.2.00 and when 5,000 persons are drinking tea, they have to pay Tk.10,000 but when 10,000 persons are drinking tea, they have to pay Tk.20,000 and when 15,000 persons are drinking tea, they are paying Tk.30,000. Here per cup rate is fixed.

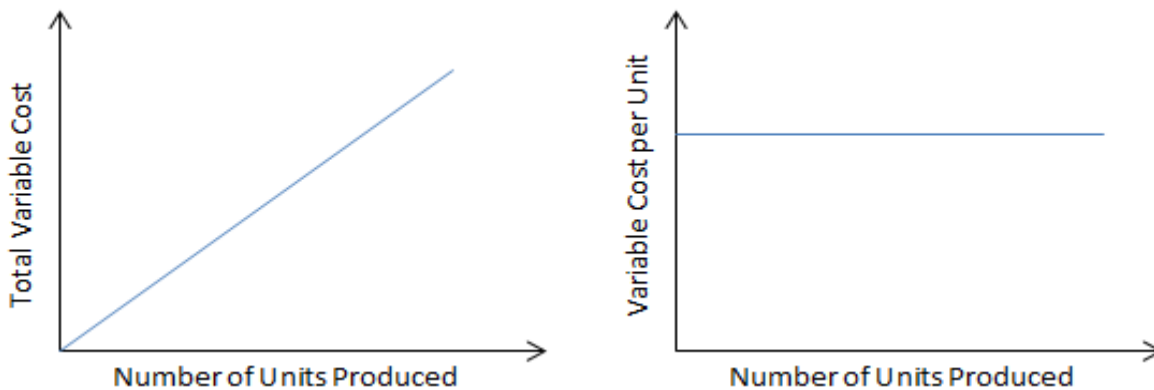


Figure # 2 Total and Per Unit Variable Cost Behavior

4.3.2.1 Step Variable Costs

A step variable cost is a cost that generally varies with the level of activity, but which tends to be incurred at certain discrete points and involve large changes in amounts when such a point is reached. Because a step variable cost can remain approximately the same while activity levels change, this step effect can impact the allocated cost per manufactured unit. The allocated amount per unit decreases as the number of units produced increases, until such time as the higher volume level triggers the incurrence of a new step variable cost, after which the cost per unit increases due to the higher total variable cost.

Example of a Step Variable Cost

An example of a step variable cost is the compensation of a quality assurance (QA) worker in the assembly area of a production department. Each QA worker is capable of reviewing a certain number of parts per day. Once the production



process exceeds that volume level, another quality assurance worker must be hired. Thus, the cost of the QA person generally varies with the level of activity, but only changes at discrete points - when the existing QA staff can no longer handle the work load, forcing another person to be hired.

4.3.2.2 True variable Costs

True variable cost (also known as proportionately variable cost) may be defined as a cost whose total amount increases or decrease in direct proportion to the change in the level of activity that drives the cost. In real manufacturing processes, only a few costs are truly or proportionately variable. The most common example of true variable cost is the cost of direct materials used in manufacturing processes.

4.3.3 Semi-Variable / Semi-fixed / Mixed Cost

Mixed costs or semi-variable costs have properties of both fixed and variable costs due to presence of both variable and fixed components in them. An example of mixed cost is electricity expense because it usually consists of a fixed component such as line rent and fixed subscription charges as well as variable cost charges per kw cost. For appropriate decision making, management needs to make separation of mixed cost into both fixed and variable components. A mixed cost contains both variable and fixed cost elements. Mixed costs are also known as semi variable costs. (Noreen, Brewer & Garrison, 2011). Some costs have both fixed and variable elements and are called mixed or semi variable costs. For example, a company's telephone costs may have a fixed monthly payment and a charge per phone-minute used. (Horngren, Datar & Rajan, 2012).

Example:

Electricity bills

(i) Fixed cost = rental charge

(ii) Variable cost = charge per unit of electricity used

Techniques of segregation of mixed cost into both variable and fixed elements:

- (i) High-Low Method
- (ii) Scatter Diagram Method and
- (iii) Regression Analysis

Steps to follow to estimate the fixed and variable elements of mixed costs

There are various steps to estimate the fixed and variable elements of mixed costs which are given below:

Step1 Review records of costs in previous periods:

- Select the period with the highest activity level.
- Select the period with the lowest activity level.

Step2 Determine the following:

- Total cost at high activity level.
- Total cost at low activity level.
- Total units at high activity level.
- Total units at low activity level.

Step3 Calculate the following:

$$\frac{\text{Total cost at high activity level} - \text{total cost at low activity level}}{\text{Total units at high activity level} - \text{total units at low activity level}} = \text{variable cost per unit}$$

Step4 The fixed costs can be determined as follows:

(Total cost at high activity level) – (total units at high activity level × variable cost per unit)

4.3.31 High Low method

The high-low method is a technique used to separate mixed costs into variable cost and fixed costs. Although the high-low method is easy to apply, it is seldom used because it can distort costs, due to its reliance on two extreme values from a given data set.

High-Low Method Formula

The formula for developing a cost model using the high-low method is as follows:



$$\text{Variable cost per unit} = \frac{\text{Highest activity cost} - \text{Lowest activity cost}}{\text{Highest activity units} - \text{Lowest activity units}}$$

Once the variable cost per unit is determined:

Fixed cost = Highest activity cost – (Variable cost per unit x Highest activity units)

or

Fixed cost = Lowest activity cost – (Variable cost per unit x Lowest activity units)

The linear equation formula is

$Y=a+bx$

Where,

Y= Total Costs

a = Fixed costs

b = Variable cost per unit

x = Total activities.

4.3.3.Scatter Diagram Method

Scatter graph method makes use of a graphical representation of ‘mixed cost’ of a company and the activity levels which affect this cost or due to which this cost is incurred. The activity levels of the business is usually marked upon the horizontal axis (i.e., x-axis) and the attached costs on the vertical axis (i.e., y-axis). A regression line is then drawn to match the points at which these two variables meet.

Like high-low point method and least squares regression method of mixed cost analysis, scatter graph method follows the following cost function:

$y = a + bx$

Where:

- y = total cost
- a = total fixed cost
- b = variable cost units
- x = activity level

4.3.4Regression Analysis for Mixed Costs

Mixed costs, also known as semi-variable costs, exhibit characteristics of both fixed and variable costs. They vary with the level of activity but also have a fixed component that remains constant regardless of production or sales volume. Imagine a company's utility bill: the base charge (fixed) remains the same each month, while the usage charges (variable) fluctuate based on consumption.

4.4Analysis of Variance (ANOVA)

H₀ There are no significant impact of variable costs on decision making.

Table # 1

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	3.209E10	4	8.022E9	4.223	.005
Within Groups	1.045E11	55	1.899E9		
Total	1.366E11	59			



Table #1 focuses the calculated value of F (4.223) is greater than the critical value F (2.54) with (4,55) degree of freedom at 5 percent level of significance. So, the null hypothesis is rejected. If we also compare the sig. value then we can see that the significance value is less than alpha i.e. .05. So, null hypothesis is rejected. It indicates that there are significant impact of variable costs on decision making.

H₀₂ There are no significant impact of fixed costs for certain level of activity or certain time on decision making.

Table # 2

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.158	4	.039	.895	.473
Within Groups	2.426	55	.044		
Total	2.584	59			

Table # 2 shows the calculated value of F (0.895) is less than the critical value F (2.54) with (4,55) degree of freedom at 5 percent level of significance. So, the null hypothesis is accepted. If we also compare the sig. value then we can see that the significance value is more than alpha i.e. .05. So, null hypothesis is accepted. It indicates that there are **no significant impact of fixed costs for certain level of activity or certain time on decision making.**

H₀₂ There are no significant impact of mixed costs on decision making.

Table # 3

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	29.532	4	7.383	4.129	.003
Within Groups	259.301	145	1.788		
Total	288.833	149			

Table #3 depicts the calculated value of F (4.129) which is greater than the critical value F (2.37) with (4,145) degree of freedom at 5 percent level of significance. So, the null hypothesis is rejected. If we also compare the sig. value then we can see that here the significance value is less than alpha i.e. .05. So, null hypothesis is rejected. It indicates that there are **significant impact of mixed costs on decision making.**

5.CONCLUSION

From the above discussion it can be concluded, that the concept of cost behavior is very important aspect of cost management that identifies and analyzes the factors that influence the cost of a product or service of an organization. There is a positive aspect of the findings of the study is that companies should aware of the importance and significance of cost management. In order to make growth of the company financial manager need to apply cost efficient strategy. Since the identification and grouping of costs based on their behavior is very complex activity, yet it must take into account certain characteristics depending on the nature and activities of the company. Understanding cost behavior is essential for each and every company to improve profitability and competitiveness in the market.

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