

STANDARD COSTING (VARIANCES)

1. Material Variance

1.1 Material costs variance = (Standard quantity × Standard Price) – (Actual quantity × Actual price)

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

1.2 Material price variance = Actual quantity × (Standard price – Actual price)

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

1.3 Material usage variance = Standard price (Standard quantity – Actual quantity)

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

1.4 Material cost variance = Material usage variance + Material price variance

$$\text{MCV} = \text{MUV} + \text{MPV}$$

Material usage variance is further sub-divided into:

i) Material mix variance

ii) Material yield variance. (Or Material sub-usage variance)

1.5 Material mix variance = (Revised standard quantity – Actual quantity) × Standard price

$$\text{MMV} = (\text{RSQ} - \text{AQ}) \times \text{SP}$$

Revised standard quantity = (Standard quantity of one material × Total of actual quantities of all materials) / Total of standard quantities of all materials

1.6 Material revised usage variance = (Standard quantity – Revised standard quantity) × Standard Price

$$\text{MRUV} = (\text{SQ} - \text{RSQ}) \times \text{SP}$$

1.7 Material yield variance = (Actual yield – Standard yield) × Standard output price

$$\text{MYV} = (\text{AY} - \text{SY}) \times \text{SOP}$$

Material usage variance = Material mix variance + Material yield variance (MUV = MMV + MYV)

Or

Material usage variance = Material mix variance + Material revised usage variance (MUV = MMV + MRUV)

Note: Material revised usage variance is also known as material sub – usage variance. In each case there will be only one variance either material yield or material revised Usage variance.

2. Labour Variance

2.1 Labour Cost variance = (Std. hours for actual output × Std. rate per hour) – (Actual hours × Actual rate per hour)

$$\text{LCV} = (\text{SH} \times \text{SR}) - (\text{AH} \times \text{AR})$$

2.2 Labour rate variance = Actual time (Std. rate – Actual rate)

$$\text{LRV} = \text{AH} \times (\text{SR} - \text{AR})$$

2.3 Labour efficiency (or time) variance = Std. rate (Std. hours for actual output – Actual hours)

$$\text{LEV} = \text{SR} \times (\text{SH} - \text{AH})$$

Check: Labour cost variance = Labour efficiency variance + Labour rate variance

$$\text{LCV} = \text{LEV} + \text{LRV}$$

Labour efficiency variance is further divided into the following variances:

(i) Idle time variance

(ii) Labour mix variance

(iii) Labour yield variance (or Labour revised-efficiency variance)

2.4 Idle time variance = Idle hours × Standard rate

$$\text{ITV} = \text{IH} \times \text{SR}$$

2.5 Labour mix variance = (Revised std. hours – Actual hours) × Standard rate

$$\text{LMV} = (\text{RSH} - \text{AH}) \times \text{SR}$$

2.6 Labour revised efficiency variance = (Std. hours for actual output – Revised std. hours) × Standard rate

$$\text{LREV} = (\text{SH} - \text{RSH}) \times \text{SR}$$

2.7 Labour yield variance = (Actual yield – Std. yield from actual input) × Std. Labour cost per unit of output

$$\text{LYV} = (\text{AY} - \text{SY}) \times \text{SLC}$$

Check: Labour efficiency variance = Idle time variance + Labour mix variance + Labour yield variance

$$\text{LEV} = \text{ITV} + \text{LMV} + \text{LYV} \text{ (or LREV)}$$

3. Overhead Variance

Basic terms used in the computation of overhead variance

Standard overhead rate (per hour) = Budgeted overhead ÷ budgeted hours **or**

Standard overhead rate (per unit) = Budgeted Overhead ÷ Budgeted output in units

Note: Separate overhead rates will be computed for fixed and variable overheads.

Basic calculations before the computation of overhead variances:

(i) When overhead rate per hour is used:

(a) Standard hours for actual output (SHAO) = (Budgeted hours × Actual output) ÷ Budgeted output

(b) Absorbed (or Recovered) overhead = Std. hours for actual output × Std. overhead rate per hour

(c) Standard overhead = Actual hours × Std. overhead rate per hour

(d) Budgeted overhead = Budgeted hours × Std. overhead rate per hour

(e) Actual overhead = Actual hours × Actual overhead rate per hour

(ii) When overhead rate per unit is used

- (a) **Standard output for actual hours (SOAH)** = $[\text{Budgeted output (in units)} \times \text{Actual hours}] \div \text{Budgeted hours}$
- (b) **Absorbed overhead** = $\text{Actual output} \times \text{Std. overhead rate per unit}$
- (c) **Standard overhead** = $\text{Std. output for actual time} \times \text{Std. overhead rate per unit}$
- (d) **Budgeted overhead** = $\text{Budgeted output} \times \text{Std. overhead rate per unit}$
- (e) **Actual overhead** = $\text{Actual output} \times \text{Actual overhead rate per unit}$

Overhead cost variance = $\text{Absorbed overhead} - \text{Actual overhead}$ or

Overhead cost variance = $(\text{Std. hours for A.O.} \times \text{Std. overhead rate}) - \text{Actual overhead}$

Overhead cost variance is divided into two categories:

- (i) Variable overhead (VO) variances
- (ii) Fixed overhead (FO) variances

Variable Overhead (VO) Variances

V. O. cost variance = $(\text{Absorbed variable overhead} - \text{Actual variable overhead})$
= $(\text{Std. hours for actual output} \times \text{Std. variable overhead Rate}) - \text{Actual overhead cost}$

This variance is sub-divided into the following two variances:

- (a) Variable overhead expenditure variance or spending variance or budget variance
- (b) Variable overhead efficiency variance

V. O. expenditure variance = $(\text{Standard variable overhead} - \text{Actual variable overhead})$
= $(\text{Actual hours} \times \text{Std. variable overhead rate}) - \text{Actual overhead cost}$

V.O. efficiency variance = $(\text{Absorbed variable overhead} - \text{Standard variable overhead})$
= $(\text{Std. hours for actual output} - \text{Actual hours}) \times \text{Std. variable overhead rate}$

Check: V. O. cost variance = $\text{V.O. expenditure variance} + \text{V. O. efficiency variance}$

Fixed Overhead (FO) Variances

F.O cost variance = $(\text{Absorbed overhead} - \text{Actual overhead})$
= $(\text{Std. hours for actual output} \times \text{Std. fixed overhead rate}) - \text{Actual fixed overhead}$

Fixed overhead cost variance is further divided into the following two variances:

- (a) Fixed overhead expenditure variance
- (b) Fixed overhead volume variance

F.O. expenditure variance = $(\text{Budgeted fixed overhead} - \text{Actual fixed overhead})$
= $(\text{Budgeted hours} \times \text{Std. fixed overhead rate}) - \text{Actual fixed overhead}$

F.O volume variance = $(\text{Absorbed overhead} - \text{Budgeted overhead})$
= $(\text{Std. hours for actual output} - \text{Budgeted hours}) \times \text{Std. fixed overhead rate}$

Check: F.O. cost variance = $\text{F.O. expenditure variance} + \text{F.O. volume variance}$

Fixed overhead volume variance is further divided into the following variances:

- (a) Efficiency variance; (b) Capacity variance; (c) Calendar variance

Efficiency variance = $(\text{Absorbed fixed overhead} - \text{Standard fixed overhead})$
= $(\text{Std. hours for actual output} - \text{Actual hours}) \times \text{Std. fixed overhead rate}$

Capacity variance = $(\text{Standard fixed overhead} - \text{Budgeted overhead})$
= $(\text{Actual hours} - \text{Budgeted hours}) \times \text{Std. fixed overhead rate}$

Calendar variance = $(\text{Actual No. of working days} - \text{Std. No. of working days}) \times \text{Std. fixed rate per day}$
= $(\text{Revised budgeted hours} - \text{Budgeted hours}) \times \text{Std. fixed rate per hour}$

Revised budgeted hours = $\text{Budgeted hours} \times \text{Actual days} \div \text{Budgeted days}$

Note: When calendar variance is computed, there will be a modification in the capacity variance. In that case revised capacity variance will be calculated and the formula is:

Revised capacity variance = $(\text{Actual hours} - \text{Revised budgeted hours}) \times \text{Std. fixed rate per hour}$

Check: F. O. volume variance = $\text{Efficiency Variance} + \text{Capacity variance} + \text{Calendar variance}$

4. SALES VARIANCE

The sales variances can be computed in two ways. They are:

- (a) Sales turnover or value method.
- (b) Profit or sales margin method.

(a) Sales turnover or sales value method: It includes the following:

Sales value variance: $(\text{Budgeted sales} - \text{Actual sales})$

The variance can be bifurcated into sales price variance and sales volume variance.

Sales price variance: $\text{Actual quantity of Sales} (\text{Actual price} - \text{Budgeted price})$
or

$(\text{Actual sales} - \text{Actual quantity at budgeted prices})$

Sales volume variances: $\text{Budgeted price} (\text{Actual quantity} - \text{Budgeted quantity})$
or

$(\text{Actual quantity at budgeted price} - \text{budgeted sales})$

Check: Sales value variance = $\text{Sales price variance} + \text{Sales volume variances}$

Sales volume variance can be sub-divided into two parts:

- (i) Sales mix variance
- (ii) Sales quantity variance

Sales mix variance: Total actual sales quantity (Budgeted price p. u. of Act. Mix – Budgeted price p.u. of budgeted mix)

Sales quantity variance: Budgeted price per unit of budgeted mix (Actual total sales qty. – Budgeted total sales qty.)

Check: Sales volume variance = Sales mix variance + Sales quantity variance

(b) Profit or sales margin method

Total Sales Margin Variance (TSMV): (Budgeted margin - Actual margin)

Sales Margin Price Variance (SMPV): Actual quantity (Actual margin per unit – Budgeted margin per unit).

Sales Margin Volume Variance (SMVV) = Budgeted margin per unit (Actual units – Budgeted units)

This can be further sub-divided into the following two variances:

Sales Margin Quantity Variance (SMQV): (Bgt'd total qty – Actual Total qty) Bgt'd margin p.u. of Bgt'd mix.

Sales Margin Mix Variance (SMMV): = Total actual qty sold × (Bgt'd margin p.u. of actual mix – Bgt'd margin p.u. of Bgt'd mix).

Check: Sales Margin Volume Variance = Sales Margin Quantity Variance + Sales Margin Mix Variance

COSTING OF SERVICE SECTOR

COST UNITS

(A) To External Customers Cost Unit

- (i) Hotel Bed night available, **Bed night occupied**
- (ii) School Student hours, **Full time students**
- (iii) Hospital Patient per day, **Room per day**
- (iv) Accounting firm, **Charged out client hours**
- (v) Transport Passenger km., **quintal km.**

(B) Internal services Cost Unit

- (i) Staff canteen Meals provided, **No. of staff**
- (ii) Machine maintenance, **Maintenance hours provided to user department**
- (iii) Computer department **Computer time provided to user department**

Costing Methods Used In Service Sector

- (i) Job costing method
- (ii) Process costing method
- (iii) Hybrid costing method

Job costing method in service sector

The two significant costs which are incurred in service sectors are:

- (i) Direct Labour
- (ii) Service overheads

Process costing method in service sector:

In this method the cost of service is obtained by assigning costs to masses of units and then computing unit costs on an average basis.

Customer costing in service sector:

The central theme of this approach is customer satisfaction. For customer costing purpose, the costs are divided into following categories. These are:

- (i) Customer Specific costs
- (ii) Customer-line categories
- (iii) Company costs

CVP ANALYSIS & DECISION MAKING

BASIC FORMULAS

1. Sales-Variable Cost = Contribution = Fixed Cost + Profit

2. P/V ratio (or C/S ratio) = Contribution ÷ Sales

= Contribution per unit ÷ selling price per unit

= Change in Contribution ÷ Change in Sales

3. Break-even Point: Point where there is no profit or no loss.

- (i) At BEP, Contribution = Fixed Cost

Thus, Break Even Sales (in sales value) = Fixed Cost ÷ P/V ratio

4. Margin of safety = Sales – BEP sales

= Contribution / PV ratio - Fixed cost / PV ratio

= Profit / PV ratio

5. BEP Calculation in different scenario:

(i) Without limiting factor (non- attributable to a single product)

BEP in units = Fixed cost ÷ Average contribution p.u. (when sales mix in units are given)

BEP in Rs. = Fixed cost ÷ composite p/v ratio (when sales mix in rupee are given)

(ii) With limiting factor (attributable to a single product)

Find contribution per limiting factor & give rank. Find total contribution from 1st rank product.

Calculate the amount of fixed cost still to recover. Whether it can be recovered by 2nd rank product or not?

(iii) For Perishable product apply the same concept in case of opening stock with different variable cost.

e. BEP in case of process costing is expressed in terms of total raw material input

f. In capital budgeting, BEP is that sales volume Σ where discounted Cash inflow = discounted Cash out flow. In case of perpetuity, the financing charge p.a. = CIF pa

g. Potential BE: On the basis of sales out of current period production only.

h. Multiple BE: Different BE due to change in sales price, variable costs & fixed costs for different production level.

i. Cash BEP = Cash fixed cost , contribution p.u. So do not consider the sunk cost.

j. BEP for decision making purpose: Accept that proposal where BEP is lowest provided the profit cannot be calculated.

6. Shut down point = (Total fixed cost - Shut down costs) ÷ Contribution per unit

Budget & Budgetary Control

Basic Formulas

i) Efficiency Ratio = (Standard hours ÷ Actual hours) × 100

ii). Activity Ratio = (Standard hours ÷ Budgeted hours) × 100

iii) Calendar Ratio = (Available working days ÷ budgeted working days) × 100

iv) Standard Capacity Usage Ratio = (Budgeted hours ÷ Max. possible hours in the budgeted period) × 100

v). Actual Capacity Usage Ratio = (Actual hours worked ÷ Maximum possible wrkg hrs. in a period) × 100

vi). Actual Usage of Budgeted Capacity Ratio= (Actual working hours ÷ Budgeted hours) × 100

TRANSFER PRICING

A transfer price is the amount of money that one unit of an organization charges for goods and services to another unit of an organization. One of the key aspects here is that a transfer price is equivalent to an ordinary selling price and that any department or division that sets a transfer price is effectively selling its goods and services at a profit or a loss to another department or division within its organization. Any part of an organization using transfer pricing will be classed as a profit center: since it is operating with a view to making a profit (whether positive, profit, or negative, loss). **If goods and services are transferred between departments and divisions at cost, then no profit or loss arises and the issue of transfer pricing does not, or should not, arise.**

Organizations have a system of transfer pricing, therefore, in order to assess the efficiency and effectiveness of its department and divisional managers. This maybe in spite of the fact that transfer prices may be artificial in the sense that it is felt that there is no rationale for “selling” between departments and divisions.

Criteria for fixing Transfer Pricing:-

i) External Capacity not fully utilized = Variable Cost

ii) Capacity fully Utilized

a) If single product :-

Selling Price (–) Selling Expenses

b) If multiple product

Variable cost + Opportunity cost (measured on the basis of Product actually sacrificed)

iii) If no market for Intermediate product

Cost of supplying division of optimum level

(–) Cost of the supplying division at previous output level.

Difference in Output

(This would be equal to Variable cost when Fixed Cost is same at all levels)

Note:-

i) Ignore Variable Selling expenses on Inter Department Transfer

ii) In case of (ii) above If selling expenses is not given we have to assume some % as selling Expenses but it should not exceed 5% .

BUDGETARY CONTROL

Budget Ratios:-

- 1) Capacity usage Ratio
$$= \frac{\text{Budgeted Hours}}{\text{Maximum possible working hours in budget period}} \times 100$$
- 2) Standard Capacity Employed Ratio
$$= \frac{\text{Actual Hours Worked}}{\text{Budgeted hours}} \times 100$$
- 3) Level of Activity Ratio
$$= \frac{\text{Standard Hours for Actual Production}}{\text{Standard Hours for Budgeted Production}} \times 100$$
- 4) Efficiency Ratio
$$= \frac{\text{Standard Hours for Actual Production}}{\text{Actual Hours}} \times 100$$
- 5) Calendar Ratio
$$= \frac{\text{Actual Working days}}{\text{Budgeted working days}} \times 100$$

Zero Base Budgeting:

The name zero base budgeting derives from the idea that such budgets are developed from a zero base: that is, at the beginning of the budget development process, all budget headings have a value of ZERO. This is in sharp contrast to the incremental budgeting system in which in general a new budget tends to start with a balance at least equal to last year's total balance, or an estimate of it.

Definition of Zero Base Budgeting (ZBB)

“A method of budgeting whereby all activities are reevaluated each time a budget is set. Discrete levels of each activity are valued and a combination chosen to match funds available”.

Objectives and Benefits of ZBB

What zero base budgeting tries to achieve is an optimal allocation of resources that incremental and other budgeting systems probably cannot achieve. ZBB starts by asking managers to identify and justify their area(s) of work in terms of decision packages (qv).

An effective zero base budgeting system benefits organizations in several ways. It will

- Focus the budget process on a comprehensive analysis of objectives and needs
- Combine planning and budgeting into a single process
- Cause managers to evaluate in detail the cost effectiveness of their operations
- Expand management participation in planning and budgeting at all levels of the organization

ACTIVITY BASED COSTING

In Traditional Method we split the Over Head incurred in production, based on machine hours which are not acceptable for many reasons. In ABC method Over Head are split according to the related activity, for each type of Over Head. Overhead are apportioned among various Production cost centers on the basis of Activity cost drivers.

RELEVANT COSTING - SOME THEORY

Introduction: -

A management decision involves predictions of costs & revenues. Only the costs and revenues that will differ among alternative actions are relevant to the decision. The role of historical data is to support the calculation of future data. But historical data may not be relevant to the management decision itself. Qualitative factors may be decisive in many cases, but to reduce the number of such factors to be judged, accountants usually try to express many decision factors as possible in quantitative terms.

Meaning of Relevant Costs: - Relevant costs represent those future costs that will be changed by a particular decision. While irrelevant costs are those costs that will not be affected by a decision. In the short run, if the relevant revenues exceed the relevant costs then it will be worthwhile accepting the decision. Therefore relevant costs play a major role in the decision-making process of an organization. A particular cost can be relevant in one situation but irrelevant in another, the important point to note is that relevant costs represent those future costs that will be changed by a particular decision, while irrelevant costs are those costs that will not be affected by that decision. We shall now see what are relevant costs and revenues for decision-making process. In summary relevant information concerns:

Other Important Terminologies: -

Relevant costs are costs appropriate to aiding the making of specific management decisions. Actually, to affect a decision a cost must be:

Future: Past costs are irrelevant as they are not affected them by future decisions & decisions should be made as to what is best now.

Incremental: This refers to additional revenue or expenditure, which may appear as a result of our decision-making. (A cash flow - Such charges as depreciation may be future but do not represent cash flows and, as such, are not relevant.)

Sunk costs: Past costs, not relevant for decision making.

Committed costs: This is future in nature but which arise from past decisions, perhaps as the result of a contract.

Relevant Costs: Problem areas:

1 Problems in determining the relevant costs of materials:

When considering various decisions, if the any materials required is not taken from existing stocks but would be purchased on a later date, then the estimated purchase price would be the relevant material cost. A more difficult problem arises when materials are taken from existing stock. In this situation the relevant cost of materials for a particular job (say job X) depends on:

- Material is in regular use of the company
- Material is not in regular use of the company
- Material is in short supply.

If the material is in regular use of the company then the material taken from existing stock requires replacement for the purpose of regular use therefore the relevant cost of material will be the Replacement cost.

If the material is not in regular use of the company the relevant cost of the materials depends on their alternative use. The alternative use of the materials will be either to sell them or to use them on other jobs. Hence the cost of using the materials results in an opportunity cost consisting of either

The net sales revenue if the materials were sold (or) the expense that would be avoided if the materials were used on some other job whichever is greater.

If the material is in short supply the only way material for the job under consideration can be obtained is by reducing production of some other product / job. This would release material for the order. But the reduced production will result in loss of contribution which should be taken in to account when ascertaining the relevant costs for the specific order. Therefore the relevant cost will be Contribution lost (before the material cost since the material cost will be incurred in any case) will be the relevant cost.

Labour: Determining the direct labour that are relevant to short - term decision depends on the circumstances.

Where a company has temporary spare capacity and the labour force is to be maintained in the short - term, the direct labour cost incurred will remain same for all alternative decisions. The direct labour cost will therefore be irrelevant for short - term decision - making purposes.

However where casual labour is used and where workers can be hired on a daily basis; a company may then adjust the employment of labour to exactly the amount required to meet the production requirements. The labour cost will increase if the company accepts additional work, and will decrease if production is reduced. In this situation the labour cost is a relevant cost for decision - making purposes.

In a situation where full capacity exists and additional labour supplies are unavailable in the short - term, and where no further overtime working is possible, the only way that labour resources could then be obtained for a specific order would be to reduce existing production. This would release labour for the order. but the reduced production will result in loss of contribution, which should be taken in to account when ascertaining the relevant costs for the specific' order. Therefore the relevant cost will be Contribution lost (before the labour cost) will be the relevant cost.

ASSIGNMENT

- 1) Basis of Technique used is minimization Technique
- 2) It can also be done in maximation Technique
- 3) Various steps in Assignment Problem are

Step 1: Check whether the problem is balanced or unbalanced by checking whether row is equal to column, if unbalanced add dummy column or row to balance the problem.

Step 2: Identify Least Number in each row and subtract with all number in that Row.

Step 3: Identify least number of each column and subtract with all number in that column.

Step 4: Check whether solution is reached with zero selection in one row and column, i.e. Cover all the zero with minimum number of lines, solution is reached only when selected zeros is equal to number of rows or columns or number of lines is equal to order of matrix.

Step 5: If solution is not reached so maximum sticking

Step 6: Select the least element in within the unstriked Element

Step 7: The element selected above is

- i) Subtracted with all the unstriked element
- ii) Added to all the double striked element (Intersection of two lines)

Step 8: Check the solution

Step 9: If solution is not reached continue with the process from step 5.

LEARNING CURVE

Learning is the process of acquiring skill, Knowledge, and ability by an individual. According to learning curve theory the productivity of the worker increases with increase in experience due to learning effect. The learning theory suggests that the best way to master a task is to “learn by doing”. In other words, as people gain experience with a particular job or project they can produce each unit more efficiently than the preceding one.

The speeding up of a job with repeated performance is known as the learning effect or learning curve effect.

The cumulative average time per unit produced is assumed to fall by a constant percentage every time the total output is doubled. So generally learning effect is found in the multiples of 2. If learning curve effect is asked between two even numbers then Learning curve equation is formed i.e. Learning curve effect is expressed mathematically as follows:

Learning curve equation =

$$Y = a(x)^{-b} \quad \text{Where } Y = \text{Average time per unit}$$

$a = \text{Total time for first unit}$
 $x = \text{Cumulative number of units manufactured}$
 $b = \text{the learning curve index}$

$$\text{Learning curve index (b)} = \frac{\log (1 - \% \text{ decrease})}{\log 2}$$