

When accountants prepare financial statements of past performance, they use a variety of categories for recording costs. Categories such as advertising cost, administrative costs, labor costs and many others are used that help identify the type of cost.

However, using costs for decision-making is much different. For this purpose, costs are categorized into two basic types. They are classified as either variable or fixed.

A cost is variable or fixed depending on whether the amount of the cost changes as the volume of production changes. A cost is a variable cost if it increases (decreases) as the volume or production levels increase (decrease.) For example, the amount of a raw material used in the production process increases as more units of a product are produced (more corn is used to make more ethanol.)

Fixed costs do not change with changes in production. Fixed costs remain the same regardless of the amount of production. For example, the depreciation on an ethanol facility is the same regardless of whether the facility is operated at 75% of capacity or 100% of capacity.

So, for decision-making purposes, costs are categorized as either fixed or variable.

Variable Costs

Variable costs are those costs that vary directly with the amount of production. For example, if you are a pencil maker, you need an eraser for each pencil you make. So erasers are a variable cost of making pencils. If you make 1,000 pencils you need 1,000 erasers. If you make 5,000 pencils you need 5,000 erasers. If erasers cost 20 cents each, the variable eraser cost of making 1,000 pencils is \$200 (1,000 X \$.20). If you make 2,000 pencils, the variable cost is \$400 (2,000 X \$.20). Total variable costs are the sum of all of the costs that vary in direct proportion to production.

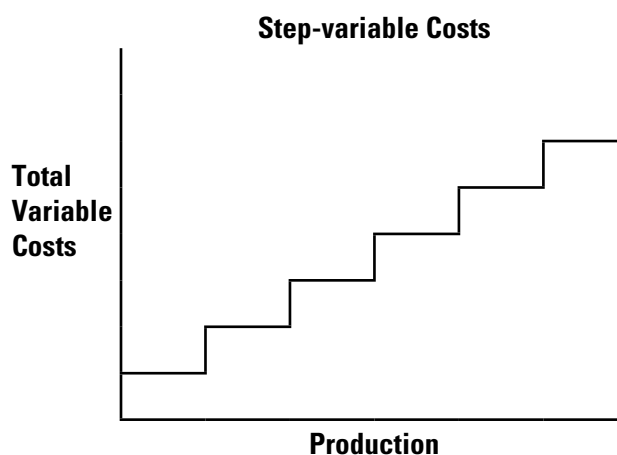
Semi-variable Costs

Semi-variable costs are costs that have both a variable and fixed component. Commercial leases often have a fixed rent per month plus an additional rent based on the amount of production or sales. For example, rent is \$5,000 plus five cents for each pencil that is made. The base rent of \$5,000 is a fixed cost and the five cents per pencil is a variable cost.

Step-variable Costs

Step-variable costs are costs that are constant over a range of production. If one employee can make 10,000 pencils, then the employee's wage is constant over a production range of one to 10,000 pencils. If you produce 11,000 pencils, you will need another employee. So your cost doubles. If you make 25,000 pencils, your cost triples because you need three employees.

Figure 1. Step-variable Costs



However, this cost can be converted to a true variable cost by paying employees a fixed amount for each pencil they make, instead of a fixed wage. For example, if the employee is paid 10 cents for each pencil he or she makes, the labor cost is now a true variable cost.

Fixed Costs

Fixed costs are those costs that don't change regardless of the amount produced. If our pencil maker hires a bookkeeper for \$10,000, this is a fixed cost because the cost stays the same regardless of the number of pencils that are produced. Fixed cost may only be relevant over a range of production. For example, if a processing facility capacity is 100,000 units of production, 100,000 is the upper limit of the range for the fixed cost. Production over 100,000 will require additional facility investment which will mean more fixed costs.

Example 1

Using the pencil maker example above, the variable and fixed costs are shown below.

Variable cost per pencil	
Erasers	\$.20
Rent	.05
Labor	.10
Total	\$.35

Fixed cost	
Rent	\$5,000
Labor	<u>10,000</u>
Total	\$15,000

Total cost can be computed using this formula:

Total Cost = (Variable Cost x Units Produced) + Fixed Costs

If 10,000 pencils are made, total cost is \$18,500

$$\text{Total Cost} = (\$.35 \times 10,000) + \$15,000$$

$$\text{Total Cost} = \$3,500 + \$15,000$$

$$\text{Total Cost} = \$18,500$$

If 100,000 pencils are made, total cost is \$50,000

$$\text{Total Cost} = (\$.35 \times 100,000) + \$15,000$$

$$\text{Total Cost} = \$35,000 + \$15,000$$

$$\text{Total Cost} = \$50,000$$

Avoidable Fixed Costs

Avoidable fixed costs are costs you are not required to incur. In other words, you will stay in business if you don't incur the cost. If the pencil

maker spends \$5,000 on advertising the pencils, this is a fixed cost. However, it is avoidable because the pencil maker can stop buying advertising and still stay in business (although sales volume may suffer).

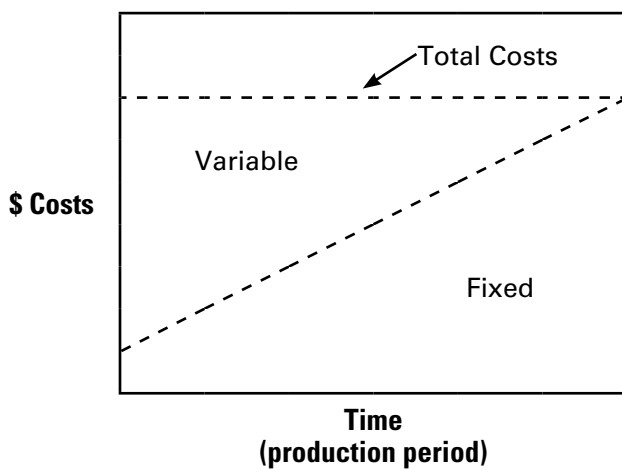
Unavoidable Fixed Costs

Unavoidable fixed costs are costs you have to incur if you want to stay in business. For example, the administrative costs of running a processing facility are an unavoidable fixed cost. Interest on term debt on the facility is also an unavoidable fixed cost.

Sunk Costs

Sunk costs are costs that have been paid. A variable cost that is paid becomes a form of fixed cost called a sunk cost. Because the cost has already been paid, it is a fixed cost. Avoidable fixed costs become unavoidable fixed costs once the cost has been paid. Likewise, a variable cost becomes a sunk cost once it has been paid as shown in the figure below. For example, purchasing \$2,000 worth of erasers to use in making pencils (above) is a sunk cost. As you progress through the production period, costs that were initially variable become fixed. Once the pencils are produced and entered into inventory, most of the variable costs have been incurred and become sunk or fixed costs.

Figure 2. Costs Over Time



Decision Making

The net return or profit from the pencil example can be computed by using variable and fixed costs.

Another example is shown below.

Example 2

Assume

Pencil price = \$1.00

Pencil sales = 50,000

Variable cost = $\$.35 \times 50,000 = \$17,500$

Fixed cost = 15,000

Total cost = \$32,500

Revenue = $\$1.00 \times 50,000 = \$50,000$

Net return = \$17,500

Example 3

Assume

Pencil price = \$.75

Pencil sales = 25,000

Variable cost = $\$.35 \times 25,000 = \$8,750$

Fixed cost = \$15,000

Total cost = \$23,750

Revenue = $\$.75 \times 25,000 = \$18,750$

Net return = (\$5,000)

Additional Information

Visit the [Ag Decision Maker website](http://www.extension.iastate.edu/agdm/vdanalysis.html#concepts) for additional resources on economic and business analysis concepts, www.extension.iastate.edu/agdm/vdanalysis.html#concepts.