Chapter 16

Standard costing

Standard costing going ... going ... gone?

Lean accounting concepts

Lean accounting is a mystery to most business people and accountants. They have heard of lean manufacturing but not lean accounting. Lean accounting evolved in the manufacturing environment and hasn't made much progress into lean thinking applications. There are a number of ways lean accounting can be applied in a variety of situations. It is perfect for managing and measuring results in tough economic times.

Initially lean accounting got traction because it had the capability of overcoming the problems associated with standard costing. Standard costing is driven by labor efficiency, machine utilization, and absorption of overhead. These standard cost techniques were traditionally used by managers to build excessive inventories and generate positive variances to improve GAAP profitability leading to higher management incentive bonuses.

The economic recession has created a need for lean accounting. However, since most accountants haven't used lean tools, the application goes unused. Lean accounting deals with tracking throughput or revenue and the associated variable costs required to generate those sales. Understanding that lean contribution from sales directly improves the bottom line is critical. You don't spend funds unless it is associated with generating revenue. Since lean accounting provides better information for decision making it has the impact of increasing sales. In a slower economy, companies need tools like value stream costing and similar lean decision-making applications.

AccountingWEB.com, 2 April 2009.

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Questions relating to this news story can be found on page 366

About this chapter

This chapter examines *standard costing*, another planning and control technique used in management accounting. Like budgeting and budgetary control, standard costing involves estimating future sales revenue and product costs. But standard costing goes into much more detail: the total *budgeted* cost is broken down into the elements of cost (direct materials, direct labour, variable overhead and fixed overhead) and these costs are then compared with the *actual* cost of those elements. The difference between the

standard cost and the *actual* cost is known as a variance. Variances are usually analysed into a volume variance and a price variance and sometimes these variances themselves are broken down into sub-variances. Significant variances are then investigated and immediate action is taken to correct any unexpected or unwelcome ones. The difference between budgeted sales and actual sales can also be analysed into volume and price variances.

Standard costing is of particular relevance in manufacturing industry where specific products or processes are produced repetitively.

Learning objectives

By the end of this chapter, you should be able to:

- **describe the nature, purpose and importance of standard costing and variance analysis;**
- **identify the main steps involved in implementing and operating a standard-costing system;**
- **calculate three standard-costing performance measures;**
- **calculate sales, direct materials, direct labour, variable overhead and fixed overhead variances;**
- **prepare a standard-cost operating statement.**

Why this chapter is important

Standard costing is an important management accounting planning and control technique and you need to know what it is and how it works if you are to become a really effective and self-aware manager. This chapter is important, therefore, for three reasons:

- you could be required to provide information for standard-costing purposes;
- you may be presented with standard-costing operating statements;
- you need to know what action to take in order to control unexpected trends.

Operation

The operation of a standard-costing system requires virtually everyone in an entity to be involved to some extent. The system depends on the supply of a vast amount of information from every cost centre throughout the entity and the personnel who are best placed to supply it are those who work in the various cost centres. It is not, however, a one-way process. Once the information has been processed it is fed back to those people who supplied it originally. They are then expected to use that information to deal with any significant variances.

If a standard-costing system is to work properly it is vital that it is fully supported by those people it is supposed to help. If they do not think that it is of any benefit to them they are then likely to provide inaccurate information and to discount subsequent reports based on it. If this is how they do behave then the system might as well be abandoned because it will result in ineffective planning and control.

Definitions

There are four important standard-costing terms you need to be familar with:

1 ***Standard**: the amount or level set for the performance of a particular activity.*
2 ***Standard cost**: the planned cost for a particular level of activity.*
3 ***Variance**: the difference between the standard (or planned) cost and the actual cost.*
4 ***Variance analysis**: an investigation into and an explanation of why variances occurred.*

Uses

Four main purposes of standard costing can be identified:

- *Stock valuation.* The standard-cost method of stock valuation is the expected or planned price that the entity expects to pay for its materials. Its advantages are that it is simple to use and it can remain stable for some time. The main difficulties are in establishing a standard cost and in coping with significant differences between the actual costs and the standard costs.
- *Control.* By comparing in detail actual costs against the standard costs on a frequent basis swift action can be taken to correct any departures from what was planned.
- *Performance measurement.* Standard costing provides information that enables an entity to determine if it is meeting its objectives.
- *Pricing.* The information provided by a standard-costing system helps entities to set their selling prices.

Application

Standard costing is an extremely useful planning and control technique that is particularly useful in those manufacturing companies where the production process is repetitive and identical units are constantly being turned out. This enables a general standard to be set that meets most situations. Non-repetitive operations do not enable a standard to be set very easily because by definition each operation tends to be different.

Standard costing is a development of the early twentieth century. By 1918 the basic equations that are still in use today had been devised. At the beginning of the twenty-first century manufacturing techniques are very different from those a hundred years ago, e.g. purchases are made to order and inventories are kept low. It might be thought, therefore, that standard costing would no longer be relevant. The research evidence available suggests that this is not so and that standard costing is still used quite widely.

Period

The standard-costing period will usually be the same as that for the main budget and sub-budget periods. Short periods are preferred so that the actual results can be compared frequently with the standard results. Corrective action can then be taken quickly before it is too late to do anything about any unexpected trends. Short standard-costing periods may also be necessary where market or production conditions are subject to frequent changes or where it is particularly difficult to prepare long-term plans.

Standards

The preparation of standard costs requires great care and attention. As each element of cost is subject to detailed arithmetical analysis, it is important that the initial information is accurate. Indeed, the information produced by a standard-costing system will be virtually worthless if subsequent analyses reveal that variances were caused by inefficient budgeting or standard setting.

In preparing standard costs, management will need to be informed of the level of activity to be used in preparing the standard costs, i.e. whether the entity will need to operate at, say, 80 per cent or 90 per cent of its theoretical capacity. An activity level should be chosen that is capable of being achieved. It would be possible to choose a standard that was *ideal*, i.e. one that represented a performance that could be achieved only under the most favourable of conditions. Such a standard would, however, be unrealistic, because it is rare for ideal conditions to prevail. An ideal standard is a standard that is attainable under the most favourable conditions and where no allowance is made for normal losses, waste and machine downtime.

A much more realistic standard is called an *attainable* standard. Such a standard is one that the entity can expect to achieve in reasonably efficient working conditions. In other words, it is accepted that some delays and inefficiencies, e.g. waste and machine downtime will occur, but it is also assumed that management will attempt to minimize them.

You may also come across the term *basic* standards. These are standards that are left unchanged over long periods of time. This enables some consistency to be achieved in comparing actual results with the same standards over a substantial period of time but they may become so out of date that meaningful comparisons are not possible.

Activity 16.1

Your company bases its standard costs on an ideal level of activity, i.e. no allowance is made for natural losses such as evaporation and the standard costs can only be achieved in entirely favourable conditions. As a cost centre manager, what would your reaction be when you received a report showing that your centre had a number of large unwelcome variances? What would you do about such variances?

Cost data

The cost data needed to operate a standard-costing system is considerable. The main requirements are as follows.

- *Direct materials*: types, quantities and price.
- *Direct labour*: grades, numbers and rates of pay.
- *Variable overhead*: the total variable overhead cost broken down into various categories, such as employee and general support costs.
- *Fixed overhead*: the total fixed overhead, likewise broken down into various categories such as employee costs, building costs and general administration expenses.

The above summary shows that the standard cost of a particular unit comprises four elements: direct materials, direct labour, variable overhead and fixed overhead. In turn, each element comprises two factors, namely quantity and price. In Example 16.1 we show you how the standard cost of a specific unit is built up.

Example 16.1

Calculation of the total standard cost of a specific unit using absorption costing

	£
• Direct materials	
Quantity × price (2 units × £5)	10
• Direct labour	
Hours × hourly rate (5 hours × £10)	50
• Variable overhead	
Hours × variable overhead absorption rate per hour (5 hours × £6)	30
• Fixed overhead	
Hours × fixed overhead absorption rate per hour (5 hours × £3)	15
Total standard cost per unit	105

Note: The example is based on fictitous data. It assumes that the unit cost is calculated on the basis of standard absorption costing. This is the most common method of standard costing. It is also possible to adopt a system of standard *marginal* costing (see Chapter 17).

Standard hours and the absorption of overhead

Standard absorption costing requires overhead to be absorbed on the basis of *standard* hours. In a non-standard costing system it is absorbed on the basis of *actual* hours. A standard hour represents the amount of work that should be performed in an hour assuming that it is done in standard conditions, i.e. in *planned* conditions. Each unit is given a standard time of so many hours in which the work should be done.

So the total standard time will be calculated as follows:

Number of units × standard hours per unit

It is *not* calculated by multiplying the number of units by the *actual* hours per unit.

Sales

As well as calculating cost variances some companies do the same for sales, although this is thought to be much less common. A detailed analysis of the budgeted sales is needed to obtain the number of each product to be sold and its selling price. Such information will be needed not just for the overall budget period but also for each sub-budget period.

There are a number of ways in which sales variances may be calculated. We could just deal with actual and budgeted sales revenue but in this book we are going to adopt a method based on *sales profit* as this method is thought to be of much greater interest and relevance to managers. Basically it involves taking the actual sales revenue and then deducting the *standard* cost of those sales (not the actual cost). The balance is then compared with the budgeted profit. Any difference between the actual cost and the standard cost is taken care of when the cost variances are calculated. We will explain how it works in a little more detail later in the chapter.

Activity 16.2

Tick the appropriate column.

	True	*False*
(a) A standard costing system absorbs overhead on the basis of actual hours.		
(b) A standard costing period has to be at least one year long.		
(c) Sales variances cannot be broken down into both price and quantity variances.		
(d) Normal losses are ignored in setting an attainable standard.		
(e) Standard costing is an out-of-date technique.		

Performance measures

Management may find it useful if some performance measures are extracted from the standard costing data. Such measures pinpoint the level of efficiency of the entity, help managers to spot unfavourable trends and enable them to take immediate corrective action. There are three specific performance measures that we are going to cover in this chapter: the efficiency ratio, the capacity ratio and the production volume ratio (see Figure 16.1).

Referring to Figure 16.1, the actual hours are those direct labour hours actually worked. The budgeted direct labour hours are those that were expected or planned to be worked. Standard hours produced measure the actual output produced in standard direct labour hours. If each unit produced *should have* taken (say) five hours and 100 units were produced, the total hours produced would be 500 (5 DLH × 100). The budget might have been planned on the basis of 120 units, in which case the total standards labour hours would have been 600 (5 DLH × 120). In a machine-intensive cost centre, machine hours would be substituted for direct labour hours. The formula for each performance measure is outlined below.

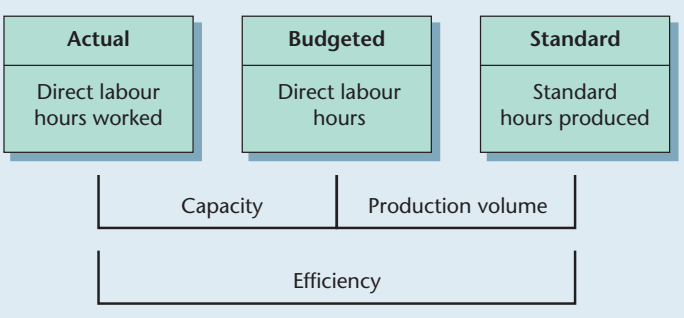

Figure 16.1 Three performance measures

The efficiency ratio

This ratio compares the total standard (or allowed) hours of units produced with the total actual hours taken to produce those units. The formula is:

$$\frac{\text{Standard hours produced}}{\text{Actual direct labour hours worked}} \times 100$$

Reminder:
The standard hours produced = the standard direct labour hours of production for the *actual* activity.

The efficiency ratio enables management to check whether the company has produced the units in more or less time than had been allowed.

The capacity ratio

This ratio compares the total actual hours worked with the total budgeted hours. It is calculated as follows:

$$\frac{\text{Actual direct labour hours worked}}{\text{Budgeted direct labour hours}} \times 100$$

The capacity ratio enables management to ascertain whether all of the budgeted hours (i.e. all the hours *planned* to be worked) were used to produce the actual units.

The production volume ratio

This compares the total allowed hours for the work actually produced with the total budgeted hours. It is calculated as follows:

$$\frac{\text{Standard hours produced}}{\text{Budgeted direct labour hours}} \times 100$$

The production volume ratio enables management to compare the work produced (measured in terms of standard hours) with the budgeted hours of work. This ratio gives management some information about how effective the company has been in using the budgeted hours.

In Example 16.2 we show you how to calculate these three ratios.

Example 16.2

Calculation of efficiency, capacity and production volume ratios

The following information relates to the Frost Production Company Limited for the year to 31 March 2011:

1 Budgeted direct labour hours: 1000
2 Budgeted units: 100
3 Actual direct labour hours worked: 800
4 Actual units produced: 90

Example 16.2 *continued*

Required:
Calculate the following performance ratios:
(a) the efficiency ratio
(b) the capacity ratio
(c) the production volume ratio.

Answer to Example 16.2

(a) The efficiency ratio:

$$\frac{\text{Standard hours produced}}{\text{Actual direct labour hours worked}} \times 100 = \frac{900^*}{800} \times 100 = \underline{112.5\%}$$

* Each unit is allowed 10 standard hours (1000 hours/100 units). Since 90 units were produced, the total standard hours of production must equal 900.

It would appear that the company has been more efficient in producing the goods than was expected. It was allowed 900 hours to do so but it produced them in only 800 hours.

(b) The capacity ratio:

$$\frac{\text{Actual direct labour hours worked}}{\text{Budgeted hours}} \times 100 = \frac{800}{1000} \times 100 = \underline{80\%}$$

All of the time planned to be available (the capacity) was not utilized, either because it was not possible to work 1000 direct labour hours or because the company did not undertake as much work as it could have done.

(c) The production volume ratio:

$$\frac{\text{Standard hours produced}}{\text{Budgeted hours}} \times 100 = \frac{900^*}{1000} \times 100 = \underline{90\%}$$

* As calculated for the efficiency ratio.

It appears that if 90 units had been produced in standard conditions, another 100 hours would have been available (10 units × 10 hours). Since the 90 units only took 800 hours to produce, at least another 20 units $\left(\frac{1000 - 800}{10}\right)$ could have been produced in standard conditions.

Comments

The budget allowed for 100 units to be produced and each unit was expected to take 10 direct labour hours to complete, a total budgeted activity of 1000 direct labour hours. However, only 90 units were actually produced. If these units had been produced in standard time, they should have taken 900 hours (90 units × 10 direct labour hours). These are the standard hours produced. The 90 units were completed in 800 actual hours. It appears, therefore, that the units were produced more efficiently than had been expected. The management will still need, of course, to investigate why only 90 units were produced and not the 100 units expected in the budget.

We can now move on to examine how standard cost variances may be calculated and whether they may be viewed as being either favourable or unfavourable. We do so in the next section.

Activity 16.3

Fill in the missing words.

(a) Capacity ratio = ———— ratio + ———— ratio.
(b) Standard hours produced = ———— direct labour hours for the ———— activity.

Cost variances

News clip

CIMA

Ian Herbert, a CIMA learning assessor, has argued in a magazine article that management accounting techniques such as standard costing, throughput accounting, and just-in-time management are still relevant even though the service sector has become more important. He argues that there are three reasons why this is so: (1) the world manufactures more goods than ever before; (2) many manufacturing processes are now outsourced to third parties; and (3) the *principles* of traditional techniques can be applied to the service sector.

Source: Adapted from *Financial Management*, April 2009, p. 53.

Structure

The difference between actual costs and standard costs may result in two main variances: price and quantity. These variances may either be favourable (F) to profit or adverse (A). This means that the actual prices paid or costs incurred can be more than anticipated (adverse to profit) or less than anticipated (favourable to profit). Similarly, the quantities used in production can result in more being used (adverse to profit) or less than expected (favourable to profit).

The standard production cost variances are shown in Figure 16.2. The formulae you need are shown below.

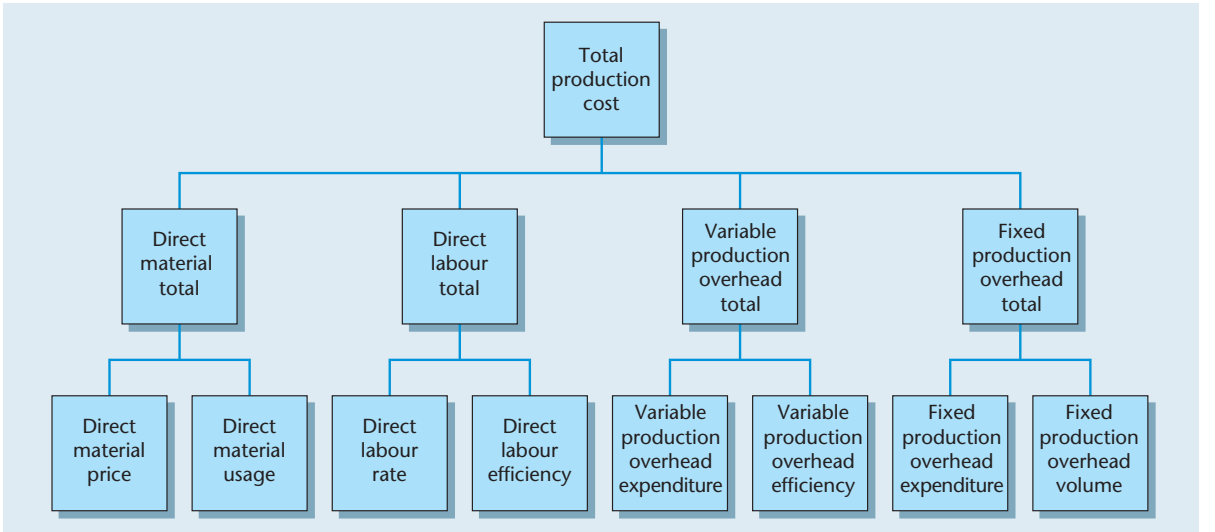

Figure 16.2 Main standard production cost variances

Direct materials

1 **Total** = (actual cost per unit × actual quantity used) – (standard cost per unit × standard quantity for actual production)
2 **Price** = (actual cost per unit – standard cost per unit) × total actual quantity used
3 **Usage** = (total actual quantity used – standard quantity for actual production) × standard cost

These relationships are shown in Figure 16.3.

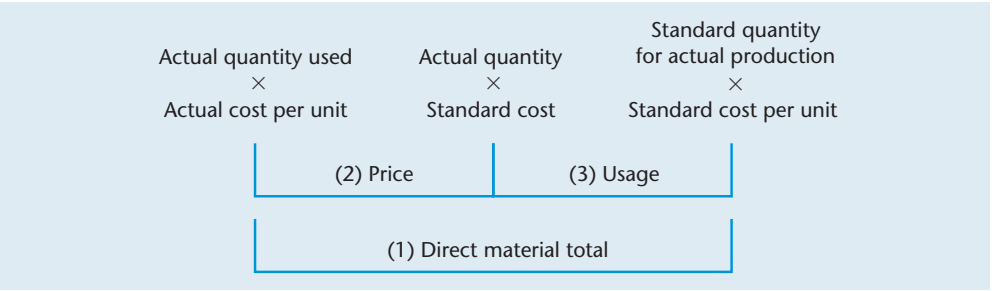

Figure 16.3 Calculation of direct material cost variances

Direct labour

1 **Total** = (actual hourly rate × actual hours) – (standard hourly rate × standard hours for actual production)
2 **Rate** = (actual hourly rate – standard hourly rate) × actual hours worked
3 **Efficiency** = (actual hours worked – standard hours for actual production) × standard hourly rate

These relationships are shown in Figure 16.4.

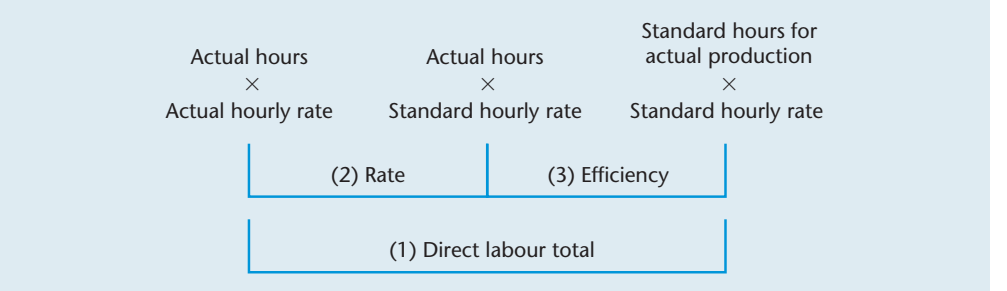

Figure 16.4 Calculation of direct labour cost variances

Variable production overhead

1 **Total** = actual variable overhead – [standard hours for actual production × variable production overhead absorption rate (VOAR)]
2 **Expenditure** = actual variable overhead – (actual hours worked × VOAR)
3 **Efficiency** = (standard hours for actual production – actual hours worked) × VOAR

These relationships are shown in Figure 16.5.

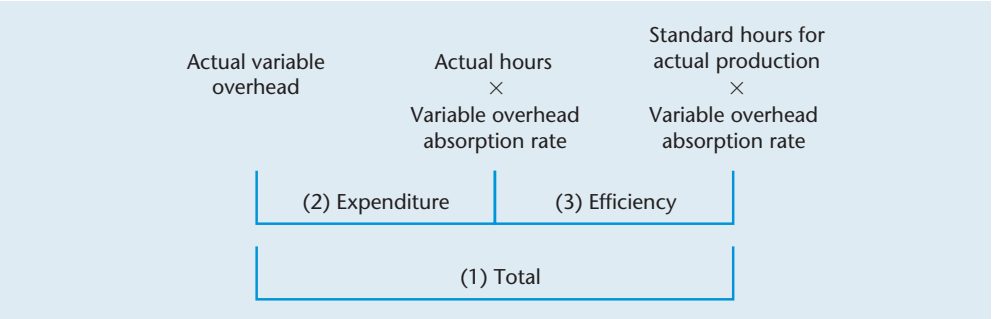

Figure 16.5 Calculation of variable production overhead variances

Fixed production overhead

1 **Total** = actual fixed overhead – [standard hours of production × fixed overhead absorption rate (FOAR)]
2 **Expenditure** = actual fixed overhead – budgeted fixed expenditure
3 **Volume** = budgeted fixed overhead expenditure – (standard hours for actual production × FOAR)

These variances are shown in Figure 16.6.

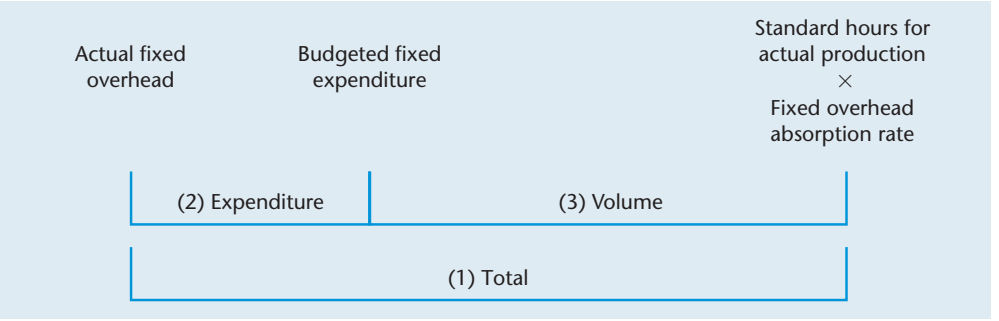

Figure 16.6 Calculation of fixed production overhead variances

Activity 16.4 List twelve main cost variances.

A comprehensive example

We will now use a comprehensive example to illustrate the main cost variances. The details are contained in Example 16.3.

Example 16.3

Calculation of the main cost variances

The following information has been extracted from the records of the Frost Production Company Limited for the year to 31 March 2011:

Budgeted costs per unit:	£
Direct materials (15 kilograms × £2 per kilogram)	30
Direct labour (10 hours × £4 per direct labour hour)	40
Variable overhead (10 hours × £1 per direct labour hour)	10
Fixed overhead (10 hours × £2 per direct labour hour)	20
Total budgeted cost per unit	100

The following budgeted data are also relevant:

1 The budgeted production level was 100 units.
2 The total standard direct labour hours amounted to 1000.
3 The total budgeted variable overhead was estimated to be £1000.
4 The total budgeted fixed overhead was £2000.
5 The company absorbs both fixed and variable overhead on the basis of direct labour hours.

Actual costs:	£
Direct materials	2 100
Direct labour	4 000
Variable overhead	1 000
Fixed overhead	1 600
Total actual costs	8 700

Note: 90 units were produced in 800 actual hours, and the total actual quantity of direct materials consumed was 1400 kilograms.

Required:
(a) Calculate the direct materials, direct labour, variable production overhead and fixed production overhead total cost variances.
(b) Calculate the detailed variances for each element of cost.

Answer to Example 16.3(a)

In answering part (a) of this question the first thing that we need to do is to summarize the total variance for each element of cost for the actual 90 units produced:

	Actual costs	*Total standard cost for actual production*	*Variance*
	£	£	£
Direct materials	2 100	2 700 (1)	600 (F)
Direct labour	4 000	3 600 (2)	400 (A)
Variable production overhead	1 000	900 (3)	100 (A)
Fixed production overhead	1 600	1 800 (4)	200 (F)
Total	8 700	9 000	300 (F)

Notes:
(a) F = favourable to profit; A = adverse to profit.
(b) The numbers in brackets refer to the tutorial notes below.

Tutorial notes

1 The standard cost of direct material for actual production = the actual units produced × the standard direct material cost per unit, i.e. 90 × £30 = £2700.

2 The standard cost of direct labour for actual production = the actual units produced × standard direct labour cost per unit, i.e. 90 × £40 = £3600.

3 The standard variable cost for actual performance = the actual units produced × variable overhead absorption rate per unit, i.e. 90 × £10 = £900.

4 The fixed overhead cost for the actual performance = the actual units produced × fixed overhead absorption rate, i.e. 90 × £20 = £1800.

Comments on the answers to Example 16.3(a)

Example 16.3(a) shows that the total actual cost of producing the 90 units was £300 less than the budget allowance. An investigation would need to be made in order to find out why only 90 units were produced when the company had budgeted for 100. Although the 90 units have cost £300 less than expected, a number of other variances have contributed to the total variance. So assuming that these variances are considered significant, they would need to be carefully investigated in order to find out what caused them.

As a result of calculating variances for each element of cost, it becomes much easier for management to investigate why the actual production cost was £300 less than expected. However, by analysing the variances into their major causes, the accountant can provide even greater guidance. This is illustrated in part (b) of the example.

Answer to Example 16.3(b)

In answering part (b) of Example 16.3, we will deal with each element of cost in turn. As we do so we will take the opportunity to comment on the results.

Direct materials

1 Price = (actual cost per unit – standard cost per unit) × total actual quantity used

∴ the price variance = (£1.50 – 2.00) × 1400 (kg) = £700 (F)

The actual price per unit was £1.50 (£2100/1400) and the standard price was £2.00 per unit. There was, therefore, a total saving (as far as the price of the materials was concerned) of £700 (£0.50 × 1400). This was favourable (F) to profit.

2 Usage = (total actual quantity used – standard quantity for actual production) × standard cost

∴ the usage variance = (1400 – 1350) × £2.00 = £100 (A)

In producing 90 units, Frost should have used 1350 kilograms (90 × 15 kg) instead of the 1400 kilograms actually used. If this extra usage is valued at the standard cost (the difference between the actual price and the standard cost has already been allowed for), there is an adverse usage variance of £100 (50 (kg) × £2.00).

3 Total = price + usage:

∴ the total direct materials variance = £700 (F) + £100 (A) = £600 (F)

The £600 favourable total variance was calculated earlier in answering part (a) of the question. This variance might have arisen because Frost purchased cheaper materials. If this were the case then it probably resulted in a greater wastage of materials, perhaps because the materials were of an inferior quality.

Direct labour

1 Rate = (actual hourly rate – standard hourly rate) × actual hours worked

∴ the rate variance = (£5.00 – £4.00) × 800 DLH = £800 (A)

The actual hourly rate is £5.00 per direct labour hour (£4000/800) compared with the standard rate per hour of £4. Every extra actual hour worked, therefore, resulted in an adverse variance of £1 or £800 in total (£1 × 800).

Answer to Example 16.3(b) *continued*

2 Efficiency = (actual hours worked – standard hours for actual production) × standard hourly rate.

∴ the efficiency variance = (800 – 900) × £4.00 = £400 (F)

The actual hours worked were 800. However, 900 hours would be the allowance for the 90 units actually produced (90 × 10 DLH). If these hours were valued at the standard hourly rate (differences between the actual rate and the standard rate having already been allowed for when calculating the rate variance), a favourable variance of £400 arises. The favourable efficiency variance has arisen because the 90 units took less time to produce than the budget allowed for.

3 Total = rate + efficiency

∴ the total direct labour variance = £800 (A) + £400 (F) = £400 (A)

The £400 adverse total variance was calculated earlier in answering part (a) of the question. It arises because the company paid more per direct labour hour than had been budgeted, although this was offset to some extent by the units being produced in less time than the budgeted allowance. This variance could have been caused by using a higher grade of labour than had been intended. Unfortunately, the higher labour rate per hour was not completely offset by greater efficiency.

Variable production overhead

1 Expenditure = actual variable overhead – (actual hours worked × variable production overhead absorption rate)

∴ the expenditure variance = £1000 – (800 × £1.00) = £200 (A)

2 Efficiency = (standard hours for actual production – actual hours worked) × variable production overhead absorption rate

∴ the efficiency variance = (900 – 800) × £1.00 = £100 (F)

3 Total = expenditure + efficiency

∴ the total variable production overhead variance
= £200 (A) + £100 (F) = £100 (A)

The adverse variance of £100 (A) arises because the variable overhead absorption rate was calculated on the basis of a budgeted cost of £10 per unit. In fact the absorption rate ought to have been £11.11 per unit (£1000/90) because the total actual variable cost was £1000. There would, of course, be no variable production overhead cost for the ten units that were not produced. The £100 adverse total variance was calculated earlier in answering part (a) of the example.

Fixed production overhead

1 Expenditure = actual fixed overhead – budgeted fixed expenditure

∴ the expenditure variance = £1600 – £2000 = £400 (F)

The actual expenditure was £400 less than the budgeted expenditure. This means that the fixed production overhead absorption rate was £400 higher than it needed to have been if it had been the only fixed overhead variance.

2 Volume = budgeted fixed overhead – (standard hours of production × fixed production overhead absorption rate)

∴ the volume variance = £2000 – (900 × £2.00) = £200 (A)

As a result of producing fewer units than expected, £200 less overhead has been absorbed into production.

3 The fixed production overhead total variance was calculated earlier in answering part (a) of the question. The simplified formula is as follows:

Total = expenditure + volume

= £400 (F) + £200 (A) = £200 (F)

As the actual activity was less than the budgeted activity, only £1800 of fixed overhead was absorbed into production instead of the £2000 expected in the budget. However, the actual expenditure was only £1600 so the overestimate of expenditure compensated for the overestimate of activity.

Activity 16.5

Think of a reason why a favourable direct materials price variance might be offset by an adverse direct materials usage variance.

Similarly, why might an adverse direct labour rate variance be offset by a favourable direct labour efficiency variance?

Sales variances

In an *absorption* costing system, a total sales variance would be classified into a selling price variance and a sales volume profit variance (see Figure 16.7).

The formulae are outlined below and they are also shown in diagrammatic form in Figure 16.8.

1 Total sales variance = [actual sales revenue – (actual sales quantity × standard cost per unit)] – (budgeted quantity × standard profit per unit)

2 Selling price variance = [actual sales revenue – (actual sales quantity × standard cost per unit)] – (actual quantity × standard profit per unit)

An alternative formula for the calculation of the selling price variance is as follows: (actual selling price per unit – standard selling price per unit) × actual sales quantity.

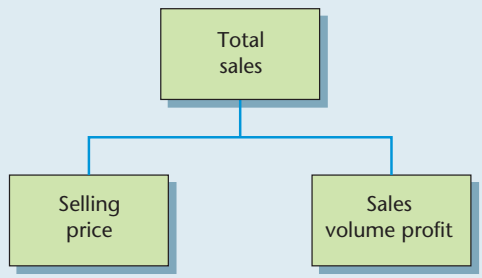

Figure 16.7 Main sales variances

3 **Sales volume profit variance** = (actual quantity – budgeted quantity) × standard profit per unit

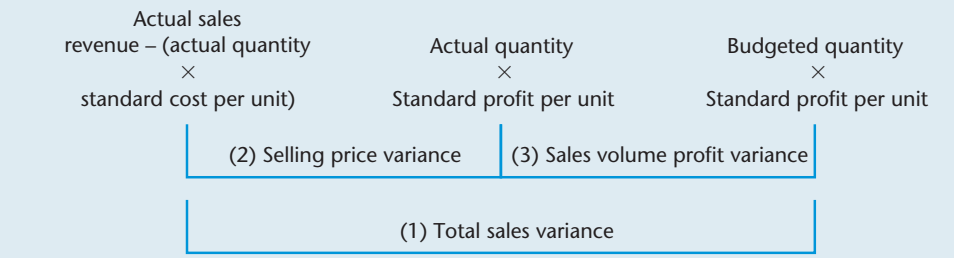

Figure 16.8 Calculation of sales profit variances

The use of sales variance formulae is illustrated in Example 16.4.

Example 16.4

Calculating sales variances

The following data relate to Frozen Limited for the year to 31 July 2011:

	Budget/standard	*Actual*
Sales (units)	100	90
Selling price per unit	£10	£10.50
Standard cost per unit	£7	–
Standard profit per unit	£3	

Required:
Calculate the sales variances.

Answer to Example 16.4

Selling price variance = [actual sales revenue – (actual sales quantity × standard cost per unit)] – (actual quantity × standard profit per unit)

= [£945 – (90 units × £7)] – (90 units × £3) = (£945 – 630) – 270 = £45 (F)

The actual selling price per unit was £0.50 more than the standard selling price (£10.50–10.00) and so the variance is favourable. Other things being equal, the profit would be £45 higher than budgeted *for the actual number of units sold*.

Sales volume profit variance = (actual quantity – budgeted quantity) × standard profit per unit

The standard profit is £3 per unit.

(90 units – 100 units) = 10 × £3 = £30 (A)

The sales volume profit variance is £30 adverse because only 90 units were sold instead of the budgeted amount of 100 units. As a result, £30 less profit was made.

Total sales variance = [actual sales revenue – (actual sales quantity × standard cost per unit)] – (budgeted quantity × standard profit per unit)

The actual sales revenue = £945 (90 units × £10.50).

[£945 – (90 units × £7)] – (100 units × £3) = (£945 – 630) – 300 = £15 (F)

When the £45 favourable selling price is set off against the £30 adverse sales volume profit variance, there is a favourable total sales variance of £15 (£45 – 30).

Activity 16.6

Assuming that the demand for Product X is elastic, what effect might a reduction in its selling price have on its sales volume profit variance?

Operating statements

Once all the variances have been calculated they may be summarized in the form of an operating statement. There is no standardized format for such a statement but the one used in Example 16.5 gives you a good idea of what one looks like.

The structure used in Example 16.5 is particularly helpful because it shows the link between the budgeted profit and the actual profit. This means that management can trace the main causes of sales and cost variances. In practice the statement would also show the details for each product.

Example 16.5

Preparation of a standard cost operating statement

Example 16.3 gave some information relating to the Frost Production Company Limited for the year to 31 March 2011. The cost data used in that example will now be used to illustrate the structure of a standard cost operating statement, along with some additional information.

Additional information:

1 Assume that the budgeted sales were 100 units at a selling price of £150 per unit.
2 90 units were sold at £160 per unit.

Required:

Prepare a standard cost operating statement for the year to 31 March 2011.

Answer to Example 16.5

Frost Production Company Limited. Standard cost operating statement for the year to 31 March 2011:

			£
Budgeted sales (100 × £150)			15 000
Budgeted cost of sales (100 × £100)			10 000
Budgeted profit			5 000
Sales volume profit variance (1)			(500)
Budgeted profit from actual sales			4 500
Variances: (2)	(F)	(A)	
	£	£	
Sales price (3)	900		
Direct materials usage		100	
Direct materials price	700		
Direct labour efficiency	400		
Direct labour rate		800	
Variable overhead efficiency	100		
Variable overhead expenditure		200	
Fixed overhead volume		200	
Fixed overhead expenditure	400		
	2 500	1 300	1 200
Actual profit			5 700

Answer 16.5 continued

1 **Sales volume profit variance** = (actual quantity – budgeted quantity) × standard profit per unit
= (90 – 100) × £50 = £500 (A)

2 Details of the cost variances were shown in the answer to Example 16.3.

3 **Selling price variance** = (actual selling price per unit – standard selling price per unit) × actual sales quantity
= (£160 – £150) × 90 = £900 (F)

The operating profit statement will help management to decide where to begin an investigation into the causes of the respective variances. It is unlikely that they will all be investigated. It may be company policy, for example, to investigate only those variances that are particularly significant, irrespective of whether they are favourable or adverse. In other words, only *exceptional* variances would be investigated. A policy decision would then have to be taken on what was meant by 'exceptional'.

Activity 16.7

Suppose that you were the managing director of a medium-sized manufacturing company. Which managers do you think should be supplied with a copy of the company's four-weekly standard cost operating statement?

Questions you should ask

The calculation of standard cost variances is a complex arithmetical exercise. As a non-accountant it is unlikely that you will have to calculate variances but it is important for you to have some idea of how it is done so that you are in a stronger position to find out what happened. You can then take any necessary corrective action.

So what questions should you ask? We suggest that you can use the following as a basis for any subsequent investigation.

- Was the given level of activity accurate?
- Was the standard set realistic?
- Is there anything unusual about the actual events?
- Is the measure (i.e. the standard) reliable?
- Are there any particular variances that stand out?
- Are there any that are the main cause of any total variance?
- Is there a linkage between variances, e.g. between a favourable price variance and an unfavourable quantity/volume variance?
- Are there any factors that were not apparent at the time that the standards were set?

Conclusion

We have come to the end of a complex chapter. You may have found that it has been extremely difficult to understand just how standard cost variances are calculated.

Fortunately, it is unlikely that, as a non-accountant, you will ever have to calculate them for yourself. It is sufficient for your purposes to understand their meaning and to have some idea of the arithmetical foundation on which they are based.

Your job will usually be to investigate the *causes* of the variances and to take necessary action. A standard costing system is supposed to help managers plan and control the entity much more tightly than can be achieved in the absence of such a system. However, it can only be of real benefit if it is actually used by managers.

Key points

1. A standard cost is the planned cost of a particular unit or process.
2. Standard costs are usually based on what is reasonably attainable.
3. Actual costs are compared with standard costs.
4. Corrective action is taken if there are any unplanned trends.
5. Three performance measures used in standard costing are the efficiency ratio, the capacity ratio and the production volume ratio.
6. Variance analysis is an arithmetical exercise that enables differences between actual and standard costs to be broken down into the elements of cost.
7. The degree of analysis will vary, but usually a total cost variance will be analysed into direct material, direct labour, variable overhead and fixed overhead variances and sub-analysed into quantity and expenditure variances.
8. Sales variances may also be calculated, the total sales variance being analysed into a selling price variance and a sales volume profit variance.
9. The variances help in tracing the main causes of differences between actual and budgeted results but they do not *explain* what has actually happened – they are merely the starting point for a more detailed investigation.

Check your learning

1. Explain what is meant by the following terms: (a) a standard, (b) a standard cost, (c) a variance, (d) variance analysis.
2. List four uses of standard costing.
3. What type of entities might benefit from a standard costing system?
4. How long should a standard costing period be?
5. What is (a) a basic standard, (b) an attainable standard, (c) an ideal standard?
6. Name four types of information required for a standard costing system.
7. What is meant by 'a standard hour'?
8. Name three standard cost performance measures.
9. What are their respective formulae?

10 Complete the following equations:

(a) direct materials total = _____ + _____

(b) direct labour total = _____ + _____

(c) variable production overhead total = _____ + _____

(d) fixed production overhead total = _____ + _____

11 What is (a) an adverse variance, (b) a favourable variance?

12 Complete this equation: total sales variance = _____ + _____

13 Complete this statement: a standard cost operating statement links the budgeted profit to the _____ _____ for the period.

News story quiz

Remember the news story at the beginning of this chapter? Go back to that story and reread it before answering the following questions.

We do not deal with 'lean accounting' in this book. It's a very new area of accounting and it has not yet caught on. All you need to know for the purposes of this news story is that the proponents of lean accounting believe that traditional management accounting techniques are inappropriate for modern manufacturing practices. Try to answer the following questions based on your impression of standard costing that you have obtained from reading this chapter and any practical experience you have of working for an organization.

Questions

1 Do you think that standard costing is an outdated management control technique?

2 Is it a fair criticism to argue that standard costing is driven by 'labor (sic) efficiency, machine utilisation and absorption of overhead'?

3 Why should standard costing necessarily lead to 'excessive inventories that generate positive variances'?

Tutorial questions

The answers to questions marked with an asterix can be found in Appendix 4.

16.1 Is it likely that a standard-costing system is of any relevance in a service industry?

16.2 'Standard costing is all about number crunching, and for someone on the shop floor it has absolutely no relevance.' Do you agree with this statement?

16.3 'Sales variance calculations are just another example of accountants playing around with numbers.' Discuss.

16.4* You are presented with the following information for X Limited:

Standard price per unit: £10.
Standard quantity for actual production: 5 units.

Actual price per unit: £12.
Actual quantity: 6 units.

Required:
Calculate the following variances:

(a) direct material total variance
(b) direct material price variance
(c) direct material usage variance.

16.5 The following information relates to Malcolm Limited:

Budgeted production: 100 units.
Unit specification (direct materials): 50 kilograms × £5 per kilogram = £250.
Actual production: 120 units.
Direct materials used: 5400 kilograms at a total cost of £32,400.

Required:
Calculate the following variances:

(a) direct material total
(b) direct material price
(c) direct material usage.

16.6* The following information relates to Bruce Limited:

Actual hours: 1000.
Actual wage rate per hour: £6.50.
Standard hours for actual production: 900.
Standard wage rate per hour: £6.00.

Required:
Calculate the following variances:

(a) direct labour total
(b) direct labour rate
(c) direct labour efficiency.

16.7 You are presented with the following information for Duncan Limited:

Budgeted production: 1000 units.
Actual production: 1200 units.
Standard specification for one unit: 10 hours at £8 per direct labour hour.
Actual direct labour cost: £97,200 in 10,800 actual hours.

Required:
Calculate the following variances:

(a) direct labour total
(b) direct labour rate
(c) direct labour efficiency.

16.8* The following overhead budget has been prepared for Anthea Limited:

Actual fixed overhead: £150,000.
Budgeted fixed overhead: £135,000.
Fixed overhead absorption rate per hour: £15.
Actual hours worked: 10,000.
Standard hours of production: 8000.

Required:
Calculate the following fixed production overhead variances:

(a) total
(b) expenditure
(c) volume.

16.9* Using the data contained in the previous question, calculate the following performance measures:

(a) efficiency ratio
(b) capacity ratio
(c) production volume ratio.

16.10 The following information relates to Osprey Limited:

Budgeted production: 500 units.
Standard hours per unit: 10.
Actual production: 600 units.
Budgeted fixed overhead: £125,000.
Actual fixed overhead: £120,000.
Actual hours worked: 4900.

Required:
Calculate the following fixed production overhead variances:

(a) total
(b) expenditure
(c) volume.

16.11 Using the data from the previous question, calculate the following performance measures:

(a) efficiency ratio
(b) capacity ratio
(c) production volume ratio.

16.12* Milton Limited has produced the following information:

Total actual sales: £99,000.
Actual quantity sold: 9000 units.
Budgeted selling price per unit: £10.
Standard cost per unit: £7.
Total budgeted units: 10,000 units.

Required:
Calculate:

(a) the selling price variance
(b) the sales volume profit variance
(c) the sales variance in total.

16.13 You are presented with the following budgeted information for Doe Limited:

Sales units	100
Per unit:	£
Selling price	30
Cost	(20)
Profit	10
Actual sales	120 units
Actual selling price per unit	£28

Required:
Calculate the sales variances.

16.14 The budgeted selling price and standard cost of a unit manufactured by Smillie Limited is as follows:

	£
Selling price	30
Direct materials (2.5 kilos)	5
Direct labour (2 hours)	12
Fixed production overhead	8
	25
Budgeted profit	5

Total budgeted sales: 400 units

During the period to 31 December 2012, the actual sales and production details for Smillie were as follows:

	£
Sales (420 units)	13 440
Direct materials (1260 kilos)	2 268
Direct labour (800 hours)	5 200
Fixed production overhead	3 300
	10 768
Profit	2 672

Required:
(a) Prepare a standard cost operating statement for the period to 31 December 2012 incorporating as many variances as the data permit.
(b) Explain what the statement tells the managers of Smillie Limited.

16.15 Mean Limited manufactures a single product, and the following information relates to the actual selling price and actual cost of the product for the four weeks to 31 March 2012:

	£000
Sales (50 000 units)	2 250
Direct materials (240 000 litres)	528
Direct labour (250 000 hours)	1 375
Variable production overhead	245
Fixed production overhead	650
	2 798
Loss	(548)

The budgeted selling price and standard cost of each unit was as follows:

	£
Selling price	55
Direct materials (5 litres)	10
Direct labour (4 hours)	20
Variable production overhead	5
Fixed production overhead	15
	50
Budgeted profit	5

Total budgeted production: 40 000 units.

Required:

(a) Prepare a standard cost operating statement for the four weeks to 31 March 2012 incorporating as many variances as the data permit.

(b) Explain how the statement may help the managers of Mean Limited to control the business more effectively.

Further practice questions, study material and links to relevant sites on the World Wide Web can be found on the website that accompanies this book. The site can be found at **www.pearsoned.co.uk/dyson**