

NOTES BY HOMERA ASHRAF

Standard Costing and Variance Analysis

Standard Cost

Standard Cost as defined by the Institute of Cost and Management Accountant, London "is the Predetermined Cost based on technical estimate for materials, labour and overhead for a selected period of time and for a prescribed set of working conditions."

Standard Costing

Chartered Institute of Management Accountants England defines Standard Costing as "the Preparation and use of standard costs, their comparison with actual costs and the analysis of variances to their causes and points of incidence."

Advantages of Standard Costing

The following are the important advantages of standard costing :

- (1) It guides the management to evaluate the production performance.
- (2) It helps the management in fixing standards.
- (3) Standard costing is useful in formulating production planning and price policies.
- (4) It guides as a measuring rod for determination of variances.
- (5) It facilitates eliminating inefficiencies by taking corrective measures. .

Limitations of Standard Costing

Besides all the benefits derived from this system, it has a number of limitations which are given below:

- (1) Standard costing is expensive and a small concern may not meet the cost.
- (2) Due to lack of technical aspects, it is difficult to establish standards.
- (3) Standard costing cannot be applied in the case of a- concern where non-standardised products are produced.
- (4) Fixing of responsibility is' difficult. Responsibility cannot be fixed in the case of uncontrollable variances.
- (5) , Frequent revision is required while insufficient staff is incapable of operating this system.

Differences : Though Standard Costing and Budgetary Controls are aims at the maximum efficiencies and Marginal Cost, yet there are some basic differences between the two from the objectives of using the two costs.

Budgetary Control	Standard Costing
(1) Budgets are projections of financial accounts.	(1) Standard Costing is a projection of cost accounts.
(2) As a statement of both income and expenses it forms part of budgetary control.	(2) Standard costing is not used for the purpose of forecasting.
(3) Budgets are estimated costs. They are "what the cost will be."	(3) Standard Cost are the "Norms" or "what cost should be."
(4) It is applied to any industry engaged in mass production.	(4) It is applicable to concern engaged in construction work.
(5) It is a part of accounting system and standard costing variances are recorded in the books of accounts.	(5) It is not a part of accounting system because it is based on statistical facts and figures.

Preliminary Steps for establishing Standard Costing System

For establishing a standard costing system in an organisation, the following preliminary steps are to be adopted:

- ❖ *Establishment of Cost Centres:* Establishment of cost centres with clearly defined areas of responsibility is the first step for establishing a standard costing system.
- ❖ *Classification of Accounts:* Classification of accounts for the purpose of identifying each expense and revenue by function and deciding the responsibility of such expenses and revenues.
- ❖ *Types of Standard:* Standards may be set out as per the situation and according to suitability of their achievement. In this context, generally five types of standard are available, viz. Basic Standard, Current Standard, Ideal Standard, Normal Standard and Expected / Practical Standard.

Types of Standard

Standard may be classified into the following five types:

- *Basic Standard:* Basic standard is a standard which is established for us over a long period of time. This type of standard remains constant over a long period of time. In this type of standard, a base year is chosen for comparison purpose.
- *Current Standard:* Current standard is established for a short period and for current condition.
- *Ideal Standard:* Ideal Standard is a standard which may be attained under most favourable conditions. This standard is based on the best possible operation conditions.
- *Normal Standard:* Normal standard is a standard which can be achieved under normal operating conditions this standard is difficult to set as it require significant degree of forecasting.
- *Expected or Practical Standard:* Expected or practical standard is a standard which is based on expected operating performance after making a reasonable allowance for unavoidable losses. This is an attainable and realistic standard.

VARIANCE ANALYSIS

Standard Costing guides as a measuring rod to the management for determination of "Variances" in order to evaluate the production performance. The term "Variances" may be defined as the difference between Standard Cost and actual cost for each element of cost incurred during a particular period. The term "Variance Analysis" may be defined as the process of analyzing variance by subdividing the total variance in such a way that management can assign responsibility for off-Standard Performance.

The variance may be favourable variance or unfavourable variance. When the actual performance is better than the Standard, it resents "Favourable Variance." Similarly, where actual performance is below the standard it is called as "Unfavourable Variance."

Variance analysis helps to fix the responsibility so that management can ascertain

- (a) The amount of the variance
- (b) The reasons for the difference between the actual performance and budgeted performance
- (c) The person responsible for poor performance
- (d) Remedial actions to be taken

Types of Variances: Variances may be broadly classified into two categories (A) Cost Variance and (B) Sales Variance.

(A) **Cost Variance:** Total Cost Variance is the difference between Standards Cost for the Actual Output and the Actual Total Cost incurred for manufacturing actual output. The Total Cost Variance Comprises the following :

I. Direct Material Variances/ Material Cost Variances (MCV): The Material Cost Variance is the difference between the Standard cost of materials for the Actual Output and the Actual Cost of materials used for producing actual output.

$$\text{MCV} = \text{SC} - \text{AC}$$

OR

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

Where,

SC = standard cost; AC = actual cost; SQ = standard quantity; SP = standard price; AQ = actual quantity; AP = actual price.

(1) **Material Price Variance (MPV) :** MPV is the difference between the standard cost of actual quantity and actual cost for actual quantity.

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

(2) **Material Usage Variance (MUV):** MUV is the difference between the standard cost of standard quantity of material for actual output and the Standard cost of the actual material used.

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

(3) **Material Mix Variance (MMV) :** It is the portion of the material usage variance which is due to the difference between the Standard and the actual composition of mix. Material Mix Variance is calculated under two situations as follows :

(a) When Actual Weight and Standard Weight of Mix are equal :

(i) The formula is used to calculate the Variance:

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

(ii) In case standard quantity is revised due to shortage of a particular category of materials, the formula will be changed as follows :

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

Where, RSQ = Revised standard quantity

(b) When Actual Weight and Standard Weight of Mix are different:

(i) The formula used to calculate the Variance is :

$$\text{MMV} = \left(\frac{\text{Total weight of actual mix}}{\text{Total weight of standard mix}} \times \text{standard cost of standard mix} \right) - \text{standard cost of actual mix}$$

(ii) In case the standard is revised due to the shortage of a particular category of materials, the alternative formula will be as follows:

$$\text{MMV} = \left(\frac{\text{Total weight of actual mix}}{\text{Total weight of standard mix}} \times \text{standard cost of revised standard mix} \right) - \text{standard cost of actual mix}$$

(3) **Materials Yield Variance (MYV):** It is the portion of Material Usage Variance. This variance arises due to spoilage, low quality of materials and defective production planning etc. Materials Yield Variance may be defined as "the difference between the Standard Yield Specified and the Actual Yield Obtained." This variance may be calculated as under:

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

Where, AY= Actual Yield, SY = Standard Yield and
Standard Rate is calculated as follows :

Standard Rate = Standard cost of standard mix / Net standard output.

Verification:

1. MCV = MPV + MUV
2. MUV = MMV + MYV

Notes- positive means favourable(F) and negative means adverse(A).

Question 1

Zenith Ltd. manufactures a simple product, the standard mix of which is :

Material A : 40% at ₹10 per Kg.

Material B : 60% at ₹20 per kg.

Normal loss in production is 20% of input. During a month, 165 kgs. of product were produced from the use of 95 kgs. of Material A at ₹ 9 and 105 kgs. of Material B at ₹ 20 per kg. Calculate Material Variances.

[CU B.Com.(Hons), 2017]

Solution

Here, Actual production during the month = 165 kg.

Standard production loss = 20% of the input.

∴ Standard input for actual production = $100 / 80 \times 165 \text{ kg.} = 206.25 \text{ kg.}$

Then, Standard input Material A = 40% of 206.25 kg. = 82.50 kg.

And, Standard input Material B = 60% of 206.25 kg. = 123.75 kg.

Now, the information have been re-arranged as below:

	Standard			Actual		
	Qty. Kg.	Rate ₹	Amount ₹	Qty. Kg.	Rate ₹	Amount ₹
Material A	82.50	10	825	95	9	855
Material B	123.75	20	2,475	105	20	2,100
Input	206.25		3,300	200		2,955
Less: Loss (20%)	41.25		-	35		-
Output	165		3,300	165		2,955

(a) **Materials Cost Variance (MCV)**

= Standard material cost of actual output – Actual material cost of actual output

= ₹ 3,300 – ₹ 2,955 = ₹ 345 (F).

(b) **Material Price Variance (MPV)**

= (SP – AP) AQ × AO

Material A : $(10 - 9) \times 95 = ₹ 95 (F)$

Material B : $(20 - 20) \times 105 = ₹ Nil$

₹ 95 (F)

(c) **Materials Usage Variance (MUV)**

= SP (SQ × AO – AQ × AO)

Materials A : $10 [82.5 - 95] = ₹ 125 (A)$

Materials B : $20 [123.75 - 105] = ₹ 375 (F)$

₹ 250 (F)

(d) *Material Mix Variance (MMV)*

= SP [Standard mix for actual input – Actual mix for actual input]

Materials A : 10 [(82.50 / 206.25 × 200) – 95] = ₹ 150 (A)

Materials B : 20 [(123.75 / 206.25 × 200) – 105] = ₹ 300 (F)

₹ 150 (F)

(e) *Materials Yield Variance (MYV)*

= Standard Yield Rate [Actual output for actual input – Standard output for actual input]

= ₹ 3,300 / 165 kg. [165 – (165 / 206.25 × 200)] = ₹ 100 (F)

Test:

(i) $MCV = MPV + MUV$

Here, ₹ 345 (F) = ₹ 95 (F) + ₹ 250 (F) = ₹ 345 (F), checked.

(ii) $MUV = MMV + MYV$

Here, ₹ 250 (F) = ₹ 150 (F) + ₹ 100 (F) = ₹ 250 (F), checked.

II. Labour Variances

(a) Labour Cost Variance (LCV): Labour Cost Variance is the difference between the Standard Cost of labour allowed for the actual output achieved and the actual wages paid.

Labour Cost Variance = Standard Cost of Labour - Actual Cost of Labour

(or)

Labour Cost Variance = {SR x SH for AO} - {AR x AH}

Where, SR = Standard Rate, ST = Standard Hour, AO = Actual Output, AR = Actual Rate, AT = Actual Hour.

(b) Labour Rate Variance (LRV): It is that part of labour cost variance which is due to the difference between the standard rate specified and the actual rate paid. This variances arise from the following reasons:

- (a) Change in wage rate.
- (b) Faulty recruitment.
- (c) Payment of overtime.
- (d) Employment of casual workers etc.

It is expressed as follows :

$$LRV = AH (SR - AR)$$

(c) Labour Efficiency Variance (LEV): Labour Efficiency Variance otherwise known as Labour Time Variance. It is that portion of the Labour Cost Variance which arises due to the difference between standard labour hours specified and the actual labour hours spent. The usual reasons for this variance are (a) poor supervision (b) poor working condition (c) increase in labour turnover (d) defective materials. It may be calculated as following:

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

(d) Labour Idle Time Variance: Labour Idle Time Variance arises due to abnormal situations like strikes, lockout, breakdown of machinery etc. In other words, idle time

occurs due to the difference between the time for which workers are paid and that which they actually expend upon production. It is calculated as follows :

$$\text{Idle Time Variance} = \text{Idle Hours} \times \text{Standard Rate}$$

(e) Labour Mix Variance (LMV): It is otherwise known as Gang Composition Variance. This variance arises due to the differences between the actual gang composition than the standard gang composition. Labour Mix Variance is calculated in the same way of Materials Mix Variance. This variance is calculated in two ways:

(i) When Standard and actual times of the labour mix are same: The formula for its computation may be as follows :

$$\text{LMV} = \text{Standard cost of standard labour mix} - \text{Standard cost of Actual labour mix.}$$

(ii) When Standard and actual times of the labour mix are different : Changes in the composition of a gang may arise due to shortage of a particular grade of labour. It may be calculated as follows :

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

Where, Revised Standard Hour (RSH) = Total Actual Hour/ Total standard hour X actual hour.

(f) Labour Yield Variance (LYV): This variance is calculated in the same way as Material Yield Variance. Labour Yield Variance arises due to the variation in labour cost on account of increase or decrease in yield or output as compared to relative standard. The formula for this purpose is as follows:

$$\text{LYV} = \text{Standard labour cost per unit of output} \times (\text{Standard output for actual hour} - \text{actual output})$$

Verification:

1. Labour Cost Variance = Labour Rate Variance + Labour Efficiency Variance
2. Labour Efficiency Variance = Labour Mix Variance + Labour Yield Variance

Question 2

The following information is available from the books of ABC Ltd. For the month of January, 2016 :

Materials purchased	:	24,000 kg for ₹ 1,05,600
Materials consumed	:	22,800 kg
Actual wages paid for 5,940 hours	:	₹ 29,700
Units produced	:	2,160 units

Standard prices and rates are :

Direct material price is ₹ 4 per kg.

Direct labour rate is ₹ 4 per hour.

Standard input is 10 kg of raw material for one unit.

Standard labour requirement is 2.5 hours per unit.

Calculate all material and labour variances for the month of January, 2016. [CU B.Com.(Hons), 2016]

A. Material Variances:

(i) *Material Cost Variance (MCV)*

= Standard material cost for actual output – Actual material cost for actual output

$$= SP \times SQ \times AO - AP \times AQ \times AO$$

$$= (\text{₹ } 4 \times 10 \text{ kg.} \times 2,160 \text{ units}) - (\text{₹ } 4.40 \times 22,800 \text{ kg.})$$

$$= \text{₹ } 86,400 - \text{₹ } 1,00,320 = \text{₹ } 13,920 \text{ (A).}$$

(ii) *Material Price Variance (MPV)*

$$= (SP - AP) AQ \times AO$$

$$= (4 - 4.40) \times 22,800 = \text{₹ } 9,120 \text{ (A).}$$

(iii) *Material Quantity Variance (MQV)*

$$= SP [SQ \times AO - AQ \times AO]$$

$$= 4 [(10 \text{ kg.} \times 2,160 \text{ units}) - 22,800 \text{ kgs.}]$$

$$= \text{₹ } 4,800 \text{ (A).}$$

Test : $MCV = MPV + MQV$

Here, $\text{₹ } 13,920 \text{ (A)} = \text{₹ } 9,120 \text{ (A)} + \text{₹ } 4,800 \text{ (A)} = \text{₹ } 13,920 \text{ (A)}$, checked.

B. Labour Variances:

(i) *Labour Cost Variance (LCV)*

= Standard labour cost for actual output – Actual labour cost for actual output

$$= SR \times SH \times AO - AR \times AH \times AO$$

$$= (\text{₹ } 4 \times 2.50 \text{ hours} \times 2,160 \text{ units}) - (\text{₹ } 5 \times 5,940 \text{ hours})$$

$$= \text{₹ } 21,600 - \text{₹ } 29,700 = \text{₹ } 8,100 \text{ (A).}$$

(ii) *Labour Rate Variance (LRV)*

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

$$= (4 - 5) \times 5,940$$

$$= \text{₹ } 5,940 \text{ (A).}$$

(iii) *Labour Efficiency Variance (LEV)*

$$= SR [SH \times AO - AH \times AO]$$

$$= 4 [(2.50 \text{ hours} \times 2,160 \text{ units}) - 5,940 \text{ hrs}]$$

$$= 4 (5,400 - 5,940)$$

$$= \text{₹ } 2,160 \text{ (A).}$$

Test : $LCV = LRV + LITV + LEV$

Here, $\text{₹ } 8,100 \text{ (A)} = \text{₹ } 5,940 \text{ (A)} + \text{₹ } 2,160 \text{ (A)} = \text{₹ } 8,100 \text{ (A)}$, checked.

Working Notes:

Here, Standard price of material per kg. = $SP = \text{₹ } 4$

Standard quantity of materials required for one unit of output = $SQ = 10 \text{ kg.}$

Actual output = $AO = 2,160 \text{ units.}$

Actual quantity of materials used for actual output = $AQ \times AO = 22,800 \text{ kgs.}$

Actual price of material per kg. = $AP = \text{₹ } 1,05,600 / 24,000 \text{ kg} = \text{₹ } 4.40$

Again, Standard hours required for one unit of output = $SH = 2.50 \text{ hours.}$

Actual hours taken for actual output = $AH \times AO = 5,940 \text{ hours}$

Standard labour rate per hour = $SR = \text{₹ } 4$

Actual labour rate per hour = $AR = \text{₹ } 29,700 / 5,940 \text{ hrs} = \text{₹ } 5.$

Question 3

The details regarding the composition and the weekly wage rates of labour force engaged on a job scheduled to be completed in 30 weeks are as follows :

Category of Workers	Standard		Actual	
	No. of workers	Weekly wage Rate per worker	No. of workers	Weekly wage Rate per worker
Skilled	75	60	70	70
Semi-Skilled	45	40	30	50
Unskilled	60	30	80	20

The work was actually completed in 32 weeks. Calculate the various labour variances.

Solution:

(1) Labour Cost Variance = Standard Labour Cost – Actual Labour Cost

Calculation of Standard Labour Cost :

Category of Standard Workers :

		Week		Rate Rs.		Amount Rs.
Skilled	=	75	x	30	=	2,250
Semi Skilled	=	45	x	30	=	1,350
Unskilled	=	60	x	30	=	1,800
						<u>5,400</u>
						<u>2,43,000</u>

Calculation of Actual Labour Cost :

		Actual Week		Rate Rs.		Amount Rs.
Skilled	=	75	x	32	=	2,240
Semi Skilled	=	30	x	32	=	960
Unskilled	=	80	x	32	=	2,560
						<u>5,760</u>
						<u>2,56,000</u>

(1) Labour Cost Variance = Standard Labour - Actual Labour Cost
= 2,43,000 – 2,56,000 = Rs. 13,000 (A)

(2) Labour Rate Variance = (Standard Rate – Actual Rate) x Actual Time
 Skilled = (Rs. 60 – Rs. 70) x 2,240 = Rs. 22,400 (A)
 Semi Skilled = (Rs. 40 – Rs. 50) x 960 = Rs. 9,600 (A)
 Unskilled = (Rs. 30 – Rs. 20) x 2,560 = Rs. 25,600 (F)
 Labour Rate Variance = Rs. 6,400 (A)

(3) Labour Efficiency Variance = $\left\{ \begin{array}{l} \text{Standard} \\ \text{Time} \end{array} - \begin{array}{l} \text{Actual} \\ \text{Time} \end{array} \right\} \times \text{Standard Rate}$

Skilled = (2,250 – 2,240) x 60 = Rs. 600 (F)
 Semi Skilled = (1,350 – 960) x 40 = Rs. 15,600 (F)
 Unskilled = (1,800 – 2,560) x 30 = Rs. 22,800 (A)
 Labour Efficiency Variance = Rs. 6,600 (A)



$$(4) \text{ Labour Mix Variance} = \left\{ \frac{\text{Revised Standard Time}}{\text{Total Standard Time}} - \frac{\text{Actual Time}}{\text{Total Standard Time}} \right\} \times \text{Standard Rate}$$

Where :

$$\text{Revised Standard Time} = \frac{\text{Standard Time}}{\text{Total Standard Time}} \times \text{Actual Time}$$

Skilled	=	$\frac{2,250}{5,400}$	x 5,760	=	2,400 hours
Semi Skilled	=	$\frac{1,350}{5,400}$	x 5,760	=	1,440 hours
Unskilled	=	$\frac{1,800}{5,400}$	x 5,760	=	1,920 hours

Labour Mix Variance

Skilled	=	(2,400 - 2,240)	x 60	=	Rs. 9,600 (F)
Semi Skilled	=	(1,440 - 960)	x 40	=	Rs. 19,200 (F)
Unskilled	=	(1,920 - 2,560)	x 30	=	Rs. 19,200 (A)
Labour Mix Variance				=	Rs. 9,600 (F)

$$(5) \text{ Labour Revised Efficiency Variance} = \left\{ \frac{\text{Standard Time}}{\text{Total Standard Time}} - \frac{\text{Revised Standard Time}}{\text{Total Standard Time}} \right\} \times \text{Standard Rate}$$

Skilled	=	(2,250 - 2,400)	x Rs. 60	=	Rs. 9,000 (A)
Semi Skilled	=	(2,350 - 1,440)	x Rs. 40	=	Rs. 3,600 (A)
Unskilled	=	(1,800 - 1,920)	x Rs. 30	=	Rs. 300 (A)
Labour Revised Efficiency Variance				=	Rs. 16,200 (A)

Verification :

$$(1) \text{ Labour Cost Variance} = \frac{\text{Labour Rate Variance}}{\text{Labour Rate}} + \frac{\text{Labour Efficiency Variance}}{\text{Labour Rate}}$$

Rs. 13,000 (A)	=	Rs. 6,400 (A)	+ Rs. 6,600 (A)
Rs. 13,000 (A)	=	Rs. 13,000 (A)	

$$(2) \text{ Labour Efficiency Variance} = \frac{\text{Labour Mix Variance}}{\text{Labour Rate}} + \frac{\text{Labour Revised Variance}}{\text{Labour Rate}}$$

$$\text{Rs. 6,600 (A)} = \text{Rs. 9,600 (F)} + \text{Rs. 16,200 (A)}$$

$$\text{Rs. 6,600 (A)} = \text{Rs. 6,600 (A)}$$

III. Overhead Variances (concept only as per syllabus)

Overhead may be defined as the aggregate of indirect material cost, indirect labour cost and indirect expenses. Overhead Variances may arise due to the difference between standard cost of overhead for actual production and the actual overhead cost incurred. The Overhead Cost Variance may be calculated as follows:

$$\text{Overhead Cost Variance} = \text{Standard overhead rate per unit} - \text{Actual overhead cost}$$

Classification of Overhead Variance

Overhead Variances can be classified as :

I. Variable Overhead Variances:

(1) Variable Overhead Cost Variance

- (2) Variable Overhead Expenditure Variance
- (3) Variable Overhead Efficiency Variance

II. Fixed Overhead Variance:

- (a) Fixed Overhead Cost Variance
- (b) Fixed Overhead Expenditure Variance
- (c) Fixed Overhead Volume Variance
- (d) Fixed Overhead Capacity Variance
- (e) Fixed Overhead Efficiency Variance
- (f) Fixed Overhead Calendar Variance

REFER TO CALCUTTA UNIVERSITY RECOMMENDED BOOK