

13 - Standard Costing and Variance Analysis

A **standard cost** is an estimated unit cost built up of standards for each cost element (standard resource price and standard resource usage).

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

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

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

It is determined by management's estimates of the following.

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

Standard costing has two principal uses.

- **To value inventories and cost production** for cost accounting purposes. It is an alternative method of valuation to methods like FIFO and LIFO
- **To act as a control device** by establishing standards (expected costs) and comparing actual costs with the expected costs, thus highlighting areas of the organisation which may be out of control.

It can also be used in the following circumstances.

(a) To assist in setting **budgets** and **evaluating managerial performance**.

(b) To enable the principle of '**management by exception**' to be practised. A standard cost, when established, is an average expected unit cost. Because it is only an average, actual results will vary to some extent above and below the average. Only significant differences between actual and standard should be reported.

- (c) To provide a prediction of future costs to be used in **decision-making** situations.
- (d) To **motivate** staff and management by the provision of challenging targets.
- (e) To provide guidance on possible ways of **improving efficiency**.

Standard costing as a control technique

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

Where standard costing should be used

Standard costing is most suited to mass production and repetitive assembly work.

Types of standards

- An **ideal standard** is a standard which can be attained under perfect operating conditions: no wastage, no inefficiencies, no idle time, no breakdowns
- An **attainable standard** is a standard which can be attained if production is carried out efficiently, machines are properly operated and/or materials are properly used. Some allowance is made for wastage and inefficiencies
- A **current standard** is standard based on current working conditions (current wastage, current inefficiencies)
- A **basic standard** is a long-term standard which remains unchanged over the years and is used to show Trends

The **different types of standard have a number of advantages and disadvantages.**

(a) **Ideal standards** can be seen as **long-term targets** but are not very useful for day-to-day control purposes.

(b) **Ideal standards cannot be achieved.** If such standards are used for budgeting, an allowance will have to be included to make the budget realistic and attainable.

(c) **Attainable standards** can be used for **product costing**, cost control, inventory valuation, estimating and as a basis for budgeting.

(d) **Current standards** or attainable standards provide the **best basis for budgeting**, because they represent an achievable level of productivity.

(e) Current standards **do not attempt to improve** on current levels of efficiency.

(f) **Current standards** are useful during **periods when inflation is high**. They can be set on a month by month basis.

(g) **Basic standards** are used to show **changes in efficiency or performance** over a long period of time. They are perhaps the least useful and least common type of standard in use.

The impact on employee behaviour of the type of standard set

Ideal: Some say that they provide employees with an **incentive to be more efficient** even though it is highly unlikely that the **standard will be achieved**. Others argue that they are likely to have an **unfavourable effect on employee motivation** because the differences between standards and actual results will always be adverse. **The employees may feel that the goals are unattainable** and so **they will not work so hard**.

Attainable: Might be an **incentive to work harder** as they provide a **realistic but challenging target of efficiency**.

Current: **Will not motivate employees to do anything more than they are currently doing**.

Basic: May have an **unfavourable impact** on the motivation of employees. Over time they will discover that they are **easily able to achieve the standards**. They may become bored and lose interest in what they are doing if they have nothing to aim for.

Budgets and standards compared

Budgets and standards are very similar and interrelated, but there are important differences between them

| Budgets | Standards |
|---|--|
| Gives planned total aggregate costs for a function or cost centre | Shows the unit resource usage for a single task, for example the standard labour hours for a single unit of production |
| Can be prepared for all functions , even where output cannot be measured | Limited to situations where repetitive actions are performed and output can be measured |
| Expressed in money terms | Need not be expressed in money terms. For example a standard rate of output does not need a financial value put on it |

A **variance** is the difference between an actual result and an expected result.

Variance analysis is the process by which the *total* difference between standard and actual results is analysed.

The reasons for variances

| Variance | Favourable | Adverse |
|--------------------------------|---|---|
| Material price | Unforeseen discounts received Greater care in purchasing Change in material standard | Price increase Careless purchasing Change in material standard |
| Material usage | Material used of higher quality than standard More effective use made of material Errors in allocating material to jobs | Defective material Excessive waste Theft Stricter quality control Errors in allocating material to jobs |
| Labour rate | Use of workers at a rate of pay lower than standard | Wage rate increase |
| Labour efficiency | Output produced more quickly than expected, because of work motivation, better quality of equipment or materials, better learning rate Errors in allocating time to jobs | Lost time in excess of standard allowed Output lower than standard set because of lack of training , sub-standard material etc Errors in allocating time to jobs |
| Overhead Expenditure | Savings in costs incurred More economical use of services | Increase in cost of services Excessive use of services Change in type of services used |
| Overhead Volume | Production or level of activity greater than budgeted. | Production or level of activity less than budgeted |
| Fixed overhead capacity | Production or level of activity greater than budgeted | Production or level of activity less than budgeted |
| Selling price | Unplanned price increase Less competition Competitor shuts down business | Unplanned price reduction Intense competition New competitor in the market |
| Sales volume | Additional demand | Unexpected fall in demand Production difficulties |

Investigating variances

Factors which should be considered in assessing the significance of the variance.

- Materiality
- Controllability
- The type of standard being used
- Variance trend
- Interdependence between variances
- Costs of investigation

Interdependence between variances

Individual variances should not be looked at in isolation. One variance might be inter-related with another, and much of it might have occurred only because the other variance occurred too. **When two variances are interdependent (interrelated) one will usually be adverse and the other one favourable.** Here are some examples.

| Interrelated variances | Explanation |
|--------------------------------|---|
| Materials price and Usage | <p>If cheaper materials are purchased for a job in order to obtain a favourable price variance, materials wastage might be higher and an adverse usage variance may occur.</p> <p>If the cheaper materials are more difficult to handle, there might be an adverse labour efficiency variance too.</p> <p>If more expensive materials are purchased, the price variance will be adverse but the usage variance might be favourable if the material is easier to use or of a higher quality.</p> |
| Labour rate and Efficiency | <p>If employees are paid higher rates for experience and skill, using a highly skilled team might lead to an adverse rate variance and a favourable efficiency variance (experienced staff are less likely to waste material, for example).</p> <p>In contrast, a favourable rate variance might indicate a larger-than-expected proportion of inexperienced workers, which could result in an adverse labour efficiency variance, and perhaps poor materials handling and high rates of rejects too (and hence an adverse materials usage variance).</p> |
| Selling price and sales volume | <p>A reduction in the selling price might stimulate bigger sales demand, so that an adverse selling price variance might be counterbalanced by a favourable sales volume variance.</p> <p>Similarly, a price rise would give a favourable price variance, but possibly cause an adverse sales volume variance.</p> |

Variance Formulae

| | |
|-----------------|--|
| Material | <p><u>Material Price Variance</u> $= (SP/Kg - AP/Kg) \times \text{Actual Qty Purchased / Used}$</p> <p><u>Material Usage Variance</u> $= (SQA \text{ for AP} - A \text{ Qty Used}) \times SP / Kg$</p> <p><u>Material Total Variance</u> $= (SCA \text{ for AP} - A \text{ Cost Incurred})$</p> |
| Labour | <p><u>Labour Rate Variance</u> $= (SR / Hr - AR / Hr) \times \text{Actual Paid Hrs}$</p> <p><u>Labour Efficiency Variance</u> $= (SHA \text{ for AP} - \text{Actual Operating Hrs}) \times SR / Hr$</p> <p><u>Labour Total Variance</u> $= (SCA \text{ for AP} - A \text{ Cost Incurred})$</p> |

| | |
|-----------------------|---|
| Fixed Overhead | <u>Fixed Prod OH Expenditure Variance</u> = (Budg OH for BP – Actual OH for AP) |
| | <u>Fixed Prod OH Volume Variance</u> = (Budg Volume – Actual Volume) x OAR / Unit |
| | <u>Fixed Prod OH Volume Efficiency</u> = (SHA for AP – A Operating Hrs) x OAR / Hr |
| | <u>Fixed Prod OH Volume Capacity</u> = (Budg Hrs for BP – A Hrs for AP) x OAR / Hr |
| | <u>Fixed Prod OH Total Variance (Over / Under Absorption)</u> = (Actual OH Incurred – Amount Absorbed) (OFUA) |
| Sales | <u>Sales Price Variance</u> = (Standard Selling Price / Unit – Actual Selling Price / Unit) x Actual Units Sold |
| | <u>Sales Volume Variance</u> = (Budgeted Volume – Actual Volume) x Standard Selling Price / Unit |

An **operating statement** is a regular report for management which compares actual costs and revenues with budgeted figures and shows variances.

Operating Statement Format

| | | | |
|--|------------|------------|--------------------|
| Budgeted Profit (Budg Units x Std. Profit / Unit) | | | xxxxxx |
| Sales Volume Profit Variance | | | xx/(xx) |
| Sales Price Variance | | | xx/(xx) |
| <u>Cost Variances</u> | FAV | ADV | |
| Material Price Variance | xx | | |
| Material Usage Variance | | xx | |
| Labor Rate Variance | xx | | |
| Labor Efficiency Variance | | xx | |
| Fixed Production OH Expenditure | xx | | |
| Fixed Production OH Volume Efficiency | | xx | |
| Fixed Production OH Volume Capacity | <u>xx</u> | <u>xx</u> | |
| Total Cost Variances | xx | xx | <u>xx/(xx)</u> |
| Actual Profit before Non-Production Costs | | | xxxxx |
| Less Non Production OH | | | (xxx) |
| Actual Net Profit | | | <u>xxxx</u> |

13 - Standard Costing and Variance Analysis

Q1. The budget for the new product is based upon the production and sale of 1000 units each year at \$90 per unit. The standard cost of production of each unit is made up as follows:

Direct material: 4 kilos at \$5.50 per kilo.

Direct labour: 1.75 hours at \$12 per hour.

The balance of the additional expenditure consists of administration expenses. 10% is added to the cost of production for factory profit.

1000 units of the product were made and sold. The actual expenditure per unit was as follows:

Direct material: 4.2 kilos at \$5.25 per kilo.

Direct labour: 1.5 hours at \$12.60 per hour.

REQUIRED

(c) Calculate the following variances:

(i) direct materials usage

(ii) direct materials price

(iii) direct labour efficiency

(iv) direct labour rate.

Q2. The managers of Namllih Ltd planned to produce and sell 1500 briefcases in August 2008. They actually produced and sold 1125 briefcases.

The following information is available.

The standard costs for producing 1500 briefcases were:

Direct materials 1400 m² at a cost of \$2.10 per m²

Direct labour 2460 hours at \$4.20 per hour

The actual costs were:

Direct materials 1210 m² at \$2.05 per m²

Direct labour 1800 hours at \$4.10 per hour

REQUIRED

(a) Calculate:

(i) material price variance

(ii) material usage variance

(iii) total materials variance

(iv) labour rate variance

(v) labour efficiency variance

(vi) total labour variance

[12]

(b) Explain how any **two** of the variances calculated in (a) may be connected.

[2]

- Q3.** Lim Ltd manufactures plastic storage boxes. The materials are purchased as large sheets of plastic ready for pressing into shape.

Actual results for the year ended 31 March 2009 were as follows:

| | | |
|---------------------|---------------|----------------|
| Sales | \$ | \$ |
| | | 190 000 |
| Less variable costs | | |
| Raw materials | 89 100 | |
| Direct labour | <u>33 000</u> | <u>122 100</u> |
| Contribution | | <u>67 900</u> |

Additional information

- 1 There were no opening or closing stocks of boxes.
- 2 The budget and standard cost details for the year ended 31 March 2009 were:
 - (i) budgeted sales of boxes would be: 24 000 at \$10 each;
 - (ii) each box would require 1.4 m² of plastic at \$3.20 per m²;
 - (iii) each box would require 10 minutes of direct labour time paid at \$8.40 per hour.
- 3 The actual results for the year ended 31 March 2009 showed:
 - (i) 20 000 boxes were made and sold;
 - (ii) 27 000 m² of plastic was used;
 - (iii) 4000 hours of direct labour time were used.

REQUIRED

- (a) Calculate the:
- (i) sales volume variance;
 - (ii) sales price variance;
 - (iii) total sales variance;
 - (iv) raw materials usage variance;
 - (v) raw materials price variance;
 - (vi) total raw materials variance;
 - (vii) direct labour efficiency variance;
 - (viii) direct labour rate variance;
 - (ix) total direct labour variance.
- (b) Using the original budgeted figures, prepare a statement showing the budgeted contribution. [10]
- (c) Explain **one** reason why the following variances calculated in (a) might have arisen:
- (i) sales volume variance;
 - (ii) raw materials price variance;
 - (iii) direct labour rate variance. [6]

Q4. Ridgeway Ltd manufactures two products, Product A and Product B. The following information is available:

- 1 Ridgeway Ltd employs 26 production staff who usually work 150 hours a month each at a rate of \$10 an hour.
14 work on the production of Product A.
12 work on the production of Product B.
- 2 In a normal month production of
Product A requires 4200 kg of raw material at \$8.20 per kg.
Product B requires 3500 kg of raw material at \$8.80 per kg.
- 3 An average unit of Product A uses 3 kg of raw material and 2 machine hours.
An average unit of Product B uses 3.5 kg of raw material and 3 machine hours.
- 4 Monthly fixed overheads total \$42 760.

In March 2010 Ridgeway Ltd produced and sold 1600 units of Product A at a total sales value of \$125 760.

It bought and used 4600 kg of raw material at a cost of \$40 480 and it employed production staff for 2200 hours at a cost of \$22 440.

The sales price variance for the month was \$4672 adverse.

(d) Explain how a raw materials usage variance might be connected to a direct labour efficiency variance. [6]

[Total: 40]

REQUIRED

(d) Calculate the following for Product A, for March 2010:

- (i) materials price variance
- (ii) materials usage variance
- (iii) total materials variance
- (iv) labour rate variance
- (v) labour efficiency variance
- (vi) total labour variance.

(e) Calculate the standard selling price per unit of product A. [3]

(f) State **four** advantages of using a standard costing system. [8]

Q5. Aston Manufacturing Company has recently implemented a new standard costing system.

- (a) Explain the purpose of standard costing. [4]

Budgeted data for the month of April 2012 was:

| | |
|-----------------------------|----------------------------|
| Sales and production | 5000 units |
| Materials per unit | 8 kilograms |
| Materials cost per kilogram | \$6 |
| Labour per unit | 3 hours |
| Labour cost per hour | \$7.50 |
| Overheads per unit | 3 hours at \$3.50 per hour |

The standard selling price gives a standard profit margin of 19%.

REQUIRED

- (b) Calculate the standard selling price per unit. [7]

Additional information:

The actual results for April 2012 were:

| | |
|----------------|------------------|
| Production | 5300 units |
| Sales | 5100 units |
| Sales revenue | \$522 750 |
| Materials used | 43 460 kilograms |
| Materials cost | \$271 625 |
| Labour hours | 15 500 hours |
| Labour cost | \$120 125 |

REQUIRED

- (c) Calculate the following variances, stating clearly whether the variance is adverse or favourable.
- (i) Sales price [4]
 - (ii) Sales volume [2]
 - (iii) Material price [2]
 - (iv) Material usage [2]
 - (v) Labour rate [2]
 - (vi) Labour efficiency [2]
- (d) Suggest a possible reason for **each** of the variances. [6]

Q6. The managers of Draxian Industries Ltd operate a system of standard costing and budgetary control. The company manufactures components which pass through two departments - machining and finishing. The standard cost and budget information for March 2006 was as follows:

| | Machining department | Finishing department |
|------------------------------------|----------------------|----------------------|
| Standard cost per unit | | |
| direct materials | \$4 | |
| direct labour machining (2 hours) | \$14 | |
| direct labour finishing (1½ hours) | | \$12 |
| Budgeted output – units | 20 000 | 20 000 |
| Budgeted direct labour hours | 40 000 | 30 000 |

All output passes through both departments.

Additional information:

1 The actual production cost and details for March 2006 were as follows:

- (i) Output passing through each department was 18 000 units and there was no opening or closing work in progress.
- (ii) Direct materials used at standard prices was \$71 360.
- (iii) Direct materials used at actual prices was \$73 144.
- (iv) The direct labour hours used and the direct wages paid for the machining department were:

| | hours | \$ |
|----------------------|--------|---------|
| Machining department | 36 300 | 263 175 |

2 Variances for the finishing department have been calculated and are:

| | |
|-----------------------------------|-------------------|
| Direct labour efficiency variance | \$3200 adverse |
| Direct labour rate variance | \$2740 favourable |

REQUIRED

(a) Calculate

- (i) the total direct material variance for the machining department;
- (ii) the direct material usage variance for the machining department;
- (iii) the direct material price variance for the machining department. [6]

(b) Calculate

- (i) the total direct labour variance for the machining department;
- (ii) the direct labour efficiency variance for the machining department;
- (iii) the direct labour rate variance for the machining department. [6]

(c) Calculate

- (i) the actual direct labour hours used for the finishing department;
- (ii) the actual direct wage rate paid per hour for the finishing department;
- (iii) the total direct labour variance for the finishing department. [6]

(d) Identify **one** possible reason for **each** of the following variances calculated in (a) and (b) and also the variances given for the finishing department in (c).

- (i) the direct material usage variance for the machining department;
- (ii) the direct material price variance for the machining department;
- (iii) the direct labour efficiency variance for the machining department;
- (iv) the direct labour rate variance for the machining department;
- (v) the direct labour efficiency variance for the finishing department;
- (vi) the direct labour rate variance for the finishing department. [12]

(e) Discuss possible links between **two pairs** of variances calculated above. [6]

(f) Explain **two** reasons why a system of standard costing might be introduced into a business. [4]

[Total: 40]

Q7

A company produces and sells one product only, the Thing, the standard cost for one unit being as follows.

| | |
|---|-----------|
| | \$ |
| Direct material A – 10 kilograms at \$20 per kg | 200 |
| Direct material B – 5 litres at \$6 per litre | 30 |
| Direct wages – 5 hours at \$6 per hour | 30 |
| Fixed production overhead | <u>50</u> |
| Total standard cost | 310 |

The fixed overhead included in the standard cost is based on an expected monthly output of 900 units.

Fixed production overhead is absorbed on the basis of direct labour hours.

During April the actual results were as follows.

Production 800 units
Material A 7,800 kg used, costing \$159,900
Material B 4,300 litres used, costing \$23,650
Direct wages 4,200 hours worked for \$24,150
Fixed production overhead \$47,000

Required

- (a) Calculate price and usage variances for each material.
- (b) Calculate labour rate and efficiency variances.
- (c) Calculate fixed production overhead expenditure and volume variances and then subdivide the volume variance.

Q8

A company manufactures one product, and the entire product is sold as soon as it is produced. There are no opening or closing inventories and work in progress is negligible.

The company operates a standard costing system and analysis of variances is made every month. The standard cost card for the product, a widget, is as follows.

STANDARD COST CARD – WIDGET

| | |
|--|--------------|
| | \$ |
| Direct materials 0.5 kilos at \$4 per kilo | 2.00 |
| Direct wages 2 hours at \$2.00 per hour | 4.00 |
| Fixed overhead 2 hours at \$3.70 per hour | <u>7.40</u> |
| Standard cost | 13.40 |
| Standard profit | <u>6.60</u> |
| Standard selling price | <u>20.00</u> |

Budgeted output for January was 5,100 units. Actual results for January were as follows.

Production of 4,850 units was sold for \$95,600

Materials consumed in production amounted to 2,300 kilos at a total cost of \$9,800

Labour hours paid for amounted to 8,000 hours at a cost of \$16,800

Fixed overheads amounted to \$42,300

Required

Calculate all variances and prepare an operating statement for January.

Q9. Ayanda Limited manufactures one product. The company keeps no inventory of raw materials or finished goods.

The following budgeted information for a standard month is provided.

| | |
|--------------------|-------------------------------|
| Sales | 1000 units at \$130 each |
| Raw materials | 600 kilos at \$18 per kilo |
| Production labour | 1500 hours at \$7.50 per hour |
| Variable overheads | \$28 000 |
| Fixed overheads | \$34 000 |

Variable overheads arise from selling and distribution activities. Fixed overheads include both production and other overheads.

REQUIRED

(a) Prepare the budget for a standard month, showing **total** contribution and profit. [4]

Additional information

Actual results for March were as follows.

| | |
|--------------------|-------------------------------|
| Sales | 1200 units at \$132 each |
| Raw materials | 780 kilos at \$14 per kilo |
| Production labour | 2050 hours at \$8.50 per hour |
| Variable overheads | \$35 100 |
| Fixed overheads | \$34 100 |

(b) Prepare the flexed budget for March, showing **total** contribution and profit. [6]

(c) Calculate the actual **total** contribution and profit for March. [4]

(d) Prepare a statement reconciling the total of actual direct production costs in (c) with the total of direct production costs from the flexed budget in (b). Start your answer with the actual costs. Your answer should involve **four** relevant variances. [12]

Additional information

In March the company bought raw materials which were of a lower quality than usual.

REQUIRED

(e) Explain how the purchase of lower quality raw materials had affected the variances in your reconciliation in (d). [8]

(f) Advise the directors whether this purchase of lower quality materials has benefitted the business. [6]

[Total: 40]

Q10 In April Amit introduced a new standard costing system.

He produces and sells one item. The standard production is 5000 units. Amit does not have any opening inventory. Closing inventory is valued at full standard cost.

The standard costs per unit were as follows:

| | |
|------------------|----------------------------|
| Direct materials | 3 kilos at \$5 per kilo |
| Direct labour | 4 hours at \$8 per hour |
| Overheads | 2 hours at \$3.50 per hour |

The selling price will allow Amit a profit on the full standard cost of 17.5%.

REQUIRED

(a) Calculate the standard selling price per unit. [3]

Additional information

The actual results for April were:

| | |
|-----------------------|-------------------------|
| Production | 5100 units |
| Sales | 5040 units \$65.25 each |
| Direct materials used | 15450 kilos |
| Direct material cost | \$78 795 |
| Direct labour hours | 20 250 |
| Direct labour cost | \$172 125 |
| Overhead variance | \$300 adverse |

REQUIRED

(b) Calculate the following variances for April, clearly identifying which variance you have calculated.

- (i) Sales price
 - (ii) Sales volume
 - (iii) Total sales
 - (iv) Direct material price
 - (v) Direct material usage
 - (vi) Total material
 - (vii) Direct labour rate
 - (viii) Direct labour efficiency
 - (ix) Total labour
- [18]

(c) Explain how the direct labour variances may have arisen during April. [5]

(d) Calculate the actual profit for April. [4]

(e) Calculate the budgeted profit for the actual units sold for April. [3]

(f) Prepare a statement reconciling the budgeted profit with actual profit. Start your statement with your answer is part (e). [7]

[Total: 49]
30