

CHAPTER - THREE & FOUR

FLEXIBLE BUDGETS AND STANDARD COSTING

Introduction

Fixed Budgets

These are also known as a “static” budget, because the budget remains at the fixed levels that were used when the budget was created. It does not change, even though the considerations or plans that went into its development might change. Accurate results are tough to interpret with fixed budgets, because a budget that was based on 1,000 pizzas is going to be much different if you actually ended up only making 800 pizzas.

According to C.I.M.A., London, “a fixed budget is a budget which is designed to remain unchanged irrespective of the level of activity actually attained.”

Thus, a budget prepared on the basis of a standard or fixed level of activity is known as a fixed budget. It does not change with the change in the level of activity. Therefore, it becomes an unrealistic yardstick in case the level of activity actually attained does not confirm to the one assumed for budgeting purposes. The management will not be in a position to assess the performance of different heads on the basis of budgets prepared by them because they can serve as yardsticks only when the actual level of activity corresponds to the budgeted level of activity.

Fixed budget is useful when there is no significant variation between the budgeted output and the actual output. It does not consider variances due to changes in the volume. In the industries where the pattern of demand is stable a fixed budget may be adequate, especially where the budget period is comparatively short. In such concerns it is possible to forecast sales with a considerable degree of accuracy.

A budget is a formal plan of action expressed in monetary terms. A budget that is based on a single estimate of expected sales and production is called a “static budget”. The yearly master budget which is developed around a single (static) planned output level explained in the preceding chapter in a static budget. In

short, static or master budget is prepared based on the level of output planned at the start of the budget period. All static budgets have the following common points:-

1. They are geared towards only one level of activity
2. They are static in nature in that comparison of actual result is always made against budgeted costs at the original budget activity level.

Static budget variances

A **variance** is the difference between actual price and quantity and standard budgeted price and quantity. The budgeted performance is the expected performance, which is a point of reference for making comparisons. This chapter helps to distinguish of these variance is computed.

Static budget variance is the difference between the actual result and the corresponding budgeted amount in the static budget.

$$\text{Static budget variance} = \text{Actual result} - \text{Static budget amount}$$

Variance may be favorable variance or unfavorable variance.

📖 **Favorable variance (denoted by F):-** has the effect of increasing operating income relative to the budgeted amount.

📖 **Unfavorable variances (denoted by u):-** has the effect of decreasing operating income relative to the budgeted amount. Unfavorable variances are also called **adverse variances** in some countries, for example, the **United Kingdom**.

📖 For revenue items, favorable means actual revenues exceed the budgeted revenues and the reverse is true for unfavorable variance.

📖 For cost items, favorable means actual cost less than budgeted costs and the reverse is true for unfavorable variance.

Example: 1: ABC Company manufactures and sells jackets. The jackets require tailoring and many hand operations. The company incurred only manufacturing

costs. ABC Company has three variable cost categories. The budgeted variable cost per jacket for each category is:-

<u>Cost category</u>	<u>Variable cost per jacket</u>
Direct material costs	\$ 60
Direct manufactory labor costs	\$16
Variable manufacturing overhead costs	<u>12</u>
Total variable costs	<u>\$88</u>

The number of units manufactured is the cost driver for direct materials, direct manufacturing labor, and variable manufacturing over head. The relevant range for the cost driver is from 0 to 12,000 jackets. Budgeted and Actual data for April 2008 follow:-

Budgeted fixed cost under the relevant range.....	\$276,000
Budgeted selling price	\$120 per jackets
Budgeted production and sales	\$12,000 jackets
Actual fixed cost under the relevant rage.....	\$285,000
Actual selling price	\$125 per jackets
Actual variable costs	\$10,000 jackets

<u>Cost category</u>	<u>Variable cost per jacket</u>
Direct material costs.....	\$62.16
Direct manufacturing labor costs	19.8
Variable manufacturing over head costs	13.05
Total variable cost	95.01

Required

Compute Actual operating income static budget operating income and static budget variance for operating income.

Additional information

All direct materials are purchased and used in the same budget period and there is no direct material inventory at either the beginning or the end of the period. No work-in-process or finished goods inventories exist at either the beginning or the end of the period.

Solution

$$(1) \qquad (2)=(1)-(3) \qquad (3)$$

Budget	Actual	Static Results	Budget Variances	Static
Unit sold	10,000	2000U		12,000
Revenues		<u>\$1,225,000</u>		<u>\$190,000U</u>
<u>\$1,440,000</u>				
Variable costs				
Direct material	621,600	98,000F		720,000
Direct manufactory labor	198,000	6,000U		192,000
Variable manufactory overhead	130,500	13,500F		144,000
Total variable costs	950,100	105,900F		1,056,000
Contribution margin	299,900	84,100 U		384,000
Fixed costs	<u>285,000</u>	<u>9,000 u</u>		<u>276,000</u>
Operating income	<u>\$14,900</u>	<u>\$93,100U</u>		<u>\$108, 000</u>

Static budget variance for operating income

Actual contribution margin % = $\$299,900 \div \$1,250,000 = 24\%$

Budgeted contribution margin% = $\$384,000 \div 1.440, 000 = 26.7\%$

Flexible budgets

Flexible Budgets - These are budgets that “flex” or change with varying levels of activity. Most of the time flexible budgets correspond to actual levels of output. With our example, we would “flex” or adjust our budget to correspond with the actual output of 800 pizzas. This makes interpretation of the results much more meaningful. They help management evaluate performance. We will work on creating flexible budgets in class, but the strategy is to identify costs as either variable or fixed. Variable costs will change as the output changes, and fixed costs will remain the same.

Flexible budget, also known as variable or sliding sale budget, is a budget which is designed to furnish budgeted costs for any level of activity actually attained. Flexible budgeting technique may be employed to adjust other budgets

according to current conditions arising out of seasonal variations or changes in the length of the working period etc.

According to C.I.M.A., London, “a flexible budget is a budget designed to change in accordance with the level of activity actually attained.”

- ➔ A budget prepared in a manner so as to give the budgeted cost for any level of activity is known as a flexible budget.
- ➔ Such a budget is prepared after considering the fixed and variable elements of cost and the changes that may be expected for each item at various levels of operations.
- ➔ Under this method, a series of budgets would be prepared at different levels of activity. Variable items are shown in the budget as per the level of output.
- ➔ Fixed costs are shown at the same amount irrespective of level of output. Sales value is computed and entered into the flexible budget.
- ➔ The position of profit or loss will be revealed at the various levels of activity. Management will take a decision to operate at a particular level of activity where the profit is maximum taking into account all other factors.

A flexible budget is more realistic, useful and practical. The likely changes in the actual circumstances are taken into account while preparing a flexible budget. The technique is highly useful for control purposes. Actual performance of an executive may be compared with what he should have achieved in the actual circumstances and not with what he should have achieved under quite different circumstances.

Developing flexible budget

The only difference between static budget and flexible budget is that static budget is prepared for the planned output; whereas flexible budget is based on the actual output.

Steps in developing a flexible budget

Step 1: Identify the actual quantity of output

Step 2: Calculate flexible budget for revenues based on budgeted selling Price and actual quantity of output.

Step 3: Calculate flexible budget for costs based on budgeted variable cost per output Unit, Actual quantity of output and budgeted fixed cost.

Example: 8.2 using example 8.1 develop flexible budget.

Solution:

Step1 Identify the actual quantity of output

In April 2003 ABC produced and sold 10,000 jackets

Step2 Flexible budget for revenues

Flexible budget revenue=budgeted selling price x actual quantity of output.
= \$120 per jacket x 10,000 jackets.
= **\$1,200,000**

Step 3 flexible budgets for cost

Flexible budget variable costs

Direct materials, \$60 per jacket x 10,000 jackets
\$600,000

Direct manufacturing labor, \$16 per jacket x10, 000 jackets.....
160,000

Variable manufacturing overhead, \$12 per jacket x10, 000 jak...
120,000

Total flexible-budget variable costs.....
880,000

Flexible budget fixed costs 276,000

Flexible budget total costs **\$1,156,000**

Flexible-Budget Variances & Sales-Volume Variances

Flexible-Budget Variance

Once the flexible budget in prepared, the manager is ready to compare actual results for a period against the comparable budgeted level anywhere with in the relevant range.

The **flexible-budget variance** is the difference between an actual result and the corresponding flexible budget amount based on the actual output level in the budget period.

Flexible budget variance = Actual result - Flexible budget amount

Example 3: using data presented in example 3.1 compute flexible budget variances.

	Actual budget Results	Flexible-budget variance	Flexible
Units sold	10,000	0	10,000
Revenues	\$1,250,000	50,000F	\$1,200,000
Variable costs			
Direct material variance	621,600	21,600U	600,000
-Direct manufactory labor	198,000	38,000U	
160,000			
Variable manufactory overhead	<u>130,500</u>	<u>10,500U</u>	
120,000			
Total variable cost	<u>950,100</u>	<u>70,100U</u>	<u>880,000</u>
Contribution margin	299,900	20,100U	
320,000			
Fixed cost	<u>285,000</u>	<u>9,000U</u>	<u>276,000</u>
Operating income	<u>\$14,900</u>	<u>\$29,100U</u>	<u>\$44,000</u>

The operating income in example 3.3 shows the flexible budget variance is \$29,100U (\$14,900-\$44,000). The \$29,100 unfavorable variance arises because actual selling price, variable cost per unit and fixed costs differ from their budgeted amount. The flexible-budget variance for revenues is called the selling-price variance because it arises solely from the difference between the actual selling price and the budgeted selling price:

$$\text{Selling-price variance} = \left(\frac{\text{Actual} - \text{Budgeted}}{\text{selling price} - \text{selling price}} \right) \times \text{Actual units sold}$$

$$\begin{aligned} \text{Variance} &= (\$125 \text{ per jacket} - \$120 \text{ per jacket}) \times 10,000 \text{ jackets} \\ &= \underline{\underline{\$50,000F}} \end{aligned}$$

Sales-Volume variance

The **Sales-Volume Variance** is the difference between a flexible-budget amount and the corresponding static-budget amount.

$$\text{Sales-Volume Variance} = \text{Flexible budget amount} - \text{Static budget amount}$$

The flexible-budget variance for revenues is called the selling-price variance because it arises solely from the difference between the actual selling price and the budgeted selling price:

$$\text{Selling-price variance} = \left(\frac{\text{Actual} - \text{Budgeted}}{\text{selling price}} \right) \times \text{Actual units sold}$$

Example: 4 using data presented in example .1 compute:

1. Flexible-budget variance
2. Sales-volume variance
3. Static budget variance and
4. Selling price variance

Standard costing-

A control technique that reports variances by comparing actual costs to pre-set standards facilitating action through management by exception. A **standard cost** is an estimated unit cost built up of standards for each cost element (standard resource price and standard resource usage).



Standard costing is principally used to value inventories and cost production and to act as a control device.



The pre-set standards require managers to plan in advance the amount and price of each resource that will be used in providing a service or manufacturing a product.

- 📖 These pre-set standards, for selling prices and sales volumes as well as for costs, provide a basis for planning, a target for achievement and a benchmark against which the actual costs and revenues can be compared.
- 📖 The actual costs and revenues recorded after the event are then compared with the preset standards and the differences are recorded as variances.
- 📖 If resource price or usage is above standard, or if sales volume or selling price is below standard, an adverse variance will result.
- 📖 If resource price or usage is below standard or if sales volume or selling price is above standard, a favorable variance will result.
- 📖 Careful analysis of the variances and their presentation to management can help to direct managers' attention to areas of the business that are performing below or above expectation.
- 📖 If certain variances are large or significant then managers can concentrate their attention on these activities where any corrective action is likely to be most worthwhile.
- 📖 If other variances are small or not significant then managers can ignore these activities, knowing that they appear to be conforming to expectations.
- 📖 A standard cost is a carefully predetermined unit cost which is prepared for each cost unit. It contains details of the standard amount and price of each resource that will be utilized in providing the service or manufacturing the product.
- 📖 In order to be able to apply standard costing it must be possible to identify a measurable cost unit. This can be a unit of product or service but it must be capable of standardizing,
- 📖 For example, standardized tasks must be involved in its creation. The cost units themselves do not necessarily have to be identical.
- 📖 For example, standard costing can be applied in situations such as costing plumbing jobs for customers where every cost unit is unique. However, the plumbing jobs must include standardized tasks for which a standard time and cost can be determined for monitoring purposes.

The standard cost of product 12345 is set out below on a **standard cost card**.

Standard Cost Card			
Product: the Splodget, No 12345			
		<i>Cost</i>	<i>Requirement</i>
		\$	
Direct materials			
	A	\$2.00 per kg	6 kgs
12.00			
	B		\$3.00 per kg
2 kgs	6.00		
	C		\$4.00 per liter
1 liter	4.00		
			Others
<u>2.00</u>			
24.00			
Direct labour			
	Grade I	\$4.00 per hour	3 hrs
12.00			
	Grade II		\$5.40 per hour
5 hrs	<u>27.00</u>		
39.00			
Variable production overheads			\$1.00 per hour
8 hrs	8.00		
Fixed production overheads			\$3.00 per hour
8 hrs	<u>24.00</u>		
Standard full cost of production			⇒
-----		<u>95.00</u>	

📖 Notice how it is **built up from standards for each cost element**: standard quantities of materials at standard prices, standard quantities of labour time at standard rates and so on. It is therefore determined by management's estimates of the following.

- The expected prices of materials labour and expenses
- Efficiency levels in the use of materials and labor
- Budgeted overhead costs and budgeted volumes of activity

Reasons for using a standard costing system

Standard costing has two principal **uses**.

- ▢ **To value inventories and cost production** for cost accounting purposes. It is an alternative method of valuation to methods like FIFO and LIFO which you will have covered in your earlier studies.
- ▢ **To act as a control device** by establishing standards (expected costs) and comparing actual costs with the expected costs, thus highlighting areas of the organization which may be out of control.
- ▢ It can also be used in the following circumstances.
 - 📖 To assist in setting **budgets** and **evaluating managerial performance**.
 - 📖 To enable the principle of '**management by exception**' to be practiced. A standard cost, when established, is an average expected unit cost. Because it is only an average, actual results will vary to some extent above and below the average. Only significant differences between actual and standard should be reported.
 - 📖 To provide a prediction of future costs to be used in **decision-making** situations.
 - 📖 To **motivate** staff and management by the provision of challenging targets.
 - 📖 To provide guidance on possible ways of **improving efficiency**.

Although the various uses of standard costing should not be overlooked, we will be concentrating on the control aspect.

Standard costing as a control technique

Question: What are the possible advantages for the control function of an organization of having a standard costing system?

Answer:

- 📖 Carefully planned standards are an aid to more accurate **budgeting**.
- 📖 Standard costs provide a **yardstick** against which actual costs can be measured.

- 👉 The setting of standards involves determining the **best** materials and methods which may lead to economies.
- 👉 A **target of efficiency** is set for employees to reach and **cost-consciousness** is stimulated.
- 👉 Variances can be calculated which enable the principle of '**management by exception**' to be operated. Only the variances which exceed acceptable tolerance limits need to be investigated by management with a view to control action.
- 👉 Standard costs and variance analysis can provide a way of **motivation** to managers to achieve better performance. However, care must be taken to distinguish between controllable and non-controllable costs in variance reporting.

Where standard costing should be used

Standard costing is most suited to mass production and repetitive assembly work. Although standard costing can be used in a variety of costing situations (batch and mass production, process manufacture, jobbing manufacture (where there is standardization of parts) and service industries (if a realistic cost unit can be established)), the **greatest benefit** from its use can be gained if there is a **degree of repetition** in the production process so that average or expected usage of resources can be determined. It is therefore most suited to **mass production** and **repetitive assembly work** and less suited to organizations which produce to customer demand and requirements.

In general, standard costing involves the establishment of predetermined estimates of the costs of products or services, the collection of actual costs and the comparison of the actual costs with the predetermined estimates. The predetermined costs are known as standard costs and the difference between standard and actual cost is known as a **variance**. The process by which the total difference between standard and actual results is analysed is known as **variance analysis**.

Variance analysis

Variance is the difference between the expected standard cost and the actual cost incurred. A unit standard cost contains detail concerning both the usage of resources and the price to be paid for the resources.

Variance analysis involves breaking down the total variance to explain how much of it is caused by the usage of resources being different from the standard, and how much of it is caused by the price of resources being different from the standard. These variances can be combined to reconcile the total cost difference revealed by the comparison of the actual and standard cost.

A variance is the difference between an actual result and an expected result. The process by which the total difference between standard and actual results is analysed is known as variance analysis. When actual results are better than the expected results, we have a favorable variance (F). If, on the other hand, actual results are worse than expected results, we have an adverse (A).

Standard costing is an important subtopic of cost accounting. Standard costs are usually associated with a manufacturing company's cost of direct material, direct labor and manufacturing over head.

A standard can be defined as a bench mark for measuring performance. Cost and quantity standards are set by managers for all three elements of cost inputs i.e, materials, labor, and overhead. Quantity standards say how much of a cost element, such as labor time, should be used in producing a single unit of product.

Cost standard say what the cost of this amount of time should be. Actual quantity and actual cost of inputs are measured against these standards to see if operations are proceeding with in the limits that management has set. If either quantity or cost of inputs exceeds the bound which management has set, attention is directed to the difference, thereby permitting the manager to focus

his or her efforts where they will do the most good. This process is called management by exception.

Benefits of standard costs

Helps managers:-

- 📄 In budget preparation
- 📄 Target levels of performance
- 📄 Identify performance standard
- 📄 Set sales prices
- 📄 Decrease accounting costs

A standard input is a carefully determined quantity of input required for one unit of output. A standard price is a carefully determined price that a company expects to pay for a unit of input.

A standard cost is a carefully determined cost of a unit of output.

$$\left(\begin{array}{c} \text{Standard cost per output unit} \\ \text{for each variable directcost} \\ \text{input} \end{array} \right) = \left(\begin{array}{c} \text{standard input allowed} \\ \text{for one output unit} \end{array} \right) \times \left(\begin{array}{c} \text{standard price} \\ \text{per input unit} \end{array} \right)$$

Standard for material

Direct material price standard should reflect the final, delivered cost of materials, net of any discounts taken. Direct material input or quantity standard should reflect the amount of material going into each unit of finished product.

Standard for labor

Direct labor price and quantity standards are usually expressed in terms of labor rate and labor-hours. The standard direct labor rate would include not only wages earned but also allowance benefits and other labor-related costs. The standard direct labor time required to complete a unit of product is standard direct labor input. In the example mentioned: 2 square yards of cloth input

allowed per output unit (jacket) manufactured, at \$30 standard price per square yard.

Standard direct material cost per unit = 2 square yardsx\$30 per square yards: \$60 In addition, 0.8 manufacturing labor-hour of input allowed per output unit mafactured, at \$20 standard price per hour. Standard direct manufacturing =0.8 labor hourx\$20 per labor hour=\$16 Labor cost per jacket.

How the words” budget” and “standard” related? Budget is the broader term. To clarity: Budgeted input prices, budgeted input quantities, and budgeted costs need not be based on standards. However, when standard are used to obtain budgeted input prices and quantity, the terms “standard” and “budget” are used interchangeably. Standard cost trace direct cost of output produced by multiplying the standard price or rates by the standard quantities of inputs allowed for actual output produced and allocates over head costs on the basis of the standard over head. Cost rates times the standard quantities of the allocation bases allowed for the actual output produced.

Consider ABC’s two direct cost categories. The actual costs for each of these categories for the 10,000 jackets manufactured and sold in April 2008 is:-

Direct materials purchased and used	
1. Square yards of cloth purchased and used.....	22,200
2. Actual price incurred per square yard.....	\$28
3. Direct material costs (22,200x\$28).....	\$621,600
• Standard direct material per jacket	2 square yards
• Standard price per square yard	\$30
• Standard direct material cost per jacket(30x2)	\$60

Direct manufacturing labor

1. Direct manufacturing labor-hours.....	9,000
2. Actual price incurred per direct manufacturing labor hour....	\$22
3. Direct manufacturing labor costs (9000x\$22).....	\$198,000

Standard direct manufactured labor hour of input allowed per output unit manufactured..... 0.8 hours

Standard price per hour \$20
 Standard direct manufacturing labor cost per jacket..... \$16

Required

1. Compute price or rate variance for direct material and Direct manufactory labor
2. Compute efficiency or usage variance for direct material and dir3ect manufacturing labor.

Solution:

$$1. \text{ Price variance} = \left(\frac{\text{Actual price} - \text{budgeted price}}{\text{of input}} \right) \times \text{Actual quantity of input.}$$

$$= \left(\frac{\text{Actual price} \times \text{actual quantity}}{\text{of input}} \right) - \left(\frac{\text{budget price} \times \text{Actual quantity}}{\text{of input}} \right)$$

Price variance for direct materials =

$$= (\$28 \text{ per square yard} - \$30 \text{ per Sq.yard}) \times 22,200 \text{ square yards}$$

$$= \underline{\underline{\$44,400U}}$$

$$\begin{array}{l} \text{Price variance for} \\ \text{Direct manufacturing labor} \end{array} = (\$22 \text{ per hour} - \$20 \text{ per hour}) \times 9,000 \text{ hours}$$

$$= \underline{\underline{\$18,000U}}$$

2. Efficiency variance=

$$\left(\frac{\text{Actual quantity of input used} - \text{budgeted quantity of input allowed for actual output}}{\text{of input}} \right) \times \text{budgeted price of input}$$

$$\left(\frac{\text{Actual quantity of input used}}{\text{budgeted price of input}} \right) - \left(\frac{\text{budgeted quantity of inpt allowed for actual output} \times \text{budgeted price of input}}{\text{budgeted price of input}} \right)$$

Direct material

$$\begin{aligned} \text{Efficiency variance} &= (22,200 \text{ sq.yards} - (10,000 \text{ units} \times 2 \text{ sq.yard/unit} \times \$30 \text{ per sq.yard})) \\ &= (22,200 \text{ sq.yards} - 20,000 \text{ sq.yards}) \times \$30 \text{ per sq.yard} \\ &= \underline{\underline{\$66,000U}} \end{aligned}$$

$$\begin{aligned} \text{Direct manufacturing} \\ \text{Labor efficiency Variance} &= (9,000 \text{ hours} - 8,000 \text{ hours}) \times \$20 \text{ per hour} \\ &= \underline{\underline{\$20,000\text{U}}} \end{aligned}$$

Input Variance

Manufacturing Input Variances

Manufacturing input variances are a special class of variances, including direct materials, direct labor, and manufacturing overhead used in production. These variances are concerned with inputs to the manufacturing process and whether the amount of inputs used per unit manufactured was over or under the standard or whether they cost more or less per unit than the standard, and what the cost impact was of each type of variance. Manufacturing input variances are used in controlling production.

In the accounting system, manufacturing input variances are closed out at the end of each period to cost of sales or, if material, they are prorated among cost of sales, finished goods inventory and work in process inventory.

A variance report like the one a few pages back will not reflect the exact manufacturing input variances, because that variance report reflects sold units, not manufactured units. The input cost variances for the sold units are included in the flexible budget variance amount on the above report, because they are included in the Actual Results column that is compared with the Flexible Budget column to calculate a Flexible Budget variance. However, the detail is not there, and they should not be expected to reconcile with a production variance report.

A production variance report includes all units produced, whether they were sold or whether they remained in inventory as unsold units at the end of the period. But a variance report like the one we saw first is a Sales Variance Report, and it presents results of sales.

Before getting into the specific manufacturing input variances, let us think for a moment about the possible reasons for an actual input cost to be different from the standard (i.e., expected or budgeted) cost. The standard cost is determined using an estimated cost and an estimated level of usage. It is obvious that if the company either pays a different price than had been budgeted, or uses a different amount than was budgeted for the actual output, the actual cost for the actual output will be different from the budgeted cost for the actual output.

The simple fact that the actual cost is different from the budgeted amount is not, by itself, useful enough for management. Management needs to know why the actual cost is different from the budgeted amount.

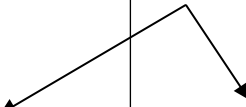
- Is it because a different amount of raw materials or labor was used than should have been used for the actual output?
- Or was it because a different price was paid for the raw materials or labor?
- Or (more likely) was it because of differences in both?

The process of variance analysis will enable management to separate out the specific reason(s) for the variance and then focus its efforts on the areas that have a negative impact on the business – identified by unfavorable variances.

In variance analysis, we subdivide input cost variances into

- 1) A price variance that reflects the difference between actual and budgeted input prices and
- 2) A quantity variance, also called an efficiency variance, which reflects the difference between actual and budgeted input quantities used.

Prime Costs	Price Variance $(AP - SP) \times AQ$	Quantity Variance $(AQ - SQ) \times SP$
Materials	Price Variance	Quantity Variance
Labor	Rate Variance	Efficiency Variance



	Mix Variance	Yield Variance
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Multiple Inputs (both Material and Labor)	$(WASPAM - WASPSM) \times AQ$	$(AQ - SQ) \times WASPSM$
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Variable Overhead	Spending Variance $(AP - SP) \times AQ$	Efficiency Variance $(AQ - SQ) \times SP$
Fixed Overhead	Spending (Flexible Budget) Variance Actual OH – Budgeted OH	Production Volume Variance Budgeted OH – Applied OH

Direct Materials Variances

We will start by looking at the variances related to direct materials and their usage. The total material variance (also called the flexible budget variance) is an easy one to calculate. It is the difference between the actual direct materials costs for the period and the standard costs for the standard amount of materials at the standard price per unit for the level of output actually produced (the flexible budget).

Example: Paterno Co. produces footballs. Each football requires a standard of 1 square meter of leather that has a standard cost of Br.5. During the period, Paterno produced 250 footballs and used 290 meters of leather. The cost of the leather was Br.4.50 per meter. Therefore, the actual total cost of the leather was Br.1, 305. However, given the actual output of 250 footballs, Paterno should have used only 250 meters. And since each meter should have cost Br.5, Paterno should have spent Br.1, 250 on leather in order to produce 250 footballs.

The total materials variance is:

Actual cost – 290 meters × Br.4.50	Br. 1,305
Standard cost – 250 meters × Br.5.00	<u>Br. 1,250</u>
Total variance	<u>Br. 55 U</u>

In total, we can see that Paterno spent more money than it should have for the leather to make the footballs. If a manager simply looks at this total variance, the conclusion may be that things are acceptable (it is an unfavorable variance, but it is not that large) and don't require any significant attention.

But, when we look in more depth at this example, it is obvious to us that the company used more materials than it should have, but paid less for each square meter of leather than expected. Management will most certainly look at the production process to find out why so much leather was required to make the 250 footballs.

Even though Paterno's total actual cost came close to the total standard cost, there is a significant problem with production. The company may have a very inefficient process that wastes too much leather; or perhaps it has new workers that are not as experienced as they will be in the future; or perhaps the less expensive leather that was purchased was more difficult to work with and an excessive amount was spoiled in the production process.

In any case, despite the fact that the total cost variance was small, Paterno needs to investigate further the cause of the variance in its usage of leather. Because of the need to have this more useful analysis, the total materials variance is divided into two components - price and quantity. The price variance measures how much of the total variance was caused by paying a different amount for the material than had been budgeted, and the quantity variance (also called the efficiency or usage variance) measures how much of the variance is due to using more or less of the material than budgeted.

a) Material Price Variance - the price variance (also called input price variance or rate variance) is calculated as:

$$(\text{Actual Price} - \text{Standard Price}) \times \text{Actual Quantity}$$

Or

$$(\text{AP} - \text{SP}) \times \text{AQ}$$

This measures how much of the variance was due to a difference in the price between what we expected it to be per unit and what it the price paid actually was. In the example above, the **price variance** is calculated as:

$$(\text{Br.4.50} - \text{Br.5}) \times 290 = \text{Br. (145)}$$

This means that we saved Br.145 because the price of the leather was lower than expected. This is a **favorable variance**. Remember that a negative variance for a cost is a favorable variance because it means that actual cost was lower than budgeted cost. So even though Paterno used more leather than it should have for each football it manufactured, it saved Br.50 per meter because the price was lower than expected.

- b) Material Quantity Variance** - the quantity variance (also called the efficiency or usage variance) is calculated as:

$$(\text{Actual Quantity} - \text{Standard Quantity for Actual Output}) \times \text{Standard Price}$$

Or

$$(\text{AQ} - \text{SQ}) \times \text{SP}$$

This is simply the difference between the actual material usage and the standard usage for this level of output, multiplied by the standard price. We use the standard price because we are trying to determine what the variance actually is, because we used either too much or too little material, not how much we paid for it. A positive variance is an unfavorable variance, while a negative variance is a favorable variance. In the example above, the **quantity variance** is calculated as:

$$(290 - 250) \times \text{Br.5} = \text{Br.200}$$

This is an **unfavorable variance** because if the actual price had been the same as the standard price, Paterno would have had to pay Br.200 more for the materials it used than it should have, given the number of footballs produced,

because it used too much material. The fact that it is unfavorable is indicated by the fact that the number we have calculated is positive. A positive variance for a cost indicates an unfavorable variance, while a negative variance for a cost indicates a favorable variance.

If we take these two variances and add them together, we will have the total materials variance that we first calculated.

Quantity variance	Br.200 U
Price variance	<u>(145)</u>
Total Variance	<u>Br. 55 U</u>

In total, Paterno had a positive variance of Br.55, which is unfavorable, because the cost for the extra leather that was used was more than the savings on each meter of leather.

Direct Labor Variances

As with the materials variance, the total labor variance (also called the flexible budget variance) is the difference between the standard labor costs for the actual level of output (the flexible budget) and the actual costs incurred by the company. Also similar to the materials variance, this total variance is attributable to variances in both labor rates and labor usage. This means that the company either paid a different wage rate than standard or used a different number of labor hours than standard for this level of output, or both.

Because this is so similar to variance analysis for materials, we will not cover it in detail again, but the total labor variance can be broken down into the labor rate variance (a price variance) and the labor efficiency variance (a quantity variance). These are calculated in the exact same manner as the direct material cost and usage variances, but simply have different names.

A) Labor Rate Variance - the labor rate variance is calculated as:

$$(\text{Actual Rate} - \text{Standard Rate}) \times \text{Actual Hours}$$

Or

$$(AR - SR) \times AH$$

B) Labor Efficiency Variance - the labor efficiency variance is calculated as:
(Actual Hours – Standard Hours for Actual Output) × Standard Rate

Or

$$(AH - SH) \times SR$$

Consider ABC's two direct cost categories. The actual costs for each of these categories for the 10,000 jackets manufactured and sold in April 2008 is:-

Direct materials purchased and used

- | | |
|--|----------------|
| 4. Square yards of cloth purchased and used..... | 22,200 |
| 5. Actual price incurred per square yard..... | \$28 |
| 6. Direct material costs (22,200x\$28)..... | \$621,600 |
| • Standard direct material per jacket | 2 square yards |
| • Standard price per square yard | \$30 |
| • Standard direct material cost per jacket(30x2) | \$60 |

Direct manufacturing labor

- | | |
|--|-----------|
| 4. Direct manufacturing labor-hours..... | 9,000 |
| 5. Actual price incurred per direct manufacturing labor hour.... | \$22 |
| 6. Direct manufacturing labor costs (9000x\$22)..... | \$198,000 |

Standard direct manufactured labor hour of input allowed per output unit manufactured..... 0.8 hours

Standard price per hour \$20

Standard direct manufacturing labor cost per jacket.....\$16

Required

3. Compute the direct materials price variance
4. Compute the direct materials usage variance
5. Compute the direct manufacturing labor rate variance
6. Compute the direct manufacturing labor efficiency variance

More than One Material Input or One Labor Class (Mix Variances)

The **Materials usage variance** can be subdivided into a materials **mix** variance and a materials **yield**

Variance when more than one material is used in the product. Manufacturing processes often require that a number of different materials are combined to make a unit of finished product. When a product requires two or more raw

materials in its make-up, it is often possible to **sub-analyse the materials usage variance into a materials mix and a materials yield variance**.

A **mix variance** occurs when the materials are not mixed or blended in standard proportions and it is a measure of whether the actual mix is cheaper or more expensive than the standard mix.

A **yield variance** arises because there is a difference between what the input should have been for the output achieved and the actual input.

Calculating the variances

The mix variance is calculated as the difference between the actual total quantity used in the standard mix and the actual quantities used in the actual mix, valued at standard costs. The yield variance is calculated as the difference between the standard input for what was actually output, and the actual total quantity input (in the standard mix), valued at standard costs.

When to Calculate the Mix and Yield Variance

A mix variance and yield variance are only appropriate in the following situations.

- (a) Where proportions of materials in a mix are changeable and controllable
- (b) Where the usage variance of individual materials is of limited value because of the variability of the mix, and a combined yield variance for all the materials together is more helpful for control. It would be totally inappropriate to calculate a mix variance where the materials in the 'mix' are discrete items. A chair, for example, might consist of wood, covering material, stuffing and glue. These materials are separate components, and it would not be possible to think in terms of controlling the proportions of each material in the final product. The usage of each material must be controlled separately.

What has been outlined above is the variance analysis process when we have only one material input into the product or only one class of labor (a class of labor is

nothing more than a different wage rate). In situations where there is a mix of materials (or labor) that goes into the product (such as for dog food or cereal), there will be a total variance, a price variance, and a quantity variance. In addition, the quantity variance is subdivided into a mix variance and a yield variance. The mix variance tells us how much of the quantity variance was caused by the fact that the actual mix that was used was different from the standard mix (i.e., more of one ingredient was used and less of another ingredient was used). The yield variance tell us how much of the quantity variance was caused by the fact that the total actual amount of all ingredients used was different from the total standard amount.

The price variance of a weighted mix is not broken down the way the quantity variance is. The mix of ingredients is called a weighted mix.

A) Total Variance of a Weighted Mix

The total variance of a weighted mix is the Total Actual Cost minus the Total Standard Cost. This and the following variance calculations will be illustrated in an example that follows this discussion.

B) Materials Price Variance or Labor Rate Variance of a Weighted Mix

The price variance of a weighted mix is the sum of the price variances for each component of the mix, each one calculated individually, using the formula $(AP - SP) \times AQ$. So if the product manufactured has more than one material input or more than one labor rate, a price variance is calculated for each separate input, and the individual price variances are added together to calculate the total price variance.

C) Total Material Quantity or Labor Efficiency Variance of a Weighted Mix

The total material quantity or labor efficiency variance of a weighted mix is the sum of the quantity variances for each component of the mix, each one calculated individually. The formula $(AQ - SQ) \times SP$ is used to calculate the quantity variance for each component of the mix separately, and then

the individual quantity variances are added together to calculate the total quantity variance. We then break down this total material quantity or labor efficiency variance into two sub-variances – the mix and the yield variances.

D. The Mix Variance (Materials or Labor)

The mix variance is the part of the quantity variance that results because the mix of materials actually used or the mix of the labor used was different from the mix that should have been used (i.e., the standard). An example would be including more corn and less wheat in the cereal than the standard calls for. This can occur if there is not enough of a specific input and substitutes were required, or if the wrong proportions were accidentally used in the product. The formula used to calculate the mix variance is a variation of the price variance formula:

(AP - SP) × AQ But instead of using the actual and standard prices for the input, we use weighted average standard prices. We use:

- 1) The weighted average standard price of the mix. We calculate this as the actual quantity used for each input multiplied by the standard cost for each input, and then adding the results; and
- 2) The weighted average standard price of the mix. This is calculated as the standard quantity of each input for the actual output multiplied by the standard cost for each input, and then adding the results. This is demonstrated with numbers in the example following the explanations of these sub-variances. (It is not as bad as it sounds.)

The mix variance is calculated as follows:

$$\left[\begin{array}{l} \text{Weighted Average Standard} \\ \text{Actual Quantity of all} \\ \text{Mix} \\ \text{calculated using the Standard Costs} \end{array} \times \begin{array}{l} \text{Price of the} \\ \text{material or labor inputs} \end{array} \right] - \begin{array}{l} \text{Weighted Average Standard} \\ \text{Price of the Standard} \\ \text{(both} \end{array}$$

Or

$$\mathbf{(WASPAM - WASPSM) \times AQ}$$

Dear learners' Note that when looking at any mix variances, it is essential that responsibility be given to an individual only if the person actually has control over the mix, or the substitutions, used.

The Yield Variance (Material or Labor)

The yield variance results from the difference between the total actual quantity of the inputs that were actually used to produce the actual output and the total standard quantity that should have been used to produce the actual output. The formula to calculate the yield variance is a variation of the quantity variance of the mix, or $(AQ - SQ) \times SP$. Instead of using the standard price of a single input, we use the weighted average standard price of the standard mix.

The yield variance is calculated as follows:

$$\left[\begin{array}{l} \text{Actual Total Quantity- Standard Total Quantity} \\ \text{Standard Price Of All Inputs} \\ \text{Standard Mix of All Inputs} \end{array} \right] \times \begin{array}{l} \text{Weighted Average} \\ \text{of All Inputs} \\ \text{of} \end{array}$$

Or

$$(AQ - SQ) \times \text{WASPSM}$$

In the formula above, the actual quantity of input to the product (AQ) is equal to the total number of all of the pounds or hours (or whatever else) that actually was used to produce the actual level of output. The standard quantity of input to the product (SQ) is equal to the total number of all of the pounds or hours (or whatever else) that should have been used to produce the actual level of output. Again dear learners' Remember, if there is only one input to the product, there is no need to calculate these two additional variances. On the following pages is a full example of the calculation of the total variance, the price variance, the quantity variance, and the materials mix and yield variances of a weighted mix. Dear learners' see the following example for the calculation of the total variance, the price variance, the quantity variance, and the materials mix and yield variances of a weighted mix.

Comprehensive Example: A company produces cereal made up of different grains. The material prices in effect for the fiscal year ending June 30 and the standard kg allowed for the output of April are:

<u>Standard Cost</u>	<u>Standard Price/Kg</u>	<u>Standard Kg for Output</u>
Corn Br.2, 500.00	Br.10.00	250
Wheat 2,000.00	Br. 8.00	250
Rice <u>750.00</u>	Br. 3.00	<u>250</u>
	<u>750</u> <u>250.00</u>	<u>Br.5,</u>

Due to various natural disasters around the world, the price for each input increased on January 1. The standard prices were not revised, and the actual output in April was the same as planned. The actual material prices and the actual usage for April were as follows:

	<u>Actual Price</u>	<u>Actual Usage</u>	<u>Actual Cost</u>
Corn	Br.12.00	375	Br.4, 500.00
Wheat 1,700.00	Br. 8.50	200	
Rice	Br. 5.50	<u>325</u>	<u>1,787.50</u>
		<u>900</u>	<u>Br.7, 987.50</u>

Required:

Using the above information, calculate the material price and quantity variances, and also the material mix and yield sub-variances.

Example 2: Materials usage, mix and yield variances

A company manufactures a chemical, Dynamite, using two compounds Flash and Bang. The standard materials usage and cost of one unit of Dynamite are as follows.

	\$								
Flash		5 kg at \$2 per kg							
10									
Bang			10 kg at \$3 per kg						
<u>30</u>									

40

In a particular period, 80 units of Dynamite were produced from 500 kg of Flash and 730 kg of Bang.

Required: Calculate the materials usage, mix and yield variances?

The Use of Variances

A variance is the difference between actual results and expected performance. The expected performance is also called budgeted performance, which is a point of reference for making comparisons. Variance may have a number of uses for managers, such as,

1. For the planning and controlling function of management

Variance a list, managers in implementing their strategies by enabling management exception. This is the practice of focusing management attention on areas that are not operating as expected and devoting less time to areas operating as expected. In other words, by highlighting the areas that have deviated most from expectations, variances enable managers to focus their efforts on the most critical areas.

2. For performance evaluation and to motivate managers.

Employee may have efficiency incentives linked to achieving a budgeted amount of operating costs.

3. A tool for changing strategy

Sometimes variances suggest that the company should consider a change in strategy.

In general variance analysis contributes in many ways to making the five-step decision making process more effective. It allows managers to evaluate performance and learn by providing a framework for correctly assessing current performance. In turn, managers take corrective actions to ensure that decisions are implemented correctly and that previously budgeted results are in fact attained. Variance also enable managers to generate more informed predications about the future and there by improve the quality of the five-step decision-making process.