

A collection of items including a chessboard, medals, a compass, and glasses. The chessboard is in the top left corner, featuring a red and blue checkered pattern with several pieces. Below it are two medals: one with a red ribbon and a white star, and another with a blue ribbon and a white star. A silver compass is in the bottom left corner. A pair of gold-rimmed glasses is in the center. The background is a light-colored, textured surface.

# ***STANDARD COSTING & VARIANCE ANALYSIS***

- ***R. SIVAKUMAR***



# USES OF ACCOUNTING INFORMATION

Accounting information is quite useful to the Management in terms of arriving at a decision and also in planning, control and performance evaluation. Accounting information can be used for:

1. Projecting the profit level.
2. Analysing the impact of cost if sales volume drop by 10 %.
3. Measuring the efficiency of production.
4. Measuring the performance of each segment.
5. Designing performance measurement systems to encourage employees to participate for the betterment of the Organisation.



The answers to the above issues lie in the installation of a good accounting system encompassing an effective Budgetary control and **STANDARD COSTING SYSTEM**. Establishing a Standard costing system will be quite useful to the Management in both planning and control. In the planning stage, it can assist the Management with necessary data; at the control stage, it can be used to find the deviations between the actuals vis-a-vis the standards. The measurement of such deviations is carried out through the technique of ***VARIANCE ANALYSIS***.

# STANDARD COSTING - DEFINITION

**STANDARD COSTING** may be defined basically as a technique of cost accounting which compares the “standard cost” of each product or service with the actual cost, to determine the efficiency of the operation, so that any remedial action may be taken immediately. The “standard cost” is a predetermined cost which determines what each product or service should cost under given circumstances.





# STEPS IN STANDARD COSTING

Standard costing involves:

- ❖ The setting of standards
- ❖ Ascertaining actual results
- ❖ Comparing standards and actual costs to determine the variances
- ❖ Investigating the variances and taking appropriate action where necessary.



# PRELIMINARIES IN ESTABLISHING A SYSTEM OF STANDARD COSTS

1. The establishment of cost centers with clearly defined areas of responsibility.
2. The classification of accounts, with provision for standard and actual costs with variances.
3. The type of standard to be operated.
4. The setting of standard costs for each element of cost.



# TYPES OF STANDARD

- ◆ IDEAL
- ◆ EXPECTED ACTUAL
- ◆ NORMAL
- ◆ BASIC
- ◆ CURRENT



# ADVANTAGES OF STANDARD COSTING

- ❖ Provides a yardstick against which the actual costs can be measured.
- ❖ The setting of standards is involves determining the best materials and methods, which may lead to economies.
- ❖ A target of efficiency is set for employees to reach, and cost consciousness is stimulated.
- ❖ Variances can be calculated which enable the principle of “management by exception” to be operated.



# ADVANTAGES OF STANDARD COSTING

- ❖ Costing procedures are often simplified.
- ❖ Provides a valuable aid to management in determining prices and formulating policies.
- ❖ The evaluation of stock is facilitated.
- ❖ The operation of cost centers defines responsibilities.



# STANDARD COSTING - LIMITATIONS

- ◆ VARIATION IN PRICE
- ◆ VARYING LEVELS OF OUTPUT
- ◆ CHANGING STANDARD OF TECHNOLOGY
- ◆ ATTITUDE OF TECHNICAL PEOPLE
- ◆ MIX OF PRODUCTS
- ◆ DO NOT REFLECT THE TRUE VALUE AND EXCHANGE
- ◆ BASED ON THEORETICAL MAXIMUM EFFICIENCY, ATTAINABLE GOOD PERFORMANCE & AVERAGE PAST PERFORMANCE



# VARIANCE ANALYSIS

“Variance” is the difference between a budgeted or standard amount and the actual amount during a given period. Variance Analysis is defined to be an analysis of the cost variances into its component parts and the explanation of the same. It is that part of the process of control which involves the calculation of a variance and interpretation of results for identifying the causes thereof and also for pinpointing responsibility. Variances are normally calculated for all the cost components such as Materials, Labour and Overheads. Variances are also calculated for Revenues, i.e., Sales and also for Net profits (Sales - Costs).



# FUNDAMENTALS

Let us understand the fundamentals of Variance Analysis with a simple example.

ONE UNIT of Product A requires TWO Kgs. of Material X at a price of Rs.5 per Kg. TEN UNITS of Product A was manufactured and 22 Kgs. of X was consumed. The actual price was Rs.6 per Kg.



## Computation of the cost variance :

For the actual production of 10 Units of A, the consumption at standard should have been 20 Kgs. of X. With a standard price of Rs.5 per Kg. the total standard cost for actual production works out to Rs.100; whereas the actual cost incurred for the same level of production happens to be Rs.132 (22 Kgs. x Rs.6 per Kg.). The above results in a total cost variance of Rs.32 Unfavourable.

## Analysis of the cost variance :

On analysing, it can be noticed that this variation of Rs.32 was caused because of an extra consumption of 2 Kgs. of X at the rate of Rs.5 per Kg - Rs.10 and an extra payment of Re.1 per Kg. for all the 22 Kgs - Rs.22.



# BASIC CONCEPTS

The term standard for measurement of variances signifies the conversion of the actuals based on STANDARDS, i.e., Standard for actual production. Where there is an input-output situation the term standard will signify standard input with reference to actual output.

Where there is a concept of equivalent units the term standard will signify standard input for equivalent units.

Volume and price are the two relevant basic factors that cause the variance.

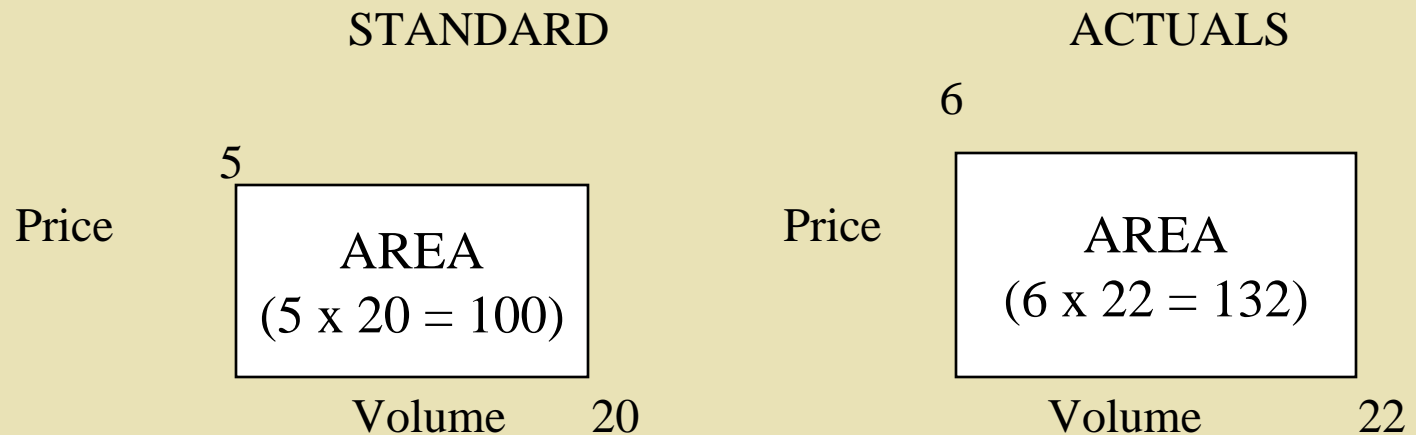
Volume is equated to efficiency, usage and can be further analysed in terms of **mix**, **sub-usage** / **yield** / **sub-efficiency**, **capacity** etc. Depending upon the nature of the component of cost.

# MATERIAL VARIANCE

## – DERIVATION OF FORMULAE

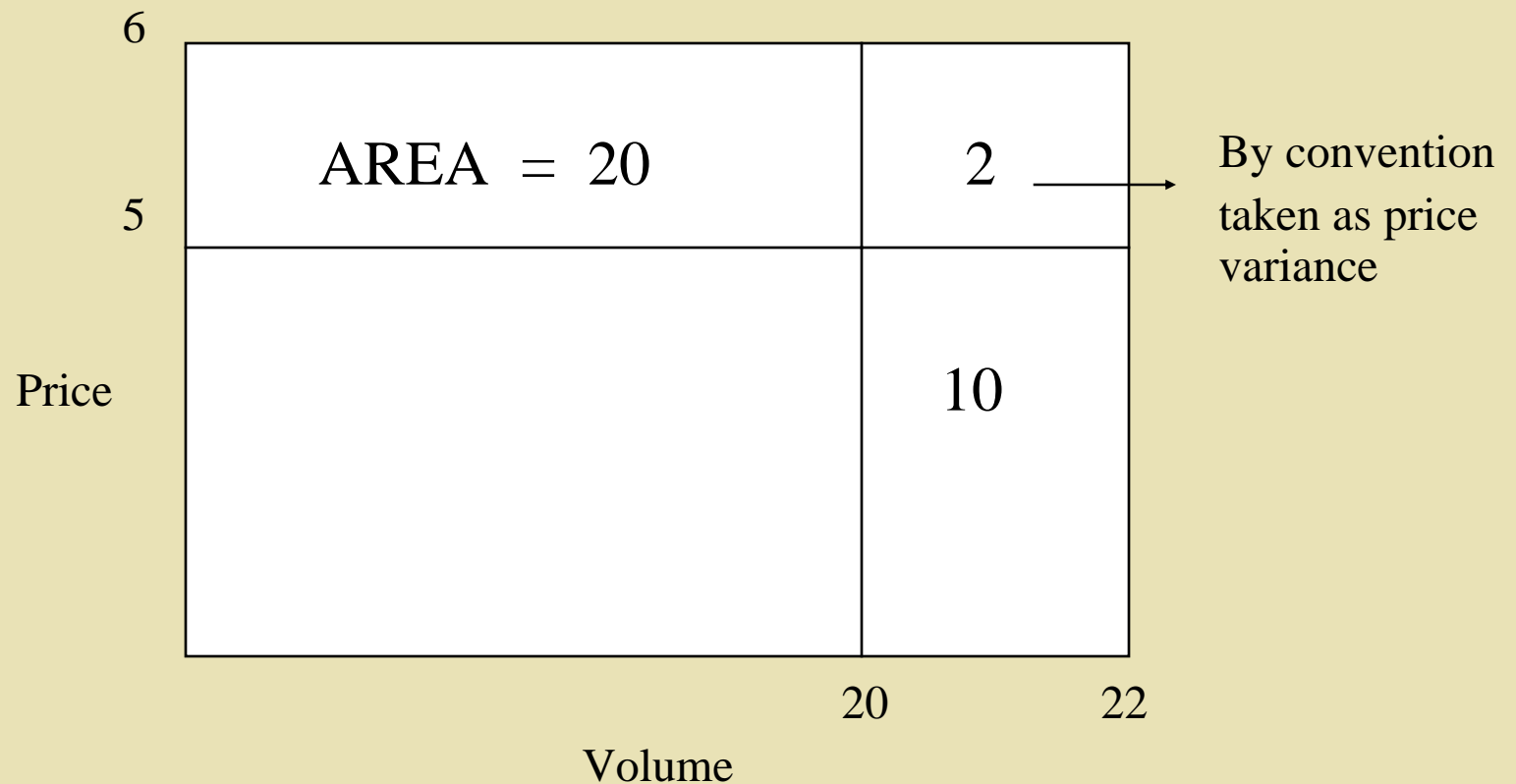
To understand the various variances regarding Materials, let us figuratively draw the example given above.

### STEP 1

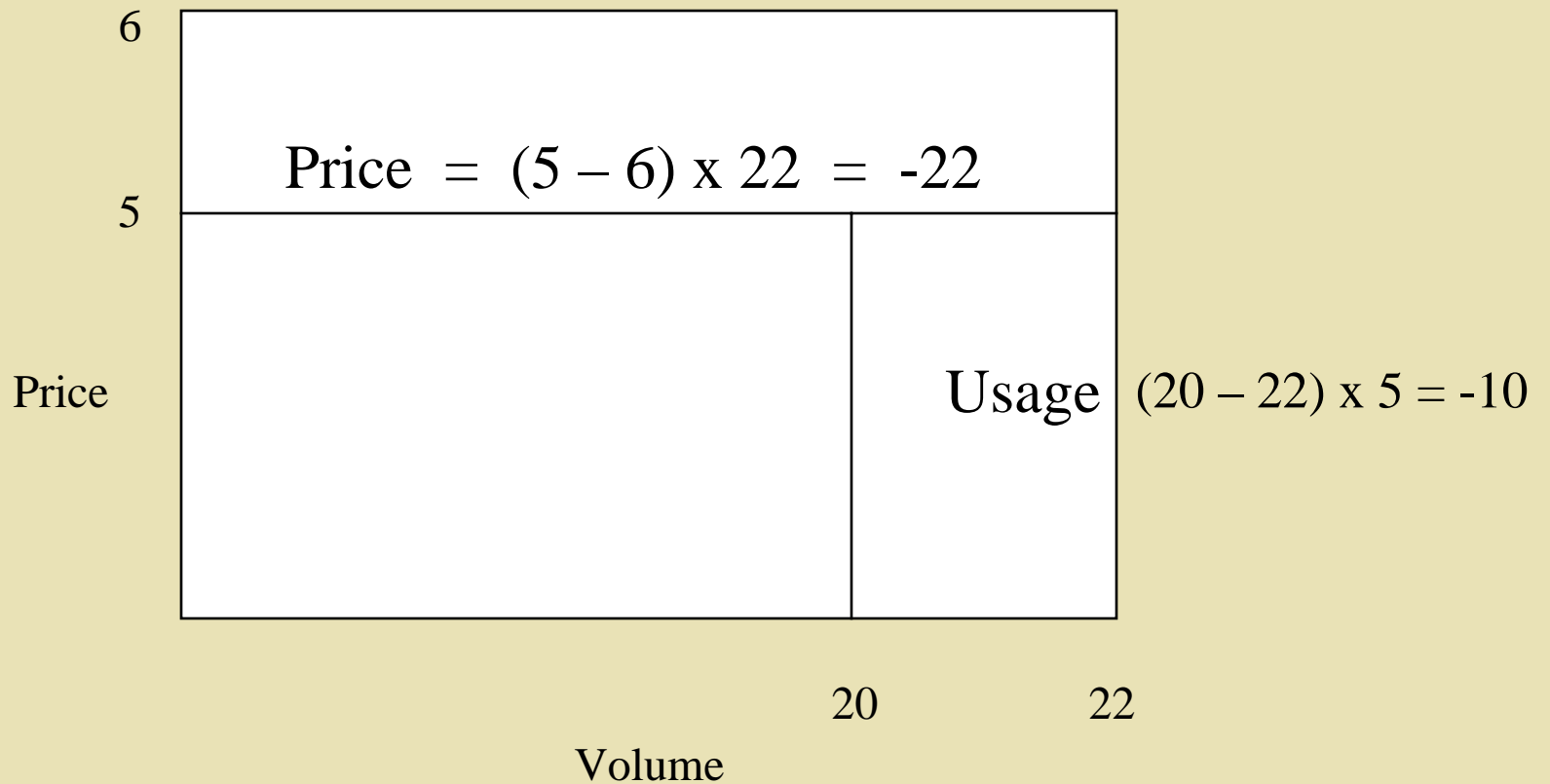


# MATERIAL VARIANCE – DERIVATION OF FORMULAE STEP 2

Combining the figures, we arrive at the cost variance of 32 (20+2+10) :

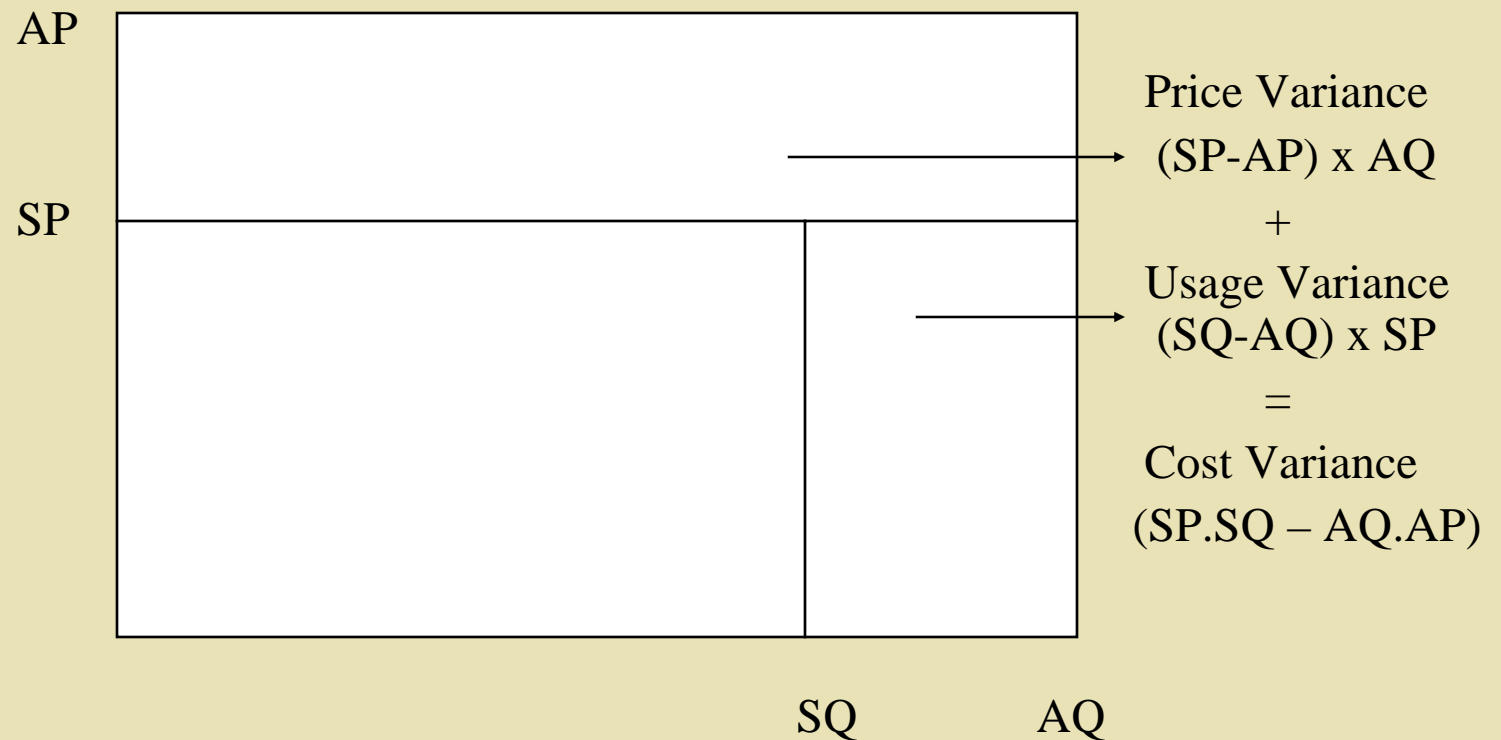


# MATERIAL VARIANCE – DERIVATION OF FORMULAE STEP 3

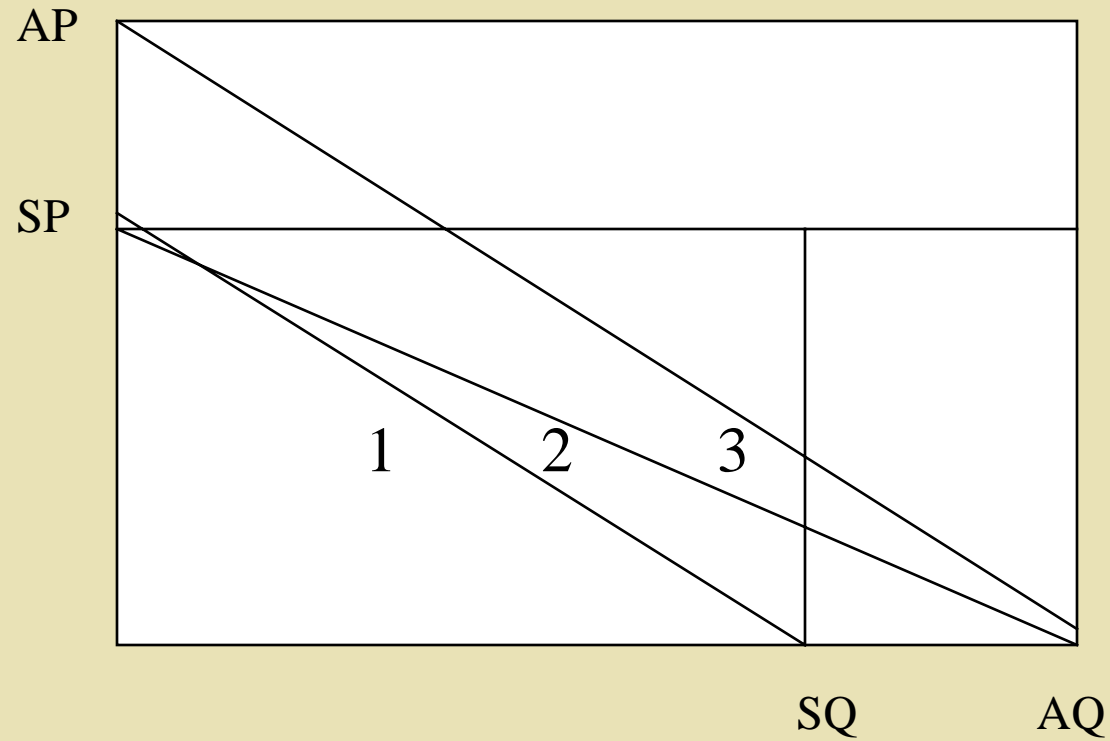


# MATERIAL VARIANCE – DERIVATION OF FORMULAE STEP 4

Replacing the numbers by notation, the variances can be analysed as follows :



## RE-ANALYSIS OF THE FIGURE



(1) SP.SQ

(2) SP.AQ

(3) AQ.AP

(1) - (2)  
= USAGE

(2) - (3)  
= PRICE

(1) - (3) = COST VARIANCE

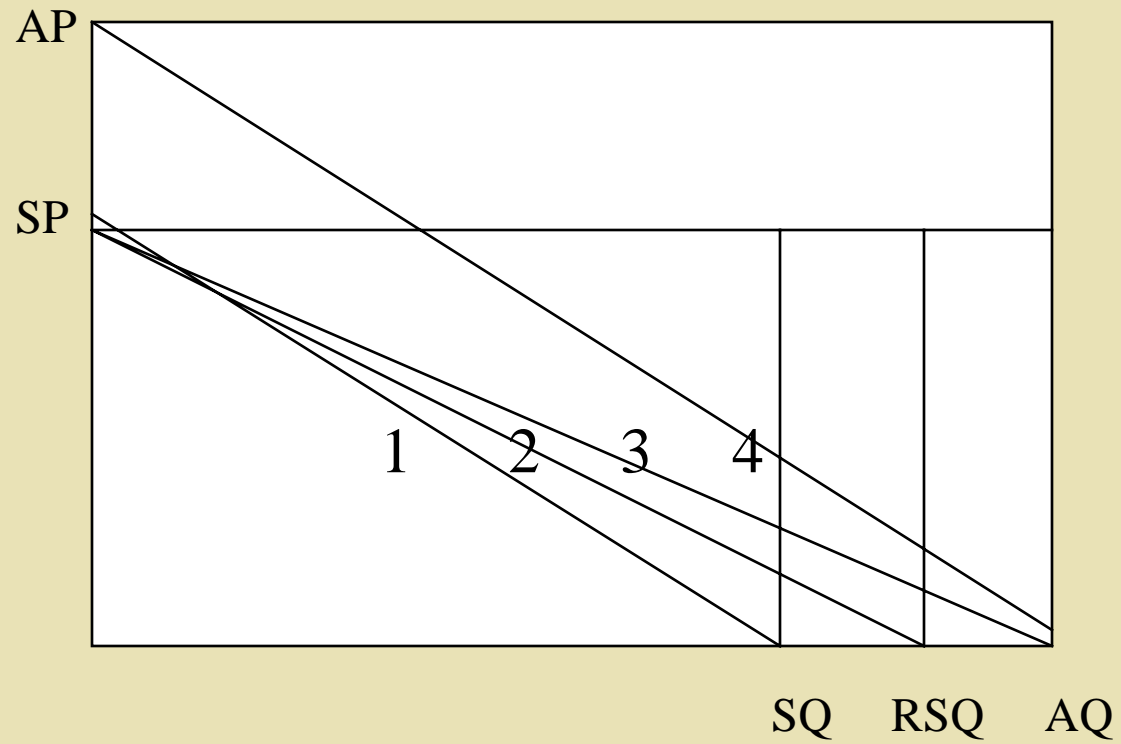


## FURTHER ANALYSIS

### - REVISED STANDARD QUANTITY

To complete the entirety of Material variances, we introduce the term **REVISED STANDARD QUANTITY (RSQ)** into the figure. The term Revised Standard Quantity is actually used when there is more than one Material for analysing the Usage Variance into the relative components, namely, Sub-usage and Mix. It should be understood that the RSQ is actually the Standard Ratio of the various elements of the Mix as applied to the **TOTAL ACTUAL INPUT**. Hence, in the figure, although  $RSQ = AQ$ , it is shown in between SQ and AQ for analysing the variances. **This is only for understanding the formulae and should not to be viewed mathematically.**

## FINAL FIGURE



(1) SP.SQ

(2) SP.RSQ

(3) SP.AQ

(4) AQ.AP

$(1) - (2)$ = SUB USAGE or YIELD	$(2) - (3)$ = MIX	$(3) - (4)$ = PRICE	
$(1) - (3) = \text{USAGE}$			
$(1) - (4) = \text{COST VARIANCE}$			



# YIELD VARIANCE :

The concept of Yield arises when there is an Input-Output situation. In practical applications, say, a Chemical Industry or a Pharmaceutical Industry, it can be noticed that, two or more ingredients are required for a final Product. This results in a loss which is usually acceptable under normal circumstances, based on technical specifications. Hence, the Standard itself is based on an acceptable loss proportion. If the actual loss on actual input were to be more than the standard proportion of loss allowed on actual input, there arises a negative Yield Variance. On the other hand if the actual loss is less, the Yield Variance is positive.



# YIELD VARIANCE :

Mathematically, it can be seen that, the Yield Variance equals the sum total of the Sub-Usage Variance of all the elements of the Mix put-together. Hence, Yield Variance can also be computed by the following formula :

**AVERAGE STANDARD PRICE    x    ( STANDARD LOSS OF ACTUAL INPUT    -    ACTUAL LOSS OF ACTUAL INPUT )**

**AVERAGE STANDARD PRICE = ( THE SUM TOTAL OF SP.SQ OF EACH ELEMENT OF THE MIX PUT-TOGETHER / TOTAL STANDARD OUTPUT ).**

**TOTAL STANDARD OUTPUT = TOTAL STANDARD INPUT OF ALL ELEMENTS - STANDARD LOSS.**

**NOTE :** Since the standard input is with reference to actual output, the total standard output and total actual output, will always be equal.



## A SPECIAL PROPERTY OF SUB-USAGE / YIELD VARIANCE :

Since, the variances are computed by applying the standard ratio on total actual input, the difference of  $SQ - RSQ$  will be either Positive or Negative or Nil. Therefore this is the only variance which is quite unique in the sense that once the sign of the variance of one of the elements is known, the sign of the others will also be the same. Further, it is unique because if the total variance is known the individual variance of the elements can be computed by apportioning the total variance with the weighted standard ratio of each of the elements, i.e.,  $SP.SQ$ .



## MATERIAL PRICE VARIANCE :

Where the Raw Material stocks are valued at Standard Price, it can be noticed that the Material Price variance will remain the same whether calculated on the quantity purchased or on the quantity consumed, suitably adjusted for value.

### EXAMPLE :

Opening Stock	10 Kgs. @ Rs.20 per Kg.
Purchases	80 Kgs. @ Rs.25 per Kg.
Closing Stock	20 Kgs. @ Rs.20 per Kg.



## **MATERIAL PRICE VARIANCE :**

The Actual value of consumption for 70 Kgs.  
=  $[10*20 + 80*25 - 20*20] = \text{Rs.}1800$ .  
At standard, the value will be =  $70 * 20$   
=  $\text{Rs.}1,400$ . Hence the variance is  $\text{Rs.}400$  (A).  
This variance can also be computed on the  
quantity purchased.

Actual value of purchases will be =  $80 * 25$   
=  $\text{Rs.}2,000$ . At standard, the value will be  
=  $80 * 20 = \text{Rs.}1,600$ . Therefore the price  
varaince is  $\text{Rs.}400$  (A).

Where Stocks are valued differently, the price  
variance should be calculated only on the  
consumption suitably adjusted for value.



# LABOUR VARIANCES

Recall back the final figure regarding Material Variances. As a first step, Replacing the Standard Price with Standard Rate and Standard Quantity with Standard Hours, we get the following :

SR.SH      SR.RSH      SR.AH      AH.AR

As regards Labour, a basic feature is the concept of IDLE-TIME. By definition, Idle-time is the number of hours lost due to non-production. In Cost Accounting, the Idle-time can be either due to normal or abnormal causes. However, for the purposes of computing variances, they are viewed synonymously.



Irrespective of whether it is normal or abnormal the idle-time variance is calculated using the following formula :

**Idle-hours x Standard Rate or Average Standard Rate**

This is calculated individually for the various composition of Labour. Idle hours can be expressed as the difference between hours taken for production - hours actually paid. Hence, this variance will always be Unfavourable. Idle-time variance can be built in by splitting the Actual Hours into Actual hours taken for production and Actual hours paid. The Revised Standard Hours will be the ratio of the elements of Labour, as applied to the total Actual Hours taken for production.



# SALES VARIANCES

## Sales Turnover or Value method :

Here we reverse the order of Material variances to analyse the nature of variance, i.e., Favourable or Adverse. Therefore the formulation will be as follows :

(1)	(2)	(3)	(4)
$AQ.AP$	$AQ.SP$	$SP.RSQ$	$SP.SQ$
$(1) - (2)$ $= Price$	$(2) - (3)$ $= Mix$	$(3) - (4)$ $= Quantity$	
	$(2) - (4) = Volume$		
$(1) - (4) = Value Variance$			



## **Profit or Sales Margin Method :**

The basic concept of the above method is to analyse the Profit margin by removing the Standard Cost from the Selling Prices. Conceptually, any increase in Selling price increases the profit absolutely. Therefore, even from the actual Selling price, only the Standard cost is removed for analysing the Margin variances. However, it should be noticed that for a full comprehensive analysis of variances, the Cost variances will have to be analysed separately apart from the Sales Margin variances. To derive the formula e for Sales Margin variances, the same figure used for Sales variances on the basis of Turnover will be retained with the removal of the Standard cost from each of the Selling Prices. Further, the prefix 'Margin' will be given.

# SALES VARIANCES

## Profit or Sales Margin Method :

(1) AQ. (AP-SC)	(2) AQ. (SP-SC)	(3) RSQ. SP-SC	(4) SQ. SP-SC
(1) - (2) Margin = Price	(2) - (3) Margin = Mix	(3) - (4) Margin = Quantity	
	(2) - (4) = Margin Volume		
(1) - (4) = Margin Value Variance			

**NOTE** As regards Sales variances, the terms Budget and Standard are viewed synonymously. As the entire evaluation is on Output, there is no concept of Yield.



# OVERHEAD VARIANCES

By definition, Overheads constitute Indirect materials, Indirect labour and Indirect expenses. Hence, they are not identifiable with respect to a Unit of production. Therefore they are absorbed by a proper Recovery Rate based on number of units produced or labour hours or machine hours. This Recovery Rate again is on the basis of a Budget (usually the normal capacity). Analysing the fundamental causes for variance, viz, Volume and Price, with regard to Overheads, it can be noticed that the same will be computed by comparing the Budgeted volume and Actual volume with the standard recovery as well as actual recovery.

# OVERHEAD VARIANCES - BASIC FORMULATION

(1)	(2)	(3)
<i>Standard Recovery x Actual production</i>	<i>Standard Recovery x Budgeted production</i>	<i>Actual Recovery x Actual production</i>
=	=	=
<i>Standard overhead</i>	<i>Budgeted overhead</i>	<i>Actual overhead</i>

$$(1) - (2) = \textit{Volume}$$

$$(2) - (3) = \textit{Expenditure}$$

$$(1) - (3) = \textit{Cost Variance}$$



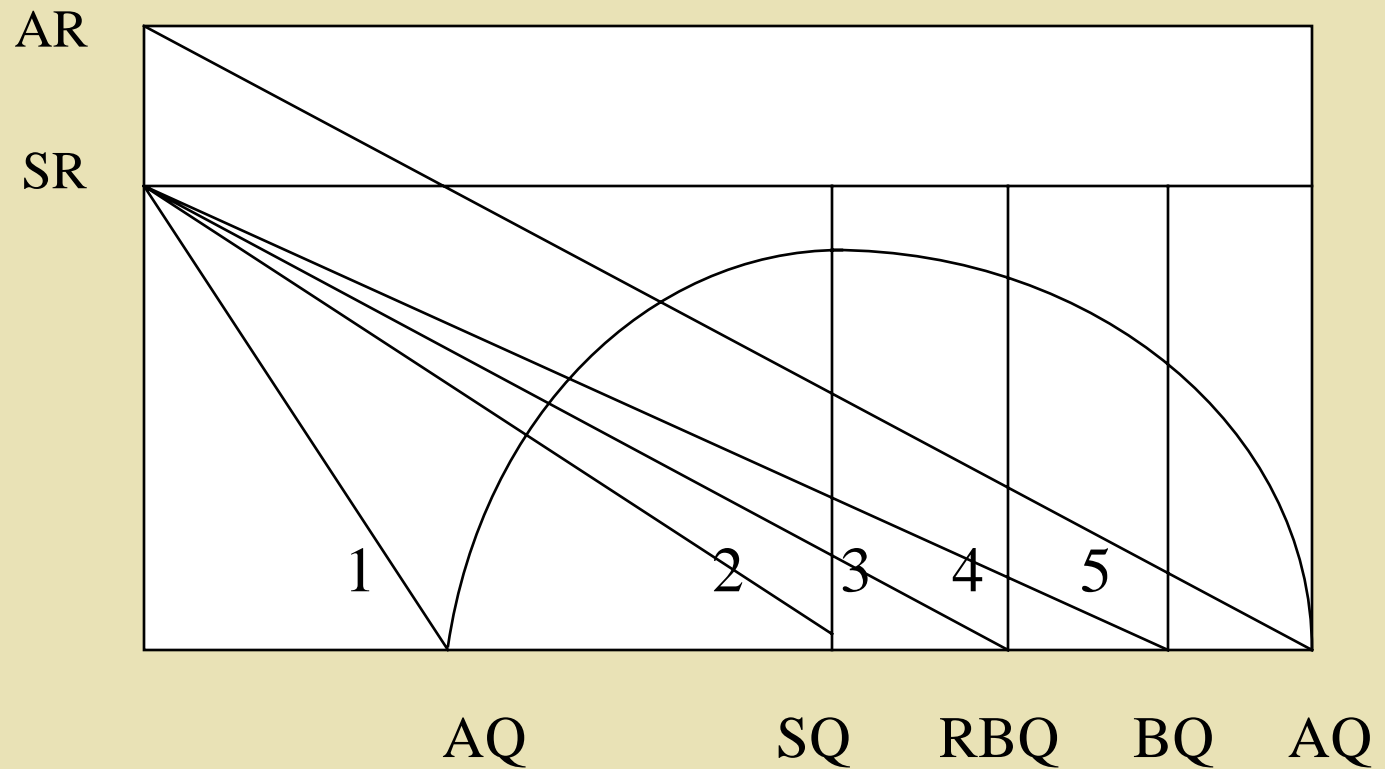


# OVERHEAD VARIANCES

The causes for increase in Volume is due to factors such as Efficiency, Capacity and Calendar. The concept of Calendar variance arises due to a revision of the Budgeted capacity, necessitated by the change in the number of days actually worked. Hence, it should be seen that as regards Overheads, there is no revision of the Standard unlike Materials and Labour, but there is only a revision of the Budget. Considering the usual Recovery Rates normally used, namely, Standard Recovery based on number of units produced or number of labour hours, the two separate figures can be drawn for analysing the variances.

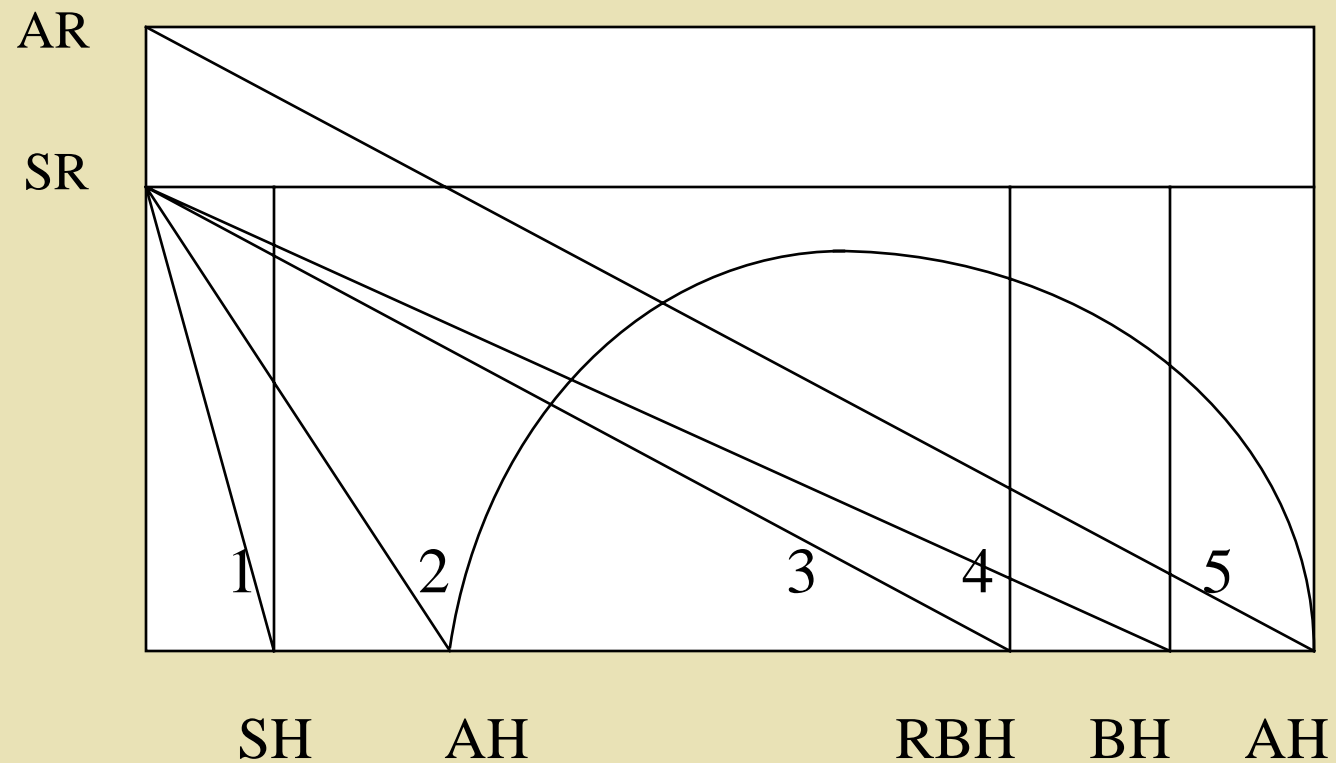
# OVERHEAD VARIANCES

**FIGURE 1 - Based on Standard Recovery per unit**



# OVERHEAD VARIANCES

**FIGURE 2 - Based on Standard Recovery per hour**





# OVERHEAD VARIANCES

In the above two figures, a change in the normal order of formulation can be noticed, i.e., a change has been done with respect to Actual Quantity in the first place (Figure - I) and Actual Hours in the second place (Figure -II). This is to facilitate the Cost variance as well as the Efficiency variance. By definition, the Cost variance is  $SR.AQ - AR.AQ$  and the Efficiency variance is  $SR.AQ - SR.SQ$  in terms of the number of units produced. Whereas, with respect to number of hours, the same will be  $SR.SH - AH.AR$  and  $SR.SH - SR.AH$ . As regards Figure - II, it is possible to split AH into 'AH for production' and 'AH paid' for computing the Overhead Idle-time variance.

# OVERHEAD VARIANCES

(1)	(2)	(3)	(4)	(5)
SR.AQ	SR.SQ	SR.RBQ	SR.BQ	AQ.AR
				<i>[Actual overheads]</i>

(1a)

SR.SH	SRAH	SRAH	SR.RBH	SR.BH	AH.AR
<i>Prodn.</i>	<i>Paid</i>				
(1) - (1a)	(1a) - (2)	(2) - (3)	(3) - (4)	(4) - (5)	
=Efficiency	=Idle-time	=Capacity	=Calendar	=Expenditure	
(1) - (2) = Efficiency <i>[Idle-time is normal]</i>					
(1) - (4) = Volume					
(1) - (5) = Cost Variance					

**NOTE** In case Idle-time is abnormal, it will not form part of Efficiency variance.

# VARIABLE OVERHEAD VARIANCES

The above analysis is usually carried out for Fixed Overheads. For Variable Overheads, the following three variances are usually computed :

(1)

(2)

(3)

*SR.SH*

*SR.AH*

*AH.AR*

*(1) - (2) = Efficiency*

*(2) - (3) = Expenditure*

*(1) - (3) = Cost Variance*





## FIXED OVERHEAD EFFICIENCY VARIANCE– A SPECIAL NOTE

Traditional books on Cost Accounting usually carry out a full analysis of the Volume variance of Fixed overheads. However, there has been a debate whether Efficiency is to be computed for Fixed Overheads. The basis of argument here is that Efficiency variances are measures to help the short-run control of performance. Efficient use of Materials, Labour and Variable factory overheads can affect actual costs, but short-run Fixed overheads are unaffected by efficiency. Therefore, Efficiency variance is not calculated for Fixed overheads. The analysis is restricted to Volume and Expenditure.



# Material Price

## ◆ Possible causes

- ✍ Inefficient buying or failure to make timely purchases
- ✍ Increase in market price
- ✍ Emergency purchases
- ✍ Bulk purchases
- ✍ Change in transport cost
- ✍ Non-availability of standard quality
- ✍ Loss of cash discount
- ✍ Change in the method of material collection

## ◆ Responsibility

Purchase department

--

Production/Sales department

Purchase department

Purchase department

--

Finance Department

Production/Purchase department



# Material Usage:

## Material mix and Material yield

### ◆ Possible causes

- ☞ Poor quality of material
- ☞ Carelessness in the use of material
- ☞ Inefficient production method
- ☞ Defective machinery
- ☞ Unskilled employees
- ☞ Wrong specification
- ☞ Change in mix
- ☞ Experimental production
- ☞ Pilferage

### ◆ Responsibility

- Purchase/Inspection departments
- Foreman / Operator
  
- Production/Engineering dept.
  
- Foreman / Maintenance depart.
- Planning / Personnel dept.
- Planning department
- Production/Engineering dept.
  
- Security Staff



# Labour Rate

## ◆ Possible causes

- ✓ Revision in wages
- ✓ Overtime for urgent completion of job
- ✓ Change in gang composition or wrong grade of labour
- ✓ Executive overtime, special increment/high labour awards
- ✓ Special rates for experimental production

## ◆ Responsibility

Production / Sales department

Foreman/Personnel department

Top management



# Labour Efficiency

## ◆ Possible causes

- ✓ Inefficient/Untrained workers
- ✓ Machinery breakdown
- ✓ Poor quality of material
- ✓ Inefficient supervision
- ✓ Hours lost in waiting, delay in routing material, tools, instructions and improper production scheduling
- ✓ Poor working conditions
- ✓ Change in design, quality standard of product

## ◆ Responsibility

- Foreman/Personnel department
- Maintenance department
- Purchase department
- Foreman
- Engineering department
  
- Top management
- Planning department



# Overheads Expenditure

## ◆ Possible causes

- ⌘ Rise in salaries and price levels
- ⌘ Lack of proper control
- ⌘ Change in production methods
- ⌘ Change in manufacturing polity

## ◆ Responsibility

Foreman

Production/Engineering  
Department

Top management



# Efficiency

- ◆ Possible causes

- ⇒ Inefficient/untrained workers
- ⇒ Lack of proper planning
- ⇒ Poor performance of machinery
- ⇒ Old worn-out machinery

- ◆ Responsibility

Foreman/Personnel  
department

Planning department

Maintenance department



# Capacity

- ◆ Possible causes

- ★ Slackening of sales, lack of orders
- ★ Lock out/strikes
- ★ Power failure
- ★ Seasonal cuts in production
- ★ Machine break-downs

- ◆ Responsibility

Sales Manager

Top management

Maintenance department

Maintenance department



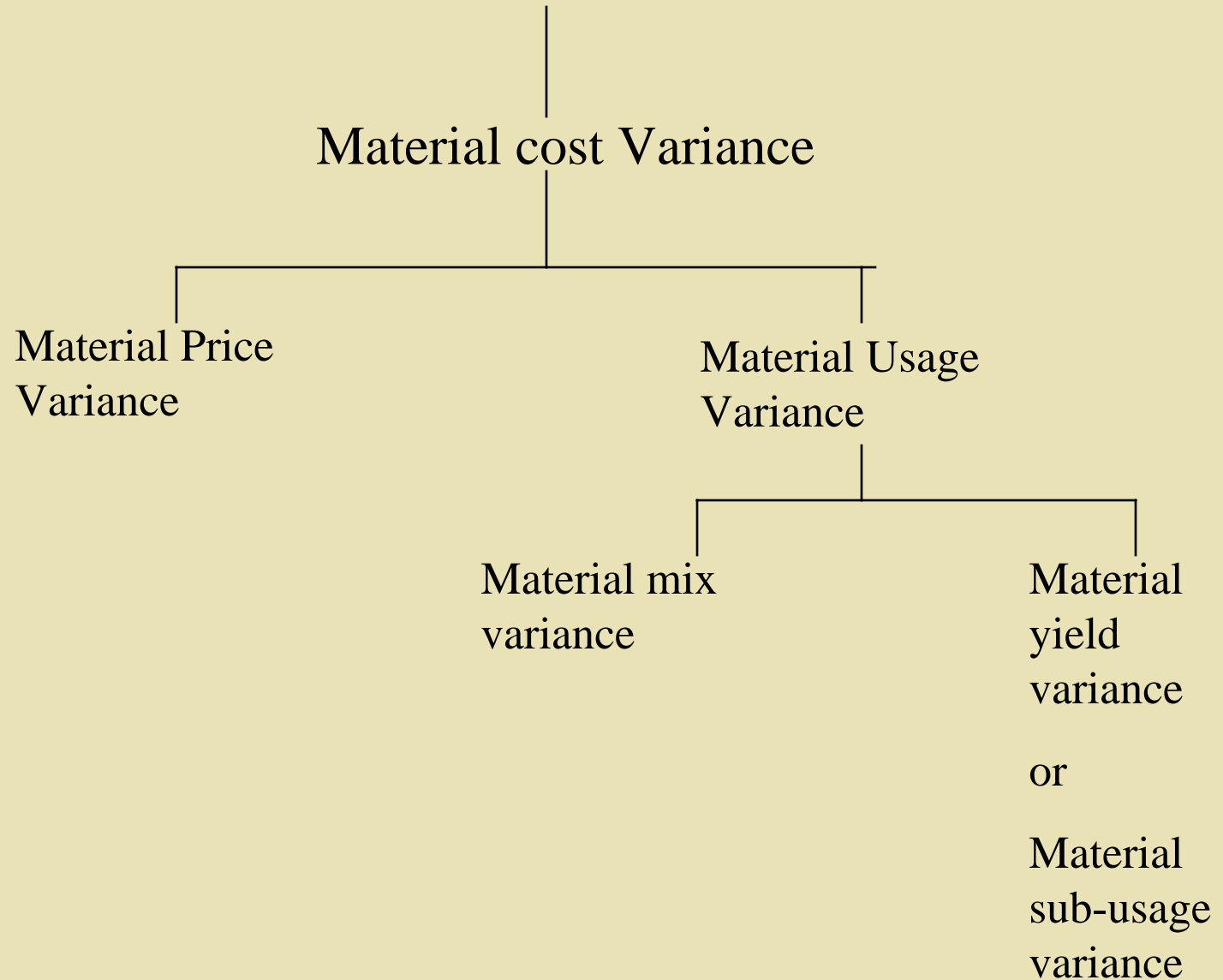
# Calender

◆ Possible causes

◆ Responsibility

❧ Difference between  
the budgeted and  
actual days

# TOTAL COST VARIANCES



# TOTAL COST VARIANCES

Labour cost Variance

Labour  
Rate Variance

Labour  
efficiency  
Variance

Labour ideal  
time Variance

Labour gang  
variance

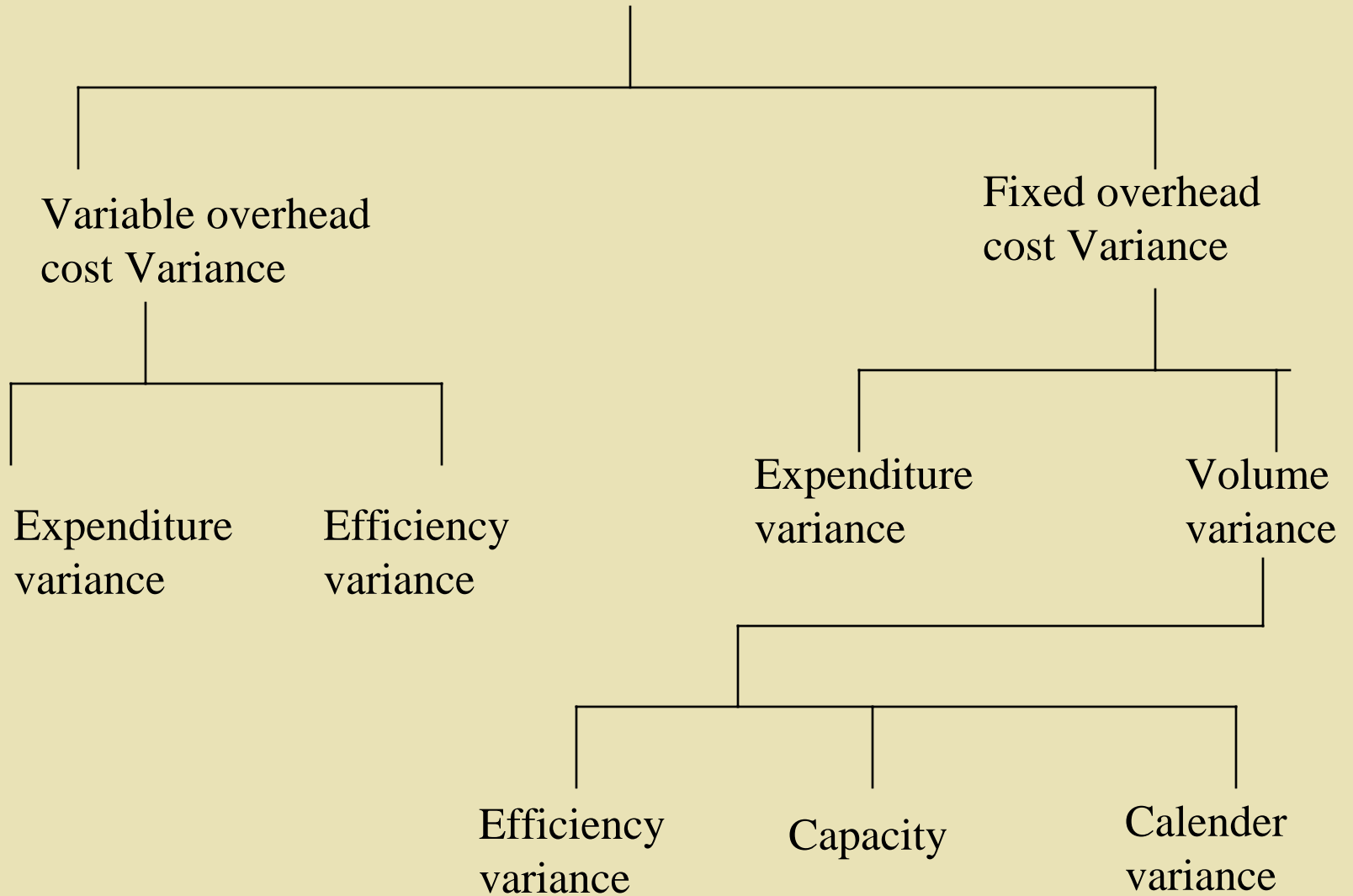
or

Labour mix  
variance

Labour sub-  
efficiency  
variance



# TOTAL COST VARIANCES





# Material Price

## ◆ Possible causes

- (a) Inefficient buying or failure to make timely purchases
- (b) Increase in market price
- (c) Emergency purchases
- (d) Bulk purchases
- (e) Change in transport cost
- (f) Non-availability of standard quality
- (g) Loss of cash discount
- (h) Change in the method of material collection

## ◆ Responsibility

Purchase department

--

Production/Sales department


Purchase department

Purchase department

--

Finance Department

Production/Purchase department



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- (g) Change in mix
- (h) Experimental production
- (i) Pilferage

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- (e) Special rates for experimental production

## ◆ Responsibility

Production / Sales department

Foreman/Personnel department

Top management



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- (d) Inefficient supervision
- (e) Hours lost in waiting, delay in routing material, tools, instructions and improper production scheduling
- (f) Poor working conditions
- (g) Change in design, quality standard of product

## ◆ Responsibility

- Foreman/Personnel department
- Maintenance department
- Purchase department
- Foreman
- Engineering department
  
- Top management
- Planning department



# Overheads Expenditure

- ◆ Possible causes
  - (a) Rise in salaries and price levels
  - (b) Lack of proper control
  - (c) Change in production methods
  - (d) Change in manufacturing polity

- ◆ Responsibility

Foreman

Production/Engineering  
Department

Top management



# Efficiency

- ◆ Possible causes
  - (a) Inefficient/untrained workers
  - (b) Lack of proper planning
  - (c) Poor performance of machinery
  - (d) Old worn-out machinery
- ◆ Responsibility
  - Foreman/Personnel department
  - Planning department
  - Maintenance department



# Capacity

- ◆ Possible causes

- (a) Slackening of sales, lack of orders
- (b) Lock out/strikes
- (c) Power failure
- (d) Seasonal cuts in production
- (e) Machine break-downs

- ◆ Responsibility

Sales Manager

Top management

Maintenance department

Maintenance department



# Calender

- ◆ Possible causes
  - ◆ Responsibility
- (a) Difference between the budgeted and actual days