

STANDARD COSTING



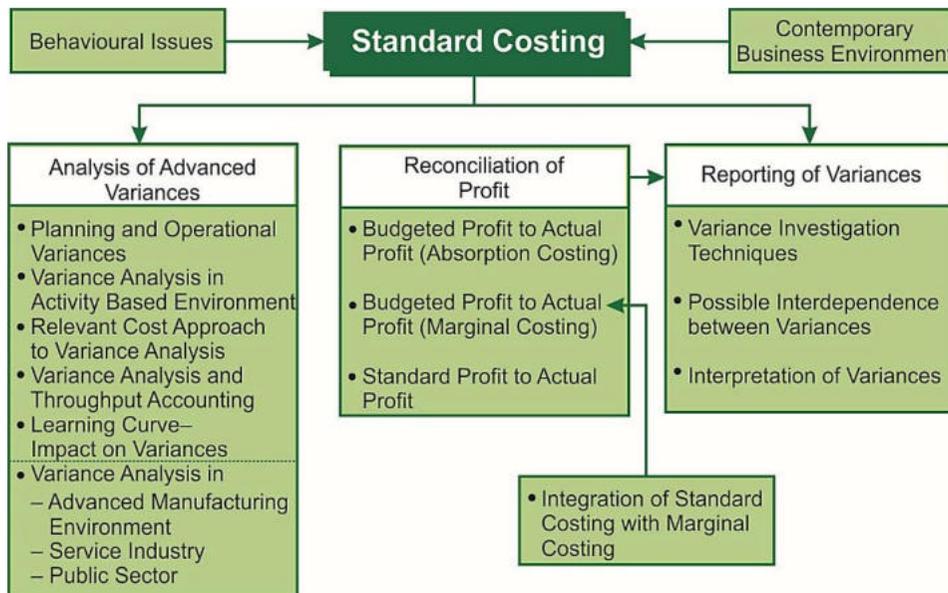
LEARNING OUTCOMES

After studying this chapter, you will be able to:

- CALCULATE advanced variances
- INTERPRET variances
- IDENTIFY and EXPLAIN the relationship of the variances
- APPLY standard costing methods including the reconciliation of budgeted and actual profit margins
- Use variance analysis to ASSESS how future performance of an organisation can be improved
- EXPLAIN the behavioural problems resulting from using standard costs in rapidly changing environments



CHAPTER OVERVIEW



A. ANALYSIS OF ADVANCED VARIANCES

Variance analysis is examinable both at Intermediate Level (Cost and Management Accounting) and at Final Level (Strategic Cost Management and Performance Evaluation). One main difference in syllabus between the two papers is that the Final Level syllabus **includes analysis of advanced variances**, as follows:

- Planning and Operational Variances
- Variance Analysis in Activity Based Costing
- Learning Curve Impact on Variances
- Relevant Cost Approach to Variance Analysis
- Variance Analysis and Throughput Accounting
- Variance Analysis in Advanced Manufacturing Environment
- Variance Analysis in Service Industry
- Variance Analysis in Public Services

1. Planning & Operational Variances

When the current environmental conditions are different from the anticipated environmental conditions (prevailing at the time of setting standard or plans) the use of routine analysis of variance for measuring managerial performance is not desirable / suitable. The variance analysis can be useful for measuring managerial performance if the variances computed are determined on the basis of revised targets / standards based on current actual environmental conditions.

In order to deal with the above situation i.e., to measure managerial performance with reference to material, labour and sales variances, it is necessary to compute the Planning and Operational Variances.

A *Planning Variance* simply compares a revised standard to the original standard.

An *Operational Variance* simply compares the actual results against the revised amount.

Operating Variances would be calculated after the planning variances have been established and are thus a realistic way of assessing performance.

Planning Variance

Classification of variances caused by ex-ante budget allowances being changed to an ex post basis. Also, known as a revision variance.

Operational Variance

Classification of variances in which non-standard performance is defined as being that which differs from an ex post standard. Operational variances can relate to any element of the standard product specification.

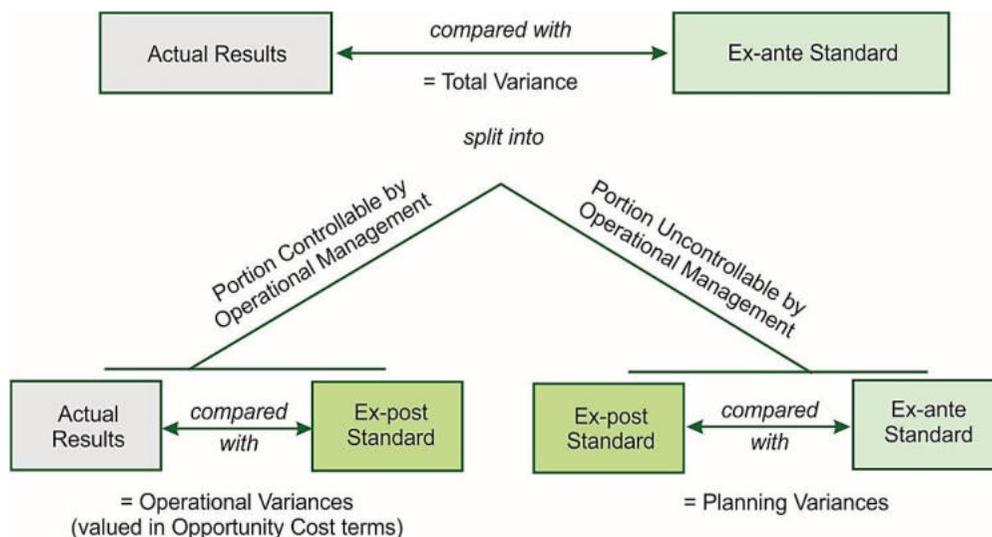


Figure A.1 – Planning and Operational Variances

Standard ex ante

Before the event. An ex-ante budget or standard is set before a period of activity commences.

Standard, ex post

After the event. An ex post budget, or standard, is set after the end of a period of activity, when it can represent the optimum achievable level of performance in the conditions which were experienced. Thus, the budget can be flexed, and standards can reflect factors such as unanticipated changes in technology and in price levels. This approach may be used in conjunction with sophisticated cost and revenue modelling to determine how far both the plan and the achieved results differed from the performance that would have been expected in the circumstances which were experienced.

Example

Factor	Original Standards (ex-ante)		Revised Standards (ex-post)		Actual (4,500 units)	
	X	4,500 units×2 Kgs×₹12.50	₹1,12,500	4,500 units×2.25 Kgs×₹11.50	₹1,16,437.50	8,750 Kgs×₹13

Traditional Variances

Usage Variance = (9,000 Kgs. – 8,750 Kgs.) × ₹12.50
= ₹3,125 (F)

Price Variance = (₹12.50 – ₹13.00) × 8,750 Kgs.
= ₹4,375 (A)

Total Variance = ₹3,125 (F) + ₹4,375 (A)
= ₹1,250 (A)

Operational Variances

Usage Variance = (10,125 Kgs. – 8,750 Kgs.) × ₹11.50
= ₹15,812.50 (F)

Price Variance = (₹11.50 – ₹13) × 8,750 Kgs.
= ₹13,125 (A)

Total Variance = ₹15,812.50 (F) + ₹13,125 (A)
= ₹2,687.50 (F)

Planning Variances

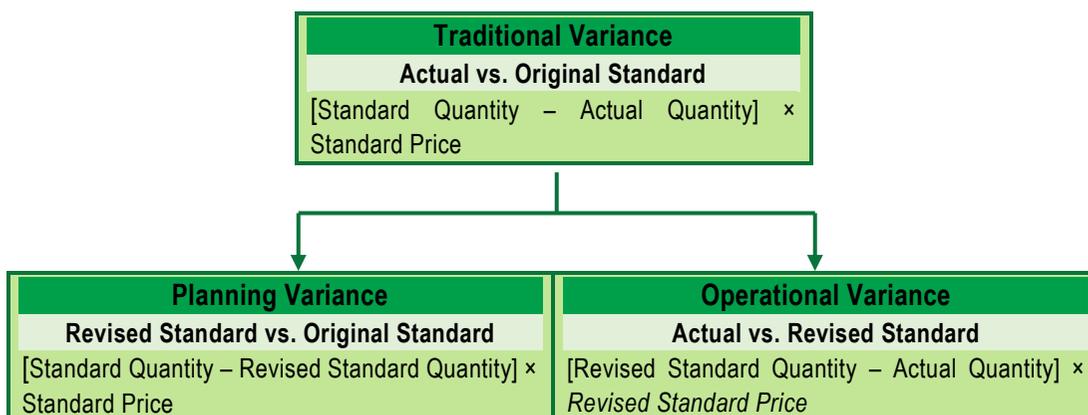
Usage Variance = (9,000 Kgs. – 10,125 Kgs.) × ₹12.50
= ₹14,062.50 (A)

Price Variance = (₹12.50 – ₹11.50) × 10,125 Kgs.
= ₹10,125 (F)

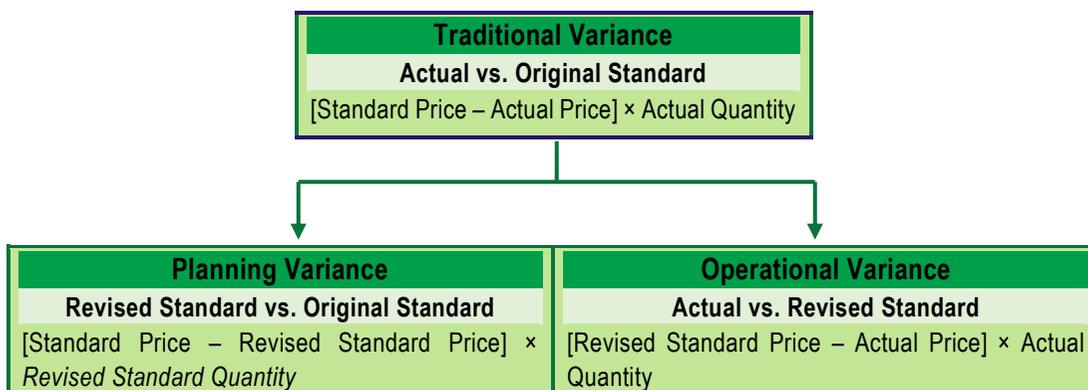
Total Variance = ₹14,062.50 (A) + ₹10,125 (F)
= ₹3,937.50 (A)



Direct Material Usage Variance



Direct Material Price Variance



Note

Direct Material Usage Operational Variance using *Standard Price*, and the Direct Material Price Planning Variance based on *Actual Quantity* can also be calculated. This approach reconciles the Direct Material Price Variance and Direct Material Usage Variance calculated in part.

Like Material Variances, here also Labour Efficiency and Wage Rate Variances should also be adjusted to reflect changes in environmental conditions that prevailed during the period.

Illustration 1

HDR Ltd produces units and incurs labour costs. A change in technology after the preparation of the budget resulted in a 25% increase in standard labour efficiency, such that it is now possible to produce 10 units instead of 8 units using 8 hours of labour- giving a revised standard labour requirement of 0.80 hours per unit. Details of actuals and budgeted for period XII are:

Grade	Original Standards (ex-ante)		Revised Standards (ex-post)		Actual (1,100 units)	
X	1,100 units × 1 hrs. × ₹10	₹11,000	1,100 units × 0.80 hrs. × ₹10.00	₹8,800	1,200 hrs. × ₹8.50	₹10,200

Required

- (i) CALCULATE the variances for 'X' by
- Traditional Variance Analysis; and
 - An approach which distinguishes between Planning and Operational Variances.
- (ii) COMMENT on the results.

Solution**(i) (a) Traditional Variances**

$$\begin{aligned} \text{Efficiency Variance} &= (1,100 \text{ hrs.} - 1,200 \text{ hrs.}) \times ₹10 \\ &= ₹1,000 \text{ (A)} \\ \text{Rate Variance} &= (₹10 - ₹8.50) \times 1,200 \text{ hrs.} \\ &= ₹1,800 \text{ (F)} \\ \text{Total Variance} &= ₹1,000 \text{ (A)} + ₹1,800 \text{ (F)} = ₹800 \text{ (F)} \end{aligned}$$

(b) Operational Variances

$$\begin{aligned} \text{Efficiency Variance} &= (880 \text{ hrs.} - 1,200 \text{ hrs.}) \times ₹10.00 \\ &= ₹3,200 \text{ (A)} \\ \text{Rate Variance} &= (₹10.00 - ₹8.50) \times 1,200 \text{ hrs.} \\ &= ₹1,800 \text{ (F)} \\ \text{Total Variance} &= ₹3,200 \text{ (A)} + ₹1,800 \text{ (F)} = ₹1,400 \text{ (A)} \end{aligned}$$

Planning Variances

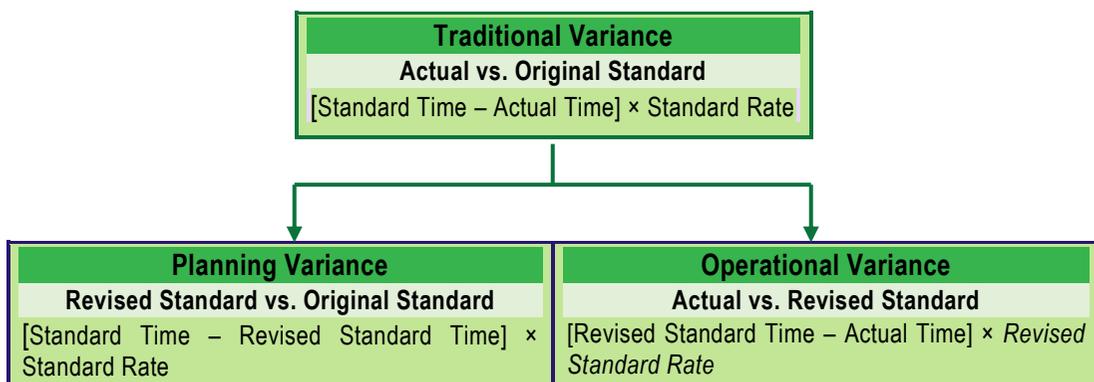
$$\begin{aligned} \text{Efficiency Variance} &= (1,100 \text{ hrs.} - 880 \text{ hrs.}) \times ₹10 \\ &= ₹2,200 \text{ (F)} \\ \text{Rate Variance} &= (₹10 - ₹10) \times 880 \text{ hrs.} \\ &= ₹0 \\ \text{Total Variance} &= ₹2,200 \text{ (F)} + ₹0 = ₹2,200 \text{ (F)} \end{aligned}$$

(ii) Comment

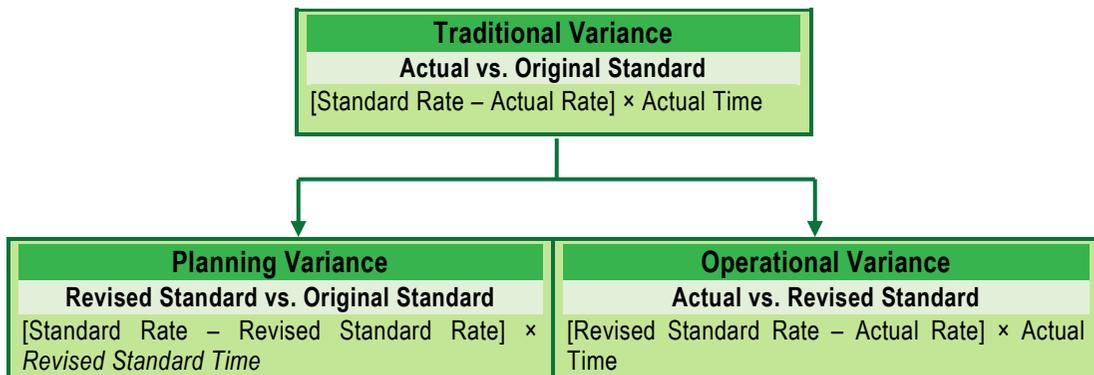
In this case, the separation of the labour cost variance into operational and planning components shows a large problem in the area of labour efficiency that might otherwise have been indicated. The operational variances are based on the revised (ex post) standard, and this gives a more meaningful performance benchmark than the original (ex-ante) standard.



Direct Labour Efficiency Variance



Direct Labour Rate Variance

**Note**

Direct Labour Efficiency Operational Variance using *Standard Rate*, and the Direct Labour Rate Planning Variance based on *Actual Hours* can also be calculated. This approach reconciles the Direct Labour Rate Variance and Direct Labour Efficiency Variance calculated in part.

The conventional Sales Volume Variance reports the difference between actual and budgeted sales valued at the standard price per unit. The variance just indicates whether sales volume is greater or less than expected. It does not indicate how sales management has performed. In order to assess the performance of sales management, market conditions prevailing during the period should be taken into consideration. *Accordingly, the sales volume variance can be sub-divided into planning variance (market size variance) and operational variance (market share variance).*



Test Your Understanding

What does planning/ operational variance mean?

Hint

- A *Planning Variance* simply compares a revised standard to the original standard.
- An *Operational Variance* simply compares the actual results against the revised amount.



Test Your Understanding

What does controllable/ uncontrollable variances mean?

Hint

- *Controllable Variances* are those variances which arises due to inefficiency of a cost centre /department.
- *Uncontrollable Variances* are those variances which arises due to factors beyond the control of the management or concerned department of the organization.

2. Variance Analysis in Activity Based Costing

Variance analysis can be applied to activity costs (such as setup costs, product testing, quality testing etc.) to gain understanding into why actual activity costs vary from activity costs in the static budget or in the flexible budget. Interpreting cost variances for different activities requires understanding whether the costs are output unit-level, batch level, product sustaining, or facility sustaining costs¹.

We use the similar track to variance analysis for activity-based costing as for traditional costing. The price variance is the difference between standard price and actual price for the actual quantity of input used for each cost driver. The efficiency variance measures the difference between the actual amount of cost driver units used, and the standard allowed to make the output. We multiply the difference in quantities by the standard price per cost driver to get the rupee value of the variance².

ABC approach is based on the assumption that the overheads are basically variable (but variable with the delivery numbers and not the units output). The efficiency variance reports the cost impact of undertaking more or less activities than standard, and the expenditure variance reports cost impact of paying more or less than standard for the actual activities undertaken³.

¹ Cost Accounting: A Managerial Emphasis, 13/e by Charles T. Horngren, p275; Managerial Accounting

² An Introduction to Concepts, Methods and Uses by Michael W. Maher, Clyde P. Stickney, Roman L. Weil, p 362

³ Performance Operations by Robert Scarlett, p119.

Illustration 2

N & S Co. (NSC) is a multiple product manufacturer. NSC produces the unit and all overheads are associated with the delivery of units to its customers.

Particulars	Budget	Actual
Overheads (₹)	4,000	3,900
Output (units)	2,000	2,100
Customer Deliveries (no. 's)	20	19

Required

CALCULATE Efficiency Variance and Expenditure Variance by adopting ABC approach.

Solution**Computation of Variances**

Efficiency Variance = Cost Impact of *undertaking activities* more/ less than *standard*
 = (21 deliveries* – 19 deliveries) × ₹200
 = ₹400 F

$$(*) \left(\frac{20 \text{ Deliveries}}{2,000 \text{ units.}} \right) \times 2,100 \text{ units}$$

Expenditure Variance = Cost impact of paying more/ less than standard for actual activities undertaken
 = 19 deliveries × ₹200 – ₹3,900
 = ₹100 (A)

3. Learning Curve- Impact on Variances

Learning curve is a geometrical progression, which reveals that there is steadily decreasing cost for the accomplishment of a given repetitive operation, as the identical operation is increasingly repeated. The amount of decrease will be less and less with each successive unit produced. As more units are produced, people involved in production become more efficient than before. Each additional unit takes less time to produce. The amount of improvement or experience gained is reflected in a decrease in man-hours or cost. Where learning takes place with a regular pattern it is important to take account of the reduction in labour hours and cost per unit'. Automated manufacturing is unlikely to have much variation or to display a regular learning curve. In less-automated processes, however, where learning curves do occur, *it is important to take the resulting decline in labour hours and costs into account in setting standards, determining prices, planning production, or setting up work schedules.* With the help of the learning curve theory the standard time of any batch or unit can be computed then compare the actual data with the standard and compute the variances.

Illustration 3

City International Co. is a multiproduct firm and operates a standard costing and budgetary control system. During the month of June the firm launched a new product. An extract from performance report prepared by Sr. Accountant is as follows:

Particulars	Budget	Actual
Output	30 units	25 units
Direct Labour Hours	180.74 hrs.	118.08 hrs.
Direct Labour Cost	₹ 1,19,288	₹ 79,704

Sr. Accountant prepared a performance report for the new product on certain assumptions but later on he realized that this new product has similarities with other existing product of the company. Accordingly, the rate of learning should be 80% and the learning would cease after 15 units. Other budget assumptions for the new product remain valid.

The original budget figures are based on the assumption that the labour has learning rate of 90% and learning will cease after 20 units, and thereafter the time per unit will be the same as the time of the final unit during the learning period, i.e. the 20th unit. The time taken for 1st unit is 10 hours.

Required

Show the variances that reconcile the actual labour figures with revised budgeted figures (for actual output) in as much detail as possible.

Note:

The learning index values for a 90% and a 80% learning curve are -0.152 and -0.322 respectively.

[log 2 = 0.3010, log 3 = 0.47712, log 5 = 0.69897, log 7 = 0.8451, antilog of 0.6213 = 4.181, antilog of 0.63096 = 4.275]

Solution**Working Note**

The usual learning curve model is

$$y = ax^b$$

Where

y = Average time per unit for x units

a = Time required for first unit

x = Cumulative number of units produced

b = Learning coefficient

W.N.1

Time required for first 15 units based on revised learning curve of 80% (when the time required for the first unit is 10 hours)

$$\begin{aligned}
 y &= 10 \times (15)^{-0.322} \\
 \log y &= \log 10 - 0.322 \times \log 15 \\
 \log y &= \log 10 - 0.322 \times \log (5 \times 3) \\
 \log y &= \log 10 - 0.322 \times [\log 5 + \log 3] \\
 \log y &= 1 - 0.322 \times [0.69897 + 0.47712] \\
 \log y &= 0.6213 \\
 y &= \text{antilog of } 0.6213 \\
 y &= 4.181 \text{ hours}
 \end{aligned}$$

$$\begin{aligned}
 \text{Total time for 15 units} &= 15 \text{ units} \times 4.181 \text{ hours} \\
 &= 62.72 \text{ hours}
 \end{aligned}$$

Time required for first 14 units based on revised learning curve of 80% (when the time required for the first unit is 10 hours)

$$\begin{aligned}
 y &= 10 \times (14)^{-0.322} \\
 \log y &= \log 10 - 0.322 \times \log 14 \\
 \log y &= \log 10 - 0.322 \times \log (2 \times 7) \\
 \log y &= \log 10 - 0.322 \times [\log 2 + \log 7] \\
 \log y &= 1 - 0.322 \times [0.3010 + 0.8451] \\
 \log y &= 0.63096 \\
 y &= \text{antilog of } 0.63096 \\
 y &= 4.275 \text{ hrs}
 \end{aligned}$$

$$\begin{aligned}
 \text{Total time for 14 units} &= 14 \text{ units} \times 4.275 \text{ hrs} \\
 &= 59.85 \text{ hrs}
 \end{aligned}$$

Time required for 25 units based on revised learning curve of 80% (when the time required for the first unit is 10 hours)

$$\begin{aligned}
 \text{Total time for first 15 units} &= 62.72 \text{ hrs} \\
 \text{Total time for next 10 units} &= 28.70 \text{ hrs } [(62.72 - 59.85) \text{ hours} \times 10 \text{ units}] \\
 \text{Total time for 25 units} &= 62.72 \text{ hrs} + 28.70 \text{ hrs} \\
 &= 91.42 \text{ hrs}
 \end{aligned}$$

W.N.2**Computation of Standard and Actual Rate**

$$\begin{aligned}
 \text{Standard Rate} &= \frac{\text{₹}1,19,288}{180.74 \text{ hrs.}} \\
 &= \text{₹}660.00 \text{ per hr.} \\
 \text{Actual Rate} &= \frac{\text{₹}79,704}{118.08 \text{ hrs.}} \\
 &= \text{₹}675.00 \text{ per hr.}
 \end{aligned}$$

W.N.3**Computation of Variances**

$$\begin{aligned}
 \text{Labour Rate Variance} &= \text{Actual Hrs} \times (\text{Std. Rate} - \text{Actual Rate}) \\
 &= 118.08 \text{ hrs} \times (\text{₹}660.00 - \text{₹}675.00) \\
 &= \text{₹}1,771.20 \text{ (A)} \\
 \text{Labour Efficiency Variance} &= \text{Std. Rate} \times (\text{Std. Hrs} - \text{Actual Hrs}) \\
 &= \text{₹}660 \times (91.42 \text{ hrs} - 118.08 \text{ hrs}) \\
 &= \text{₹}17,595.60 \text{ (A)}
 \end{aligned}$$

Statement of Reconciliation (Actual Figures Vs Budgeted Figures)

Particulars	₹
Actual Cost	79,704.00
Less: Labour Rate Variance (Adverse)	1,771.20
Less: Labour Efficiency Variance (Adverse)	17,595.60
Budgeted Labour Cost (Revised)*	60,337.20

*Budgeted Labour Cost (Revised)**

$$\begin{aligned}
 &= \text{Std. Hrs.} \times \text{Std. Rate} \\
 &= 91.42 \text{ hrs.} \times \text{₹}660 \\
 &= \text{₹}60,337.20
 \end{aligned}$$

4. Relevant Cost Approach to Variance Analysis

Traditional approach to variance analysis is to compute variances based on total actual cost for production inputs and total standard cost applied to the production output. This is ambiguous, when inputs are limited. Failure to use limited inputs properly leads not only to increased acquisition cost but also to a lost contribution. Therefore, it is necessary to consider the lost contribution in variance analysis. When this approach is used, price or expenditure variances are not affected.

5. Variance Analysis and Throughput Accounting

Variance analysis has no emphasis on the constrained resources. Instead, it is based on the *efficiency* and *cost of operation* of each part of the manufacturing system, rather than the ability of the entire system to generate profit. Thus, a firm may find that it attains excellent efficiency and price variances by having long manufacturing rounds and buying in large quantities. A system based on constraint management will likely show very odd results under a variance reporting system. For example, when a terminal upstream from the constrained resource runs out of work, a manager functioning under the throughput accounting system will shut it down in order to avoid the formation of an unnecessary level of work-in-process inventory. However, this will result in a negative labor efficiency variance, since the terminal's staff is not actively producing anything. Throughput accounting does use variance analysis, but not the ones used by a traditional system. Instead, its main emphasis is on tracking variations in the size of the inventory buffer placed before the constrained resource, to confirm that the constraint is never halted due to an inventory shortage.

6. Variance Analysis in Advanced Manufacturing Environment/ High-Technology Firms

The variance analysis generally applies to all types of organizations; however, high-technology firms like Audio Technology, Automotive, Computer Engineering, Electrical and Electronic Engineering, Information Technology, Medical devices, Nanotechnology, Semiconductors, Telecommunication apply the model somewhat differently. Now much of the electronic industry is highly automated. A large part of the manufacturing process is computerized. In the high-technology environment that is emerging, many costs that once were largely variable have become fixed, most becoming committed fixed cost. Some high technology manufacturing organizations have found that the two largest variable costs involve materials and power to operate machines. In these companies, the emphasis of variance analysis is placed on direct materials and variable manufacturing overhead.

Much of the manufacturing labour consists of highly skilled experts/ operators/ programmers which are largely committed costs. Firms don't want to take the risk of losing such highly trained personnel even during an economic downturn. The result is less direct labour and more overhead. For these firms labour variances may no longer be meaningful because direct labour is a committed cost, not a cost expected to vary with output.

7. Standard Costing in Service Sector

Standard Costing can be equally applicable for various types of industries for example accountants, solicitors, dentists, hairdressers, transport companies and hotels. Service industries comprise a wide range of different businesses that differ in size and types of service provided. Standard costing and variance analysis is more tough to apply to service sector organizations as major portion of their cost is comprised of overhead expenses rather than production expenses. While traditional variance analysis of overheads does not deliver very useful information for overheads control purposes, application of activity based costing can provide an effective basis for variance analysis of overheads in service sector organizations although this may need significant time and effort in the implementation of a MIS.



Concept Insight

McDonaldization⁴

McDonaldization is a process of rationalisation, which takes a task and breaks it down into smaller tasks. This is repeated until all tasks have been broken down to the smallest possible level. The resulting tasks are then rationalised to find the single most efficient method for completing each task. All other methods are then deemed inefficient and discarded¹.

The impact of McDonaldization is that standards can be more accurately set and assessed. It can be easily ascertained that how much time and cost should go into each activity. The principles can be applied to many other services, such as hairdressing, dentistry, or opticians' services.

8. Standard Costing in Public Sector⁵

In order to cost control in public sector (e.g., street cleaning refuse disposal and so on), regular variance analysis is required. Actual unit costs should be calculated on a monthly basis and compared with estimated unit cost. To achieve this comparison, information needs to be maintained about the unit of service adopted. For example, statistics would be maintained on the number of visits made and the number of hours worked. In this example, time recording may be beneficial in providing the detailed information necessary for variance analysis. Actual monthly costs should be taken from the organisation's financial management system and each month financial reports should be produced which offer an accurate image of budgeted vs actual expenditure. These reports are must for budgetary control. Actual expenditure reported on financial systems may require some modification to take account of:

- Trade Payables (services used but bills unpaid)
- Accruals (services used but bills yet to be received)
- Timing Differences (some costs are not incurred evenly over the year)



B. STANDARD MARGINAL COSTING

Standards and Variances can be calculated on the basis of marginal costing. A standard marginal costing system incorporates only costs which are variable to the product. Accordingly, the absorption of fixed costs, and the variances derived therefrom, do not feature in a standard marginal costing system. When Marginal Costing is in use there is no Overhead Volume Variance, because Marginal Costing does not absorb Fixed Overhead. Fixed Overhead Expenditure Variance is the only variance for Fixed Overhead in a Marginal Costing system. It is calculated as in an Absorption Costing system.

⁴ www.mcdonaldization.com/whatisit.shtml

⁵ Costing and Pricing Public Sector Services: Essential Skills for the Public Sector (2011) By Jennifer Bean, Lascelles Hussey



Concept Insight

Sales Variances

Sales Variances can be used to analyse the performance of the revenue centres on broadly identical terms to those for manufacturing costs. The most important aspect of sales variance calculations is that they are calculated in terms of **profit** or **contribution**. Sales directly influences the total profits. Thus, a more meaningful performance measure will be obtained by comparing the results of the sales function in terms of *profit* or *contribution* rather than sales revenue.

In standard absorption costing system, *profit margins* are used (selling price less total unit manufacturing cost), whereas with a standard marginal costing system, *contribution* (selling price less unit manufacturing variable cost) are used to calculate the variances.

If marginal costing approach is adopted, sales contribution variance pursues to identify the influence of the sales function on the difference between budget and actual contribution.



“Sales function is responsible for the sales volume and the unit selling price, but not the unit manufacturing costs, the standard cost of sales and not the actual cost of sales is deducted from actual sales price.”

Sales Contribution Variance is the difference between the actual contribution and budgeted contribution (based on standard unit costs).

Sales Contribution Variance

$$= \text{Actual Contribution} - \text{Budgeted Contribution}$$

The effect of using standard costs throughout the contribution calculations means that the sales variances arise because of changes in those variables controlled by the sales function (i.e., selling prices and sales quantity). Therefore, it is possible to analyse the sales contribution variance into two sub-variances – a sales contribution price variance and a sales contribution volume variance.

Sales Contribution Price Variance

$$= (\text{Actual Contribution per unit} - \text{Standard Contribution per unit}) \times \text{Actual Quantity}$$

Sales Contribution Volume Variance

$$= (\text{Actual Quantity} - \text{Budgeted Quantity}) \times \text{Standard Contribution per unit}$$

* based on standard unit costs

Where a company sells several different products that have different contributions, the sales volume contribution variance can be divided into a sales quantity and sales mix variance. The quantity variance measures the effect of changes in physical volume on total contribution, and the mix variance measures the impact arising from actual sales mix being different from budgeted sales mix.

Sales Contribution Mix Variance

$$= (\text{Actual Quantity} - \text{Actual Quantity in Budgeted Proportions}) \times \text{Standard Contribution per unit}$$

Sales Contribution Quantity Variance

$$= (\text{Actual Quantity in Budgeted Proportion} - \text{Budgeted Quantity}) \times \text{Standard Contribution per unit}$$

Where industry's sales data is readily available, it is possible to divide the sales quantity variance into a component due to change in market size and a component due to change in market share: The formulae and calculations of the market size and market share variances are as follows:

$$\text{Market Size Variance} = [\text{Budgeted Market Share \%} \times (\text{Actual Industry Sales Quantity in units} - \text{Budgeted Industry Sales Quantity in units}) \times (\text{Average Budgeted Contribution per unit})]$$

$$\text{Market Share Variance} = [(\text{Actual Market Share \%} - \text{Budgeted Market Share \%}) \times (\text{Actual Industry Sales Quantity in units}) \times (\text{Average Budgeted Contribution per unit})]$$



C. RECONCILIATION OF PROFIT

Generally, under variance analysis we compute various variances from the actual and the standard/budgeted data. Sometimes all or a few variances and actual data are made available and from that we are required to prepare standard product cost sheet, original budget and to reconcile the budgeted profit with the actual profit.

Some important concepts are given below:

1. Reconciliation Statement

Budgeted Profit to Actual Profit (Absorption Costing)

Budgeted Profit					<input type="checkbox"/>
(Budgeted Quantity × Standard Margin)					
Effect of Variances					
Material Cost Variance					
Material Price Variance				<input type="checkbox"/>	
Material Usage Variance					
Material Mix Variance	<input type="checkbox"/>				
Material Yield Variance	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	
Labour Cost Variance					
Labour Rate Variance				<input type="checkbox"/>	
Labour Idle Time Variance				<input type="checkbox"/>	
Labour Efficiency Variance					
Labour Mix Variance	<input type="checkbox"/>				
Labour Sub-Efficiency Variance	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	
Variable Overhead Cost Variances					
Variable Overhead Expenditure Variance				<input type="checkbox"/>	
Variable Overhead Efficiency Variance				<input type="checkbox"/>	<input type="checkbox"/>
Fixed Overhead Cost Variances					
Fixed Overhead Expenditure Variance				<input type="checkbox"/>	
Fixed Overhead Volume Variance					
Fixed Overhead Capacity Variance	<input type="checkbox"/>				
Fixed Overhead Efficiency Variance	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Sales Margin Variances (in terms of Profit)					
Sales Margin Price Variance				<input type="checkbox"/>	
Sales Margin Volume Variance					
Sales Margin Mix Variance	<input type="checkbox"/>				
Sales Margin Quantity Variance	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Actual Profit					<input type="checkbox"/>

2. Reconciliation Statement

Budgeted Profit to Actual Profit (Marginal Costing)

Budgeted Profit				<input type="checkbox"/>
(Budgeted Quantity × Standard Margin)				
Effect of Variances				
Material Cost Variance				
Material Price Variance		<input type="checkbox"/>		
Material Usage Variance				
Material Mix Variance	<input type="checkbox"/>			
Material Yield Variance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Labour Cost Variance				
Labour Rate Variance		<input type="checkbox"/>		
Labour Idle Time Variance		<input type="checkbox"/>		
Labour Efficiency Variance				
Labour Mix Variance	<input type="checkbox"/>			
Labour Sub-Efficiency Variance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Variable Overhead Cost Variances				
Variable Overhead Expenditure Variance		<input type="checkbox"/>		
Variable Overhead Efficiency Variance		<input type="checkbox"/>	<input type="checkbox"/>	
Fixed Overhead Cost Variances				
Fixed Overhead Expenditure Variance		<input type="checkbox"/>		
Fixed Overhead Volume Variance				
Fixed Overhead Capacity Variance	NA			
Fixed Overhead Efficiency Variance	NA	NA	<input type="checkbox"/>	
Sales Contribution Variances				
Sales Contribution Price Variance		<input type="checkbox"/>		
Sales Contribution Volume Variance				
Sales Contribution Mix Variance	<input type="checkbox"/>			
Sales Contribution Quantity Variance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Actual Profit				<input type="checkbox"/>

3. Reconciliation Statement Standard Profit to Actual Profit (Absorption Costing)

Standard Profit					<input type="checkbox"/>
(Actual Quantity × Standard Margin)					
Effect of Variances					
Material Cost Variance					
Material Price Variance				<input type="checkbox"/>	
Material Usage Variance					
Material Mix Variance	<input type="checkbox"/>				
Material Yield Variance	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	
Labour Cost Variance					
Labour Rate Variance				<input type="checkbox"/>	
Labour Idle Time Variance				<input type="checkbox"/>	
Labour Efficiency Variance					
Labour Mix Variance	<input type="checkbox"/>				
Labour Sub-Efficiency Variance	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	
Variable Overhead Cost Variances					
Variable Overhead Expenditure Variance				<input type="checkbox"/>	
Variable Overhead Efficiency Variance				<input type="checkbox"/>	<input type="checkbox"/>
Fixed Overhead Cost Variances					
Fixed Overhead Expenditure Variance				<input type="checkbox"/>	
Fixed Overhead Volume Variance					
Fixed Overhead Capacity Variance	<input type="checkbox"/>				
Fixed Overhead Efficiency Variance	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Sales Margin Variance (in terms of Profit)					
Sales Margin Price Variance				<input type="checkbox"/>	
Sales Margin Volume Variance					
Sales Margin Mix Variance	NA				
Sales Margin Quantity Variance	NA	NA		<input type="checkbox"/>	<input type="checkbox"/>
Actual Profit					<input type="checkbox"/>

Illustration 4

Well-known Footwear (WF) is a shop that focuses on shoes for various sports and activities like jogging, cricket, tennis, and hockey. Budgeted profit for the WF is calculated considering an average selling price of ₹ 500 per pair of shoes and an average cost of ₹ 350 per pair of shoes. The supervisor of the WF has discretion in staffing and in setting prices. Usually, the WF is staffed for 650 hrs. per month at a budgeted rate of ₹ 125 per hr. In addition to this base wages, sales staff gets a payment equal to 5.5% of takings. Moreover, staffing levels are not expected to change in response to “little” changes in shoe sales. For Sep’2023, the WF had budgeted sales of 2,250 pairs of shoes and 650 staffing hrs. Actual results for Sep’2023 were as follows:

Pairs of shoes sold	2,500
Revenue	12,00,000
Less: Cost of shoes	8,25,000
Less: Staff – additional payment	66,000
Less: Staff – base wages @ ₹ 125 per hour	78,125
Profit	₹ 2,30,875

Note- “little” changes in shoe sales specified as $\pm 12\%$.

Required

- (i) PREPARE a reconciliation statement of budgeted profit to actual profit.
- (ii) COMMENT on supervisor’s performance.

Solution**(i) Reconciliation Statement Budgeted and Actual Profit (Sep’2023)**

Budgeted profit	1,94,375
Sales volume variance (F)	30,625
Sales price variance (A)	50,000
Shoe cost variance (F)	50,000
Staff cost variance -commission (F)	2,750
Staff cost variance -base wage (F)	3,125
Actual profit	₹2,30,875

(ii) Comment

The performance seems good. It shows that the supervisor of the WF passed on a 5.7% decrease in shoe cost to customers (same is also revealed through the entirely offsetting of the shoe cost variance and price variance), i.e., shoe costs decreased by ₹20 per pair, from a standard cost of ₹350 per pair to an actual cost ₹330 per pair. Additionally, the selling price decreased by ₹20 per pair, from a standard price of ₹500 per pair to an actual price of ₹480 per pair. In turn, the reduction in the selling price appeared to produce a favourable sales volume variance and a reasonable increase in profit.

Since the reduction in the selling price, staff commissions also were lower than budgeted. Moreover, the ₹50,000 reduction in revenue led to $0.055 \times ₹50,000 = ₹2,750$ less in commission costs.

Lastly, staffing was 25 hours under budget, leading to a savings of $25 \times ₹125 = ₹3,125$. Therefore, the supervisor attained an increase in sales with lesser staff hours.

Overall, it appears that the manager has done a great job of making revenue and controlling costs.

Workings

Statement Showing Budgeted and Actual Profit (Sep'2023)

	Budgeted Data	Actual Data
Units (pairs of shoes)	2,250	2,500
Price per pair of shoes	₹500.00	₹480.00
Cost per pair of shoes	₹350.00	₹330.00
Commission rate	₹27.50 (5.5% of ₹500)	₹26.40 (5.5% ₹480)
Contribution	₹122.50	₹123.60
Revenue	₹11,25,000	₹12,00,000
Less: Cost of shoes	7,87,500	8,25,000
Less: Staff – additional payment (commission)	61,875	66,000
Less: Staff – base wages	81,250	78,125
Profit	₹1,94,375	₹2,30,875

Computation of variances

Total Profit Variance	=	₹2,30,875 – ₹1,94,375 = ₹36,500 (F)
Sales Contribution Volume Variance	=	Standard Contribution – Budgeted Contribution
	=	₹122.50 × 2,500 – ₹122.50 × 2,250
	=	₹3,06,250 – ₹2,75,625 = ₹30,625 (F)
Sales Price Variance	=	Actual Revenue – Standard Revenue
	=	₹480 × 2,500 – ₹500 × 2,500
	=	₹12,00,000 – ₹12,50,000 = ₹50,000 (A)
Shoe Cost Variance *	=	₹350 × 2,500 – ₹330 × 2,500
	=	₹8,75,000 – ₹8,25,000 = ₹50,000 (F)
Staff Cost Variance-commission*	=	₹27.50 × 2,500 – ₹26.40 × 2,500
	=	₹68,750 – ₹66,000 = ₹2,750 (F)
Staff Cost Variance (base wage)	=	₹81,250 – ₹78,125 = ₹3,125 (F).

(*) Note- The cost variance (for both shoe and staff-commission) equal to the difference between the standard cost and the actual cost.

Illustration 5

Osaka Manufacturing Co. (OMC) is a leading consumer goods company. The budgeted and actual data of OMC for the year 2023-24 are as follows-

Particulars	Budget	Actual	Variance
Sales / Production (units)	2,00,000	1,65,000	(35,000)
Sales (₹)	21,00,000	16,92,900	(4,07,100)
Less: Variable Costs (₹)	12,66,000	10,74,150	1,91,850
Less: Fixed Costs (₹)	3,15,000	3,30,000	(15,000)
Profit	5,19,000	2,88,750	(2,30,250)

The budgeted data shown in the table is based on the assumption that total market size would be 4,00,000 units but it turned out to be 3,75,000 units.

Required

PREPARE a statement showing reconciliation of budget profit to actual profit through marginal costing approach for the year 2023-24 in as much detail as possible.

Solution**Statement of Reconciliation - Budgeted Vs Actual Profit**

Particulars	₹
Budgeted Profit	5,19,000
Less: Sales Volume Contribution - Planning Variance (Adverse)	52,125
Less: Sales Volume Contribution - Operational Variance (Adverse)	93,825
Less: Sales Price Variance (Adverse)	39,600
Less: Variable Cost Variance (Adverse)	29,700
Less: Fixed Cost Variance (Adverse)	15,000
Actual Profit	2,88,750

Workings*Basic Workings*

$$\text{Budgeted Market Share (in \%)} = \frac{2,00,000}{4,00,000}$$

$$= 50\%$$

$$\text{Actual Market Share (in \%)} = \frac{1,65,000}{3,75,000}$$

$$= 44\%$$

Budgeted Contribution	=	₹21,00,000 – ₹12,66,000
	=	₹8,34,000
Average Budgeted Contribution (<i>per unit</i>)	=	$\frac{₹8,34,000}{2,00,000}$
	=	₹4.17
Standard Sales Price <i>per unit</i>	=	$\frac{₹21,00,000}{2,00,000}$
	=	₹10.50
Actual Sales Price <i>per unit</i>	=	$\frac{₹16,92,900}{1,65,000}$
	=	₹10.26
Standard Variable Cost <i>per unit</i>	=	$\frac{₹12,66,000}{2,00,000}$
	=	₹6.33
Actual Variable Cost <i>per unit</i>	=	$\frac{₹10,74,150}{1,65,000}$
	=	₹6.51

CALCULATION OF VARIANCES

Sales Variances

Volume Contribution Planning*	=	Budgeted Market Share % × (Actual Industry Sales Quantity <i>in units</i> – Budgeted Industry Sales Quantity <i>in units</i>) × (Average Budgeted Contribution <i>per unit</i>)
	=	50% × (3,75,000 units – 4,00,000 units) × ₹4.17
	=	52,125 (A)
		(*) Market Size Variance
Volume Contribution Operational**	=	(Actual Market Share % – Budgeted Market Share %) × (Actual Industry Sales Quantity <i>in units</i>) × (Average Budgeted Contribution <i>per unit</i>)
	=	(44% – 50%) × 3,75,000 units × ₹4.17
	=	93,825 (A)
		(**) Market Share Variance

$$\begin{aligned}
 \text{Price} &= \text{Actual Sales} - \text{Standard Sales} \\
 &= \text{Actual Sales Quantity} \times (\text{Actual Price} - \text{Standard Price}) \\
 &= 1,65,000 \text{ units} \times (\text{₹}10.26 - \text{₹}10.50) \\
 &= 39,600 \text{ (A)}
 \end{aligned}$$

Variable Cost Variances

$$\begin{aligned}
 \text{Cost} &= \text{Standard Cost for Production} - \text{Actual Cost} \\
 &= \text{Actual Production} \times (\text{Standard Cost per unit} - \text{Actual Cost per unit}) \\
 &= 1,65,000 \text{ units} \times (\text{₹}6.33 - \text{₹}6.51) \\
 &= \text{₹}29,700 \text{ (A)}
 \end{aligned}$$

Fixed Cost Variances

$$\begin{aligned}
 \text{Expenditure} &= \text{Budgeted Fixed Cost} - \text{Actual Fixed Cost} \\
 &= \text{₹}3,15,000 - \text{₹}3,30,000 \\
 &= \text{₹}15,000 \text{ (A)}
 \end{aligned}$$



D. INVESTIGATION OF VARIANCES

Variances focus attention on deviations, but all deviations cannot be taken as 'out of Control' situations. However, variance investigation on the other hand may not be fruitful in any given situation considering that it requires resources and thus a cost benefit analysis should be considered before undertaking investigation. Investigating variances is a key step in using variance analysis as part of performance management. *"Interpretation may suggest possible cause of variances but investigation must arrive at definite conclusions about the cause of the variance so that action to correct the variance can be effective."* There are behavioural as well as technical consequences to the decision to investigate variances. If no variances are investigated, it may cease to be motivated by the system which produces variances. Investigating favourable and adverse variances may create positive behavioural reinforcements, with implications for motivation, aspiration levels and inter-departmental relationships.

1. Factors to be Considered When Investigating Variance

Certain set of factors should be considered before undertaking the variance investigation of the actual performance against the estimated set.

Size: A standard is seen as an average of the estimates and therefore small variations seen from the standard should be ignored and not investigated further. In addition, organizations can establish limits and the variances seen beyond those limits should be undertaken for further investigation.

Type of Variance: Adverse variance is given more importance by the organization over favourable variances seen with regards to the estimates.

Cost: The costs associated with the undertaking of the investigation should be lower than the benefits associated with the investigation of variances for the organization to undertake the said investigation.

Pattern in variance: The variances need to be monitored over a period of time and if the variance of a particular cost is seen to be worsening over time, then in that case the investigation in relation to the variance needs to be undertaken.

Budgetary process: In case the budgetary process is uncontrollable and unrealistic then in that case the investigation should be re-evaluating the budgetary process rather than undertaking investigation of the variances.

2. Method Used for Investigating Variance⁶

2.1 Simple Rule of Thumb Model

It is based on arbitrary criteria such as investigating if the absolute size of a variance is greater than a certain amount or if the ratio of the variance to the total cost exceeds some predetermined percentage. They are based on *managerial judgement* and do not consider statistical significance.

2.2 Statistical Decision Model

For the statistical models, two mutually exclusive states are possible. First assumes that the system is 'In Control' and a variance is simply due to *random fluctuations around the expected outcome*. The second possible state is that the system is in some way 'Out of Control' and corrective action can be taken to rectify the situation.

An investigation is undertaken when the probability that an observation comes from an 'In-Control' distribution falls below some arbitrarily determined probability level.



E. POSSIBLE INTERDEPENDENCE BETWEEN VARIANCES

It is a term used to express the way in which the cause of one variance may be wholly or partially explained by the cause of another variance. For control purposes, it might therefore be essential to look at several variances together and not in isolation.

Some examples of interdependence between variances are listed below:

- Use of cheaper material, which is of poorer quality, the material price variance will be favourable, but this can cause more wastage of materials leading to adverse usage variance.
- Using more skilled labour to do the work will result in an adverse labour rate variance, but productivity might be higher as a result due to experienced labour.

⁶ Management and Cost Accounting by Colin M. Drury

- Changing the composition of a team might result in a cheaper labour mix (favourable mix variance) but lower productivity (adverse yield variance).
- Workers trying to improve productivity (favourable efficiency variance) in order to get bonus (adverse rate variance) might use materials wastefully in order to save time (adverse materials usage).
- Cutting sale prices (adverse sales price variance) might result in higher sales demand from customers (favourable sales volume variance).
- Similarly, favourable sales price variance may result in adverse sales volume variance.



F. INTERPRETATION OF VARIANCES

There can be a number of potential causes leading to variances in the operational costs –

1. Material Price Variance

- Might be caused due to the use of a different supplier.
- Order size can result in variance.
- Any form of unexpected increase in buying costs such as higher delivery charges.
- Efficiency or inefficiency associated with the buying procedure adopted.
- Lack of appropriate inventory control can result in emergency purchase of material resulting in adverse variance.

2. Material Usage Variance

- Purchase of inferior quality material.
- Implementation of better quality control.
- Increased efficiency in production can help in bringing down wastage rate.
- Changes made in the material mix.
- Careless way of handling material by production department.
- Change in method of production/ design.
- Pilferage of material from the production department.
- Poor inspection.

3. Labour Rate Variance

- Unexpected increase in the pay rate of labour.
- Level of experience of the labour can impact the direct cost of labour.
- Payment of bonuses added to the direct labour costs.
- Change in the composition of the workforce can impact direct labour costs.

4. Labour Efficiency Variance

- Improvement in work or productivity efficiency.
- Workforce mix can have an impact upon labour efficiency levels.
- Industrial action in relation to workforce.
- Poor supervision of the workforce.
- Learning curve effect upon the labour efficiency levels.
- Resource shortages causing an unexpected delay and lowering of labour efficiency levels.
- Using inferior quality of material.
- Introduction of new machinery resulting in improvement of labour productivity levels.

5. Overhead Variances

- Fixed Overhead Expenditure Variance (adverse) are caused by spending in excess of the budget.
- Fixed Overhead Volume Variance is caused by changes in production volume.
- Variable Overhead Expenditure Variance are often caused by changes in machine running costs.
- Variable Overhead Efficiency Variance- causes are similar to those for a direct labour efficiency variance.

6. Sales Price Variance

- Higher discounts given to customers in order to encourage bulk purchases.
- The effect of low price offers during a marketing campaign.
- Poor performance by sales personnel.
- Market conditions or economic conditions forcing changes in prices across the industry.

7. Sales Volume Variance

- Successful or unsuccessful direct selling efforts.
- Successful or unsuccessful marketing efforts (for example, the effects of an advertising campaign).
- Unexpected changes in customer preferences and buying patterns.
- Failure to satisfy demand due to production difficulties.
- Higher demand due to a cut in selling prices, or lower demand due to an increase in sales prices.

Illustration 6

Queensland Chemicals (QC) manufactures high-quality chemicals C-1, C-2 and C-3. Extracts from the budget for last year are given below:

	C-1	C-2	C-3
Sales Quantity (kg)	1,000	3,250	750
	₹ kg	₹ kg	₹ kg
Average Selling Price	17,600	2,560	22,400
Direct Material (C ₂ H ₆ O) Cost	8,000	1,280	9,600
Direct Labour Cost	3,200	480	4,800
Variable Overhead Cost	320	48	480

The budgeted direct labour cost per hour was ₹ 160.

Actual results for last year were as follows:

	C-1	C-2	C-3
Sales Quantity (units)	900	3,875	975
	₹ kg	₹ kg	₹ kg
Average Selling Price	19,200	2,480	20,000
Direct Material(C ₂ H ₆ O) Cost	8,800	1,200	10,400
Direct Labour Cost	3,600	480	4,800
Variable Overhead Cost	480	64	640

The actual direct labour cost per hour was ₹ 150. Actual variable overhead cost per direct labour hour was ₹ 20. QC follows just in time system for purchasing and production and does not hold any inventory.

Required

INTERPRET the Sales Mix Variance and Sales Quantity variance in terms of contribution.

Solution**Variance Interpretation**

The sales quantity variance and the sales mix variance describe how the sales volume contribution variance has been affected by a change in the *total quantity of sales* and a *change in the relative mix of products sold*.

From the figures arrived for the sales quantity contribution variance, we can observe that the increase in total quantity sold would have gained an additional contribution of ₹2,124,600, if the actual sales volume had been in the budgeted sales proportion.

The sales mix contribution variance shows that the variation in the sales mix resulted in a curtailment in profit by ₹570,600. The change in the sales mix has resulted in a relatively higher proportion of sales of C-2 which is the chemical that earns the lowest contribution and a lower proportion of C-1 which earn a contribution significantly higher. The relative increase in the sale of C-3 however, which has the highest unit contribution, has partially offset the switch in mix to C-2.

Workings

Statement Showing Standard Contribution

	C-1 ₹/ kg	C-2 ₹/ kg	C-3 ₹/ kg
Average Selling Price	17,600	2,560	22,400
Direct Material (C ₂ H ₆ O) Cost	8,000	1,280	9,600
Direct Labour Cost	3,200	480	4,800
Variable Overhead Cost	320	48	480
Contribution	6,080	752	7,520

Sales Contribution Mix Variance

Products	Actual Quantity [AQ]	Actual Sales at Budgeted Proportion [RAQ]	Difference [AQ – RAQ]	Contribution ₹ [SC]	Mix Variance (₹' 000) SC × [AQ – RAQ]
C-1	900	1,150	250 (A)	6,080	1,520 (A)
C-2	3,875	3,737.50	137.50 (F)	752	103.40 (F)
C-3	975	862.50	112.50 (F)	7,520	846 (F)
	5,750	5,750			570.60 (A)

Sales Contribution Quantity Variance

Products	Budget Sales Quantity [BQ]	Actual Sales at Budgeted Proportion [RAQ]	Difference [RAQ – BQ]	Contribution ₹ [SC]	Qty. Variance (₹' 000) SC × [RAQ – BQ]
C-1	1,000	1,150	150 (F)	6,080	912 (F)
C-2	3,250	3,737.50	487.50 (F)	752	366.60 (F)
C-3	750	862.50	112.50 (F)	7,520	846 (F)
	5,000	5,750			2,124.60 (F)



Case Scenario

Natural Spices manufactures and distributes high-quality spices to gourmet food shops and top-quality restaurants. Gourmet and high-end restaurants pride themselves on using the freshest, highest-quality ingredients.

Natural Spices has set up five state-of-the-art plants to meet the ever-growing demand. The firm procures raw material directly from the centers of produce to maintain uniform taste and quality. The raw material is first cleaned, dried and tested with the help of special machines. It is then carefully grounded into the finished product passing through various stages and packaged at the firm's ultraclean factory before being dispatched to customers.

The following variances pertain to the last week of operations, arose as a consequence of management's decision to lower prices to increase volume.

<i>Sales Volume Variance</i>	<i>18,000 (F)</i>
<i>Sales Price Variance</i>	<i>14,000 (A)</i>
<i>Purchase Price Variance</i>	<i>10,000 (F)</i>
<i>Labour Efficiency Variance</i>	<i>11,200 (F)</i>
<i>Fixed Cost Expenditure Variance</i>	<i>4,400 (F)</i>

Required

- (i) IDENTIFY the 'Critical Success Factors' for Natural Spices.
- (ii) EVALUATE the management's decision with the 'Overall Corporate Strategy' and 'Critical Success Factors'.

Solution

- (i) Gourmet and high-end restaurants recognise Natural Spices on the basis of its *high quality* of spices. Therefore, quality is the most critical success factor of Natural Spices. There are other factors which cannot be ignored such as price, delivery options, attractive packing etc. But all are secondary to the quality.
- (ii) Deliberate action of cutting price to increase sales volume indicates that firm is intending to expand its market to retail market and street shops which are price sensitive.

The Purchase Price Variance clearly indicating that the firm has purchased raw material at a lower price which may be due to buying lower quality material. Similarly, positive *Efficiency Variance* indicates cost cutting and stretching resources.

It appears that the firm is intending to expand its market to the retail market and street shops by not only reducing the price but also compromising its quality, which opposes its current strategy of *high quality*.

Management should monitor the trends of variances on a regular basis and take appropriate action in case of evidence of permanent decline in quality. Here, customer feedback is also very important.



G. REPORTING OF VARIANCES

Computation of variances and their reporting is not the final step towards the control of various elements of cost. It in fact demands an analysis of variances from the side of the executives, to ascertain the correct reasons for their occurrence. After knowing the exact reasons, it becomes their responsibility to take necessary steps so as to stop the re-occurrence of adverse variances in future. To enhance the utility of such a reporting system it is necessary that such a system of reporting should not only be prompt but should also facilitate the concerned managerial level to take necessary steps. Variance reports should be prepared after keeping in view its ultimate use and its periodicity. Such reports should highlight the essential cost deviations and possibilities for their improvements. In fact, the variance reports should give due regard to the following points –

- (i) The concerned executives should be informed about what the cost performance should have been.
- (ii) How close the actual cost performance is with reference to standard cost performance.
- (iii) The analysis and causes of variances.
- (iv) Reporting should be based on the principle of management by exception.
- (v) The magnitude of variances should also be stated.



H. BEHAVIOURAL ISSUES⁷

Variance analysis may encourage short-termism due to their inherent tendency towards short-term, quantified objectives and results.

A negative perception of an organization's variance analysis process can also encourage other *sub-optimal behaviour* among employees such as attempts to include budget slacks.

The behavioural issues connected with variance analysis could be managed by participating employees during budget setting so that they do not assess the procedure as biased. It is also vital for an organization's performance measurement system to be based on an extensive range of quantitative and qualitative measures so as to encourage management to adopt a long-term view that is aligned with an organization's strategic direction.



Practical Insight

Ethical Practices

Variance analysis for evaluating performance can have strong ethical consequences. For example, standard costing methods have been proposed for medicine as a means for improving performance⁸. Interpretation of a favourable variance may be difficult because it either reflects insufficient treatment or compliance to guidelines. Most hospitals in various countries are reimbursed as specified by the diagnostic related groups (DRG). Each DRG has specified standard "length of stay". If a patient leaves the hospital early, the hospital is financial impacted favourably but a patient staying longer than the specified time costs the hospital money.

⁷ Managerial Accounting: A Focus on Ethical Decision Making by Steve Jackson, Roby Sawyers, Greg Jenkins

⁸ Cornerstones of Financial and Managerial Accounting (2011) by Jay Rich, Jeff Jones, Dan L. Heitger, Maryanne Mowen, Don Hansen, Standard Costing: A Managerial Control Tool, p 1020.



I. STANDARD COSTING IN CONTEMPORARY BUSINESS ENVIRONMENT⁹

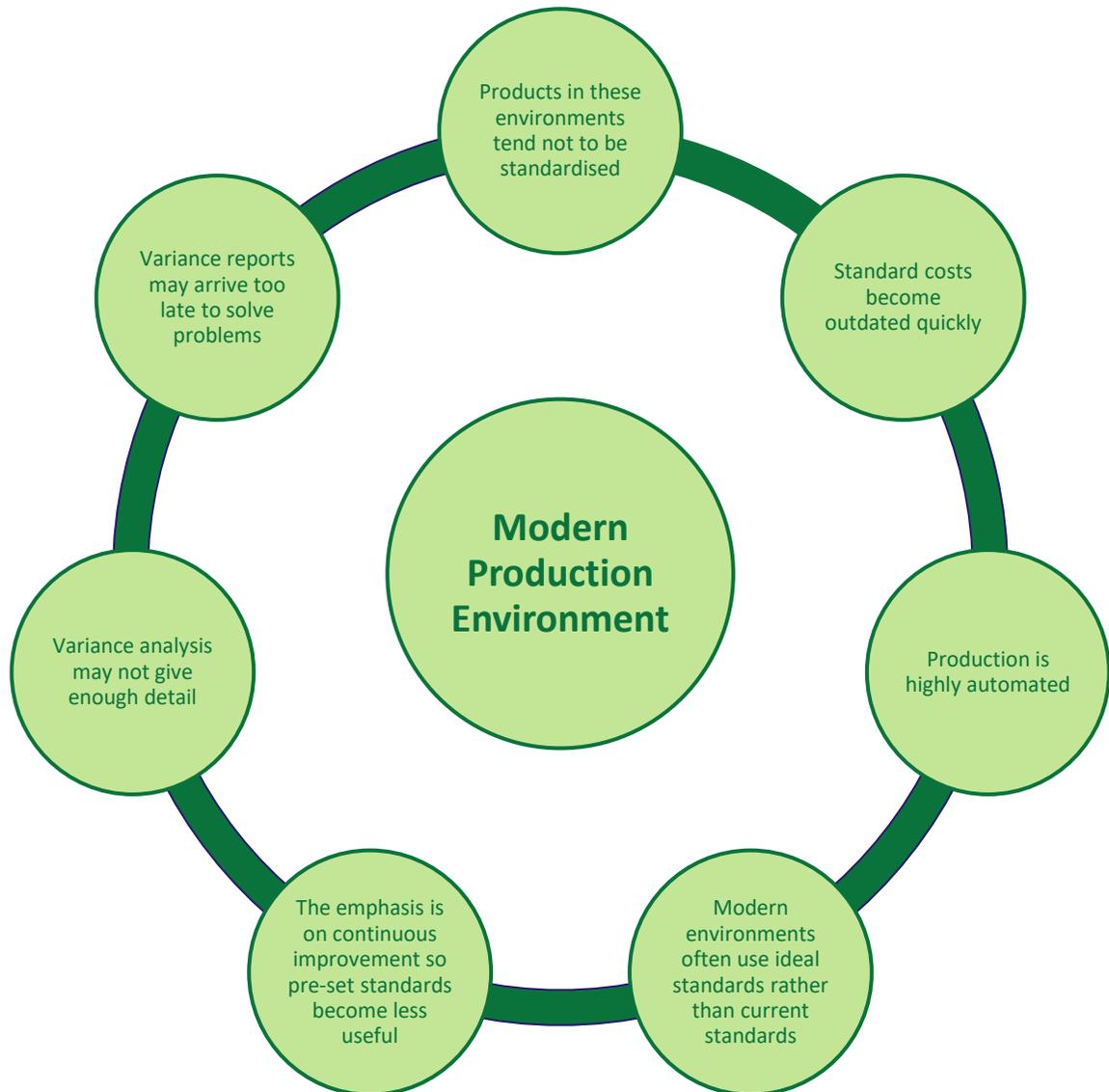


Figure H.1 – Standard Costing and Modern Business Environment

⁹ Accounting: An Introduction, 6/E By Peter Atrill, Eddie McLaney, David Harvey



J. FORMULAE

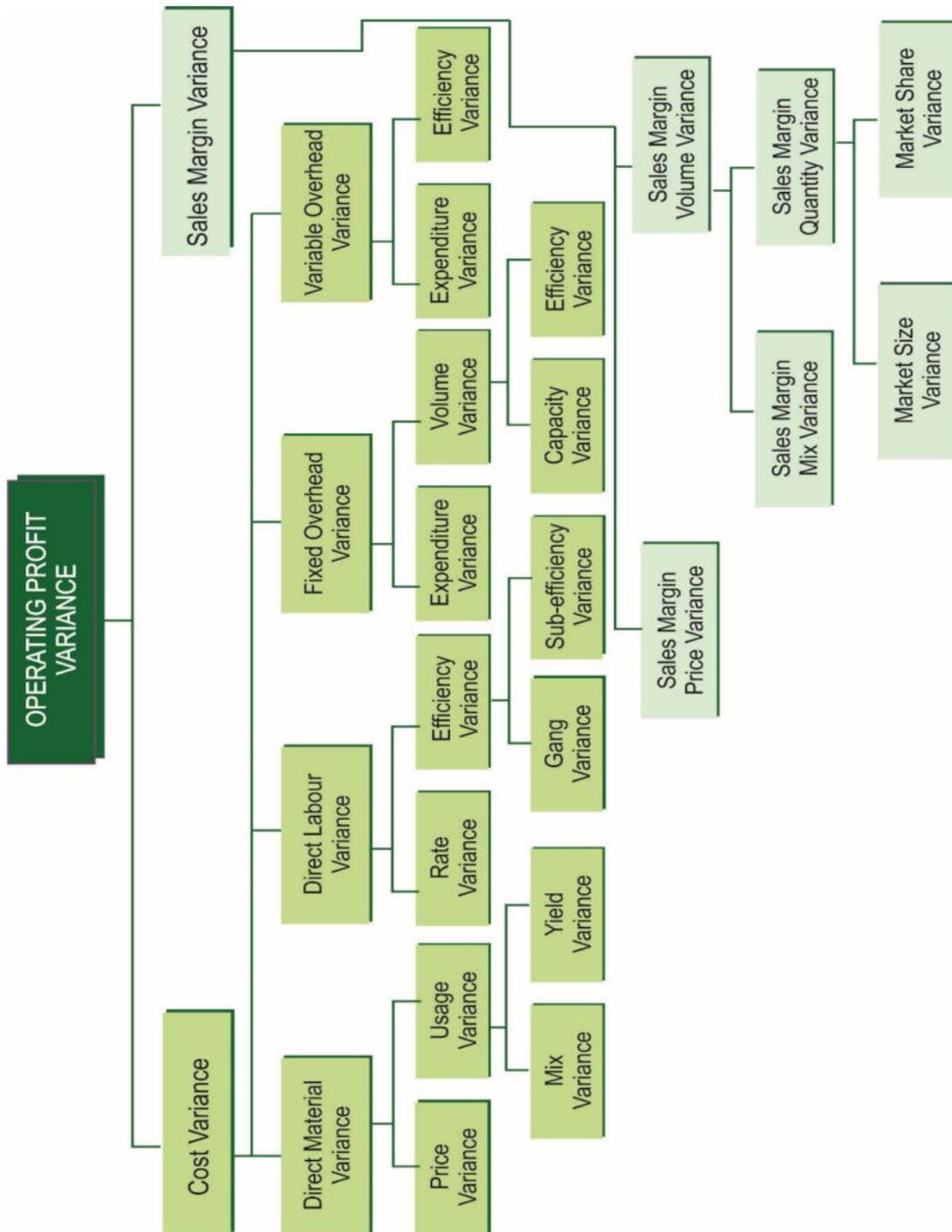
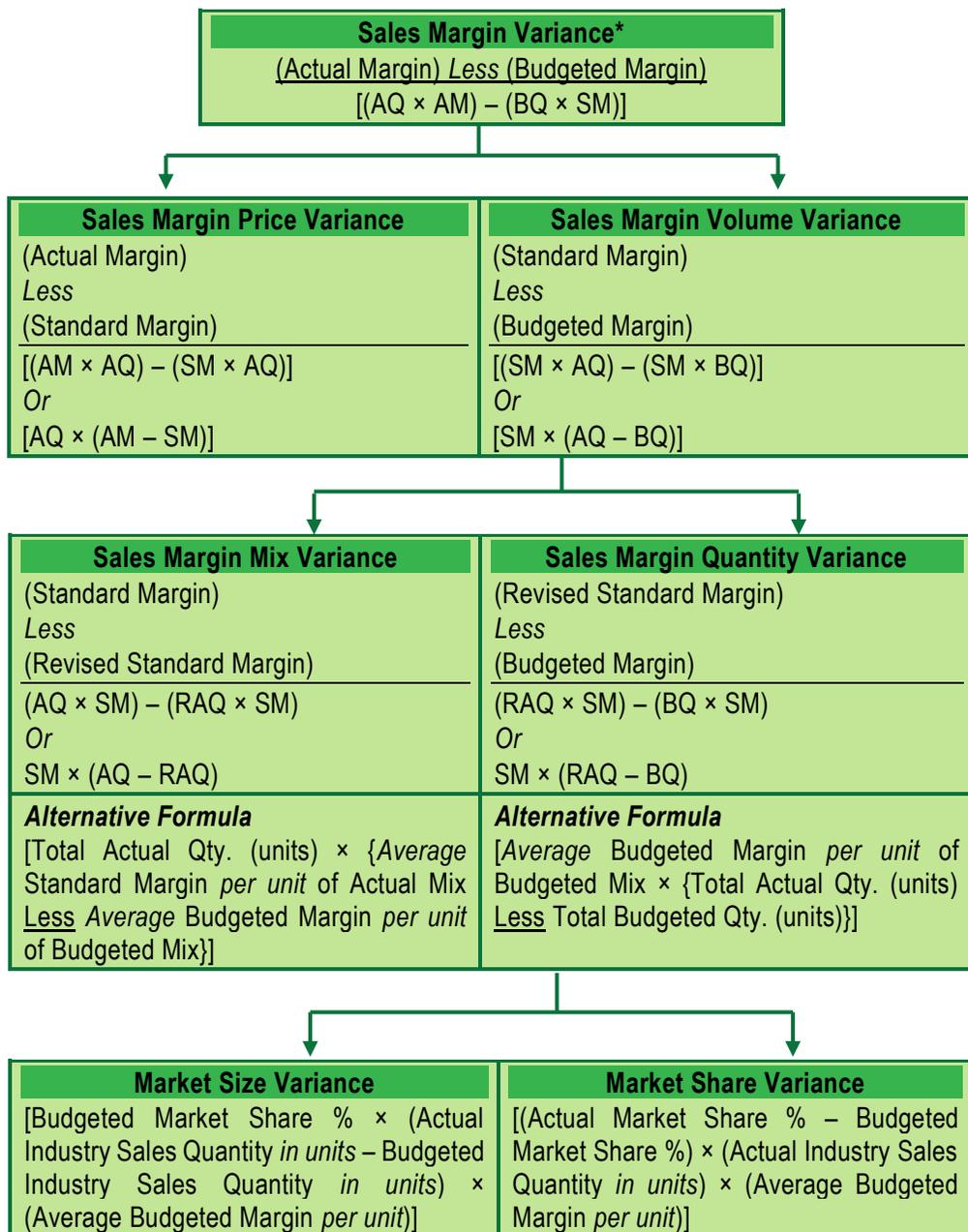


Figure I.1 – Components of Operating Profit Variance

1A. Sales Variances (Absorption Costing)



* in terms of profit

Note:

- BQ = Budgeted Sales Quantity
 AQ = Actual Sales Quantity
 RAQ = Revised Actual Sales Quantity
 = Actual Quantity Sold Rewritten in Budgeted Proportion
 SM = Standard Margin
 = Standard Price per Unit – Standard Cost per Unit
 AM = Actual Margin
 = Actual Sales Price per Unit – Standard Cost per Unit

Market Size Variance

Budgeted Market Share % × (Actual Industry Sales Quantity *in units* – Budgeted Industry Sales Quantity *in units*) × (Average Budgeted Margin *per unit*)

Or

(Budgeted Market Share % × Actual Industry Sales Quantity *in units* – Budgeted Market Share % × Budgeted Industry Sales Quantity *in units*) × (Average Budgeted Margin *per unit*)

Or

(Required Sales Quantity *in units* – Total Budgeted Quantity *in units*) × (Average Budgeted Margin *per unit*)

Market Share Variance

(Actual Market Share % – Budgeted Market Share %) × (Actual Industry Sales Quantity *in units*) × (Average Budgeted Margin *per unit*)

Or

(Actual Market Share % × Actual Industry Sales Quantity *in units* – Budgeted Market Share % × Actual Industry Sales Quantity *in units*) × (Average Budgeted Margin *per unit*)

Or

(Total Actual Quantity *in units* – Required Sales Quantity *in units*) × (Average Budgeted Margin *per unit*)

Market Size Variance + Market Share Variance

(Required Sales Quantity *in units* – Total Budgeted Quantity *in units*) × (Average Budgeted Margin *per unit*)

Add

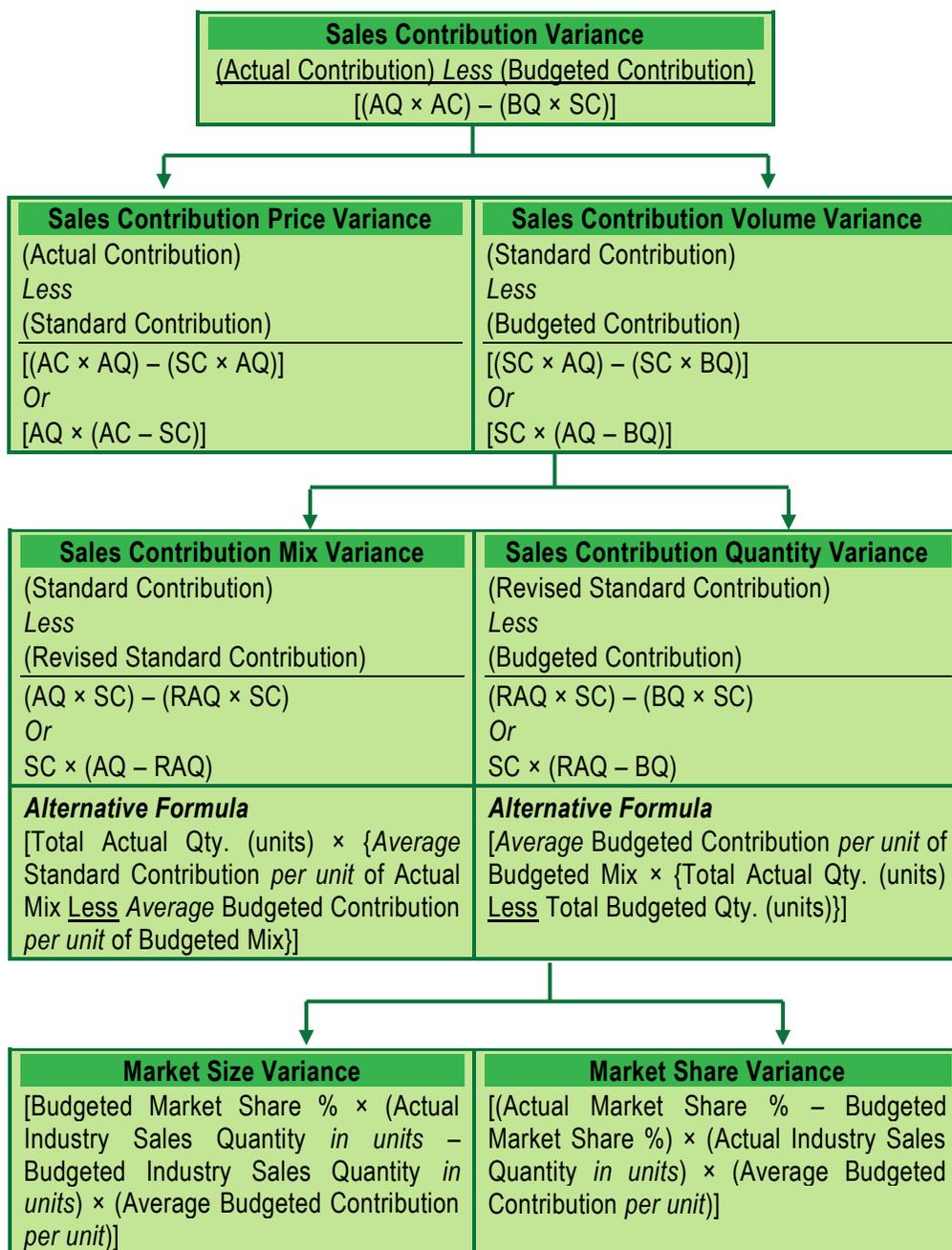
(Total Actual Quantity *in units* – Required Sales Quantity *in units*) × (Average Budgeted Margin *per unit*)

Equals to

(Total Actual Quantity *in units* – Total Budgeted Quantity *in units*) × (Average Budgeted Margin *per unit*)

Sales Margin Quantity Variance

1B. Sales Variances (Marginal Costing)



Note:

- BQ = Budgeted Sales Quantity
 AQ = Actual Sales Quantity
 RAQ = Revised Actual Sales Quantity
 = Actual Quantity Sold Rewritten in Budgeted Proportion
 SC = Standard Contribution
 = Standard Price per Unit – Standard Cost (variable) per Unit
 AC = Actual Contribution
 = Actual Sales Price per Unit – Standard Cost (variable) per Unit

Market Size Variance

Budgeted Market Share % × (Actual Industry Sales Quantity *in units* – Budgeted Industry Sales Quantity *in units*) × (Average Budgeted Contribution *per unit*)

Or

(Budgeted Market Share % × Actual Industry Sales Quantity *in units* – Budgeted Market Share % × Budgeted Industry Sales Quantity *in units*) × (Average Budgeted Contribution *per unit*)

Or

(Required Sales Quantity *in units* – Total Budgeted Quantity *in units*) × (Average Budgeted Contribution *per unit*)

Market Share Variance

(Actual Market Share % – Budgeted Market Share %) × (Actual Industry Sales Quantity *in units*) × (Average Budgeted Contribution *per unit*)

Or

(Actual Market Share % × Actual Industry Sales Quantity *in units* – Budgeted Market Share % × Actual Industry Sales Quantity *in units*) × (Average Budgeted Contribution *per unit*)

Or

(Total Actual Quantity *in units* – Required Sales Quantity *in units*) × (Average Budgeted Contribution *per unit*)

Market Size Variance + Market Share Variance

(Required Sales Quantity *in units* – Total Budgeted Quantity *in units*) × (Average Budgeted Contribution *per unit*)

Add

(Total Actual Quantity *in units* – Required Sales Quantity *in units*) × (Average Budgeted Contribution *per unit*)

Equals to

(Total Actual Quantity *in units* – Total Budgeted Quantity *in units*) × (Average Budgeted Contribution *per unit*)

Sales Contribution Quantity Variance

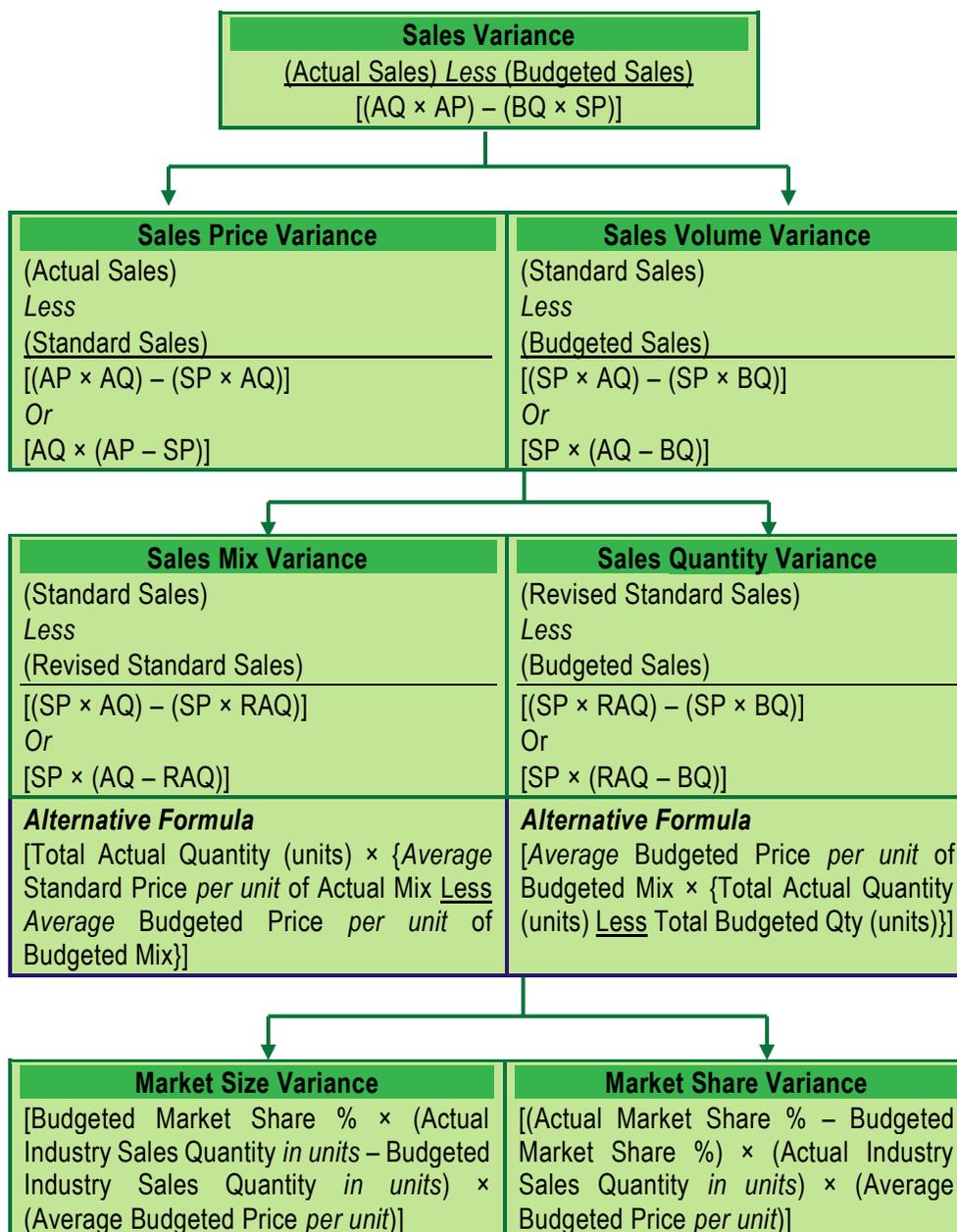


- **Sales Price Variance** is equal to **Sales Margin/ Contribution Price Variance**. This is because, for the actual quantity sold, standard cost remaining constant, change in selling price will have equal impact on turnover and profit/ contribution.
- **Sales Margin Volume Variance** is equal to **Sales Volume Variance × Budgeted Net Profit Ratio**
- **Sales Contribution Volume Variance** is equal to **Sales Volume Variance × Budgeted PV Ratio**

A Relation: Sales Margin Volume Variance in terms of Profit & Contribution

Sales Margin Volume Variance	Standard Margin Per Unit × (Actual Quantity – Budgeted Quantity) <i>Or</i>
Sales Margin Volume Variance	[Standard <i>Contribution</i> Per Unit – Standard Fixed Overheads Per Unit] × (Actual Quantity – Budgeted Quantity) <i>Or</i>
Sales Margin Volume Variance	[Standard <i>Contribution</i> Per Unit × (Actual Quantity – Budgeted Quantity)] – [Standard Fixed Overheads Per Unit × (Actual Quantity – Budgeted Quantity)] <i>Or</i>
Sales Margin Volume Variance	Sales Contribution Volume Variance – Fixed Overhead Volume Variance <i>Or</i>
Sales Contribution Volume Variance	Sales Margin Volume Variance + Fixed Overhead Volume Variance
<i>Note: Production units equals to Sales units for both actual & budget.</i>	

1C. Sales Variances (Turnover or Value)



Note:

- BQ = Budgeted Sales Quantity
 AQ = Actual Sales Quantity
 RAQ = Revised Actual Sales Quantity
 = Actual Quantity Sold Rewritten in Budgeted Proportion
 SP = Standard Selling Price per Unit
 AP = Actual Selling Price per Unit

Market Size Variance

Budgeted Market Share % × (Actual Industry Sales Quantity *in units* – Budgeted Industry Sales Quantity *in units*) × (Average Budgeted Price *per unit*)

Or

(Budgeted Market Share % × Actual Industry Sales Quantity *in units* – Budgeted Market Share % × Budgeted Industry Sales Quantity *in units*) × (Average Budgeted Price *per unit*)

Or

(Required Sales Quantity *in units* – Total Budgeted Quantity *in units*) × (Average Budgeted Price *per unit*)

Market Share Variance

(Actual Market Share % – Budgeted Market Share %) × (Actual Industry Sales Quantity *in units*) × (Average Budgeted Price *per unit*)

Or

(Actual Market Share % × Actual Industry Sales Quantity *in units* – Budgeted Market Share % × Actual Industry Sales Quantity *in units*) × (Average Budgeted Price *per unit*)

Or

(Total Actual Quantity *in units* – Required Sales Quantity *in units*) × (Average Budgeted Price *per unit*)

Market Size Variance + Market Share Variance

(Required Sales Quantity *in units* – Total Budgeted Quantity *in units*) × (Average Budgeted Price *per unit*)

Add

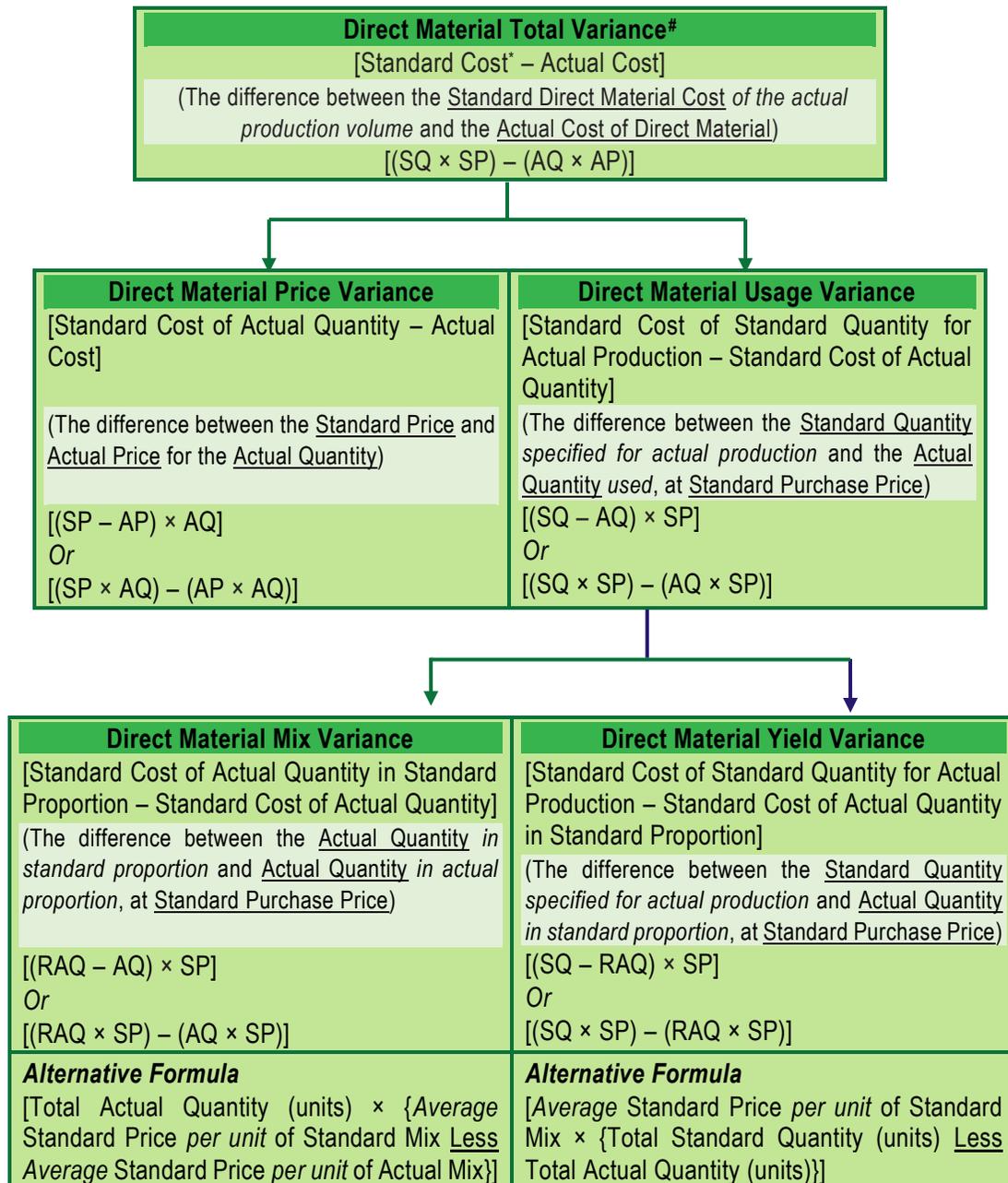
(Total Actual Quantity *in units* – Required Sales Quantity *in units*) × (Average Budgeted Price *per unit*)

Equals to

(Total Actual Quantity *in units* – Total Budgeted Quantity *in units*) × (Average Budgeted Price *per unit*)

Sales Quantity Variance

2. Direct Material Variances



Note:

SQ	=	Standard Quantity = Expected Consumption for Actual Output
AQ	=	Actual Quantity of <i>Material Consumed</i>
RAQ	=	Revised Actual Quantity = Actual Quantity Rewritten in Standard Proportion
SP	=	Standard Price per Unit
AP	=	Actual Price per Unit
(*)	=	Standard Cost refers to 'Standard Cost of Standard Quantity for Actual Output'
(#)	=	Direct Material Total Variance (also known as material cost variance)

Material Purchase Price Variance

[Standard Cost of Actual Quantity – Actual Cost]

(The difference between the Standard Price and Actual Price
for the *actual quantity of material purchased*)

$$[(SP - AP) \times PQ]$$

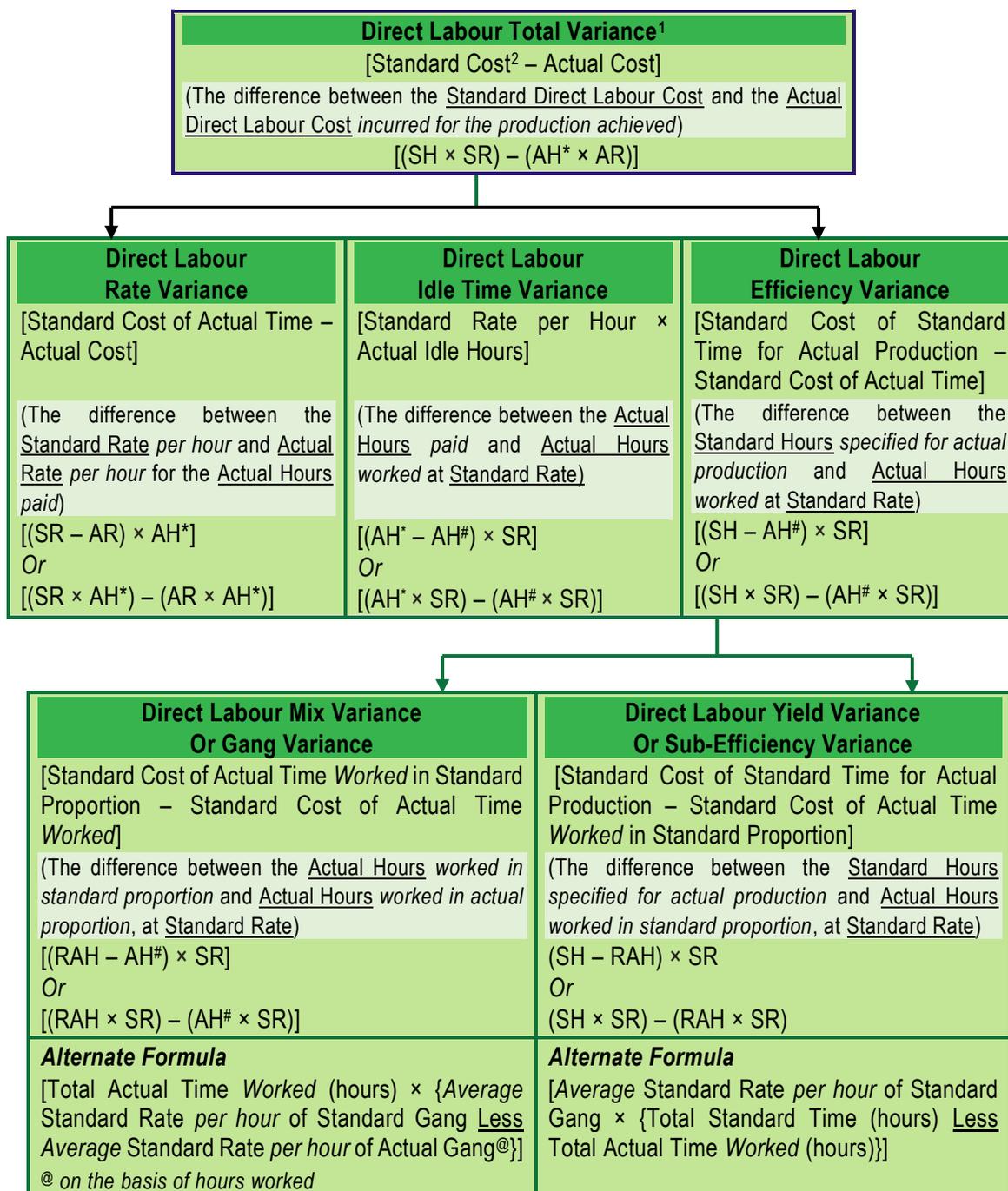
Or

$$[(SP \times PQ) - (AP \times PQ)]$$

Note:

PQ	=	Purchase Quantity
SP	=	Standard Price
AP	=	Actual Price

3. Direct Labour Variances



Note:

- SH = Standard Hours = Expected time (Time allowed) for Actual Output
AH* = Actual Hours *paid for*
AH# = Actual Hours *worked*
RAH = Revised Actual Hours = Actual Hours (worked) rewritten in Standard Proportion
SR = Standard Rate per Labour Hour
AR = Actual Rate per Labour Hour Paid
(2) = Standard Cost refers to 'Standard Cost of Standard Time for Actual Output'
(1) = Direct Labour Total Variance (also known as labour cost variance)

In the absence of idle time

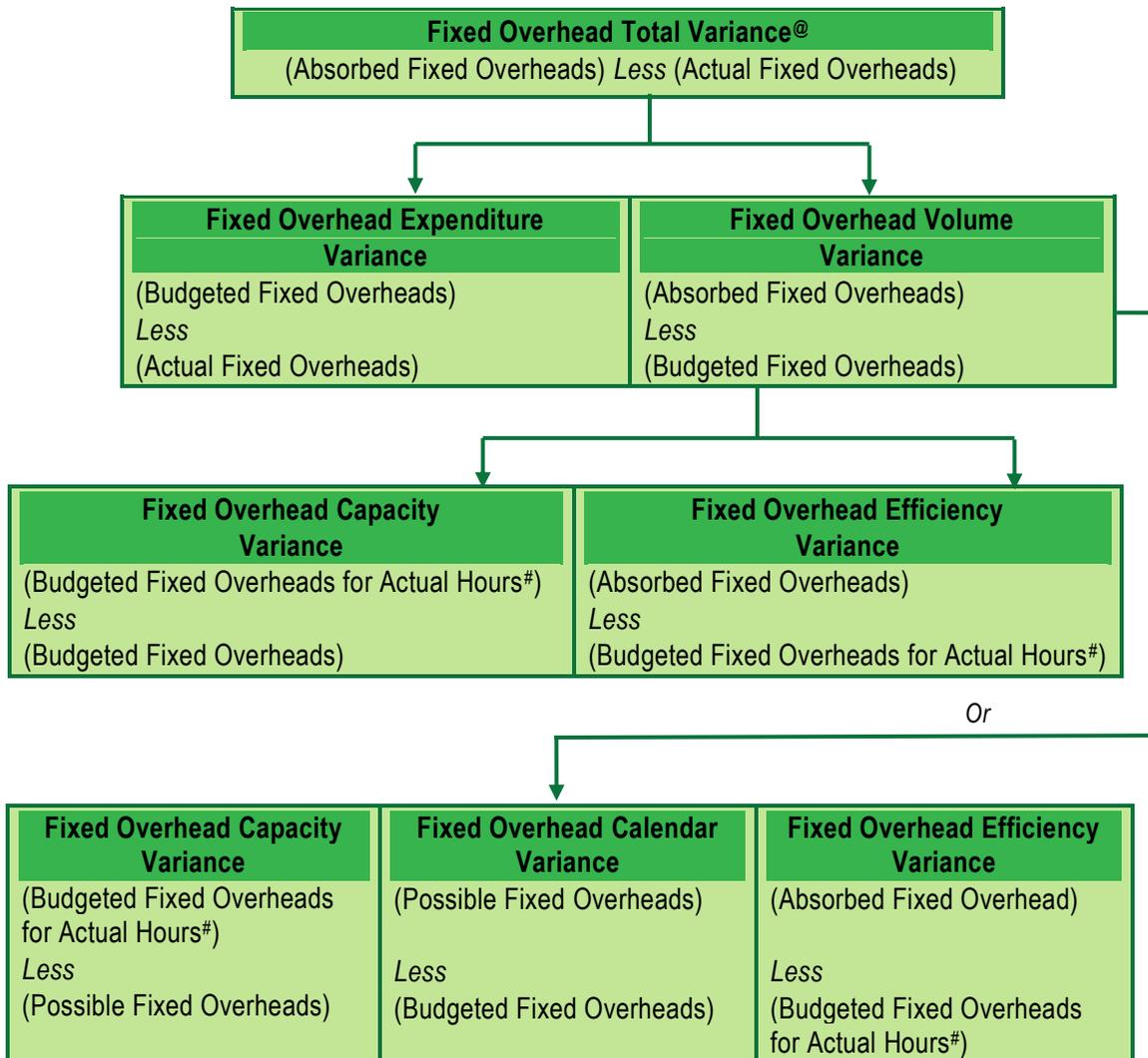
$$\text{Actual Hours Worked} = \text{Actual Hours Paid}$$



Idle Time is a period for which a workstation is available for production but is not used due to e.g., shortage of tooling, material, or operators. During Idle Time, Direct Labour Wages are being paid but no output is being produced. The cost of this can be identified separately in an Idle Time Variance, so that it is not 'hidden' in an adverse Labour Efficiency Variance.

Some organizations face Idle Time on regular basis. In this situation, the Standard Labour Rate may include an allowance for the cost of the expected idle time. Only the impact of any unexpected or abnormal Idle Time would be included in the Idle Time Variance.

4. Fixed Production Overhead Variances



[#] Actual Hours (Worked)

Note:**Standard Fixed Overheads for Production (Absorbed)**

- = Standard Fixed Overhead Rate per Unit × Actual Production in Units
- = Standard Fixed Overhead Rate per Hour × Standard Hours for Actual Production

Budgeted Fixed Overheads

- = It represents the amount of fixed overhead which should be spent according to the budget or standard during the period
- = Standard Fixed Overhead Rate per Unit × Budgeted Production in Units
- = Standard Fixed Overhead Rate per Hour × Budgeted Hours

Actual Fixed Overheads Incurred**Budgeted Fixed Overheads for Actual Hours**

- = Standard Fixed Overhead Rate per Hour × Actual Hours

Possible Fixed Overheads

- = Expected Fixed Overhead for Actual Days Worked
- = $\frac{\text{Budgeted Fixed Overhead}}{\text{Budgeted Days}} \times \text{Actual Days}$

(@)

- = Fixed Overhead Total Variance also known as 'Fixed Overhead Cost Variance'

Fixed Overhead Efficiency Variance

(Absorbed Fixed Overheads) – (Budgeted Fixed Overheads for Actual Hours)

Or

(Standard Fixed Overhead Rate per Hour × Standard Hours for Actual Output) – (Standard Fixed Overhead Rate per Hour × Actual Hours)

Or

Standard Fixed Overhead Rate per Hour × (Standard Hours for Actual Output – Actual Hours)

Fixed Overhead Capacity Variance

(Budgeted Fixed Overheads for Actual Hours) – (Budgeted Fixed Overheads)

Or

(Standard Fixed Overhead Rate per Hour × Actual Hours) – (Standard Fixed Overhead Rate per Hour × Budgeted Hours)

Or

Standard Fixed Overhead Rate per Hour × (Actual Hours – Budgeted Hours)

Fixed Overhead Volume Variance-I

(Absorbed Fixed Overheads) – (Budgeted Fixed Overheads)

Or

(Standard Fixed Overhead Rate per Unit × Actual Output) – (Standard Fixed Overhead Rate per Unit × Budgeted Output)

Or

Standard Fixed Overhead Rate per Unit × (Actual Output – Budgeted Output)

Fixed Overhead Volume Variance-II

(Absorbed Fixed Overheads) – (Budgeted Fixed Overheads)

Or

(Standard Fixed Overhead Rate per Hour × Standard Hours for Actual Output) – (Standard Fixed Overhead Rate per Hour × Budgeted Hours)

Or

Standard Fixed Overhead Rate per Hour × (Standard Hours for Actual Output – Budgeted Hours)

Or

Standard Fixed Overhead Rate per Hour × (Standard Hours per Unit × Actual Output – Standard Hours per Unit × Budgeted Output)

Or

(Standard Fixed Overhead Rate per Hour × Standard Hours per Unit) × (Actual Output – Budgeted Output)

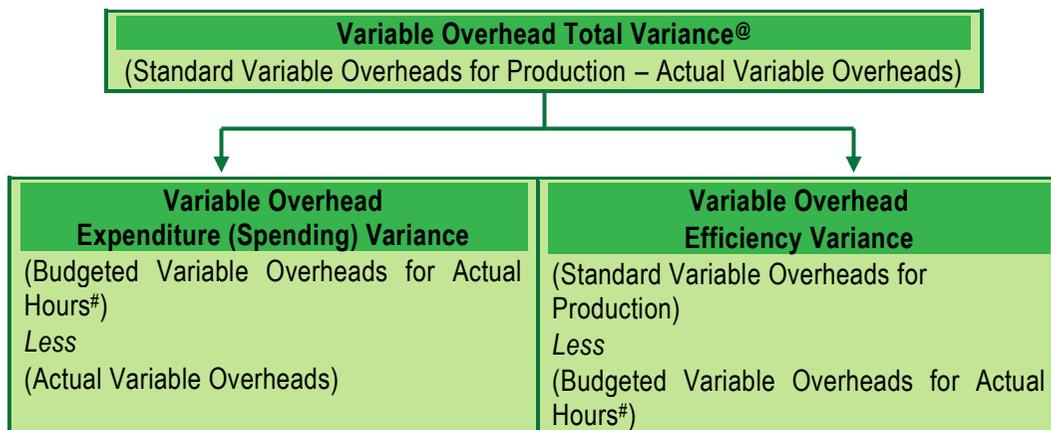
Or

Standard Fixed Overhead Rate per Unit × (Actual Output – Budgeted Output)



Overhead Variances can also be affected by idle time. It is usually assumed that Overheads are incurred when labour is working, not when it is idle. Accordingly, hours worked has been considered for the calculation of Variable and Fixed Overheads Variances.

5. Variable Production Overhead Variances



[#] Actual Hours (Worked)

Note:

Standard Variable Overheads for Production/Charged to Production

- = Standard/Budgeted Variable Overhead Rate per Unit × Actual Production (Units)
- = Standard Variable Overhead Rate per Hour × Standard Hours for Actual Production

Actual Overheads Incurred

Budgeted Variable Overheads for Actual Hours

- = Standard Variable Overhead Rate per Hour × Actual Hours

([@])

- = Variable Overhead Total Variance also known as 'Variable Overhead Cost Variance'

Variable Overhead Efficiency Variance

(Standard Variable Overheads for Production) – (Budgeted Overheads for Actual Hours)
Or

(Standard Variable Overhead Rate per Hour × Standard Hours for Actual Output) – (Standard Variable Overhead Rate per Hour × Actual Hours)
Or

Standard Variable Overhead Rate per Hour × (Standard Hours for Actual Output – Actual hours)

Variable Overhead Expenditure Variance

(Budgeted Variable Overheads for Actual Hours) – (Actual Variable Overheads)
Or

(Standard Rate per Hour × Actual Hours) – (Actual Rate per Hour × Actual Hours)
Or

Actual Hours × (Standard Rate per Hour – Actual Rate per Hour)

 **SUMMARY**

- ❑ **Planning & Operational Variances** - A Planning Variance simply compares a revised standard to the original standard.

An Operational Variance simply compares the actual results against the revised amount.

Operating variances would be calculated after the planning variances have been established and are thus a realistic way of assessing performance.

Controllable Variances are those variances which arises due to inefficiency of a cost centre /department. Uncontrollable Variances are those variances which arises due to factors beyond the control of the management or concerned department of the organization.

- ❑ **Variance Analysis in Activity Based Costing** - Variance analysis can be applied to activity costs (such as setup costs) to gain insight into why actual activity costs differ from activity costs in the static budget or in the flexible budget. Interpreting cost variances for different activities requires understanding whether the costs are output unit-level, batch level, product sustaining, or facility sustaining costs.
- ❑ **Variance Analysis in Advanced Manufacturing Environment/ High Technology Firms** - In the high-technology environment, large part of manufacturing process is computerized. Many costs that once were largely variable have become fixed, most becoming committed fixed cost. Some high technology manufacturing organizations have found that the two largest variable costs involve materials and power to operate machines. In these companies, the emphasis of variance analysis is placed on direct materials and variable manufacturing overhead. For these firms labour variances may no longer be meaningful because direct labour is a committed cost, not a cost expected to vary with output.
- ❑ **Impact of Learning Curve** - Learning curve is a geometrical progression, which reveals that there is steadily decreasing cost for the accomplishment of a given repetitive operation, as the identical operation is increasingly repeated. The amount of decrease will be less and less with each successive unit produced. Automated manufacturing is unlikely to have much variation or to display a regular learning curve. In less-automated processes, however, where learning curves do occur, it is important to take the resulting decline in labour hours and costs into account in setting standards, determining prices, planning production, or setting up work schedules.
- ❑ **Investigation of Variances** - An investigation should only be undertaken if the benefits expected from the investigation exceeds the costs of searching for and correcting the source of the variance. Interpretation may suggest possible cause of variances but investigation must arrive at definite conclusions about the cause of the variance so that action to correct the variance can be effective.

- ❑ **Relevant Cost Approach** to Variance Analysis is used if inputs are limited. Failure to use limited inputs properly leads not only to increased acquisition cost but also to a lost contribution. Therefore, it is necessary to consider the lost contribution in variance analysis. When this approach is used, price or expenditure variances are not affected.
- ❑ **Standard Costing in Service Sector** -Use of activity based costing can provide a constructive basis for variance analysis of overheads in service sector organizations.
- ❑ **McDonaldization** – Breaking tasks into smallest possible units and rationalising them to find the single most efficient method for completing each task. All other tasks are discarded. standards can be more accurately set and assessed. Helpful in services like hairdressing, dentistry, or opticians' services.
- ❑ **Behavioural Issues of Standard Costing**– Focus on short term, sub-optimal behaviour of the employees like incorporation of budget slacks. These issues can be overcome by involving employees in budget preparation and taking a long- term view of organisation strategy incorporating various qualitative and quantitative measures.
- ❑ **Possible Interdependence between Variances** – Using cheaper materials will result in a favourable material price variance, but using the cheaper material in production might increase the wastage rate (adverse material usage) and cause a fall in labour productivity (adverse labour and variable overhead efficiency). A more expensive mix of materials (adverse mix variance) might result in higher output yields (favourable yield variance).

Using more experienced labour to do the work will result in an adverse labour rate variance, but productivity might be higher as a result (favourable labour and variable overhead efficiency).
- ❑ Standard costing may be inappropriate in the modern production environment because: products may not be standardised, get outdated quickly, automation of production, emphasis on continuous improvement, delay in problem solving.



TEST YOUR KNOWLEDGE- MCQS

MCQ 1

Variance which arises because of inaccurate or faulty standards, it is not in control of management, and they should not be held responsible. This variance is –

Options

- a. Planning variance
- b. Operational variance
- c. Labour variance
- d. Efficiency variance

Key - a

Reason – Planning variance arises because of inaccurate or faulty standards; it is not in control of management, and they should not be held responsible.

MCQ 2

Variances which arise due to inefficiency of a cost centre /department is –

Options

- a. Controllable variance
- b. Uncontrollable variance
- c. Under controllable variance
- d. Planning variance

Key - a

Reason – Variances which arise due to inefficiency of a cost centre /department is Controllable variance. It is in the control of the management of the organization.

MCQ 3

If in MyGlam company the new manager wants to understand that if the variance arises solely because the actual quantity sold differs from the budgeted quantity sold is –

Options

- a. Static budget variance.
- b. Master budget increment.
- c. Sales mix variance.
- d. Sales volume variance.

Key - d

Reason – Sales Volume Variance arises due to difference of actual quantity sold and budgeted quantity sold.

MCQ 4

The total fixed overhead variance is the –

Options

- a. Measure of the lack of production volume
- b. Amount of the under-applied or over-applied fixed overhead costs.
- c. Cost Reduction achieved from difference in productions.
- d. Measure of production inefficiency.

Key - b

Reason – The total fixed overhead variance is the difference between the actual total fixed overhead cost incurred and the applied fixed overhead.

MCQ 5

The Managing Director of ACE Toy company reviewed the standard cost variance analysis, and he wants to understand the reason of unfavourable labour efficiency variance of ₹6,700. The most likely cause of the variance is –

Options

- a. The new contract with labour increased wages.
- b. For last few weeks the machinery maintenance has been inadequate.
- c. The production department has employed highly skilled workers.
- d. None of the above.

Key - b

Reason – If machine will not work properly for production in such case labour efficiency variance will be unfavourable.

MCQ 6

If the production levels increase in a manufacturing organization ABS Ltd within a relevant range, which of the following costs would decrease if production levels were increased within the relevant range?

Options

- a. Total fixed costs
- b. Variable costs per unit
- c. Total variable costs
- d. Fixed costs per unit

Key - d

Reason –The fixed cost per unit decreases, if production increases within a relevant range.

MCQ 7

When we perform a task, as experience is gain with the task, which one of the following techniques would most likely be used –

Options

- a. Regression analysis
- b. Learning curve analysis
- c. Sensitivity analysis
- d. Normal probability analysis

Key - b

Reason – A learning curve is a concept that shows how a process is improved over time due to learning and increased proficiency.

MCQ 8

The manager of production department is arguing that the following point is not responsible for Material Usage Variance –

Options

- a. Change in method of production/ design
- b. Increased efficiency in production can help in bringing down wastage rate
- c. Changes made in the material mix
- d. Purchase price of inferior quality material

Key - d

Reason – Quantity of Inferior quality material is responsible for material usage variance.

MCQ 9

A newly appointed manager of HR Department interested to know which of the following is not responsible for Labour Rate Variance.

Options

- a. Unexpected increase in the pay rate of labour
- b. Level of experience of the labour can impact the direct cost of labour
- c. Poor supervision of workforce
- d. Change in the composition of the workforce can impact direct labour costs

Key - c

Reason – Poor supervision of workforce will be responsible for labour efficiency variance.

MCQ 10

The manager who has just implemented JIT in the company is stating that the following point is not responsible for Labour Efficiency Variance.

Options

- a. Poor supervision of the workforce
- b. Learning curve effect upon the labour efficiency levels
- c. Using inferior quality of material
- d. Salary paid to female employees

Key - d

Reason – The salary paid to female employee will not impact the labour efficiency variance.

MCQ 11

Deciding the selling price of the new product in market is the most difficult decision. While doing the variance analysis, the manager of the sales and marketing department of the company is interested to know which of the following is not responsible for Sales Price Variance –

Options

- a. Higher discounts given to customers in order to encourage bulk purchases
- b. Failure to satisfy demand due to production difficulties
- c. Better sales price realization
- d. Market conditions or economic conditions forcing changes in prices across the industry

Key - b

Reason – Failure to satisfy demand due to production difficulties will result in Sales volume variance and not sales price variance.



TEST YOUR KNOWLEDGE

Planning and Operational Variances

1. Managing Director of Petro-KL Ltd (PTKLL) thinks that Standard Costing has little to offer in the reporting of material variances due to frequent changes in price of materials.

PTKLL can utilize one of two equally suitable raw materials and always plan to utilize the raw material which will lead to cheapest total production costs. However, PTKLL is frequently trapped by price changes and the material actually used often provides, after the event, to have been more expensive than the alternative which was originally rejected.

During the last accounting period, to produce a unit of 'P' PTKLL could use either 2.50 Kg of 'PG' or 2.50 kg of 'PD'. PTKLL planned to use 'PG' as it appeared it would be cheaper of the two and plans were based on a cost of 'PG' of ₹1.50 per Kg. Due to market movements, the actual prices changed and if PTKLL had purchased efficiently the cost would have been:

'PG' ₹2.25 per Kg;

'PD' ₹2.00 per Kg

Production of 'P' was 1,000 units and usage of 'PG' amounted to 2,700 Kg at a total cost of ₹ 6,480/-

Required

CALCULATE the material variance for 'P' by:

- (i) Traditional Variance Analysis; and
 - (ii) An approach which distinguishes between Planning and Operational Variances.
2. Ski Slope had planned, when it originally designed its budget, to buy its artificial ice for ₹10/ per kg. However, due to subsequent innovations in technology, producers slashed their prices to ₹9.70 per kg. and this figure is now considered to be a general market price for the purpose of performance assessment for the budget period. The actual price paid was ₹9.50, as the Ski Slope procurement department negotiated strongly for a better price. The other information relating to that period were as follows:

Original Standards (ex-ante)		Revised Standards (ex-post)		Actual (5,500 units)	
5,500 units × 5 Kgs. × ₹10	₹2,75,000	5,500 units × 4.75 Kgs. × ₹9.70	₹2,53,412.50	27,225 Kgs. × ₹9.50	₹2,58,637.50

Required

- (i) CALCULATE the variances for 'Ice' by
 - (a) Traditional Variance Analysis; and
 - (b) An approach which distinguishes between Planning and Operational Variances.
- (ii) INTERPRET the result.

3. KONY Ltd., based in Kuala Lumpur, is the Malaysian subsidiary of Japan's NY corporation, headquartered in Tokyo. KONY's principal Malaysian businesses include marketing, sales, and after-sales service of electronic products & software exports products. KONY set up a new factory in Penang to manufacture and sell integrated circuit 'Q50X-N'. The first quarter's budgeted production and sales were 2,000 units. The budgeted sales price and standard costs for 'Q50X-N' were as follows:

	RM	RM
Standard Sales Price <i>per unit</i>		50
Standard Costs <i>per unit</i>		
Circuit X (10 units @ RM 2.5)	25	
Circuit Designers (6 hrs. @ RM 2)	12	(37)
Standard Contribution <i>per unit</i>		13

Actual results for the first quarter were as follows:

	RM '000	RM '000
Sales (2,000 units)		158
Production Costs (2,000 units)		
Circuit X (21,600 units)	97.20	
Circuit Designers (11,600 hours)	34.80	(132)
Actual Contribution (2,000 units)		26

The management accountant made the following observations on the actual results–

“In total, the performance agreed with budget; however, in every aspect other than volume, there were huge differences. Sales were made at what was supposed to be the highest feasible price, but we now feel that we could have sold for RM 82.50 with no adverse effect on volume. The Circuit X cost that was anticipated at the time the budget was prepared was RM 2.5 per unit. However, the general market price relating to efficient purchases of the Circuit X during the quarter was RM 4.25 per unit. Circuit designers have the responsibility of designing electronic circuits that make up electrical systems. Circuit Designer's costs rose dramatically with increased demand for the specialist skills required to produce the 'Q50X-N', and the general market rate was RM 3.125 per hour - although KONY always paid below the normal market rate whenever possible. In my opinion, it is not necessary to measure the first quarter's performance through variance analysis. Further, our operations are fully efficient as the final contribution is equal to the original budget.”

Required

COMMENT on management accountant's view.

4. AGF is a chemical processing company that produces sprays used by farmers to protect their crops. One of these sprays 'Agrofresh' is made by using either chemical A or chemical B. To produce one litre of Agrofresh spray they have the option to use either 12 litres of chemical A or 12 litres of chemical B. During the financial year, the purchase department of AGF has planned to use chemical B as it appeared that it would be the cheaper of the two and their plans were based on a cost of chemical B of ₹15 per litre.

Due to subsequent market movement during the year the actual prices changed and if the concerned department had purchased efficiently, the cost would have been:

Chemical A	₹15.40 per litre
Chemical B	₹16.00 per litre

Production of Agrofresh spray was 1,000 litres and the usage of chemical B was 12,800 litres at a cost of ₹2,09,920.

You are the CEO of AGF and the management accountant has sent to you the following suggestions through e-mail:

"I feel that in our particular circumstances the traditional approach to variance analysis is of little use as for some of our products we can utilize one of several equally suitable chemicals and we always plan to use such chemical which will lead to cheapest production costs. However due to sharp market movements, we are frequently trapped by the sharp price changes which lead to the choice of expensive alternative at the end."

Required

To check the reality in the content of the mail, you asked, the management accountant of the company:

- (i) to CALCULATE the material variances for Agrofresh by using
 - Traditional Variance Analysis
 - Planning and Operational Variances
- (ii) to ANALYSE how planning and operational variances approached the variances.
- (iii) to ANALYSE how the advanced variances are useful to your organisation.

Variance Analysis in Activity Based Costing

5. Krishna is Chief Financial Officer of millets.com, an internet company that enables customer to order for delivery of different millets by accessing its website. Krishna is concerned with the efficiency and effectiveness of the financial function. He collects the following information for three finance activities in 2023.

Rate per unit of Cost Driver

Activity	Activity Level	Cost Driver	Static Budget Amount (₹)	Actual Amount (₹)
Receivables	Output unit	Remittance	6.39	7.50
Payables	Batch	Invoices	29.00	28.00
Travel expenses	Batch	Travel claims	76.00	74.00

The output measure is the number of deliveries which is the same as the number of remittances. The following additional information are also given:

	Budgeted	Actual
Number of deliveries	10,00,000	9,48,000
Delivery Batch size	5	4.468
Travel expenses Batch size	500	501.587

Required

CALCULATE the flexible budget variances for 2023 to :

- (i) Receivable Activities
- (ii) Payable Activities
- (iii) Travel expense Activities

(Ignore fractions in all calculations)

6. WDG Limited uses activity-based costing to allocate variable manufacturing overhead costs to products. The company identified three activities with the following information for last quarter:

Activity	Standard Rate	Standard Quantity per unit produced	Actual Costs	Actual Quantity
Indirect Materials	₹20 per kilogram	0.5 kilogram per unit	₹9,40,000	48,000 kilogram
Product Testing	₹3 per test minute	10 minutes per unit	₹22,50,000	7,40,000 test minutes
Energy	₹0.20 per minute of machine time	4 minutes of machine time per unit	₹70,000	3,60,000 minutes of machine time

The company produced 80,000 units in the last quarter. Company policy is to investigate all variances above 5% of the flexible budget amount for each activity.

Required

- (i) CALCULATE variable overhead expenditure variance and variable overhead efficiency variance for each of the activities using activity-based costing. Clearly indicate each variance as favourable or unfavourable / adverse.
 - (ii) INTERPRET the results of variable overhead efficiency variance as calculated in (i) above in respect of indirect materials and product testing activity.
 - (iii) IDENTIFY the variances that should be investigated according to company policy. Show calculations to support your answer.
7. JPY Limited produces a single product. It has recently automated part of its manufacturing plant and adopted Total Quality Management (TQM) and Just-in-Time manufacturing system. No inventories are held for material as well as for finished product. The company currently uses standard absorption costing system. Following are related to fourth quarter of 2023-24:

	Budget	Actual
Production and Sales	1,00,000 units	1,10,000 units
Direct Materials	2,00,000 kg. @ ₹30/kg	2,50,000 kg. @ ₹31.20/kg.
Direct Labour Hours	25,000 hrs. @ ₹300/ hr	23,000 hrs. @ ₹300/ hr.
Fixed Production Overhead	₹3,20,000	₹3,60,000

Production overheads are absorbed on the basis of direct labour hours.

The CEO intends to introduce activity based costing system along with TQM and JIT for better cost management. A committee has been formed for this purpose. The committee has further analysed and classified the production overhead of fourth quarter as follows:

	Budget	Actual
Costs:		
Material Handling	₹96,000	₹1,24,000
Set Up	₹2,24,000	₹2,36,000
Activity:		
Material Handling (orders executed)	8,000	8,500
Set Up (production runs)	2,000	2,100

Revision of standards relating to fourth quarter were made as below:

	Original Standard	Revised Standard
Material Content <i>per unit</i>	2 kg	2.25 kg
Cost of Material	₹30 per kg	₹31 per kg
Direct Labour Hours	15 minutes	12 minutes

Required

- (i) CALCULATE Planning and Operational Variances relating to material price, material usage, labour efficiency, and labour rate.
- (ii) CALCULATE overhead expenditure and efficiency variance using Activity Based Costing principles.

Reconciliation of Profit

8. Established in the year 1999, **FF Company** is the pioneer of fast food in Southampton. It delivers a truly fresh, affordable, made to order sandwiches, burger, and other meal in a friendly and relaxed environment. The popularity of the sandwiches, burger etc. continued to grow over the decades but one thing remained the same and that was its core values and principles:



- Always provide exceptional service to valued guests;
- Provide the highest quality menu items at a price everyone can afford and enjoy; and
- Keep operating costs low and ensure to have great systems in place and never stop improving.

It provides a comfortable place for people to unwind over interesting conversations. From the beginning, as it continues to grow, it is guided by passion for delighting customers by serving fresh, delicious food right in front of customer.

The performance report* for FY 2023-24 was presented at the management committee meeting as follows:

Particulars	Budget	Actual	Variance
Sales / Production (no. of burgers)	2,00,000	1,65,000	(35,000)
Sales (£)	10,50,000	8,46,450	(2,03,550)
Less: Variable Costs (£)	6,33,000	5,37,075	95,925
Less: Fixed Costs (£)	1,57,500	1,65,000	(7,500)
Profit	2,59,500	1,44,375	(1,15,125)

* burger segment

The Management Accountant of FF believed that the size of the fast-food market deriving the budget number of burgers to be sold is over-estimated. He has computed the value of the sales volume contribution planning variance to be 26,062.50 adverse.

Further, the report also included customer's feedback and the majority of comments were regarding delay in service time. One of feedback was as follows:

"I ordered two burgers at 2:10 pm. After half an hour (30 minutes) of waiting I called the waiter and asked him what happened? he told me that he will check with kitchen. I got the order after 45 minutes of waiting, this cafe is not good in delivery time"

The budgeted data shown in the table is based on the assumption that total market size would be 4,00,000 units.

Required

- (i) PREPARE a reconciliation statement of budgeted profit to actual profit through marginal costing approach in as much detail as possible.
- (ii) EXPLAIN the implications of the reconciliation statement.
- (iii) Management is worried about customer's feedback. ADVISE measures to improve delivery service time.

Interpretation of Variances

9. NZSCO Ltd. uses a standard costing system for manufacturing its single product 'ANZ'. Standard Cost Card per unit is as follows:

	(₹)
Direct Material (1 kg per unit)	20
Direct Labour (6 hrs @ ₹8 per hour)	48
Variable Overheads	24

Actual and Budgeted Activity Levels in units for the month of Feb'24 are:

	Budget	Actual
Production	50,000	52,000

Actual Variable Costs for the month of Feb'24 are given as under:

Direct Material	10,65,600
Direct Labour (3,00,000 hrs)	24,42,000
Variable Overheads	12,28,000

Required

INTERPRET Direct Labour Rate and Efficiency Variances.

10. T-tech is a Taiwan based firm, that designs, develops, and sells audio equipment. Founded in 1975 by Mr. Boss, firm sells its products throughout the world. T-tech is best known for its home audio systems and speakers, noise cancelling headphones, professional audio systems and automobile sound systems. Extracts from the budget are shown in the following table:

**Home Audio System Division
Jan'2024**

System	Sales (units)	Selling Price	Standard Cost (per System) ₹
3,000 W PMPO	1,500	18,750	12,500
5,000 W PMPO	500	50,000	26,250

The Managing Director has sent you a copy of an email he received from the Sales Manager 'K'. The content of the email was as follows:

"We have had an outstanding month. There was an adverse Sales Price Variance on the 3,000 W PMPO Systems of ₹ 22,50,000 but I compensated for that by raising the price of 5,000 W PMPO Systems. Unit sales of 3,000 W PMPO Systems were as expected but sales of the 5,000 W PMPOs were exceptional and gave a Sales Margin Volume Variance of ₹ 23,75,000. I think I deserve a bonus!"

The managing Director has asked for your opinion on these figures. You got the following information:

Actual results for Jan' 2024 were:

System	Sales (units)	Selling Price ₹
3,000 W PMPO	1,500	₹17,250
5,000 W PMPO	600	₹53,750

The total market demand for 3,000 W PMPO Systems was as budgeted but as a result of suppliers reducing the price of supporting UHD TV System the total market for 5,000 W PMPO Systems raised by 50% in Jan'2024.

The company had sufficient capacity to meet the revised market demand for 750 units of its 5,000 W PMPO Systems and therefore maintained its market share.

Required

- (i) CALCULATE the following Operational Variances based on the revised market details:
 - Sales Margin Mix Variance
 - Sales Margin Volume Variance
 - (ii) COMMENT briefly on the measurement of the K's performance.
11. Aquatic Feed (AF) is the leading manufacturer of fish and other sea animal feed. AF has made its credit pioneering effort and service for over one decade in development of culture, processing and exports with its state-of-art fish feed and processing plants. Hallmark of AF is constant upgradation of aquaculture technology bringing latest developments in the field to the doorstep of the Indian aquaculture farmer. It stands as a leading provider of high quality feed, best technical support to the farmer and caters to the quality standards of global customers.

One of its fish feed product is "B" which is produced by mixing and heating three ingredients: B₁, B₂ and B₃. It uses a standard costing system to monitor its costs.

The standard material cost for 100 Kg. of "B" is as follows:

Ingredients	Standard Qty. (Kg)	Cost per Kg. (₹)	Cost per 100 Kg. of "B" (₹)
B ₁	42	3	126
B ₂	62	6	372
B ₃	21	2	42
	125		540

Notes

- B₁, B₂ and B₃ are agricultural products. Their quality and price change significantly every year. Standard prices are determined at the average market price over the last three years. AF has a purchasing manager responsible for purchasing and pricing.
- The standard mix is decided by the Managing Partner having 15 years' rich experience in aquaculture field. The last time this was done at time of launching the "B" that was six years back. The standard mix has not been changed since.
- Mixing and heating process are subject to some evaporation loss.

In current month 4,605 Kg. of "B" was produced, using the following ingredients:

Ingredients	Actual Qty. (Kg)	Cost per Kg. (₹)	Total Cost of "B" (₹)
B ₁	2,202	2.8	6,165.60
B ₂	2,502	7	17,514
B ₃	921	2	1,842
	5,625		25,521.60

At every month end, the production manager receives a statement from the Managing Partner. This statement contains material price and usage variances for the month and no other feedback on the efficiency of the processes is provided.

Required

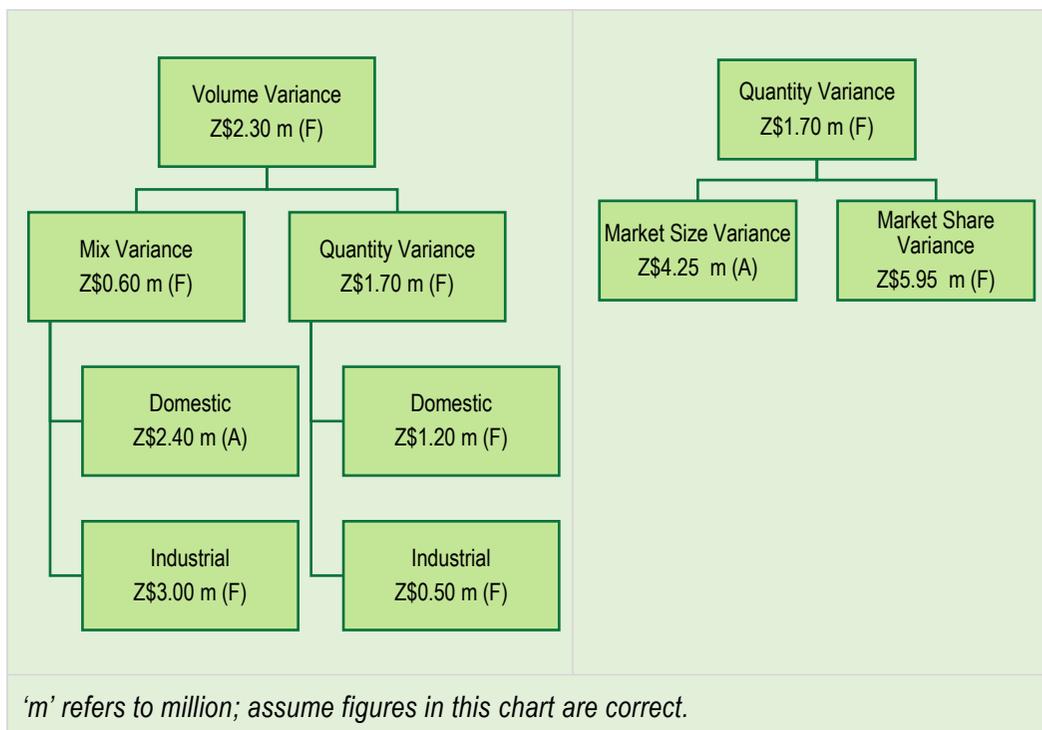
EVALUATE the performance measurement system in AF.

12. ZM Inc. is a family run business based in Country Z. It is a manufacturer of two types of flooring rolls, one for industrial usage and the other for domestic residential use, throughout mainland of Country Z. The company started with the production of residential domestic flooring. It is now an established player in this market. In the recent years, the company pioneered into making flooring rolls for industrial usage. The management has the following information about the budgeted and actual data for 2024-

Particulars	Static Budget			Actual Result		
	Industrial	Domestic	Total	Industrial	Domestic	Total
Unit Sales in Rolls ('000)	200	600	800	270	570	840
Contribution Margin (Z\$ in millions)	10.00	24.00	34.00	12.825	15.390	28.215

In late 2023, marketing research estimated market volume for industrial and domestic flooring at 8 m Rolls. Actual market volume for 2024 was 7 m Rolls. Actual sales trend of ZM Inc. is indicative of the sales trends for individual products in the future years, it is likely that they might continue to sell a similar sales trajectory.

A newly appointed accountant has computed following variances from the above data:



Required

Assuming yourself as a performance management expert of ZM, the CEO has asked you to:

- ANALYSE the variances computed by the accountant;
- ADVISE strategic inputs on 'two types of flooring rolls' to help out her in strategic decision making.

 **ANSWERS/ SOLUTIONS****1. (i) Traditional Variances**

$$\begin{aligned}\text{Usage Variance} &= (2,500 \text{ Kg} - 2,700 \text{ Kg}) \times ₹1.50 \\ &= ₹300 \text{ (A)}\end{aligned}$$

$$\begin{aligned}\text{Price Variance} &= (₹1.50 - ₹2.40) \times 2,700 \text{ Kg} \\ &= ₹2,430 \text{ (A)}\end{aligned}$$

$$\begin{aligned}\text{Total Variance} &= ₹300 \text{ (A)} + ₹2,430 \text{ (A)} \\ &= ₹2,730 \text{ (A)}\end{aligned}$$

(ii) Operational Variances

$$\begin{aligned}\text{Usage Variance} &= (2,500 \text{ Kg} - 2,700 \text{ Kg}) \times ₹2.25 \\ &= ₹450 \text{ (A)}\end{aligned}$$

$$\begin{aligned}\text{Price Variance} &= (₹2.25 - ₹2.40) \times 2,700 \text{ Kg} \\ &= ₹405 \text{ (A)}\end{aligned}$$

$$\begin{aligned}\text{Total Variance} &= ₹450 \text{ (A)} + ₹405 \text{ (A)} \\ &= ₹855 \text{ (A)}\end{aligned}$$

Planning Variances

$$\begin{aligned}\text{Controllable Variance} &= (₹2.00 - ₹2.25) \times 2,500 \text{ Kg} \\ &= 625 \text{ (A)}\end{aligned}$$

$$\begin{aligned}\text{Uncontrollable Variance} &= (₹1.50 - ₹2.00) \times 2,500 \text{ Kg} \\ &= 1,250 \text{ (A)}\end{aligned}$$

$$\begin{aligned}\text{Total Variance} &= ₹625 \text{ (A)} + ₹1,250 \text{ (A)} \\ &= ₹1,875 \text{ (A)}\end{aligned}$$

$$\begin{aligned}\text{Reconciliation} &= ₹855 \text{ (A)} + ₹1,875 \text{ (A)} \\ &= ₹2,730 \text{ (A)}\end{aligned}$$



A Planning Variance simply compares a revised standard to the original standard. An Operational Variance simply compares the actual results against the revised amount. Controllable Variances are those variances which arises due to inefficiency of a cost centre /department. Uncontrollable Variances are those variances which arises due to factors beyond the control of the management or concerned department of the organization.

Planning variances are generally *not controllable*. Where a revision of standards is required due to environmental/ technological changes that were not anticipated at the time the budget was prepared, the planning variances are truly *uncontrollable*. However, standards that failed to anticipate known market trends when they were set will reflect faulty standard-setting: it could be argued that these variances were *controllable* at the planning stage.

2. (i) (a) Traditional Variances

$$\begin{aligned} \text{Usage Variance} &= (27,500 \text{ Kgs.} - 27,225 \text{ Kgs.}) \times ₹10 \\ &= ₹2,750 \text{ (F)} \\ \text{Price Variance} &= (₹10 - ₹9.50) \times 27,225 \text{ Kgs.} \\ &= ₹13,612.50 \text{ (F)} \\ \text{Total Variance} &= ₹2,750 \text{ (F)} + ₹13,612.50 \text{ (F)} \\ &= ₹16,362.50 \text{ (F)} \end{aligned}$$

(b) Operational Variances

$$\begin{aligned} \text{Usage Variance} &= (26,125 \text{ Kgs.} - 27,225 \text{ Kgs.}) \times ₹9.70 \\ &= ₹10,670 \text{ (A)} \\ \text{Price Variance} &= (₹9.70 - ₹9.50) \times 27,225 \text{ Kgs.} \\ &= ₹5,445 \text{ (F)} \\ \text{Total Variance} &= ₹10,670 \text{ (A)} + ₹5,445 \text{ (F)} \\ &= ₹5,225 \text{ (A)} \end{aligned}$$

Planning Variances

$$\begin{aligned} \text{Usage Variance} &= (27,500 \text{ Kgs.} - 26,125 \text{ Kgs.}) \times ₹10 \\ &= ₹13,750 \text{ (F)} \\ \text{Price Variance} &= (₹10 - ₹9.70) \times 26,125 \text{ Kgs.} \\ &= ₹7,837.50 \text{ (F)} \\ \text{Total Variance} &= ₹13,750 \text{ (F)} + ₹7,837.50 \text{ (F)} \\ &= ₹21,587.50 \text{ (F)} \end{aligned}$$

(ii) Interpretation

It is important to note that an innovation in technology is outside the control of Ski Slope and is, by nature, a planning 'error'. Equally, the better negotiation of a price should be recognised as an operational matter. Operational variances are self-evidently under the control of operational management, so operational efficiency must be assessed with only these figures in mind. The material procurement department has clearly done well by negotiating a price reduction beyond the market dip. One might question the quality of the ice, as the usage variance is adverse (possibly the ice fails to cover the field and so more is required). Obviously, the favourable price variance is smaller than the adverse usage variance, thus, overall performance is quite poor. A supervisor cannot assess variances in isolation from each other.

3. Comment

As the management accountant states, and the analysis (W.N.1) presents, the overall variance for the KONI is nil. The cumulative adverse variances exactly offset the favourable variances i.e., sales price variance and circuit designer's efficiency variance. However, this traditional analysis does not clearly show the efficiency with which the KONI operated during the quarter, as it is difficult to say whether some of the variances arose from the use of incorrect standards, or whether they were due to efficient or inefficient application of those standards.

In order to determine this, a revised ex post plan should be required, setting out the standards that, with hindsight, should have been in operation during the quarter. These revised ex post standards are presented in W.N.2.

As seen from W.N.3, *on the cost side*, the circuit designer's rate variance has changed from adverse to favourable, and the price variance for circuit X, while remaining adverse, is significantly reduced in comparison to that calculated under the traditional analysis (W.N.1); *on the sales side*, sales price variance, which was particularly large and favourable in the traditional analysis (W.N.1), is changed into an adverse variance in the revised approach, reflecting the fact that the KONI failed to sell at prices that were actually available in the market.

Further, variances arose from changes in factors external to the business (W.N.4), which might not have been known or acknowledged by standard-setters at the time of planning are beyond the control of the operational managers. The distinction between variances is necessary to gain a realistic measure of operational efficiency.

W.N.1

KONY India Ltd.

Quarter-1

Operating Statement

Particulars	Favourable RM	Adverse RM	RM
Budgeted Contribution			26,000
Sales Price Variance [(RM 79 - RM 50) × 2,000 units]	58,000	---	NIL
Circuit X Price Variance [(RM 2.50 – RM 4.50) × 21,600 units]		43,200	
Circuit X Usage Variance [(20,000 units - 21,600 units) × RM 2.50]		4,000	
Circuit Designer's Rate Variance [(RM 2 - RM 3) × 11,600 hrs.]		11,600	
Circuit Designer's Efficiency Variance [(12,000 hrs. - 11,600 hrs.) × RM 2.00]	800		
Actual Contribution			26,000

W.N.2

Statement Showing Original Standards, Revised Standards, and Actual Results for Quarter 1

	Original Standards (ex-ante)		Revised Standards (ex-post)		Actual	
Sales	2,000 units × RM 50.00	RM 1,00,000	2,000 units × RM 82.50	RM 1,65,000	2,000 units × RM 79.00	RM 1,58,000
Circuit X	20,000 units × RM 2.50	RM 50,000	20,000 units × RM 4.25	RM 85,000	21,600 units × RM 4.50	RM 97,200
Circuit Designer	12,000 hrs. × RM 2.00	RM 24,000	12,000 hrs. × RM 3.125	RM 37,500	11,600 hrs. × RM 3.00	RM 34,800

W.N.3

Statement Showing Operational Variances

Particulars	RM	RM
<i>Operational Variances</i>		
Sales Price [(RM 79.00 - RM 82.50) × 2,000 units]	7,000 (A)	16,500 (A)
Circuit X Price [(RM 4.25 - RM 4.50) × 21,600 units]	5,400 (A)	
Circuit X Usage [(20,000 units – 21,600 units) × RM 4.25]	6,800 (A)	
Circuit Designer Rate [(RM 3.125 - RM 3.00) × 11,600 hrs.]	1,450 (F)	
Circuit Designer Efficiency [(12,000 hrs.– 11,600 hrs.) × RM 3.125]	1,250 (F)	

W.N.4

Statement Showing Planning Variances

Particulars	RM	RM
<i>Planning Variance</i>		
Sales Price [(RM 82.50 - RM 50.00) × 2,000 units]	65,000 (F)	16,500 (F)
Circuit X Price [(RM 2.50 - RM 4.25) × 20,000 units]	35,000 (A)	
Circuit Designer Rate [(RM 2.00 - RM 3.125) × 12,000 hrs.]	13,500 (A)	

4. (i) Traditional Variances

$$\begin{aligned} \text{Usage Variance} &= (12,000 \text{ lt.} - 12,800 \text{ lt.}) \times ₹ 15.00 \\ &= ₹ 12,000 \text{ (A)} \\ \text{Price Variance} &= (₹ 15.00 - ₹ 16.40) \times 12,800 \text{ lt.} \\ &= ₹ 17,920 \text{ (A)} \\ \text{Total Variance} &= ₹ 12,000 \text{ (A)} + ₹ 17,920 \text{ (A)} \\ &= ₹ 29,920 \text{ (A)} \end{aligned}$$

Operational Variances

$$\begin{aligned} \text{Usage Variance} &= (12,000 \text{ lt.} - 12,800 \text{ lt.}) \times ₹ 16.00 \\ &= ₹ 12,800 \text{ (A)} \\ \text{Price Variance} &= (₹ 16.00 - ₹ 16.40) \times 12,800 \text{ lt.} \\ &= ₹ 5,120 \text{ (A)} \\ \text{Total Variance} &= ₹ 12,800 \text{ (A)} + ₹ 5,120 \text{ (A)} \\ &= ₹ 17,920 \text{ (A)} \end{aligned}$$

Planning Variances

$$\begin{aligned} \text{Controllable Variance} &= (₹ 15.40 - ₹ 16.00) \times 12,000 \text{ lt.} \\ &= ₹ 7,200 \text{ (A)} \\ \text{Uncontrollable Variance} &= (₹ 15.00 - ₹ 15.40) \times 12,000 \text{ lt.} \\ &= ₹ 4,800 \text{ (A)} \\ \text{Total Variance} &= ₹ 7,200 \text{ (A)} + ₹ 4,800 \text{ (A)} \\ &= ₹ 12,000 \text{ (A)} \end{aligned}$$

$$\begin{aligned} \text{Reconciliation} &= ₹ 17,920 \text{ (A)} + ₹ 12,000 \text{ (A)} \\ &= ₹ 29,920 \text{ (A)} \end{aligned}$$



Direct Material Usage Operational Variance using *Standard Price*, and the Direct Material Price Planning Variance based on *Actual Quantity* can also be calculated. This approach reconciles the Direct Material Price Variance and Direct Material Usage Variance calculated in part.

- (ii) Traditional variance analysis is applied based on the assumption that whole of the variance is due to operational deficiencies and the planning associated with setting the original standard is perfectly correct. But this assumption is not practical. When the conditions are volatile and dynamic, traditional variances need to be analysed into planning and operational variances. Planning variances try to explain the extent to which the original standard needs to be adjusted to reflect changes in operating conditions between the current situation and that imagined when the standard was originally derived. Planning variances are generally *not controllable and may need to revise to cater the changes due to environmental/ technological changes* at a later stage. In certain situation planning variances can be considered *controllable* as well. Whereas operational variances explain the extent to which adjusted standards have been achieved. Operational variances are calculated after the planning variances have been established and are thus a realistic way of assessing performance. So, it indicates a reality check of traditional variance analysis.

In AGF, as per traditional approach total variances are ₹29,920 (adverse), out of which ₹17,920 (adverse) accounts for total operational variance and ₹12,000 (adverse) is for total planning variance. It is necessary to analyse planning variances further. The planning variance of ₹12,000 (adverse) can be divided into an *uncontrollable* adverse variance of ₹4,800 and a *controllable* adverse variance of ₹7,200. Similarly, total operational variance can be sub classified as adverse price variance of ₹5,120 and adverse usage variance of ₹12,800. This analysis gives a clearer indication of the inefficiency of the purchasing function by the concerned department. The performance of the staff of the purchasing department should be evaluated/ rewarded based on variances which are *controllable*. If an adverse *uncontrollable* variance of ₹4,800 is reported in the performance reports this is likely to lead to dysfunctional motivation effects to the purchase department.

- (iii) In today's cutthroat competition, managers must react quickly and accurately to the changes in technology, price fluctuation, consumer tastes, laws and regulations, economic conditions, political conditions, and international conditions etc. which are changing rapidly and dramatically. Accordingly, management accountant should be able to provide necessary inputs by a proper analysis of the things that pertains to his/her area like effect of changes in price. The unique features of advanced variance analysis are that it considers *different market conditions and changes in the dynamic environment*.

Moreover, advanced variances classify variances into *controllable* and *uncontrollable* variances and help the management to find out reasons for adverse variances so that corrective action can be taken. Similarly, if any adverse variances have arrived, because of changes in the market condition like inflation, it has to be differentiated from the other variances.

AGF is a type of organization where management of performance can be done only through advanced variance analysis. Advanced variance analysis of AGF shows that it has adverse planning variance as well as adverse operational variance. Further, the emergence of *controllable* and *uncontrollable* variances makes it a perfect case of advance variance analysis in AGF. In AGF, sharp price changes which lead to the choice of expensive alternative and efficiency of purchase department need to be analyzed, reported, and dealt separately by the joint effort of the management accountant and the top management. Hence, advanced variance analysis in AGF is an absolute necessity.

5. Activity-based costing, flexible-budget variances for finance function activities:

(i) Receivables

'Receivables' is an output unit level activity. Its flexible-budget variance can be calculated as follows:

Flexible Budget Variance

$$\begin{aligned}
 &= \text{Flexible Budget Costs} - \text{Actual Costs} \\
 &= ₹6.39 \times 9,48,000 - ₹7.50 \times 9,48,000 \\
 &= ₹60,57,720 - ₹71,10,000 \\
 &= ₹10,52,280 \text{ (A)}
 \end{aligned}$$

(ii) Payables

'Payables' is a batch level activity.

	Static-Budget Amounts	Actual Amounts
a. Number of deliveries	10,00,000	9,48,000
b. Batch size (units per batch)	5	4.468
c. Number of batches (a / b)	2,00,000	2,12,175
d. Cost per batch	₹29	₹28
e. Total payables activity cost (c×d)	₹58,00,000	₹59,40,900

Step 1: The number of batches in which payables should have been processed

$$\begin{aligned}
 &= 9,48,000 \text{ actual units} / 5 \text{ budgeted units per batch} \\
 &= 189,600 \text{ batches}
 \end{aligned}$$

Step 2: The flexible-budget amount for payables

$$= 1,89,600 \text{ batches} \times ₹29 \text{ budgeted cost per batch}$$

$$= ₹54,98,400$$

The flexible-budget variance can be computed as follows:

Flexible-Budget Variance

$$= \text{Flexible-Budget Costs} - \text{Actual Costs}$$

$$= 1,89,600 \times ₹29 - 2,12,175 \times ₹28$$

$$= ₹54,98,400 - ₹59,40,900$$

$$= ₹4,42,500 \text{ (A)}$$

(iii) Travel Expenses

Travel expenses is a batch level activity.

	Static-Budget Amounts	Actual Amounts
a. Number of deliveries	10,00,000	9,48,000
b. Batch size (units per batch)	500	501.587
c. Number of batches (a / b)	2,000	1,890
d. Cost per batch	₹76	₹74
e. Total travel expenses activity cost (c×d)	₹1,52,000	₹1,39,860

Step 1: The number of batches in which the travel expense should have been processed

$$= 948,000 \text{ actual units} / 500 \text{ budgeted units per batch}$$

$$= 1,896 \text{ batches}$$

Step 2: The flexible-budget amount for travel expenses

$$= 1,896 \text{ batches} \times ₹76 \text{ budgeted cost per batch}$$

$$= ₹1,44,096$$

The flexible budget variance can be calculated as follows:

Flexible Budget Variance

$$= \text{Flexible-Budget Costs} - \text{Actual Costs}$$

$$= 1,896 \times ₹76 - 1,890 \times ₹74$$

$$= ₹1,44,096 - ₹1,39,860$$

$$= ₹4,236 \text{ (F)}$$

6. (i) **Indirect Materials**

Efficiency Variance	=	Cost Impact of <i>undertaking activities</i> more/ less than <i>standard</i>
	=	$(0.50\text{kg.} \times 80,000\text{units} - 48,000\text{ kg.}) \times ₹20$
	=	₹1,60,000 (A)
Expenditure Variance	=	Cost impact of paying more/ less than standard for actual activities undertaken
	=	$48,000\text{kg.} \times ₹20 - ₹9,40,000$
	=	₹20,000 (F)

Product Testing

Efficiency Variance	=	Cost Impact of <i>undertaking activities</i> more/ less than <i>standard</i>
	=	$(10\text{ mins.} \times 80,000\text{ units} - 7,40,000\text{ mins.}) \times ₹3$
	=	₹1,80,000 (F)
Expenditure Variance	=	Cost impact of paying more/ less than standard for actual activities undertaken
	=	$7,40,000\text{mins} \times ₹3 - ₹22,50,000$
	=	₹30,000 (A)

Energy

Efficiency Variance	=	Cost Impact of <i>undertaking activities</i> more/ less than <i>standard</i>
	=	$(4\text{ mins.} \times 80,000\text{ units} - 3,60,000\text{ mins.}) \times ₹0.20$
	=	₹8,000 (A)
Expenditure Variance	=	Cost impact of paying more/ less than standard for actual activities undertaken
	=	$3,60,000\text{mins} \times ₹0.20 - ₹70,000$
	=	₹2,000 (F)

(ii) **Indirect Materials**

WDG actually spent 48,000 kg. or 8,000 kg. more than the standard allows. At a predetermined rate of ₹20 per kg., efficiency variance is 1,60,000 (A). Since the actual quantity was higher than the standard, the variance is unfavorable. This adverse variance, could have been caused by the inferior quality, result of carelessness handling of materials by production workers or could be as a result of change in methods of production, product specifications or the way in which quality of the product is checked or controlled.

Product Testing

Favorable efficiency variance amounting to ₹1,80,000 indicates that fewer testing minutes were expended during the quarter than the standard minutes required for the level of actual output. This may be due to employment of a higher skilled labor or improvement of skills of existing workforce through training and development leading to improved productivity etc.

(iii) Flexible Budget

Indirect Materials	= (0.50 kg. × 80,000 units) × ₹20 = ₹8,00,000	= ₹8,00,000 × 5% = ₹40,000
Product Testing	= (10 mins. × 80,000 units) × ₹3 = ₹24,00,000	= ₹24,00,000 × 5% = ₹1,20,000
Energy	= (4 mins. × 80,000) × ₹0.20 = ₹64,000	= ₹64,000 × 5% = ₹3,200

Efficiency Variance for all the three activities are more than 5% of their flexible budget amount. So, according to the company policy, efficiency variances should be investigated.

Alternative**Statement Showing Identification of Variances to be investigated**

	Calculation	Variance % of Flexible Budget	Criteria	Investigate Y or N
Indirect Materials				
Efficiency Variance	$\left(\frac{1,60,000}{8,00,000} \times 100\right)$	20%	5%	Y
Expenditure Variance	$\left(\frac{20,000}{8,00,000} \times 100\right)$	2.5%	5%	N
Product Testing				
Efficiency Variance	$\left(\frac{1,80,000}{24,00,000} \times 100\right)$	7.5%	5%	Y
Expenditure Variance	$\left(\frac{30,000}{24,00,000} \times 100\right)$	1.25%	5%	N
Energy				
Efficiency Variance	$\left(\frac{8,000}{64,000} \times 100\right)$	12.5%	5%	Y
Expenditure Variance	$\left(\frac{2,000}{64,000} \times 100\right)$	3.125%	5%	N

7. (i) Workings

Factor	Original Standards (ex-ante)		Revised Standards (ex-post)		Actual (1,10,000 units)	
	Material	1,10,000 units×2 kgs. ×₹30	₹66,00,000	1,10,000 units×2.25 kgs. ×₹31	₹76,72,500	2,50,000 kgs. ×₹31.20
Labour	1,10,000 × 15/60 hrs. × ₹300	₹82,50,000	1,10,000 × 12/60 hrs. × ₹300	₹66,00,000	23,000 hrs. × ₹300	₹69,00,000

Material**Traditional Variances**

$$\begin{aligned} \text{Usage Variance} &= (2,20,000 \text{ Kgs.} - 2,50,000 \text{ Kgs.}) \times ₹30 \\ &= ₹9,00,000 \text{ (A)} \\ \text{Price Variance} &= (₹30.00 - ₹31.20) \times 2,50,000 \text{ Kgs.} \\ &= ₹3,00,000 \text{ (A)} \\ \text{Total Variance} &= ₹9,00,000 \text{ (A)} + ₹3,00,000 \text{ (A)} \\ &= ₹12,00,000 \text{ (A)} \end{aligned}$$

Planning Variances

$$\begin{aligned} \text{Usage Variance} &= (2,20,000 \text{ Kg.} - 2,47,500 \text{ Kg.}) \times ₹30 \\ &= ₹8,25,000 \text{ (A)} \\ \text{Price Variance} &= (₹30 - ₹31) \times 2,47,500 \text{ Kgs.} \\ &= ₹2,47,500 \text{ (A)} \\ \text{Total Variance} &= ₹8,25,000 \text{ (A)} + ₹2,47,500 \text{ (A)} \\ &= ₹10,72,500 \text{ (A)} \end{aligned}$$

Operational Variances

$$\begin{aligned} \text{Usage Variance} &= (2,47,500 \text{ Kg.} - 2,50,000 \text{ Kg.}) \times ₹31 \\ &= ₹77,500 \text{ (A)} \\ \text{Price Variance} &= (₹31.00 - ₹31.20) \times 2,50,000 \text{ Kg.} \\ &= ₹50,000 \text{ (A)} \\ \text{Total Variance} &= ₹77,500 \text{ (A)} + ₹50,000 \text{ (A)} \\ &= ₹1,27,500 \text{ (A)} \end{aligned}$$



Direct Material Usage Operational Variance using *Standard Price*, and the Direct Material Price Planning Variance based on *Actual Quantity* can also be calculated. This approach reconciles the Direct Material Price Variance and Direct Material Usage Variance calculated in part.

Labour

Traditional Variances

$$\begin{aligned}
 \text{Efficiency Variance} &= (27,500 \text{ hrs.} - 23,000 \text{ hrs.}) \times ₹300 \\
 &= ₹13,50,000 \text{ (F)} \\
 \text{Rate Variance} &= (₹300 - ₹300) \times 23,000 \text{ hrs.} \\
 &= \text{NIL} \\
 \text{Total Variance} &= ₹13,50,000 \text{ (F)} + \text{NIL} \\
 &= ₹13,50,000 \text{ (F)}
 \end{aligned}$$

Planning Variances

$$\begin{aligned}
 \text{Efficiency Variance} &= (27,500 \text{ hrs.} - 22,000 \text{ hrs.}) \times ₹300 \\
 &= ₹16,50,000 \text{ (F)} \\
 \text{Rate Variance*} &= (₹300 - ₹300) \times \mathbf{22,000 \text{ hrs.}} \\
 &= \text{NIL} \\
 \text{Total Variance} &= ₹16,50,000 \text{ (F)} + 0 \\
 &= ₹16,50,000 \text{ (F)}
 \end{aligned}$$

Operational Variances

$$\begin{aligned}
 \text{Efficiency Variance} &= (22,000 \text{ hrs.} - 23,000 \text{ hrs.}) \times \mathbf{₹300} \\
 &= ₹3,00,000 \text{ (A)} \\
 \text{Rate Variance} &= (₹300 - ₹300) \times 23,000 \text{ hrs.} \\
 &= \text{NIL} \\
 \text{Total Variance} &= ₹3,00,000 \text{ (A)} + 0 \\
 &= ₹3,00,000 \text{ (A)}
 \end{aligned}$$



Direct Labour Efficiency Operational Variance using *Standard Rate*, and the Direct Labour Rate Planning Variance based on *Actual Hours* can also be calculated. This approach reconciles the Direct Labour Rate Variance and Direct Labour Efficiency Variance calculated in part.

(ii) **Material Handling**

Efficiency Variance

$$\begin{aligned}
 &= \text{Cost Impact of } \textit{undertaking activities} \text{ more/ less than } \textit{standard} \\
 &= (8,800 \text{ orders}^* - 8,500 \text{ orders}) \times ₹12 \\
 &= ₹3,600 \text{ (F)}
 \end{aligned}$$

$$(*) \left(\frac{8,000 \text{ orders}}{1,00,000 \text{ units}} \right) \times 1,10,000 \text{ units}$$

Expenditure Variance

$$\begin{aligned}
 &= \text{Cost impact of paying more/ less than standard for actual activities undertaken} \\
 &= 8,500 \text{ orders} \times ₹12 - ₹1,24,000 \\
 &= ₹22,000 \text{ (A)}
 \end{aligned}$$

Setup

Efficiency Variance

$$\begin{aligned}
 &= \text{Cost Impact of } \textit{undertaking activities} \text{ more/ less than } \textit{standard} \\
 &= (2,200 \text{ runs}^* - 2,100 \text{ runs}) \times ₹112 \\
 &= ₹11,200 \text{ (F)}
 \end{aligned}$$

$$(*) \left(\frac{2,000 \text{ runs}}{1,00,000 \text{ units}} \right) \times 1,10,000 \text{ units}$$

Expenditure Variance

$$\begin{aligned}
 &= \text{Cost impact of paying more/ less than standard for actual activities undertaken} \\
 &= 2,100 \text{ runs} \times ₹112 - ₹2,36,000 \\
 &= ₹800 \text{ (A)}
 \end{aligned}$$

8. (i) Statement of Reconciliation - Budgeted Vs Actual Profit

Particulars	£
Budgeted Profit	2,59,500
Less: Sales Volume Contribution - Planning Variance (Adverse)	26,062.50
Less: Sales Volume Contribution - Operational Variance (Adverse)	46,912.50
Less: Sales Price Variance (Adverse)	19,800
Less: Variable Cost Variance (Adverse)	14,850
Less: Fixed Cost Variance (Adverse)	7,500
Actual Profit	1,44,375

Workings*Basic Workings*

$$\text{Budgeted Market Share (in \%)} = \frac{2,00,000}{4,00,000} = 50\%$$

$$\text{Budgeted Contribution} = £10,50,000 - £6,33,000 = £4,17,000$$

Average Budgeted Contribution (*per unit*)

$$= \frac{£4,17,000}{2,00,000} = £2.085$$

$$\text{Volume Contribution Planning} = \text{Budgeted Market Share \%} \times (\text{Actual Industry Sales Quantity in units} - \text{Budgeted Industry Sales Quantity in units}) \times (\text{Average Budgeted Contribution per unit})$$

$$\Rightarrow £26,062.50 \text{ (A)} = 50\% \times (\text{Actual Industry Sales Quantity in units} - 4,00,000 \text{ units}) \times £2.085$$

$$\Rightarrow \text{Actual Industry Sales Quantity} = 3,75,000 \text{ units}$$

$$\text{Actual Market Share (in \%)} = \frac{1,65,000}{3,75,000} = 44\%$$

$$\text{Standard Sales Price per unit} = \frac{£10,50,000}{2,00,000} = £5.25$$

$$\text{Actual Sales Price per unit} = \frac{£8,46,450}{1,65,000} = £5.13$$

$$\text{Standard Variable Cost per unit} = \frac{£6,33,000}{2,00,000} = £3.165$$

$$\text{Actual Variable Cost per unit} = \frac{£5,37,075}{1,65,000} = £3.255$$

CALCULATION OF VARIANCES**Sales Variances**

Volume Contribution Operational = (Actual Market Share % – Budgeted Market Share %) × (Actual Industry Sales Quantity *in units*) × (Average Budgeted Contribution *per unit*)

$$= (44\% - 50\%) \times 3,75,000 \text{ units} \times \text{£}2.085$$

$$= \text{£}46,912.50 \text{ (A)}$$

Price = Actual Sales – Standard Sales

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

$$= 1,65,000 \text{ units} \times (\text{£}5.13 - \text{£}5.25)$$

$$= \text{£}19,800 \text{ (A)}$$

Variable Cost Variances

Cost = Standard Cost for Production – Actual Cost

$$= \text{Actual Production} \times (\text{Standard Cost per unit} - \text{Actual Cost per unit})$$

$$= 1,65,000 \text{ units} \times (\text{£}3.165 - \text{£}3.255)$$

$$= \text{£}14,850 \text{ (A)}$$

Fixed Cost Variances

Expenditure = Budgeted Fixed Cost – Actual Fixed Cost

$$= \text{£}1,57,500 - \text{£}1,65,000$$

$$= \text{£}7,500 \text{ (A)}$$

(ii) Implications of Reconciliation Statement

In the revised statement, the sales volume variance has been detailed by the way of two variances i.e., planning and operational variances. This kind of detailed information assists the company to check, which kind of variances are under the management control, and which are not. FF has adverse volume contribution planning variance, and the reason could be the environmental / market changes, that was not anticipated at the time of budget preparation, so they are not under management control and hence, no one is responsible for this. On the other hand, the sales volume contribution operational variance was under control of the managers, and they should be held responsible for the same. The reason of adverse sales volume contribution operational variance could be unsuccessful direct selling efforts/marketing efforts. FF has adverse sales price variance as well. It indicates that the burgers were sold for lower price than standard. The reason of this could be unforeseen market competitive price, tapping new market etc.

Further, revised reconciliation statement delivers little information about the variable cost and fixed cost variances. They both are adverse. Fixed cost consists of many items such as salaries, annual maintenance cost, rent and insurance etc. Often fixed cost items are not affected in short run in response to change in the level of activity, but they might change in response to other factors such as price. This may cause increase expenditure on fixed overheads. A meaningful analysis of fixed cost variance requires a line to line comparison of budgeted cost with actual cost.

In case of FF, the variable cost may be made up of large individual different items such as vegetables, gas, indirect labour, regular maintenance cost etc. Control of variable cost also requires line by line analysis for each individual item. The adverse variable cost variance simply reveals that FF incurred more on variable cost than expected. However, it is necessary to take into consideration the causes of this adverse variance, which is beyond the control of the management, for instance, the unusual price hike in vegetables in case of unseasonal rainfall.

(iii) Measures to Improve Fast Food Delivery Service Time

Customers expect that their food order to be delivered quickly. From customer's feedback in the question, it is evident that FF has a problem in food delivery, due to which, customers go unsatisfied. The reason of late delivery could be non-availability of raw material on time or employees not working properly etc. The reason of employees not working properly could be job dissatisfaction which may be due to improper working conditions, low salary, or no reward for overtime etc.

In order to reduce delivery time, raw material should be made available in stock based on daily requirement. FF may follow quantitative approach to inventory problems, which lays down clear guidelines that when to re-order or alert the management in exceptional situations.

In addition, FF must also address the issues related to employee and involve them in a loop. FF could improve the employee satisfaction with proper working conditions, better pay, training, and growth opportunities.

Moreover, it is important that customers should be informed about approximate delivery time since this will reduce customer's anxiety and will proactively reduce any complaints over long waits for delivery of food. If unexpected delays occur, it is important to communicate with customers, apologies for the delay and inform them about the new approximate delivery time along with valid reason.

In addition to this, FF can also introduce pagers or install electronic board displaying ticket number or self-serve kiosk allowing customers to roam around or order in advance so that they do not have long waiting time.

9. Interpretation

Direct Labour Rate Variance

Adverse Labour Rate Variance indicates that the labour rate per hour paid is more than the set standard. The reason may include among other things such as:

- (1) While setting standard, the current/ future market conditions like pending labour negotiation/ cases, has not been considered (or predicted) correctly.
- (2) The labour may have been told that their wage rate will be raised, or a bonus will be paid if they work efficiently.

Direct Labour Efficiency Variance

It indicates that the workers have produced actual production quantity in less time than the time allowed. The reason for favourable labour efficiency variance may include among the other things as follows:

- (1) While setting standard, workers efficiency could not be estimated properly, this may happen due to non-observance of time and motion study.
- (2) The workers may be new in the factory; hence, efficiency could not be predicted properly.
- (3) The foreman or personnel manager responsible for labour efficiency, while providing his/ her input at the time of budget/ standard, has adopted conservative approach.
- (4) The increase in the labour rate might have encouraged the labours to do work more efficiently.

In this particular case, it may have happened that since labour payment has been increased labour efficiency has also been increased. In a nutshell because of additional labour rate (Adverse), labour efficiency has gone up (Favourable)

Workings

$$\begin{aligned}
 \text{Labour Rate Variance} &= \text{Standard Cost of Actual Time} - \text{Actual Cost} \\
 &= (\text{SR} \times \text{AH}) - (\text{AR} \times \text{AH}) \\
 &\text{Or} \\
 &= (\text{SR} - \text{AR}) \times \text{AH} \\
 &= (\text{₹}8.00 - \text{₹}8.14^*) \times 3,00,000 \text{ hrs.} \\
 &= \text{₹}42,000 \text{ (A)}
 \end{aligned}$$

(*)

$$\text{Actual Labour Rate per hour} = \frac{\text{Actual Paid}}{\text{Actual Hours}}$$

$$= \frac{\text{₹ } 24,42,000}{3,00,000 \text{ hrs.}}$$

$$= \text{₹}8.14$$

Labour Efficiency Variance = Standard Cost of Standard Time for Actual Production – Standard Cost of Actual Time
 = (SH × SR) – (AH × SR)

Or

$$\begin{aligned} &= (\text{SH} - \text{AH}) \times \text{SR} \\ &= (3,12,000^{\text{s}} \text{ hrs.} - 3,00,000 \text{ hrs.}) \times \text{₹}8.00 \\ &= \text{₹}96,000 \text{ (F)} \end{aligned}$$

(\\$)

$$\begin{aligned} \text{Standard Hours} &= \text{Actual Production} \times \text{Std. hrs. per unit} \\ &= 52,000 \text{ units} \times 6 \text{ hrs.} \\ &= 3,12,000 \text{ hrs.} \end{aligned}$$

10. (i) Statement Showing Sales Margin Mix Variance

System	Standard Margin per unit (₹)	Actual Qty. (units)	Revised Actual Quantity (units)	Difference	Variance (₹)
3,000 W PMPO	6,250	1,500	1,400	+100	+6,25,000 (F)
5,000 W PMPO	23,750	600	700	-100	23,75,000 (A)
Total		2,100			17,50,000 (A)

Statement Showing Sales Margin Volume Variance

System	Standard Margin per unit (₹)	Actual Qty. (units)	Budgeted Quantity (units)	Difference	Variance (₹)
3,000 W PMPO	6,250	1,500	1,500	0	-
5,000 W PMPO	23,750	600	750	-150	35,62,500 (A)
Total		2,100			35,62,500 (A)

- (ii) A Planning Variance simply compares a revised standard (that should or would have been used if planners had known in advance what was going to happen) to the original standard. A planning variance is considered as not to be controllable by management.

The market size is not within the control of the sales manager and therefore variances caused by changes in the market size would be regarded as planning variances.

However, variances caused by changes in the selling prices and consequently the selling price variances and market shares would be within the control of the sales manager and treated as operating variances.

The market size variance compares the original and revised market sizes. This is unchanged for 3,000 W PMPO Systems so the only variance that occurs relates to the 5,000 W PMPO Systems and is ₹59,37,500 (F) [250 systems × ₹23,750].

It is vital to make this distinction because as can be seen from the scenario the measurement of the 'K's' performance is incomplete if the revised market size is ignored.

The favourable volume variance of ₹23,75,000 referred to in the 'K's' e-mail is made up of two elements, one of which, the market size, is a planning variance which is outside his control. It is this that has caused the overall volume variance to be favourable, and thus 'K' is not responsible for the overall favourable performance.



It has been stated in the question that "The total market demand for 3,000 W PMPO Systems was as budgeted but as a result of suppliers reducing the price of supporting UHD TV System the total market for 5,000 W PMPO Systems raised by 50% in Jan'2024. The company had sufficient capacity to meet the revised market demand for 750 units of its 5,000 W PMPO Systems and therefore maintained its market share. Thus, Budgeted Ratio has been taken 2:1 (1,500:750) instead of 3:1 (1,500:500) for computation of "Revised Actual Quantity (RAQ)".

11. The statement reported, ₹2,062 adverse material price variance. The responsibility for controlling the materials price variance is usually the purchasing manager's. Undoubtedly, in current scenario, the price of materials is largely beyond his or her control; however, the price variance can be influenced by such factors as quality, quantity discounts, distance of supplier's location, and so on. These factors are often under the control of the purchase manager. The production manager is responsible for material usage and cannot be held responsible for the material price variance.

Since total usage variance reported, ₹1,406 favourable, production manager could assume good performance. However, if usage variance is considered in more detail, through the mix and yield calculations, it can be observed that variance was driven by a **change in the mix** and by using a mix of ingredients which was different from standard, it has resulted in a saving of ₹840; Similarly, it has led to a favourable yield. It is worthwhile to note that changing the mix could impact the product quality and sales as well, however, no information has been given about this.

Prices and quality of three agriculture ingredients are changing significantly every year. Using ex ante prices and usage standards can implicit an outdated view of variances. Failing to separate variances caused by uncontrollable factors and planning errors from variances caused by controllable factors can be demoralizing for the managers.

In addition, managers are not involved in setting the standard mix and the same has not been changed for six years despite continuous changes in the quality and prices of the ingredients. This can also mislead the managers i.e., to carryout control activities which are based on the outdated standards.

Furthermore, a true image is missing in relation to managers' performance as statement does not include any feedback or comments on the variances. Even no follow up is being taken on the same.

Overall, it appears that AF is not having comprehensive performance measurement system, and this could adversely impact the firm in long run.

Workings

Price Variance

Input	Actual Qty. (Kg)	Std. Cost (₹)	Actual Cost (₹)	Difference (₹)	Variance (₹)
B ₁	2,202	3	2.8	0.20	440 (F)
B ₂	2,502	6	7	1 (A)	2,502 (A)
B ₃	921	2	2	-	-
	5,625				2,062 (A)

Usage Variance

Input	Standard Qty. (Kg)	Actual Qty. (Kg)	Difference (Kg)	Std. Cost (₹)	Variance (₹)
B ₁	1,934	2,202	268 (A)	3	804 (A)
B ₂	2,855	2,502	353 (F)	6	2,118 (F)
B ₃	967	921	46 (F)	2	92 (F)
	5,756	5,625	131 (F)		1,406 (F)

Mix Variance

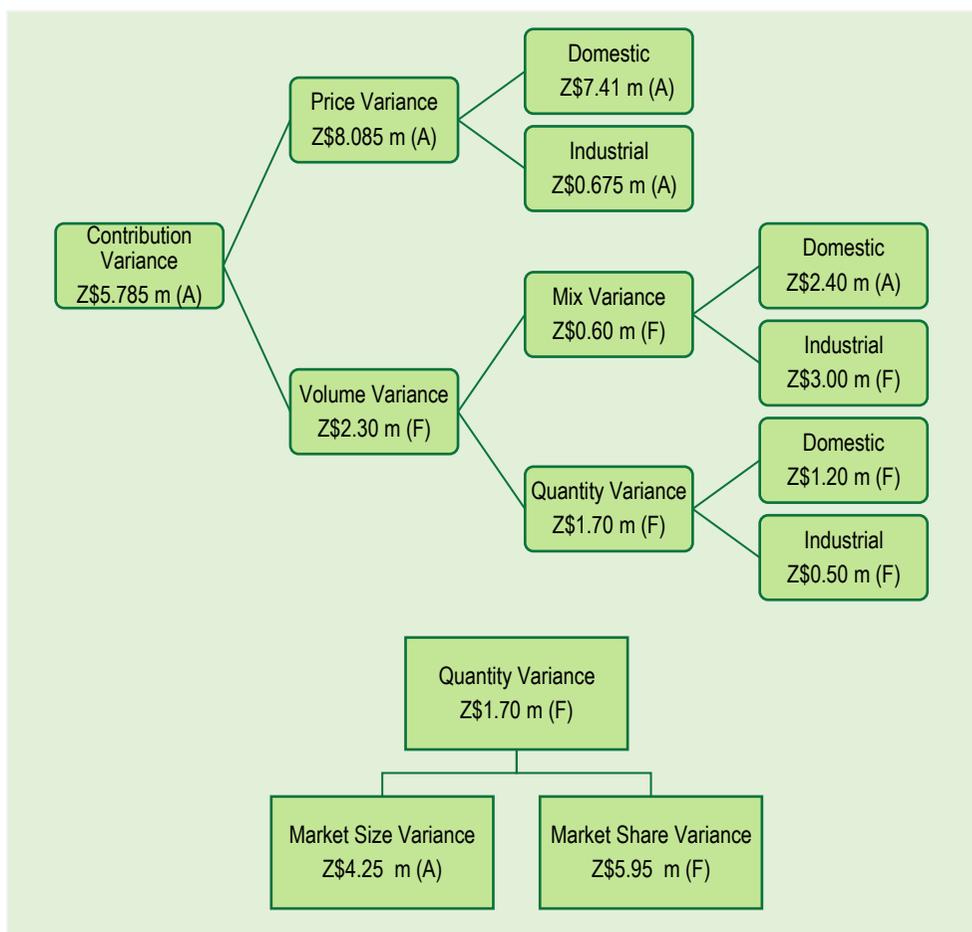
Input	Rev. Actual Qty. (Kg)	Actual Qty. (Kg)	Difference (Kg)	Std. Cost (₹)	Variance (₹)
B ₁	1,890	2,202	312 (A)	3	936 (A)
B ₂	2,790	2,502	288 (F)	6	1,728 (F)
B ₃	945	921	24 (F)	2	48 (F)
	5,625	5,625	NIL		840 (F)

Yield Variance

Input	Standard Qty. (Kg)	Rev. Actual Qty. (Kg)	Difference (Kg)	Std. Cost (₹)	Variance (₹)
B ₁	1,934	1,890	44 (F)	3	132 (F)
B ₂	2,855	2,790	65 (F)	6	390 (F)
B ₃	967	945	22 (F)	2	44 (F)
	5,756	5,625	131 (F)		566 (F)

12. (i) Analysis of Variances

It can be seen that total unit sales increased by 40,000 rolls resulted in a favorable volume variance. Therefore, a potential increase of Z\$2.3 m in contribution margin was achieved as a result of the change in sales volume compared with budgeted volume. The volume variance is further divided into a mix and quantity variance. In the case of ZM, mix variance came out to be Z\$0.60 m favorable and the quantity variance came out to be favorable Z\$1.70 m. Favorable mix variance Z\$0.60 m indicates that the sales mix shifts toward the industrial flooring rolls i.e. high contribution product. ZM sold 40,000 more rolls than were budgeted, resulting in Z\$1.70 m favorable quantity variance. Therefore, it is necessary to identify the reasons behind the increase in sales. The reasons may be the competitor's distribution issues, better customer services, or growth in the overall market. Further insight into reasons for quantity variance can be gained by analyzing market share and size variances. ZM gained 2 market share percentage points from 10% budgeted share to the actual share of 12%. The Z\$5.95 m favorable market share variance may be the effect of the decline in *contribution margin rate*. The impact of changing market size on contribution margin can be traced through market size variance. Market size variance is Z\$4.25 m adverse as actual market size decreased 12.5% compared to budgeted market size. Further, it appears that the accountant has failed to compute the *price variance*, which is a substantial part of the analysis. If we look closely at the data given, the price variance for domestic as well as industrial roll can be computed without difficulty. The price variance for domestic flooring rolls as well as industrial flooring rolls is unfavorable; this indicates that both varieties were sold at a lower margin than standard. This throughout analysis shows a negative impact of Z\$ 5.785 m on contribution margin for which price variance is the main contributor. Revised structures after the computation of price variance are as under:

**Workings****Contribution Price Variance**

Product	Actual Qty. (units'000)	Actual Contribution per unit (Z\$)	Standard Contribution per unit (Z\$)	Difference (Z\$)	Variance (Z\$)
Domestic	570	27.00	40.00	-13.00	7.41 m (A)
Industrial	270	47.50	50.00	-2.50	0.675 m (A)
Total	840				8.085 m (A)

(ii) Strategic Inputs

The actual sale of industrial flooring rolls is 35% higher than projections. However, the actual contribution margin of Z\$47.5 is *marginally lower* than standard contribution margin of Z\$50 per unit. This indicates that ZM may have cut its selling price to maintain or gain market share. Therefore, industrial flooring rolls are in the **Growth Phase** of product life cycle. Due to the increase in demand, there is a possibility of higher sales and profits to be made in future years.

Similarly, the actual sale of domestic flooring rolls is 5% lower than the expectations. However, the actual contribution margin is Z\$27 per roll i.e. 32.5% lower than the standard contribution margin. This indicates that ZM may have sold these at substantially reduced prices to maintain the sales volume. Therefore, the domestic residential flooring rolls might be in the **Decline Stage** of product life cycle.

The market size for flooring rolls has reduced from an expectation of 80 lacs rolls to 70 lacs rolls. Therefore, the market size has shrunk significantly by 12.5% for the year 2024. This is a *threat to the profitability* of the business. The management has to understand the reasons behind this shrinkage. For example, dwindling demand may be on account of cheaper substitutes available for flooring rolls. The management has to take cognizance of this threat to business. A positive for ZM is that its actual market share for flooring rolls was higher than expected at 12%. An increase in market share would have a beneficial impact on the company's profitability. Also, despite the shrinkage in market size, demand for industrial flooring rolls seems to be on the rise. This could be an *opportunity* for the management to consider.

As explained above, the industrial flooring rolls seem to be in the Growth Stage of product life cycle, while the domestic residential rolls are in the Decline Stage. Industrial flooring rolls have a higher contribution margin per roll as compared to domestic residential rolls. Accordingly, ZM may consider phasing out domestic flooring rolls and concentrate on industrial flooring rolls. In view of shrinking market conditions, it would be more profitable to phase out the weaker product and concentrate on the fast-moving and profitable product. At the same time, since domestic flooring roll still has *significant demand*, the strategy to phase out this product may have to be done in a *phased and well-planned manner*. In view of the shrinking market size, ZM should not end up losing its market share due to phasing out domestic flooring rolls.

For Your Conceptual Understanding
“Budgeted Vs Actual Figures”

Product	Budgeted Qty. Rolls ('000)	Standard Cont. per Roll (Z\$)	Budgeted Cont. (Z\$ 'in millions)	Actual Qty. Rolls ('000)	Actual Cont. per Roll (Z\$)	Actual Cont. (Z\$ 'in millions)	Revised Actual Qty. ('000)
Dom.	600	40	24.00	570	27	15.390	630 (840×75%)
Ind.	200	50	10.00	270	47.5	12.825	210 (840×25%)
	800		34.00	840		28.215	840

Contribution Mix Variance

Product	Standard Contribution per unit (Z\$)	Actual Qty. (units'000)	Revised Actual Quantity (units'000)	Difference ('000)	Variance (Z\$)
Domestic	40	570	630	-60	2.40 m (A)
Industrial	50	270	210	+60	3.00 m (F)
Total		840			0.60 m (F)

Contribution Quantity Variance

Product	Standard Contribution per unit (Z\$)	Revised Actual Quantity (units'000)	Budgeted Quantity (units'000)	Difference ('000)	Variance (Z\$)
Domestic	40	630	600	+30	1.20 m (F)
Industrial	50	210	200	+10	0.50 m (F)
Total		840			1.70 m (F)

Market Size Variance

$$\begin{aligned}
 &= \text{Budgeted Market Share \%} \times (\text{Actual Industry Sales Quantity in units} - \text{Budgeted Industry Sales Quantity in units}) \times (\text{Average Budgeted Contribution per unit}) \\
 &= 10\% \times (70,00,000 \text{ Rolls} - 80,00,000 \text{ Rolls}) \times \text{Z\$ } 42.50 \\
 &= \text{Z\$ } 4.25 \text{ m (A)}
 \end{aligned}$$

Market Share Variance

$$\begin{aligned}
 &= (\text{Actual Market Share \%} - \text{Budgeted Market Share \%}) \times (\text{Actual Industry Sales Quantity in units}) \times (\text{Average Budgeted Contribution per unit}) \\
 &= (12\% - 10\%) \times 70,00,000 \text{ Rolls} \times \text{Z\$ } 42.50 \\
 &= \text{Z\$ } 5.95 \text{ m (F)}
 \end{aligned}$$

