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Budgetary control

Topic list	Syllabus reference
1 Revision - Objectives of budgetary systems	Revision
2 The planning and control cycle	C1 (a)
3 Planning and control in the performance hierarchy	C1 (a)
4 Behavioural implications of budgeting	C4 (a)
5 Setting the difficulty level of a budget	C4 (b)
6 Participation in budgeting	C4 (c)

Introduction

This chapter serves as an introduction to Part C of the Study Text and looks at budgetary control. We begin by looking at the objectives of budgetary systems, which should be familiar to you from previous studies.

We then look at the various stages in the **planning process**, and where the annual budget fits in to this.

We also see how the budget is used in the **control process**. Finally, we consider the **behavioural aspects** of budgeting, identifying and explaining the factors which influence behaviour and budgets.

In the next chapter we go on to consider different types of budgetary systems.

Study guide

		Intellectual level
C1	Budgetary systems	
(a)	Explain how budgetary systems fit within the performance hierarchy	2
C4	Behavioural aspects of budgeting	
(a)	Identify the factors which influence behaviour	2
(b)	Discuss the issues surrounding setting the difficulty level for a budget	2
(c)	Explain the benefits and difficulties of the participation of employees in the negotiation of targets	2

Exam guide

The topics covered in this chapter may form the discussion part of a budget question or may form an entire narrative question. Much of the material is common sense and you should always try to relate it to your own experience.

1 Revision – Objectives of budgetary systems

FAST FORWARD

Here are the objectives of a budgetary planning and control system.

- Ensure the achievement of the organisation's objectives
- Compel planning
- Communicate ideas and plans
- Coordinate activities
- Provide a framework for responsibility accounting
- Establish a system of control
- Motivate employees to improve their performance

You should be familiar with the objectives of budgetary systems from your earlier studies. The key points are recapped below.

A budgetary planning and control system is essentially a system for ensuring **communication**, **coordination** and **control** within an organisation. Communication, coordination and control are general objectives: more information is provided by an inspection of the specific objectives of a budgetary planning and control system.

Objective	Comment
Ensure the achievement of the organisation's objectives	Objectives are set for the organisation as a whole, and for individual departments and operations within the organisation. Quantified expressions of these objectives are then drawn up as targets to be achieved within the timescale of the budget plan.
Compel planning	This is probably the most important feature of a budgetary planning and control system. Planning forces management to look ahead , to set out detailed plans for achieving the targets for each department, operation and (ideally) each manager and to anticipate problems. It thus prevents management from relying on ad hoc or uncoordinated planning which may be detrimental to the performance of the organisation.
Communicate ideas and plans	A formal system is necessary to ensure that each person affected by the plans is aware of what he or she is supposed to be doing . Communication might be one-way, with managers giving orders to subordinates , or there might be a two-way dialogue and exchange of ideas.
Coordinate activities	The activities of different departments or sub-units of the organisation need to be coordinated to ensure maximum integration of effort towards common goals. This concept of coordination implies, for example, that the purchasing department should base its budget on production requirements and that the production budget should in turn be based on sales expectations. Although straightforward in concept, coordination is remarkably difficult to achieve, and there is often ' sub-optimality ' and conflict between departmental plans in the budget so that the efforts of each department are not fully integrated into a combined plan to achieve the company's best targets.
Provide a framework for responsibility accounting	Budgetary planning and control systems require that managers of budget centres are made responsible for the achievement of budget targets for the operations under their personal control.
Establish a system of control	A budget is a yardstick against which actual performance is measured and assessed. Control over actual performance is provided by the comparisons of actual results against the budget plan. Departures from budget can then be investigated and the reasons for the departures can be divided into controllable and uncontrollable factors.
Motivate employees to improve their performance	The interest and commitment of employees can be retained via a system of feedback of actual results , which lets them know how well or badly they are performing. The identification of controllable reasons for departures from budget with managers responsible provides an incentive for improving future performance.

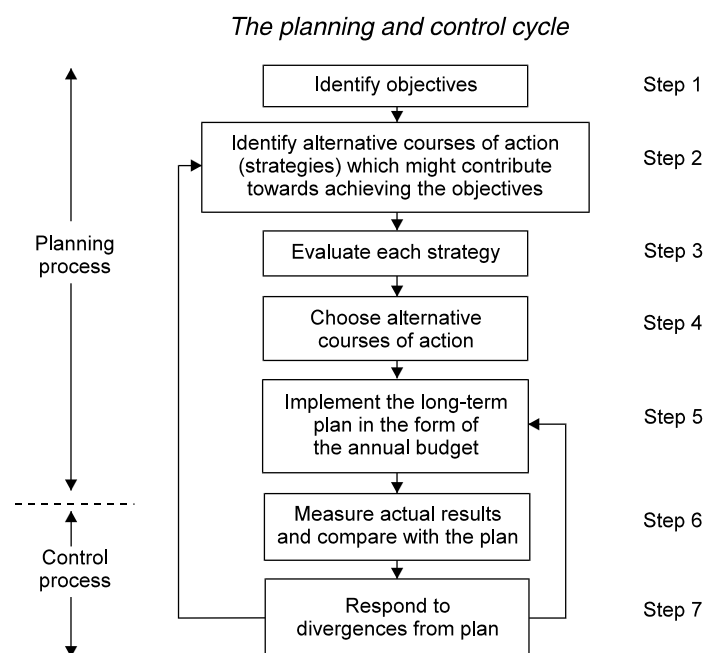
2 The planning and control cycle

FAST FORWARD

The **planning and control cycle** has seven steps.

- *Step 1.* Identify **objectives**
- *Step 2.* Identify potential **strategies**
- *Step 3.* Evaluate strategies
- *Step 4.* Choose alternative courses of action
- *Step 5.* Implement the long-term plan
- *Step 6.* Measure actual results and compare with the plan
- *Step 7.* Respond to divergences from the plan

The diagram below represents the planning and control cycle. The first five steps cover the planning process. **Planning** involves making choices between alternatives and is primarily a decision-making activity. The last two steps cover the **control** process, which involves measuring and correcting actual performance to ensure that the alternatives that are chosen and the plans for implementing them are carried out.



Step 1 Identify objectives

Objectives establish the direction in which the management of the organisation wish it to be heading. They answer the question: 'where do we want to be?'

Step 2 Identify potential strategies

Once an organisation has decided 'where it wants to be', the next step is to identify a range of possible courses of action or **strategies** that might enable the organisation to get there. The organisation must therefore carry out an **information-gathering exercise** to ensure that it has a full **understanding of where it is now**. This is known as a '**position audit**' or '**strategic analysis**' and involves looking both inwards and outwards.

- The organisation must **gather information from all of its internal parts** to find out what resources it possesses: what its manufacturing capacity and capability is, what is the state of its technical know-how, how well it is able to market itself, how much cash it has in the bank and so on.
- It must also **gather information externally** so that it can assess its position in the environment. Just as it has assessed its **own strengths and weaknesses**, it must do likewise for its competitors (**threats**). Current and potential markets must be

analysed to identify possible new **opportunities**. The 'state of the world' must be considered. Is it in recession or is it booming? What is likely to happen in the future?

Having carried out a strategic analysis, alternative strategies can be identified. An organisation might decide to be the lowest cost producer in the industry, perhaps by withdrawing from some markets or developing new products for sale in existing markets. This may involve internal development or a joint venture.

Step 3 Evaluate strategies

The strategies must then be evaluated **in terms of suitability, feasibility and acceptability**. Management should select those strategies that have the greatest potential for achieving the organisation's objectives.

Step 4 Choose alternative courses of action

The next step in the process is to collect the **chosen strategies** together and **co-ordinate them into a long-term financial plan**. Typically this would show the following.

- Projected cash flows
- Projected long-term profits
- A description of the long-term objectives and strategies in words
- Capital expenditure plans
- Balance sheet forecasts

Step 5 Implement the long-term plan

The **long-term plan** should then be **broken down into smaller parts**. It is unlikely that the different parts will fall conveniently into successive time periods. Strategy A may take two and a half years, while Strategy B may take five months, but not start until year three of the plan. It is usual, however, to break down the plan as a whole into equal time periods (usually one year). The resulting **short-term plan** is called a **budget**.

Step 6 Measure actual results and compare with plan

Actual results are recorded and analysed and information about actual results is fed back to the management concerned, often in the form of accounting reports. This reported information is **feedback** (see section 3.2.1 below).

Step 7 Respond to divergences from plan

By comparing actual and planned results, management can then do one of three things, depending on how they see the situation.

- They can take control action. By identifying what has gone wrong, and then finding out why, corrective measures can be taken.
- They can decide to do nothing. This could be the decision when actual results are going better than planned, or when poor results were caused by something which is unlikely to happen again in the future.
- They can alter the plan or target if actual results are different from the plan or target, and there is nothing that management can do (or nothing, perhaps, that they want to do) to correct the situation.



Question

Planning and control cycles

Is your organisation's planning and control cycle similar to the one described here? If it differs, how does it differ? Why does it differ? Try to find out your organisation's objectives and the strategies being adopted to attain these objectives.

Answers to this question could be usefully employed in the exam.

3 Planning and control in the performance hierarchy

FAST FORWARD

Planning and control occurs at all levels of the performance hierarchy to different degrees.

3.1 Planning

Although it implies a 'top down' approach to management, we could describe a cascade of goals, objectives and plans down through the layers of the organisation. The plans made at the higher levels of the performance hierarchy provide a framework within which the plans at the lower levels must be achieved. The plans at the lower levels are the means by which the plans at the higher levels are achieved.

It could therefore be argued that without the plans allied directly to the vision and corporate objective the operational-level and departmental plans have little meaning. Planning could therefore be deemed as more significant at the higher levels of the performance hierarchy than the lower levels.

This is not to say that planning at an operational level is not important. It is just that the two types of planning are different.

Level	Detail
Corporate plans	<ul style="list-style-type: none">• Focused on overall performance• Environmental influence• Set plans and targets for units and departments• Sometimes qualitative (eg a programme to change the culture of the organisation)• Aggregate
Operational plans	<ul style="list-style-type: none">• Based on objectives about 'what' to achieve• Specific (eg acceptable number of 'rings' before a phone is answered)• Little immediate environmental influence• Likely to be quantitative• Detailed specifications• Based on 'how' something is achieved• Short time horizons

3.2 Control

Consider how the activities of planning and control are inter-related.

- (a) Plans set the targets.
- (b) Control involves two main processes.
 - (i) Measure actual results against the plan.
 - (ii) Take action to adjust actual performance to achieve the plan or to change the plan altogether.

Control is therefore impossible without planning.

The essence of control is the measurement of results and comparing them with the original plan. Any deviation from plan indicates that control action is required to make the results conform more closely with plan.

3.2.1 Feedback

Key term

Feedback occurs when the results (outputs) of a system are used to control it, by adjusting the input or behaviour of the system.

A business organisation uses feedback for control.

- (a) **Negative feedback** indicates that results or activities must be brought back on course, as they are deviating from the plan.
- (b) **Positive feedback** results in control action continuing the current course. You would normally assume that positive feedback means that results are going according to plan and that no corrective action is necessary: but it is best to be sure that the control system itself is not picking up the wrong information.
- (c) **Feedforward control** is control based on **forecast** results: in other words if the forecast is bad, control action is taken well in advance of actual results.

There are two types of feedback.

- (a) **Single loop feedback** is control, like a thermostat, which regulates the output of a system. For example, if sales targets are not reached, control action will be taken to ensure that targets will be reached soon. The plan or target itself is not changed, even though the resources needed to achieve it might have to be reviewed.
- (b) **Double loop feedback** is of a different order. It is information used to **change the plan itself**. For example, if sales targets are not reached, the company may need to change the plan.

3.2.2 Control at different levels

FAST FORWARD

Budgetary control occurs at the **lower** levels of the performance hierarchy.

Control at the **lower-levels** of the performance hierarchy, such as standard costing, and budgetary control has the following features.

- Exercised externally by management or, in the case of empowered teams, by the staff themselves
- Immediate or rapid feedback
- Single loop feedback (ie little authority to change plans or targets)

Control does also occur at the **higher-levels of the hierarchy**, however, and has the following characteristics.

- Exercised by external stakeholders (eg shareholders)
- Exercised by the market
- Double loop feedback (ie relatively free to change targets)
- Often feedforward elements

4 Behavioural implications of budgeting

6/10, 6/12

FAST FORWARD

Used correctly, a budgetary control system can **motivate** but it can also produce undesirable **negative reactions**.

The purpose of a budgetary control system is to assist management in planning and controlling the resources of their organisation by providing appropriate control information. The information will only be valuable, however, if it is interpreted correctly and used purposefully by managers *and* employees.

The correct use of control information therefore depends not only on the content of the information itself, but also on the behaviour of its recipients. This is because control in business is exercised by people. Their attitude to control information will colour their views on what they should do with it and a number of behavioural problems can arise.

- (a) The **managers who set the budget** or standards are **often not the managers** who are then made **responsible for achieving budget targets**.
- (b) The **goals of the organisation as a whole**, as expressed in a budget, **may not coincide with the personal aspirations of individual managers**.

- (c) **Control is applied at different stages by different people.** A supervisor might get weekly control reports, and act on them; his superior might get monthly control reports, and decide to take different control action. Different managers can get in each others' way, and resent the interference from others.

4.1 Motivation

Motivation is what makes people behave in the way that they do. It comes from individual attitudes, or group attitudes. Individuals will be motivated by personal desires and interests. These may be in line with the objectives of the organisation, and some people 'live for their jobs'. Other individuals see their job as a chore, and their motivations will be unrelated to the objectives of the organisation they work for.

It is therefore vital that the goals of management and the employees harmonise with the goals of the organisation as a whole. This is known as goal congruence. Although obtaining goal congruence is essentially a behavioural problem, **it is possible to design and run a budgetary control system which will go some way towards ensuring that goal congruence is achieved.** Managers and employees must therefore be favourably disposed towards the budgetary control system so that it can operate efficiently.

The management accountant should therefore try to ensure that employees have positive attitudes towards **setting budgets, implementing budgets** (that is, putting the organisation's plans into practice) and feedback of results (**control information**).

4.2 Poor attitudes when setting budgets

Poor attitudes or hostile behaviour towards the budgetary control system can begin at the **planning stage.** **If managers are involved in preparing a budget** the following may happen.

- (a) Managers may **complain that they are too busy** to spend much time on budgeting.
- (b) They may **build 'slack' into their expenditure estimates.**
- (c) They may argue that **formalising a budget plan on paper is too restricting** and that managers should be allowed flexibility in the decisions they take.
- (d) They may set budgets for their budget centre and **not coordinate** their own plans with those of other budget centres.
- (e) They may **base future plans on past results**, instead of using the opportunity for formalised planning to look at alternative options and new ideas.

On the other hand, **managers may not be involved in the budgeting process.** Organisational goals may not be communicated to them and they might have their budget decided for them by senior management or administrative decision. It is **hard for people to be motivated to achieve targets set by someone else.**

4.2.1 Poor attitudes when putting plans into action

Poor attitudes also arise **when a budget is implemented.**

- (a) Managers might **put in only just enough effort** to achieve budget targets, without trying to beat targets.
- (b) A formal budget might **encourage rigidity and discourage flexibility.**
- (c) **Short-term planning** in a budget **can draw attention away from the longer-term consequences of decisions.**
- (d) There might be **minimal cooperation and communication** between managers.
- (e) Managers will often try to make sure that they **spend up to their full budget allowance, and do not overspend**, so that they will not be accused of having asked for too much spending allowance in the first place.

4.2.2 Poor attitudes and the use of control information

The **attitude of managers towards the accounting control information** they receive **might reduce the information's effectiveness.**

- (a) Management accounting control reports could well be seen as having a relatively **low priority** in the list of management tasks. Managers might take the view that they have more pressing jobs on hand than looking at routine control reports.
- (b) Managers might **resent control information**; they may see it as **part of a system of trying to find fault with their work**. This resentment is likely to be particularly strong when budgets or standards are imposed on managers without allowing them to participate in the budget-setting process.
- (c) If budgets are seen as **pressure devices** to push managers into doing better, control reports will be resented.
- (d) Managers **may not understand the information** in the control reports, because they are unfamiliar with accounting terminology or principles.
- (e) Managers might have a **false sense of what their objectives should be**. A production manager might consider it more important to maintain quality standards regardless of cost. He would then dismiss adverse expenditure variances as inevitable and unavoidable.
- (f) **If there are flaws in the system of recording actual costs**, managers will dismiss control information as unreliable.
- (g) **Control information** might be **received weeks after the end of the period** to which it relates, in which case managers might regard it as out-of-date and no longer useful.
- (h) Managers might be **held responsible for variances outside their control**.

It is therefore obvious that accountants and senior management should try to implement systems that are acceptable to budget holders and which produce positive effects.

4.2.3 Pay as a motivator

Many researchers agree that **pay can be an important motivator**, when there is a formal link between higher pay (or other rewards, such as promotion) and achieving budget targets. Individuals are likely to work harder to achieve budget if they know that they will be rewarded for their successful efforts. There are, however, problems with using pay as an incentive.

- (a) A serious problem that can arise is that **formal reward and performance evaluation systems can encourage dysfunctional behaviour**. Many investigations have noted the tendency of managers to pad their budgets either in anticipation of cuts by superiors or to make the subsequent variances more favourable. And there are numerous examples of managers making decisions in response to performance indices, even though the decisions are contrary to the wider purposes of the organisation.
- (b) The targets must be challenging but fair, otherwise individuals will become dissatisfied. **Pay can be a demotivator as well as a motivator!**

5 Setting the difficulty level of a budget

FAST FORWARD

'Aspirations' budgets can be used as **targets** to motivate higher levels of performance but a budget for **planning and decision making** should be based on **reasonable expectations**.

Budgets can motivate managers to achieve a high level of performance. But **how difficult** should targets be? And how might people react to targets of differing degrees of difficulty in achievement?

- (a) There is likely to be a **demotivating** effect where an **ideal standard** of performance is set, because adverse efficiency variances will always be reported.
- (b) A **low standard** of efficiency is also **demotivating**, because there is no sense of achievement in attaining the required standards. If the budgeted level of attainment is too 'loose', targets will be achieved easily, and there will be no impetus for employees to try harder to do better than this.
- (c) A budgeted level of attainment could be the **same** as the level that has been achieved in the past. Arguably, this level will be too low. It might encourage **budgetary slack**.

Academics have argued that each individual has a **personal 'aspiration level'**. This is a level of performance, in a task with which the individual is familiar, which the individual undertakes for himself to reach.

Individual aspirations might be much higher or much lower than the organisation's aspirations, however. The solution might therefore be to have **two budgets**.

- (a) A budget for **planning and decision making** based on **reasonable expectations**
- (b) A budget for **motivational purposes**, with more **difficult targets of performance**

These two budgets might be called an '**expectations budget**' and an '**aspirations budget**' respectively.

6 Participation in budgeting

12/11

FAST FORWARD

A budget can be set from the **top down (imposed budget)** or from the **bottom up (participatory budget)**. Many writers refer to a third style, the negotiated budget.

6.1 Participation

It has been argued that **participation** in the budgeting process **will improve motivation** and so will improve the quality of budget decisions and the efforts of individuals to achieve their budget targets (although obviously this will depend on the personality of the individual, the nature of the task (narrowly defined or flexible) and the organisational culture).

There are basically two ways in which a budget can be set: from the **top down (imposed budget)** or from the **bottom up (participatory budget)**.

6.2 Imposed style of budgeting (top-down budgeting)

In this approach to budgeting, **top management prepare a budget with little or no input from operating personnel** which is then imposed upon the employees who have to work to the budgeted figures.

The times when imposed budgets are effective are as follows.

- In newly-formed organisations
- In very small businesses
- During periods of economic hardship
- When operational managers lack budgeting skills
- When the organisation's different units require precise coordination

They are, of course, advantages and disadvantages to this style of setting budgets.

Advantages

- **Strategic plans** are likely to be incorporated into planned activities
- They **enhance the coordination** between the plans and objectives of divisions
- They use **senior management's awareness** of total resource availability
- They **decrease the input from inexperienced or uninformed lower-level employees**
- They **decrease the period of time taken** to draw up the budgets

Disadvantages

- **Dissatisfaction, defensiveness and low morale** amongst employees
- The **feeling of team spirit** may disappear
- The **acceptance of organisational goals and objectives** could be limited
- The feeling of the budget as a **punitive device** could arise
- **Unachievable budgets** for overseas divisions could result if consideration is not given to local operating and political environments
- **Lower-level management initiative** may be **stifled**

6.3 Participative style of budgeting (bottom-up budgeting)

In this approach to budgeting, **budgets are developed by lower-level managers who then submit the budgets to their superiors**. The budgets are based on the lower-level managers' perceptions of what is achievable and the associated necessary resources.

Participative budgets are effective in the following circumstances.

- In **well-established organisations**
- In **very large businesses**
- During periods of **economic affluence**
- When operational managers have **strong budgeting skills**
- When the organisation's different units act **autonomously**

The **advantages** of participative budgets are as follows.

- They are based on **information from employees** most familiar with the department
- **Knowledge spread** among several levels of management is pulled **together**
- **Morale and motivation** is improved
- They **increase operational managers' commitment** to organisational objectives
- In general they are **more realistic**
- **Co-ordination** between units is **improved**
- **Specific resource requirements** are **included**
- **Senior managers' overview** is mixed with operational level details

There are, on the other hand, a number of **disadvantages** of participative budgets.

- They **consume more time**
- **Changes implemented** by senior management may **cause dissatisfaction**
- Budgets may be **unachievable** if managers' are not qualified to participate
- They may cause managers to introduce **budgetary slack**
- They can support '**empire building**' by subordinates
- An **earlier start** to the budgeting process could be required

6.4 Negotiated style of budgeting

At the two extremes, budgets can be dictated from above or simply emerge from below but, in practice, different levels of management often agree budgets by a process of negotiation. In the imposed budget approach, operational managers will try to negotiate with senior managers the budget targets which they consider to be unreasonable or unrealistic. Likewise senior management usually review and revise budgets presented to them under a participative approach through a process of negotiation with lower level managers. **Final budgets are therefore most likely to lie between what top management would really like and what junior managers believe is feasible**. The budgeting process is hence a **bargaining process** and it is this bargaining which is of vital importance, **determining whether the budget is an effective management tool or simply a clerical device**.

Chapter Roundup

- Here are the objectives of a budgetary planning and control system.
 - Ensure the achievement of the organisation's objectives
 - Compel planning
 - Communicate ideas and plans
 - Coordinate activities
 - Provide a framework for responsibility accounting
 - Establish a system of control
 - Motivate employees to improve their performance
- The **planning and control cycle** has seven steps.
 - *Step 1.* Identify **objectives**
 - *Step 2.* Identify potential **strategies**
 - *Step 3.* Evaluate strategies
 - *Step 4.* Choose alternative courses of action
 - *Step 5.* Implement the long-term plan
 - *Step 6.* Measure actual results and compare with the plan
 - *Step 7.* Respond to divergences from the plan
- **Planning** and **control** occurs at all levels of the **performance hierarchy** to different degrees.
- **Budgetary control** occurs at the **lower** levels of the performance hierarchy.
- Used correctly, a budgetary control system can **motivate** but it can also produce undesirable **negative reactions**.
- ‘**Aspirations**’ budgets can be used as **targets** to motivate higher levels of performance but a budget for **planning and decision making** should be based on **reasonable expectations**.
- A budget can be set from the **top down** (**imposed** budget) or from the **bottom up** (**participatory** budget). Many writers refer to a third style, the negotiated budget.

Quick Quiz

- 1 Put the following steps in the planning cycle in the correct order.
 - Evaluate strategies
 - Implement the long-term plan
 - Identify objectives
 - Choose alternative courses of action
 - Identify potential strategies
- 2 Complete the following steps in the control cycle.

Step 6.....

Step 7.....

(a)

(b)

(c)
- 3 List the ten purposes of using budgets.
- 4 Which of the following is **not** a use of budgetary control?
 - A To define the objectives of the organisation as a whole
 - B To ensure that resources are used as efficiently as possible
 - C To provide some central control when activities are centralised
 - D To provide the basis for the preparation of future budgets

- 5 What three factors are said to determine the effectiveness of participation?
- A Nature of the task, organisation structure, personality
 B Personality, technology, organisation structure
 C Nature of the task, production processes, personality
 D Personality, leadership style, aspirations
- 6 A budget for motivational purposes, with fairly difficult targets of performance, is an aspirations budget.
True or false?
- 7 Provide five reasons why poor attitudes could arise when a budget is implemented.
- 8 *Match the description to the correct term.*
- | | <i>Term</i> | <i>Description</i> |
|-----|-----------------|--|
| (a) | Motivation | 1 Exists where managers working in their own interests also act in harmony with the interests of the organisation as a whole |
| (b) | Goal congruence | 2 Comes from individual or group attitudes |
| (c) | Incentive | 3 Concerned with getting subordinates to run rather than walk towards desired goals |

Answers to Quick Quiz

- 1 Identify objectives
 Identify potential strategies
 Evaluate strategies
 Choose alternative courses of action
 Implement the long-term plan
- 2 *Step 6.* Management uses the feedback to compare actual results and targets.
Step 7. The comparison leads management to do one of three things.
- (a) Take control action
 (b) Decide to do nothing
 (c) Alter the plan or target
- 3 Ensure the achievement of the organisation's objectives
 Compel planning
 Communicate ideas and plans
 Co-ordinate activities
 Allocate resources
 Authorisation
 Provide a framework for responsibility accounting
 Establish a system of control
 Provide a means of performance evaluation
 Motivate employees to improve their performance
- 4 C It should provide some central control when activities are decentralised.
- 5 A
- 6 True
- 7 (a) Managers might put in only just enough effort to achieve budget targets, without trying to beat targets.
 (b) A formal budget might encourage rigidity and discourage flexibility in operational decision making.
 (c) Short-term planning in a budget can draw attention away from the longer-term consequences of decisions.
 (d) Cooperation and communication between managers might be minimal.

- (e) Managers will often try to make sure that they spend up to their full budget allowance, and do not overspend, so that they will not be accused of having asked for too much spending allowance in the first place.

8 (a) 2; (b) 1; (c) 3

Now try the question below from the Exam Question Bank

Number	Level	Marks	Time
Q12	Introductory	12	22 mins

9

Budgetary systems

Topic list	Syllabus reference
1 Traditional budgetary systems	C1 (b), (c), 2 (b)
2 Fixed and flexible budgets	C1 (b), 2 (b)
3 Zero based budgeting systems	C1 (a), (b), 2 (a)
4 Activity based budgeting	C1 (b), 2 (a), (b)
5 Rolling budgets	C1 (b), 2 (a)
6 Beyond Budgeting	C2 (b)
7 Information used in budget systems	C1 (c)
8 Changing budgetary systems	C1 (d), 2 (c)
9 Budget systems and uncertainty	C1 (e)

Introduction

This chapter starts by looking at the **traditional approach** to budgeting and the preparation of budgets. **Incremental budgeting** bases next year's budget on this year's, with increases for inflation and changes in activity levels. However, this may not always be appropriate for certain organisations or for certain types of cost and revenue. **Zero based budgeting** and **rolling budgets** are alternative budget systems which can be applied in certain circumstances and situations. **Activity based budgets** may use bases other than volume of output for flexing budgets. This chapter looks in detail at these systems.

In the next chapter we will look at quantitative aids to budgeting, in other words, different ways of forecasting future figures for use in budgets.

Study guide

		Intellectual level
C1	Budgetary systems	
(a)	Explain how budgetary systems fit within the performance hierarchy	2
(b)	Select and explain appropriate budgetary systems for an organisation, including top-down, bottom-up, rolling, zero base, activity-base, incremental and feed-forward control	2
(c)	Describe the information used in budget systems and the sources of the information needed	2
(d)	Explain the difficulties of changing a budgetary system	2
(e)	Explain how budget systems can deal with uncertainty in the environment	2
C2	Types of budget	
(a)	Prepare rolling budgets and activity based budgets	2
(b)	Indicate the usefulness and problems with different budget types (including fixed, flexible, zero-based, activity-based, incremental, rolling, top-down, bottom up, master, functional).	2
(c)	Explain the difficulties of changing the type of budget used	2

Exam guide

The examiner expects you to be aware of the problems of traditional budget systems and why organisations may be reluctant to change to more appropriate systems.



One of the competencies you require to fulfil performance objective 13 is the ability to contribute to budget planning and production. You can apply the knowledge you obtain from this chapter to help to demonstrate this competence.

1 Traditional budgetary systems

FAST FORWARD

A budget is a **quantified plan of action** for a forthcoming accounting period.
A budget can be set from the **top down** (**imposed** budget) or from the **bottom up** (**participatory** budget).

1.1 Budget preparation

You will have covered budget preparation in your earlier studies and will not be required to prepare sales, production, materials etc budgets in this exam.

The following are **the key points of budget preparation to remind you.**

Point	Detail
Long-term plan	The starting point , this will show what the budget has to achieve (the introduction of new production, the required return, and so on) and outline how it is to be done . It will also contain general guidelines on allowable price increases like wage rates. The long-term policy needs to be communicated to all managers responsible for preparing budgets so that they are aware of the context within which they are budgeting and how their area of responsibility is expected to contribute.

Point	Detail
Limiting factor	The factor that limits the scale of operations , this is usually sales demand, but it may be production capacity where demand is high. Budgeting cannot proceed until the budget for the limiting factor has been prepared, since this affects all the other budgets.
Budget manual	Prepared to assist functional managers , this will show how figures and forecasts are to be arrived at and give any other information that is to apply across the organisation. It is likely to include proformas showing how the information is to be presented. If budgeting is done with spreadsheets, layouts and computations may be pre-programmed, requiring only the entry of the figures. It may include a flow diagram showing how individual budgets are interlinked and specify deadlines by which first drafts must be prepared.
Sales budget	This contains information on the expected volume of sales (based on estimates or market research), the sales mix, and selling prices . The total revenues indicated will be used to compile the cash budget, although this information needs to be adjusted to allow for the expected timing of receipts. The volume of sales indicates the level of production required and the extent of spending on distribution and administration.
Production capacity	The level of sales anticipated is matched against opening inventory and desired closing inventory to establish the level of production. From this can be calculated the need for materials (again allowing for opening and closing inventory), labour and machine hours. In other words production budgeting is done in terms of physical resources initially and costed afterwards . At this stage, too, it is likely that needs for new capital expenditure will be identified. This information will be used in preparing the capital budget.
Functional budgets	Budgets for other areas of the organisation like distribution and administration take the anticipated sales level as their point of reference. Vehicle costs, carriage costs, stationery and communication costs, and above all staff costs feature in these budgets.
Discretionary costs	Training and R&D are known as 'discretionary costs' and have special features.
Consolidation and coordination	This can begin once all parts of the organisation have submitted their individual budgets. It is most unlikely that all of the budgets will be in line with each other at the first attempt. Areas of incompatibility must be identified and the budgets modified in consultation with individual managers. Spreadsheets are invaluable at this stage, both for the consolidation itself and to allow changes to be made quickly and accurately.
Cash budget	This can only be prepared at this stage because it needs to take account of all of the plans of the organisation and translate them into expected cash flows. Cash must be available when it is needed to enable the plans to be carried out. Overdraft facilities may need to be negotiated in advance, or some activities may need to be deferred until cash has been collected.
Master budget	The final stage, once all of the necessary modifications have been made, is to prepare a summary of all of the budgets in the form of a master budget, which generally comprises a budgeted income statement, a budgeted balance sheet and a budgeted cash flow statement .

FAST FORWARD

The traditional approach to budgeting, known as **incremental budgeting**, bases the budget on the current year's results plus an extra amount for estimated growth or inflation next year. It encourages slack and wasteful spending to creep into budgets.

Key term

Incremental budgeting is so called because it is concerned mainly with the increments in costs and revenues which will occur in the coming period.

Incremental budgeting is a reasonable procedure if current operations are as effective, efficient and economical as they can be. It is also appropriate for budgeting for costs such as staff salaries, which may be estimated on the basis of current salaries plus an increment for inflation and are hence administratively fairly easy to prepare.

In general, however, it is an **inefficient form of budgeting** as it **encourages slack** and **wasteful spending** to creep into budgets. Past inefficiencies are perpetuated because cost levels are rarely subjected to close scrutiny.

Advantages of incremental budgets	Disadvantages of incremental budgets
<ul style="list-style-type: none"> Considered to be the quickest and easiest method of budgeting 	<ul style="list-style-type: none"> Builds in previous problems and inefficiencies
<ul style="list-style-type: none"> Suitable for organisations that operate in a stable environment where historic figures are reliable and are not expected to change significantly 	<ul style="list-style-type: none"> Managers may spend for the sake of spending in order to use up their budget for the year and thus ensure that they get the same (or larger) budget next year
	<ul style="list-style-type: none"> Uneconomic activities may be continued. For example, a car manufacturer may continue to make parts in-house when it may be cheaper to outsource



Question

Incremental budgeting

Can incremental budgeting be used to budget for rent? What about for advertising expenditure?

Answer

Incremental budgeting is appropriate for budgeting for rent, which may be estimated on the basis of current rent plus an increment for the annual rent increase. Advertising expenditure, on the other hand, is not so easily quantifiable and is more discretionary in nature. Using incremental budgeting for advertising expenditure could allow slack and wasteful spending to creep into the budget.

1.2.1 Incremental budgeting in the public sector

The traditional approach to budgeting in the public sector has been incremental and this has resulted in existing patterns of public expenditure being locked in. The public spending round in the UK established an annual cycle of year-on-year incremental bids by departments rather than an analysis of outputs and efficiency.

We will look at public sector objectives and performance measurement in more detail in [Chapter 18](#).

2 Fixed and flexible budgets

FAST FORWARD

Fixed budgets remain unchanged regardless of the level of activity; **flexible budgets** are designed to flex with the level of activity.



One of the competencies you require to fulfil performance objective 13 is the ability to amend budgets to reflect changes in circumstances. You can apply the knowledge you obtain from this chapter to help to demonstrate this competence.

2.1 Fixed budgets

Key term

A **fixed budget** is a budget which is designed to remain unchanged regardless of the volume of output or sales achieved.

The master budget prepared before the beginning of the budget period is known as the **fixed budget**. The term 'fixed' means the following.

- (a) The budget is **prepared on the basis of an estimated volume of production** and an **estimated volume of sales**, but no plans are made for the event that actual volumes of production and sales may differ from budgeted volumes.
- (b) When actual volumes of production and sales during a control period (month or four weeks or quarter) are achieved, a fixed budget is **not adjusted (in retrospect) to the new levels of activity**.

The major purpose of a fixed budget is at the planning stage, when it seeks to define the broad objectives of the organisation.

2.2 Flexible budgets

Key term

A **flexible budget** is a budget which, by recognising different cost behaviour patterns, is designed to change as volumes of output change.

Flexible budgets may be used in one of two ways.

- (a) **At the planning stage.** For example, suppose that a company expects to sell 10,000 units of output during the next year. A master budget (the fixed budget) would be prepared on the basis of these expected volumes. However, if the company thinks that output and sales might be as low as 8,000 units or as high as 12,000 units, it may prepare **contingency flexible budgets**, at volumes of, say 8,000, 9,000, 11,000 and 12,000 units and then assess the possible outcomes.
- (b) **Retrospectively.** At the end of each month (control period) or year, the results that should have been achieved given the actual circumstances (the flexible budget) can be compared with the actual results. As we shall see, flexible budgets are an essential factor in **budgetary control**.

The preparation and use of flexible budgets will be looked at in more detail in Chapter 11.

3 Zero based budgeting systems

6/09, 12/10

FAST FORWARD

The principle behind **zero based budgeting (ZBB)** is that the budget for each cost centre should be made from 'scratch' or zero. Every item of expenditure must be justified in its entirety in order to be included in the next year's budget.

ZBB rejects the assumption inherent in **incremental budgeting** that this year's activities will continue at the same level or volume next year, and that next year's budget can be based on this year's costs plus an extra amount, perhaps for expansion and inflation.

Key term

Zero based budgeting involves preparing a budget for each cost centre from a zero base. Every item of expenditure has then to be justified in its entirety in order to be included in the next year's budget.

In reality, however, managers do not have to budget from zero, but can **start from their current level of expenditure and work downwards**, asking what would happen if any particular aspect of current expenditure and current operations were removed from the budget. In this way, every aspect of the budget is examined in terms of its cost and the benefits it provides and the selection of better alternatives is encouraged.

3.1 Implementing zero based budgeting

FAST FORWARD

There is a three-step approach to ZBB.

- Define decision units
- Evaluate and rank packages
- Allocate resources

The implementation of ZBB involves a number of steps but of greater importance is the **development of a questioning attitude** by all those involved in the budgetary process. Existing practices and expenditures must be challenged and searching questions asked.

- Does the activity need to be carried out?
- What would be the consequences if the activity was not carried out?
- Is the current level of provision sufficient?
- Are there alternative ways of providing the function?
- How much should the activity cost?
- Is the expenditure worth the benefits achieved?

The basic approach of ZBB has three steps.

Step 1 **Define decision packages**, comprehensive descriptions of specific organisational activities which management can use to evaluate the activities and **rank** them in order of priority against other activities. There are two types.

- (a) **Mutually exclusive packages** contain alternative methods of getting the same job done. The best option among the packages must be selected by comparing costs and benefits and the other packages are then discarded.
- (b) **Incremental packages** divide one aspect of an activity into different levels of effort. The 'base' package will describe the minimum amount of work that must be done to carry out the activity and the other packages describe what additional work could be done, at what cost and for what benefits.

Suppose that a cost centre manager is preparing a budget for maintenance costs. He might first consider two mutually exclusive packages.

- Package A might be to keep a maintenance team of two men per shift for two shifts each day at a cost of \$60,000 per annum
- Package B might be to obtain a maintenance service from an outside contractor at a cost of \$50,000

A **cost-benefit analysis** will be conducted because the quicker repairs obtainable from an in-house maintenance service might justify its extra cost. If we now suppose that package A is preferred, the budget analysis must be completed by describing the incremental variations in this chosen alternative.

- (a) The 'base' package would describe the minimum requirement for the maintenance work. This might be to pay for one man per shift for two shifts each day at a cost of \$30,000.

- (b) Incremental package 1 might be to pay for two men on the early shift and one man on the late shift, at a cost of \$45,000. The extra cost of \$15,000 would need to be justified, for example by savings in lost production time, or by more efficient machinery.
- (c) Incremental package 2 might be the original preference, for two men on each shift at a cost of \$60,000. The cost-benefit analysis would compare its advantages, if any, over incremental package 1; and so on.

Step 2

Evaluate and rank each activity (decision package) on the basis of its benefit to the organisation. This can be a lengthy process. Minimum work requirements (those that are essential to get a job done) will be given high priority and so too will work which meets legal obligations. In the accounting department these would be minimum requirements to operate the payroll, purchase ledger and sales ledger systems, and to maintain and publish a set of accounts. Common problems that can occur at the ranking stage are discussed in the next section.

Step 3

Allocate resources in the budget according to the funds available and the evaluation and ranking of the competing packages. For example, a car manufacturer may choose to allocate significantly more funds to production processes than service and admin functions, based on the ranking of each activity in step 2.



Question

Base and incremental packages

What might the base and incremental packages for a personnel department cover?

Answer

The base package might cover the recruitment and dismissal of staff. Incremental packages might cover training, pension administration, trade union liaison, staff welfare and so on.



Case Study

In July 2010, South Carolina Treasurer Converse Chellis commenced a study on the implementation of zero-based budgeting for all state departments and agencies, as put forward by the General Assembly.

The General Assembly believes, if implemented correctly, a system of zero-based budgeting will cut down on efficiency and waste in government.

Chellis will examine how other US states have implemented zero-based budgeting and says he hopes to save the state of South Carolina millions of dollars.

'It's time to hold every agency in state government accountable for every dollar it spends. With the implementation of zero-based budgeting, agencies and departments will have to justify every tax dollar they spend each and every year. We've seen how agencies have incrementally increased their budgets. During these remarkably tough economic times, having government examine and explain how it spends money each and every year is just common sense'.

3.2 The advantages and limitations of implementing ZBB

The **advantages** of zero based budgeting are as follows.

- It is possible to identify and **remove inefficient or obsolete operations.**
- It forces employees to **avoid wasteful expenditure.**
- It can **increase motivation.**
- It **responds to changes** in the business environment.
- **ZBB documentation provides** an in-depth **appraisal of an organisation's operations.**

- It challenges the status quo.
- In summary, ZBB should result in a more efficient allocation of resources.

The major disadvantage of zero based budgeting is the volume of extra paperwork created. The assumptions about costs and benefits in each package must be continually updated and new packages developed as soon as new activities emerge. The following problems might also occur.

- (a) Short-term benefits might be emphasised to the detriment of long-term benefits.
- (b) It might give the impression that all decisions have to be made in the budget. Management must be able to meet unforeseen opportunities and threats at all times, however, and must not feel restricted from carrying out new ideas simply because they were not approved by a decision package, cost benefit analysis and the ranking process.
- (c) It may call for management skills both in constructing decision packages and in the ranking process which the organisation does not possess. Managers may have to be trained in ZBB techniques.
- (d) The organisation's information systems may not be capable of providing suitable information.
- (e) The ranking process can be difficult. Managers face three common problems.
 - (i) A large number of packages may have to be ranked.
 - (ii) It can be difficult to rank packages which appear to be equally vital, for legal or operational reasons.
 - (iii) It is difficult to rank activities which have qualitative rather than quantitative benefits – such as spending on staff welfare and working conditions.

In summary, perhaps the most serious drawback to ZBB is that it requires a lot of management time and paperwork. One way of obtaining the benefits of ZBB but of overcoming the drawbacks is to apply it selectively on a rolling basis throughout the organisation. This year finance, next year marketing, the year after personnel and so on. In this way all activities will be thoroughly scrutinised over a period of time.

3.3 Using zero based budgeting

FAST FORWARD

ZBB is particularly useful for budgeting for discretionary costs and for rationalisation purposes.

ZBB is not particularly suitable for direct manufacturing costs, which are usually budgeted using standard costing, work study and other management planning and control techniques. It is best applied to support expenses, that is expenditure incurred in departments which exist to support the essential production function. These support areas include marketing, finance, quality control, personnel, data processing, sales and distribution. In many organisations, these expenses make up a large proportion of the total expenditure. These activities are less easily quantifiable by conventional methods and are more discretionary in nature.

ZBB can also be successfully applied to service industries and non-profit-making organisations such as local and central government departments, educational establishments, hospitals and so on, and in any organisation where alternative levels of provision for each activity are possible and where the costs and benefits are separately identifiable.

ZBB can also be used to make rationalisation decisions. 'Rationalisation' is a euphemism for cutting back on production and activity levels, and cutting costs. The need for service departments to operate above a minimum service level or the need for having a particular department at all can be questioned, and ZBB can be used to make rationalisation decisions when an organisation is forced to make spending cuts.

4 Activity based budgeting

FAST FORWARD

At its simplest, activity based budgeting (ABB) is merely the use of costs determined using ABC as a basis for preparing budgets.

Key term

Activity based budgeting involves defining the activities that underlie the financial figures in each function and using the level of activity to decide how much resource should be allocated, how well it is being managed and to explain variances from budget.

Implementing ABC (see Chapter 2) leads to the realisation that the **business as a whole** needs to be managed with far more reference to the **behaviour of activities and cost drivers** identified. For example, traditional budgeting may make managers 'responsible' for activities which are driven by factors beyond their control: the personnel department cost of setting up new employee records is driven by the number of new employees required by managers other than the personnel manager.

4.1 Principles of ABB

ABB involves defining the activities that underlie the financial figures in each function and using the **level of activity** to decide how much resource should be **allocated**, how well it is being **managed** and to **explain variances** from budget.

ABB is therefore based on the following **principles**.

- (a) It is **activities which drive costs** and the aim is to **control the causes** (drivers) of costs rather than the costs themselves, with the result that in the long term, costs will be better managed and better understood.
- (b) **Not all activities are value adding** and so activities must be examined and split up according to their ability to add value.
- (c) Most departmental activities are driven by demands and decisions **beyond the immediate control** of the manager responsible for the department's budget.
- (d) Traditional financial measures of performance are unable to fulfil the objective of **continuous improvement**. Additional measures which focus on drivers of costs, the quality of activities undertaken, the responsiveness to change and so on are needed.

4.2 Example: ABB

A stores department has two main activities, receiving deliveries of raw materials from suppliers into stores and issuing raw materials to production departments. Two major cost drivers, the number of deliveries of raw materials and the number of production runs, have been identified. Although the majority of the costs of the department can be attributed to the activities, there is a small balance, termed 'department running costs', which includes general administration costs, part of the department manager's salary and so on.

Based on activity levels expected in the next control period, the following cost driver volumes have been budgeted.

250 deliveries of raw materials
120 production runs

On the basis of budgeted departmental costs and the cost analysis, the following budget has been drawn up for the next control period.

	<i>Total</i>	<i>Costs attributable to receiving deliveries</i>	<i>Costs attributable to issuing materials</i>	<i>Dept running costs</i>
Cost	\$'000	\$'000	\$'000	\$'000
Salaries – management	25	8	12	5
Salaries – store workers	27	13	12	2
Salaries – administration	15	4	5	6
Consumables	11	3	5	3
Information technology costs	14	5	8	1
Other costs	19	10	6	3
	<u>111</u>	<u>43</u>	<u>48</u>	<u>20</u>
Activity volumes		250	120	
Cost per unit of cost driver		\$172	\$400	\$20,000

Points to note

- (a) The apportionment of cost will be subjective to a certain extent. The objective of the exercise is that the resource has to be justified as supporting one or more of the activities. Costs cannot be hidden.
- (b) The cost driver rates of \$172 and \$400 can be used to calculate product costs using ABC.
- (c) Identifying activities and their costs helps to focus attention on those activities which add value and those that do not.
- (d) The budget has highlighted the cost of the two activities.

4.3 Benefits of ABB

Some writers treat ABB as a complete philosophy in itself and attribute to it all the good features of strategic management accounting, zero base budgeting, total quality management, and other ideas. For example, the following claims have been made.

- (a) Different **activity levels** will provide a foundation for the 'base' package and incremental packages of **ZBB**.
- (b) It will ensure that the organisation's overall **strategy** and any actual or likely changes in that strategy will be taken into account, because it attempts to manage the business as the **sum of its interrelated parts**.
- (c) **Critical success factors** will be identified and performance measures devised to monitor progress towards them. (A critical success factor is an activity in which a business **must** perform well if it is to succeed).
- (d) Because concentration is focused on the **whole of an activity**, not just its separate parts, there is more likelihood of **getting it right first time**. For example what is the use of being able to **produce** goods in time for their despatch date if the budget provides insufficient resources for the distribution manager who has to **deliver** them?



Question

Activity based budget

The production department of SPI Co has four major activities namely receiving deliveries, material handling, production runs and quality tests.

Each of these activities has an identifiable cost driver. These are provided below along with estimated volumes for the coming period.

Number of deliveries	300
Number of movements of material	400
Number of production runs	800
Number of quality tests	600

Two other activities that occur in the department are administration and supervision. Whilst these activities are non-volume related, they are necessary functions and should not be ignored in the budgeting process.

Budgeted costs for the coming period are displayed below.

	<i>Total</i>	<i>Attributable to</i>
	\$'000	\$'000
Management salary	50	Supervision: \$45; Administration: \$5
Basic wages	30	Receiving deliveries: \$7; Production runs: \$5; Administration: \$6 Material handling: \$7; Quality tests: \$5
Overtime	15	Receiving deliveries: \$6; Quality tests: \$1; Production runs: \$8
Factory overheads	12	Receiving deliveries: \$3; Production runs: \$2; Administration \$1.5; Material handling \$2; Quality tests: \$1.5; Supervision: \$2
Other costs	4	Receiving deliveries: \$1; Supervision: \$1; Administration: \$2
	<u>111</u>	

Required

Produce an activity based budget for the coming period that shows

- (i) total cost for each activity
- (ii) total cost for the production department
- (iii) cost per activity unit

Answer

Activity based budget for SPI Co

	<i>Receiving deliveries</i>	<i>Material handling</i>	<i>Production runs</i>	<i>Quality tests</i>	<i>Admin</i>	<i>S'vision</i>	<i>Total</i>
Cost driver	No of deliveries	No of movements of material	No of production runs	No of quality tests	–	–	
Volume	300	400	800	600			
	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000
Management salary	–	–	–	–	5	45	50
Basic wages	7	7	5	5	6	–	30
Overtime	6	–	8	1	–	–	15
Factory o'heads	3	2	2	1.5	1.5	2	12
Other	<u>1</u>	<u>–</u>	<u>–</u>	<u>–</u>	<u>2</u>	<u>1</u>	<u>4</u>
Total	<u>17</u>	<u>9</u>	<u>15</u>	<u>7.5</u>	<u>14.5</u>	<u>48</u>	<u>111</u>
Cost per activity unit	\$56.67	\$22.50	\$18.75	\$12.50			

5 Rolling budgets

FAST FORWARD

Rolling budgets (continuous budgets) are budgets which are continuously updated by adding a further period (say a month or a quarter) and deducting the earliest period.

5.1 Dynamic conditions

Actual conditions may differ from those anticipated when the budget was drawn up for a number of reasons.

- (a) **Organisational changes** may occur.
 - (i) A change in structure, from a functional basis, say, to a process-based one
 - (ii) New agreements with the workforce about flexible working or safety procedures
 - (iii) The reallocation of responsibilities following, say, the removal of tiers of middle management and the 'empowerment' of workers further down the line
- (b) Action may be needed to **combat an initiative by a competitor.**
- (c) **New technology** may be introduced to improve productivity, reduce labour requirements or enhance quality.
- (d) **Environmental conditions** may change: there may be a general boom or a recession, an event affecting supply or demand, or a change in government or government policy.

(e) The level of **inflation** may be higher or lower than that anticipated.

(f) The **level of activities** may be different from the levels planned.

Any of these changes **may make the original budget quite inappropriate**, either in terms of the numbers expected, or the way in which responsibility for achieving them is divided, or both.

If management need the chance to revise their plans, they may decide to introduce a system of **rolling budgets**.

Key term

A **rolling budget** is a budget which is continuously updated by adding a further accounting period (a month or quarter) when the earlier accounting period has expired.

Rolling budgets are an attempt to prepare targets and plans which are **more realistic and certain**, particularly with a regard to price levels, by **shortening the period between preparing budgets**.

Instead of preparing a **periodic budget** annually for the full budget period, there would be **budgets every one, two, three or four months** (three to six, or even twelve budgets each year). **Each of these budgets would plan for the next twelve months** so that the current budget is extended by an extra period as the current period ends: hence the name rolling budgets.

Suppose, for example, that a rolling budget is prepared every three months. The first three months of the budget period would be planned in great detail, and the remaining nine months in lesser detail, because of the greater uncertainty about the longer-term future. If a first continuous budget is prepared for January to March in detail and April to December in less detail, a new budget will be prepared towards the end of March, planning April to June in detail and July to March in less detail. Four rolling budgets would be prepared every 12 months on this 3 and 9 month basis, requiring, inevitably, greater administrative effort.

5.2 Example: Preparing a rolling budget

A company uses a system of rolling budgets. The sales budget is displayed below.

	Jan - Mar	Apr - Jun	Jul - Sep	Oct - Dec	Total
	\$	\$	\$	\$	\$
Sales	78,480	86,120	91,800	97,462	353,862

Actual sales for January – March were \$74,640. The adverse variance is explained by growth being lower than anticipated and the market being more competitive than predicted.

Senior management has proposed that the revised assumption for sales growth should be 2.5% per quarter.

Required

Update the budget as appropriate.

Solution

Step 1 The revised budget should incorporate 2.5% growth starting from the actual sales figure for January – March.

$$\$74,640 \times 1.025 = \$76,506$$

Step 2 Using the revised balance for January – March, update the budget for the next four quarters (including a figure for January – March of the following year).

Apr – Jun	=	$\$76,506 \times 1.025$	=	$\$78,419$
Jul – Sep	=	$\$78,419 \times 1.025$	=	$\$80,379$
Oct – Dec	=	$\$80,379 \times 1.025$	=	$\$82,388$
Jan – Mar	=	$\$82,388 \times 1.025$	=	$\$84,448$

Step 3 Revised budget

	Apr – Jun	Jul – Sep	Oct – Dec	Jan – Mar	Total
	\$	\$	\$	\$	\$
Sales	78,419	80,379	82,388	84,448	<u>325,634</u>

5.3 The advantages and disadvantages of rolling budgets

The **advantages** are as follows.

- They **reduce the element of uncertainty** in budgeting because they concentrate detailed planning and control on short-term prospects where the degree of uncertainty is much smaller.
- They force managers to reassess the budget regularly, and to produce budgets which are **up to date** in the light of current events and expectations.
- Planning and control will be based on a recent plan** which is likely to be far more realistic than a fixed annual budget made many months ago.
- Realistic budgets are likely to have a **better motivational influence** on managers.
- There is **always a budget which extends for several months ahead**. For example, if rolling budgets are prepared quarterly there will always be a budget extending for the next 9 to 12 months. This is not the case when fixed annual budgets are used.

The **disadvantages** of rolling budgets can be a deterrent to using them.

- They involve **more time, effort and money** in budget preparation.
- Frequent budgeting might have an **off-putting effect on managers** who doubt the value of preparing one budget after another at regular intervals.
- Revisions to the budget might involve revisions to standard costs too, which in turn would involve revisions to stock valuations. This could replace a large **administrative effort** from the accounts department every time a rolling budget is prepared.

5.4 Continuous budgets or updated annual budgets

If the expected changes are not likely to be continuous there is a strong argument that routine updating of the budget is unnecessary. **Instead the annual budget could be updated whenever changes become foreseeable**, so that a budget might be updated once or twice, and perhaps more often, during the course of the year.

When a fixed budget is updated, a 'rolling' budget would probably not be prepared. If a budget is updated in month 8 of the year, the updated budget would relate to months 8 – 12. It would not be extended to month 7 of the following year.

6 Beyond Budgeting

FAST FORWARD

Beyond Budgeting is a model that proposes that traditional budgeting should be abandoned. **Adaptive management processes** should be used rather than fixed annual budgets.

6.1 Criticisms of budgeting

In our discussion of the budgetary planning process we have come across many difficulties with budgets and criticisms of how they are used in organisations.

The Beyond Budgeting Round Table (BBRT), an independent research collaborative, propose that budgeting, as most organisations practise it, should be abandoned. Their website at www.bbtt.org lists the following ten criticisms of budgeting as put forward by Hope and Fraser *Beyond Budgeting*, 1st edition, Harvard Business School Press, 2003.

- (a) **Budgets are time consuming and expensive.** Even with the support of computer models it is estimated that the budgeting process uses up to 20 to 30 per cent of senior executives' and financial managers' time.
- (b) **Budgets provide poor value to users.** Although surveys have shown that some managers feel that budgets give them control, a large majority of financial directors wish to reform the budgetary process because they feel that finance staff spend too much time on 'lower value added activities'.
- (c) **Budgets fail to focus on shareholder value.** Most budgets are set on an incremental basis as an acceptable target agreed between the manager and the manager's superior. Managers may be rewarded for achieving their short term budgets and will not look to the longer term or take risks, for fear of affecting their own short term results.
- (d) **Budgets are too rigid and prevent fast response.** Although most organisations do update and revise their budgets at regular intervals as the budget period proceeds the process is often too slow compared with the pace at which the external environment is changing.
- (e) **Budgets protect rather than reduce costs.** Once a manager has an authorised budget he can spend that amount of resource without further authorisation. A 'use it or lose it' mentality often develops so that managers will incur cost unnecessarily. This happens especially towards the end of the budget period in the expectation that managers will not be permitted to carry forward any unused resource into the budget for next period.
- (f) **Budgets stifle product and strategy innovation.** The focus on achieving the budget discourages managers from taking risks in case this has adverse effects on their short term performance. Managers do not have the freedom to respond to changing customer needs in a fast changing market because the activity they would need to undertake is not authorised in their budget.
- (g) **Budgets focus on sales targets rather than customer satisfaction.** The achievement of short term sales forecasts becomes the focus of most organisations. However this does not necessarily result in customer satisfaction. The customer may be sold something **inappropriate to their needs**, as in recent years in the UK financial services industry. Alternatively if a manager has already met the sales target for a particular period they might try to **delay sales to the next period**, in order to give themselves a 'head start' towards achieving the target for the next period. Furthermore, there is an incentive towards the end of a period, if a manager feels that the sales target is not going to be achieved for the period, to **delay sales until the next period**, and thus again have a head start towards achieving the target for the next period. All of these actions, focusing on sales targets rather than customer satisfaction, will have a detrimental effect on the organisation in the longer term.
- (h) **Budgets are divorced from strategy.** Most organisations monitor the monthly results against the short term budget for the month. What is needed instead is a system of monitoring the longer term progress against the organisation's strategy.
- (i) **Budgets reinforce a dependency culture.** The process of planning and budgeting within a framework devolved from senior management perpetuates a culture of dependency. Traditional budgeting systems, operated on a centralised basis, do not encourage a culture of **personal responsibility**.
- (j) **Budgets lead to unethical behaviour.** For example building **slack** into the budget in order to create an easier target for achievement.

6.2 Beyond Budgeting concepts

Two fundamental concepts underlie the Beyond Budgeting approach.

- (a) **Use adaptive management processes rather than the more rigid annual budget.** Traditional annual plans tie managers to predetermined actions which are not responsive to current situations. Managers should instead be planning on a **more adaptive**, rolling basis but with the focus on cash forecasting rather than purely on cost control. Performance is monitored against world-class benchmarks, competitors and previous periods.

- (b) **Move towards devolved networks rather than centralised hierarchies.** The emphasis is on encouraging a culture of personal responsibility by delegating decision making and performance accountability to line managers.

7 Information used in budget systems

FAST FORWARD

Information used in budget systems will come from a wide variety of sources.

Past data may be used as a starting point for the preparation of budgets but other information from a wide variety of sources will also be used. Each **function** of the organisation will be required to estimate revenue and expenditure for the budget period. For example, marketing, personnel and research and development.

7.1 Sales budget information

As we have seen, for many organisations, the principal budget factor is sales volume. The sales budget is therefore often the primary budget from which the majority of the other budgets are derived. Before the sales budget can be prepared a **sales forecast** has to be made. Sales forecasting is complex and difficult and involves the use of information from a variety of sources.

- Past sales patterns
- The economic environment
- Results of market research
- Anticipated advertising
- Competition
- Changing consumer taste
- New legislation
- Distribution
- Pricing policies and discounts offered
- Legislation
- Environmental factors

7.2 Production budget information

Sources of information for the production budget will include:

- (a) **Labour costs** including idle time, overtime and standard output rates per hour.
- (b) **Raw material costs** including allowances for losses during production.
- (c) **Machine hours** including expected idle time and expected output rates per machine hour.

This information will come from the production department and a large part of the traditional work of **cost accounting** involves ascribing costs to the physical information produced.

8 Changing budgetary systems

FAST FORWARD

An organisation which decides to **change** its budgetary practices will face a number of difficulties.

The business environment has become increasingly complex, uncertain and dynamic and organisations need to be able to adapt quickly to changing conditions. It has been argued that traditional budgets are too rigid and prevent fast response to changing conditions.

However, an organisation which decides to **change** its type of budget used, or budgetary system, will face a number of **difficulties**.

- (a) **Resistance by employees.** Employees will be familiar with the current system and may have built in slack so will not easily accept new targets. New control systems that threaten to alter existing power relationships may be thwarted by those affected.
- (b) **Loss of control.** Senior management may take time to adapt to the new system and understand the implications of results.
- (c) **Training.** In order for the new budget to operate effectively, everyone within the organisation will need to be fully trained. This is time-consuming and expensive.

- (d) **Costs of implementation.** Any new system or process requires careful implementation which will have cost implications.
- (e) **Lack of accounting information.** The organisation may not have the **systems** in place to obtain and analyse the necessary information.

9 Budget systems and uncertainty

FAST FORWARD

Uncertainty can be allowed for in budgeting by means of **flexible budgeting, rolling budgets, probabilistic budgeting** and **sensitivity analysis**.

Causes of uncertainty in the budgeting process include:

- (a) **Customers.** They may decide to buy less than forecast, or they may buy more.
- (b) **Products/services.** In the modern business environment, organisations need to respond to customers' rapidly changing requirements.
- (c) **Inflation** and movements in **interest and exchange rates.**
- (d) **Volatility** in the **cost of materials.**
- (e) **Competitors.** They may steal some of an organisation's expected customers, or some competitors' customers may change their buying allegiance.
- (f) **Employees.** They may not work as hard as was hoped, or they may work harder.
- (g) **Machines.** They may break down unexpectedly.
- (h) There may be **political unrest** (terrorist activity), **social unrest** (public transport strikes) or minor or major **natural disasters** (storms, floods).

Rolling budgets are a way of trying to **reduce the element of uncertainty** in the plan. There are **other planning methods** which try to **analyse the uncertainty** such as **probabilistic budgeting** (where probabilities are assigned to different conditions – see [Chapter 7](#)) and **sensitivity analysis**. These methods are suitable when the **degree of uncertainty is quantifiable** from the start of the budget period and actual results are not expected to go outside the range of these expectations.

Chapter Roundup

- A budget is a **quantified plan of action** for a forthcoming accounting period.
- A budget can be set from the **top down (imposed budget)** or from the **bottom up (participatory budget)**.
- The traditional approach to budgeting, known as **incremental budgeting**, bases the budget on the current year's results plus an extra amount for estimated growth or inflation next year. It encourages slack and wasteful spending to creep into budgets.
- **Fixed budgets** remain unchanged regardless of the level of activity; **flexible budgets** are designed to flex with the level of activity
- The principle behind **zero based budgeting (ZBB)** is that the budget for each cost centre should be made from 'scratch' or zero. Every item of expenditure must be justified in its entirety in order to be included in the next year's budget.
- There is a three-step approach to ZBB.
 - Define decision units
 - Evaluate and rank packages
 - Allocate resources
- ZBB is particularly useful for budgeting for discretionary costs and for rationalisation purposes.
- At its simplest, **activity based budgeting (ABB)** is merely the use of costs determined using ABC as a basis for preparing budgets.
- **Rolling budgets (continuous budgets)** are budgets which are continuously updated by adding a further period (say a month or a quarter) and deducting the earliest period.
- **Beyond Budgeting** is a model that proposes that traditional budgeting should be abandoned. **Adaptive management processes** should be used rather than fixed annual budgets.
- **Information** used in budget systems will come from a wide variety of sources.
- An organisation which decides to **change** its budgetary practices will face a number of difficulties.
- Uncertainty can be allowed for in budgeting by means of **flexible budgeting, rolling budgets, probabilistic budgeting** and **sensitivity analysis**.

Quick Quiz

1 Which of the following could not be a principal budget factor?

- | | |
|------------------|----------------------|
| (a) Cash | (b) Machine capacity |
| (c) Sales demand | (d) Selling price |
| (e) Labour | (f) Premises |

2 *Fill in the gaps.*

A flexible budget is a budget which, by recognising, is designed to as the level of activity changes.

3 *Match the descriptions to the budgeting style.*

Description

- (a) Budget allowances are set without the involvement of the budget holder
 (b) All budget holders are involved in setting their own budgets

Budgeting style

- Bottom-up budgeting
 Top-down budgeting

4 Incremental budgeting is widely used and is a particularly efficient form of budgeting.

True False

5 What are the three steps of ZBB?

Step 1

Step 2

Step 3

6 To which of the following can ZBB be usefully applied?

- Personnel
- Social services department of local government
- Direct material costs
- Sales department
- Schools
- An inefficient production department
- An efficient production department

<i>Use ZBB</i>	<i>Do not use ZBB</i>

7 *Choose the appropriate word from those highlighted.*

A rolling budget is also known as a **periodic/continuous** budget.

8 If a system of a ABB is in use, how might the cost of scheduling production be flexed?

- A Number of items produced
- B Number of set-ups
- C Number of direct labour hours
- D Number of parts used in production

- 9 A system of zero-based budgeting forces employees to remove wasteful expenditure.
 True False
- 10 Use of zero-based budgeting implies flexing budgets on the basis of differences between budgeted and actual cost-driving activities.
 True False

Answers to Quick Quiz

- 1 (d)
- 2 cost behaviour patterns
flex or change
- 3 (a) Top-down budgeting
(b) Bottom-up budgeting
- 4 False. Incremental budgeting is inefficient.
- 5 Step 1. Define decision packages
Step 2. Evaluate and rank activities (decision package)
Step 3. Allocate resources

6

	<i>Use ZBB</i>	<i>Do not use ZBB</i>
Personnel	✓	
Social services department of local government	✓	
Direct material costs		✓
Sales department	✓	
Schools	✓	
An inefficient production department	✓	
An efficient production department		✓

- 7 It is also known as a continuous budget.
- 8 B Number of set-ups
- 9 True
- 10 False. This is a common feature of **activity-based** budgeting.

Now try the question below from the Exam Question Bank

Number	Level	Marks	Time
Q13	Introductory	15	27 mins

10

Quantitative analysis in budgeting

Topic list	Syllabus reference
1 Analysing fixed and variable costs	C3 (a)
2 Learning curves	C3 (b), (c)
3 Applying expected values	C3 (d)
4 Using spreadsheets in budgeting	C3 (e)

Introduction

The success of a budget is largely dependent on the level of accuracy in estimating the revenues and costs for the budget period.

This chapter looks at the **quantitative techniques** involved in budgeting, including the **high-low method** and the concept of the **learning curve**.

We also consider how **expected values** can be used to determine the best combination of profit and risk, and the use of **spreadsheets** throughout the budgeting process.

Study guide

		Intellectual level
C3	Quantitative analysis in budgeting	
(a)	Analyse fixed and variable cost elements from total cost data using the high/low method	2
(b)	Estimate the learning effect and apply the learning curve to a budgetary problem, including calculations on steady states	2
(c)	Discuss the reservations with the learning curve	2
(d)	Apply expected values and explain the problems and benefits	2
(e)	Explain the benefits and dangers inherent in using spreadsheets in budgeting	2

Exam guide

The quantitative techniques covered in this chapter are likely to form the calculation part of a budgeting question. Learning curves will probably be the hardest calculation you will need to tackle in this exam.



One of the competencies you require to fulfil performance objective 13 of the PER is the ability to prepare budgets based on the best information to an appropriate level of detail. You can apply the knowledge you obtain from this chapter of the text to help to demonstrate this competence.

1 Analysing fixed and variable costs

FAST FORWARD

The **high-low method** is a quantitative technique the management accountant can use to analyse fixed and variable cost elements from total cost data.

1.1 The high-low method

12/07, 12/08

You will have encountered the high-low method in your earlier studies. It is used to identify the fixed and variable elements of costs that are **semi-variable**. Read through the knowledge brought forward and do the question below to jog your memory.

Knowledge brought forward from earlier studies

Follow the steps below.

Step 1

Review records of costs in previous periods.

- Select the period with the **highest** activity level
- Select the period with the **lowest** activity level

Step 2

If inflation makes it difficult to compare costs, adjust by indexing up or down.

Step 3

Determine the following.

- Total costs at high activity level
- Total costs at low activity level
- Total units at high activity level
- Total units at low activity level

Step 4

Calculate the following.

$$\frac{\text{Total cost at high activity level} - \text{total cost at low activity level}}{\text{Total units at high activity level} - \text{total units at low activity level}}$$

$$= \text{variable cost per unit (v)}$$

Step 5

The fixed costs can be determined as follows. (Total cost at high activity level) – (total units at high activity level × variable cost per unit)



Question

High-low method

A department in a large organisation wishes to develop a method of predicting its total costs in a period. The following data have been recorded.

Month	Activity level (X) units	Cost \$
January	1,600	28,200
February	2,300	29,600
March	1,900	28,800
April	1,800	28,600
May	1,500	28,000
June	1,700	28,400

The total cost model for a period could be represented by what equation?

Answer

The highest activity level is in February and the lowest in May.

Total cost at highest activity level = \$29,600

Total cost at lowest activity level = \$28,000

Total units at highest activity level = 2,300

Total units at lowest activity level = 1,500

$$\text{Variable cost per unit} = \frac{29,600 - 28,000}{2,300 - 1,500} = \frac{1,600}{800} = \$2$$

Fixed costs = 29,600 – (2,300 × 2) = \$25,000

Total costs = 25,000 + 2x

1.2 The usefulness of the high-low method

The high-low method is a simple and easy to use method of estimating fixed and variable costs. However there are a number of problems with it.

- The method **ignores** all cost information apart from at the highest and lowest volumes of activity and these may not be **representative** of costs at all levels of activity.
- Inaccurate** cost estimates may be produced as a result of the assumption of a constant relationship between costs and volume of activity.
- Estimates are based on **historical** information and conditions may have changed.

The examiner has stated that she will use the high-low method to provide overhead data within a question.

2 Learning curves

12/08, 12/09, 12/11

FAST FORWARD

Learning curve theory may be useful for forecasting production time and labour costs in certain circumstances, although the method has many limitations.

Whenever an individual starts a job which is **fairly repetitive** in nature, and provided that his speed of working is not dictated to him by the speed of machinery (as it would be on a production line), he is likely to become **more confident and knowledgeable** about the work as he gains experience, to become **more efficient**, and to do the work **more quickly**.

Eventually, however, when he has acquired enough experience, there will be nothing more for him to learn, and so **the learning process will stop**.

Key term

Learning curve theory applies to situations where the work force as a whole improves in efficiency with experience. The **learning effect** or **learning curve effect** describes the speeding up of a job with repeated performance.

2.1 Where does learning curve theory apply?

Labour time should be expected to get shorter, with experience, in the production of items which exhibit any or all of the following features.

- Made largely **by labour effort** (rather than by a **highly mechanised** process)
- Brand **new** or relatively **short-lived** (learning process does not continue indefinitely)
- **Complex** and made in **small quantities** for **special orders**

2.2 The three approaches to learning curve problems

There are three methods that can be used to address learning curve scenarios.

- **Method 1.** The tabular approach
- **Method 2.** The graphical approach
- **Method 3.** The algebraic approach

2.3 Method 1 – The tabular approach: cumulative average time and the learning rate

The **tabular approach** is only effective in scenarios where output is doubling.

Under this approach, a table is set up to show levels of output, cumulative average time required per unit and incremental time for additional units. The **cumulative average time per unit** produced is assumed to **decrease** by a **constant percentage** every time **total output** of the product **doubles**.

For instance, where an 80% learning effect occurs, the cumulative average time required per unit of output is reduced to 80% of the previous cumulative average time when output is doubled.

- By **cumulative average time**, we mean the average time per unit for all units produced so far, back to and including the first unit made.
- The **doubling** of output is an important feature of the learning curve measurement.

Don't worry if this sounds quite hard to grasp in words, because it is hard to grasp (until you've learned it!). It is best explained by a numerical example.

2.4 Example: An 80% learning curve

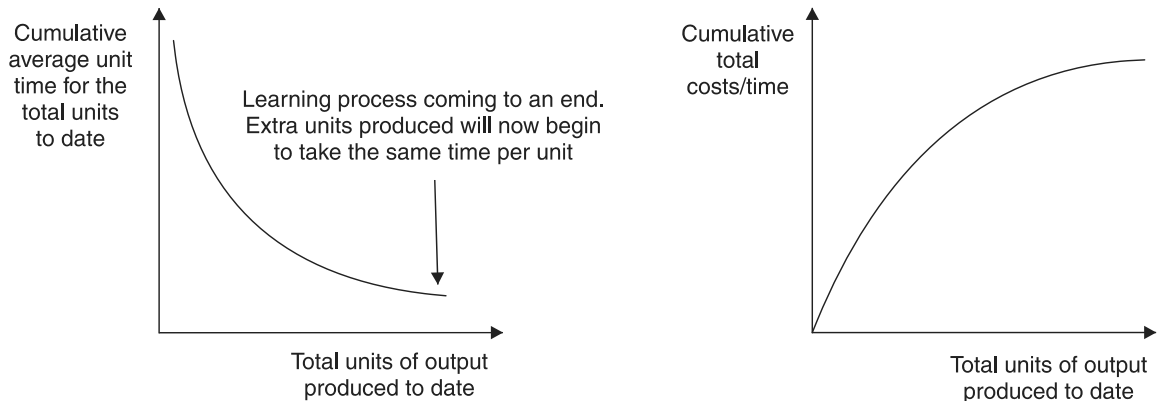
The first unit of output of a new product requires 100 hours. An 80% learning curve applies. The production times would be as follows.

Cumulative number of units	Cumulative avg time per unit (hours)	Cumulative total time (hours)	Incremental number of units	Incremental total time (hours)	Incremental average time (hours)
1	100.0	100.0	–	–	–
2*	80.0	160.0	1	60.0	60.0
4*	64.0	256.0	2	96.0	48.0
8*	51.2	409.6	4	153.6	38.4

* Output is being **doubled** each time.

2.5 Method 2 – The graphical approach

The learning effect from the above example can also be shown on a **graph**, as a learning curve either for **unit times** or **cumulative total times or costs**.



Whilst this approach is useful in scenarios where output is not doubling, in reality it is not as accurate as methods 1 and 3.

2.6 Example: The learning curve

Captain Kitts has designed a new type of sailing boat, for which the cost of the first boat to be produced has been estimated as follows:

	\$
Materials	5,000
Labour (800 hrs × \$5 per hr)	4,000
Overhead (150% of labour cost)	6,000
	<u>15,000</u>
Profit mark-up (20%)	3,000
Sales price	<u>18,000</u>

It is planned to sell all the yachts at full cost plus 20%. An 80% learning curve is expected to apply to the production work. The management accountant has been asked to provide cost information so that decisions can be made on what price to charge.

- What is the separate cost of a second yacht?
- What would be the cost per unit for a third and a fourth yacht, if they are ordered separately later on?
- If they were all ordered now, could Captain Kitts quote a single unit price for four yachts and eight yachts?

Solution

<i>Cumulative number of units</i>	<i>Cumulative avg time per unit (hours)</i>	<i>Cumulative total time (hours)</i>	<i>Incremental number of units</i>	<i>Incremental total time (hours)</i>	<i>Incremental average time (hours)</i>
1	800.0	800.0	–	–	–
2*	640.0	1,280.0 **	1	480.0	480.0
4*	512.0	2,048.0	2	768.0	384.0
8*	409.6	3,276.8	4	1,228.8	307.2

* Output is being **doubled** each time.

** $640 \times 2 = 1,280$, $512 \times 4 = 2,048$

(a) **Separate cost of a second yacht**

	\$
Materials	5,000
Labour (480 hrs × \$5)	2,400
Overhead (150% of labour cost)	3,600
Total cost	<u>11,000</u>

(b) **Cost of the third and fourth yachts**

	\$
Materials cost for two yachts	10,000
Labour (768 hours × \$5)	3,840
Overhead (150% of labour cost)	5,760
Total cost	<u>19,600</u>
Cost per yacht (÷2)	<u>9,800</u>

(c) **A price for the first four yachts together and for the first eight yachts together**

	<i>First four yachts</i>		<i>First eight yachts</i>
	\$		\$
Materials	20,000		40,000
Labour (2,048 hrs)	10,240	(3,276.8 hrs)	16,384
Overhead (150% of labour cost)	<u>15,360</u>		<u>24,576</u>
Total cost	45,600		80,960
Profit (20%)	<u>9,120</u>		<u>16,192</u>
Total sales price	<u>54,720</u>		<u>97,152</u>
Price per yacht (÷4)	<u>13,680</u>	(÷8)	<u>12,144</u>

This assumes that Captain Kitts is happy to pass on the efficiency savings to the customer in the form of a lower price.



Question

Learning curve theory

Bortamord anticipates that a 90% learning curve will apply to the production of a new item. The first item will cost \$2,000 in materials, and will take 500 labour hours. The cost per hour for labour and variable overhead is \$5.

You are required to calculate the total cost for the first unit and for the first 8 units.

Answer

Cumulative number of units	Cumulative avg time per unit (hours)	Cumulative total time (hours)	Incremental number of units	Incremental total time (hours)	Incremental average time (hours)
1	500.0	500.0	–	–	–
2*	450.0	900.0	1	400.0	400.0
4*	405.0	1,620.0	2	720.0	360.0
8*	364.5	2,916.0	4	1,296.0	324.0

	Cost of 1st unit \$		Cost of 1st 8 units \$
Materials	2,000		16,000
Labour and variable o/hd (500 hrs)	2,500	(2,916 hours)	14,580
	<u>4,500</u>		<u>30,580</u>
Average cost/unit	<u>4,500</u>		<u>3,822.50</u>

2.7 Method 3 – The algebraic approach

FAST FORWARD

The formula for the learning curve is $Y = ax^b$, where b , the learning coefficient or learning index, is defined as $(\log \text{ of the learning rate} / \log 2)$. The learning curve formula can be used to solve all learning curve scenarios.

Exam formula

The formula for the learning curve is $Y = ax^b$

where Y is the cumulative average time per unit to produce x units
 x is the cumulative number of units
 a is the time taken for the first unit of output
 b is the index of learning $(\log LR / \log 2)$
 LR is the learning rate as a decimal

Exam focus point

This is the formula that is provided in the exam which refers to time rather than labour cost. The formula can also be used to calculate the labour cost per unit. The labour **times** are calculated using the curve formula and then converted to cost.

2.7.1 Logarithms and the value of b

When $Y = ax^b$ in learning curve theory, the value of $b = \log \text{ of the learning rate} / \log \text{ of } 2$. The learning rate is expressed as a proportion, so that for an 80% learning curve, the learning rate is 0.8, and for a 90% learning curve it is 0.9, and so on.

For an 80% learning curve, $b = \log 0.8 / \log 2$.

Using the button on your calculator marked 'log'

$$b = \frac{-0.0969}{0.3010} = -0.322$$

Exam focus point

The examiner has stated that you should not round ' b ' to less than three decimal places. Ideally, you should keep the long number in your calculator and use that!

2.7.2 Example: Using the formula

Suppose, for example, that an 80% learning curve applies to production of item ABC. To date (the end of June) 230 units of ABC have been produced. Budgeted production for July is 55 units.

The cost of the very first unit of ABC, in January, was \$120.

Required

Calculate the budgeted total labour cost for July.

Solution

To solve this problem, we need to calculate three things.

- The cumulative total labour cost so far to produce 230 units of ABC.
- The cumulative total labour cost to produce 285 units of ABC, that is adding on the extra 55 units for July.
- The extra cost of production of 55 units of ABC in July, as the difference between (b) and (a).

Calculation (a)

$Y = ax^b$ and we know that for 230 cumulative units, $a = \$120$ (cost of first unit), $x = 230$ (cumulative units) and $b = -0.322$ (80% learning curve) and so $y = 120 \times (230^{-0.322}) = \20.83 .

So when $x = 230$ units, the cumulative average cost per unit is \$20.83.

Calculation (b)

Now we do the same sort of calculation for $x = 285$.

If $x = 285$, $Y = 120 \times (285^{-0.322}) = \19.44

So when $x = 285$ units, the cumulative average cost per unit is \$19.44.

Calculation (c)

<i>Cumulative units</i>	<i>Average cost per unit</i>	<i>Total cost</i>
	\$	\$
230	20.83	4,790.90
285	19.44	5,540.40
Incremental cost for 55 units		<u>749.50</u>

Average cost per unit, between 230 and 285 units = $749.50/55 = \$13.63$ per unit approx.

2.8 Example: Learning curves and standard costs

A company needs to calculate a new standard cost for one of its products. When the product was introduced, the standard variable cost of the first unit was as follows.

		<i>Cost per unit</i>
		\$
Direct material	10 kg @ \$3 per kg	30
Direct labour	10 hours @ \$9 per hour	90
Variable overhead	10 hours @ \$5 per hour	<u>50</u>
Total		<u>170</u>

During the following year, a 90% learning curve was observed. The cumulative production at the end of the third quarter was 50 units and the budgeted production for the fourth quarter is 10 units.

Required

- What is the standard cost per unit for the fourth quarter assuming that the 90% learning curve still applies?
- What is the standard cost per unit for the fourth quarter assuming the learning curve had reached a **steady state** ie peak efficiency was reached after the 50th unit was produced?

Solution

- (a) $Y = ax^b$ and for 60 cumulative units $a = 10$ hours (time for first unit), $x = 60$ (cumulative units) and $b = -0.152$ (90% learning curve) and so $Y = 10 \times (60^{-0.152}) = 5.37$ hours.

For 50 cumulative units $Y = 10 \times (50^{-0.152}) = 5.52$ hours.

<i>Cumulative units</i>	<i>Average time per unit</i>	<i>Total time</i>
50	5.52	276.0
60	5.37	322.2
Incremental time for 10 units		<u>46.2</u>

The standard time per unit is therefore $46.2/10 = 4.62$ hours

The standard cost per unit is:

		<i>Cost per unit</i>
		\$
Direct material	10 kg @ \$3 per kg	30.00
Direct labour	4.62 hours @ \$9 per hour	41.58
Variable overhead	4.62 hours @ \$5 per hour	<u>23.10</u>
Total		<u>94.68</u>

- (b) A steady state is reached after the 50th unit so we need the time taken to produce the 50th unit.

For 49 cumulative units $a = 10$ hours (time for first unit), $x = 49$ (cumulative units) and $b = -0.152$ (90% learning curve) and so $Y = 10 \times (49^{-0.152}) = 5.535$ hours.

<i>Cumulative units</i>	<i>Average time per unit</i>	<i>Total time</i>
49	5.535	271.2
50	5.520	<u>276.0</u>
Incremental time for 50 th unit		<u>4.8</u>

The standard cost per unit is:

		<i>Cost per unit</i>
		\$
Direct material	10 kg @ \$3 per kg	30.00
Direct labour	4.8 hours @ \$9 per hour	43.20
Variable overhead	4.8 hours @ \$5 per hour	<u>24.00</u>
Total		<u>97.20</u>

2.9 The practical application of learning curve theory

What costs are affected by the learning curve?

- (a) Direct labour time and costs
- (b) Variable overhead costs, if they vary with direct labour hours worked.
- (c) **Materials costs** are usually **unaffected** by learning among the workforce, although it is conceivable that materials handling might improve, and so wastage costs be reduced.
- (d) **Fixed overhead expenditure** should be **unaffected** by the learning curve (although in an organisation that uses absorption costing, if fewer hours are worked in producing a unit of output, and the factory operates at full capacity, the **fixed overheads recovered or absorbed per unit** in the cost of the output **will decline** as more and more units are made).

2.10 The relevance of learning curve effects in management accounting

Learning curve theory can be used to:

- (a) Calculate the marginal (incremental) cost of making extra units of a product.
- (b) **Quote selling prices for a contract**, where prices are calculated at cost plus a percentage mark-up for profit. An awareness of the learning curve can make all the difference between winning contracts and losing them, or between making profits and selling at a loss-making price.

- (c) **Prepare realistic production budgets** and more **efficient production schedules**.
- (d) **Prepare realistic standard costs** for cost control purposes.

Considerations to bear in mind include:

- (a) **Sales projections, advertising expenditure and delivery date commitments.** Identifying a learning curve effect should allow an organisation to plan its advertising and delivery schedules to coincide with expected production schedules. Production capacity obviously affects sales capacity and sales projections.
- (b) **Budgeting with standard costs.** Companies that use standard costing for much of their production output cannot apply standard times to output where a learning effect is taking place. This problem can be overcome in practice by:
 - (i) Establishing **standard times** for output, once the learning effect has worn off or become insignificant, and
 - (ii) Introducing a **'launch cost'** budget for the product for the duration of the learning period.
- (c) **Budgetary control.** When learning is still taking place, it would be unreasonable to compare actual times with the standard times that ought eventually to be achieved when the learning effect wears off. **Allowance should be made** accordingly when interpreting labour efficiency variances.
- (d) **Cash budgets.** Since the learning effect reduces unit variable costs as more units are produced, it should be allowed for in **cash flow projections**.
- (e) **Work scheduling and overtime decisions.** To take full advantage of the learning effect, **idle production time** should be avoided and work scheduling/overtime decisions should pay regard to the expected learning effect.
- (f) **Pay.** Where the workforce is paid a **productivity bonus**, the time needed to learn a new production process should be allowed for in calculating the bonus for a period.
- (g) **Recruiting new labour.** When a company plans to take on new labour to help with increasing production, the learning curve assumption will have to be reviewed.
- (h) **Market share.** The significance of the learning curve is that by increasing its share of the market, a company can benefit from shop-floor, managerial and technological 'learning' to achieve **economies of scale**.

2.11 Limitations of learning curve theory

- (a) The learning curve phenomenon is **not always present**.
- (b) It assumes **stable conditions** at work which will **enable learning to take place**. This is not always practicable, for example because of **labour turnover**.
- (c) It must also assume a certain degree of **motivation** amongst employees.
- (d) Breaks between repeating production of an item must not be too long, or workers will **'forget'** and the learning process will have to begin all over again.
- (e) It might be difficult to **obtain accurate data** to decide what the learning curve is.
- (f) **Workers might not agree** to a gradual reduction in production times per unit.
- (g) **Production techniques might change**, or product design alterations might be made, so that it takes a long time for a **'standard'** production method to emerge, to which a learning effect will apply.

3 Applying expected values

FAST FORWARD

Expected values can be used in budgeting to determine the best combination of expected profit and risk.

Key term

Probabilistic budgeting assigns probabilities to different conditions (most likely, worst possible, best possible) to derive an EV of profit.

A company, for example might make the following estimates of profitability for a given budget strategy under consideration.

	<i>Profit/(loss)</i> \$'000	<i>Probability</i>
Worst possible outcome	(220)	0.3
Most likely outcome	300	0.6
Best possible outcome	770	0.1

The EV of profit would be calculated as follows.

	<i>Probability</i>	<i>Profit</i> \$'000	<i>Expected</i> \$'000
Worst possible	0.3	(220)	(66)
Most likely	0.6	300	180
Best possible	0.1	770	77
Expected value of profits			<u>191</u>

3.1 Example: A probabilistic budget

PIB has recently developed a new product, and is planning a marketing strategy for it. A choice must be made between selling the product at a unit price of either \$15 or \$17.

Estimated sales volumes are as follows.

<i>At price of \$15 per unit</i>		<i>At price of \$17 per unit</i>	
<i>Sales volume</i>	<i>Probability</i>	<i>Sales volume</i>	<i>Probability</i>
Units		Units	
20,000	0.1	8,000	0.1
30,000	0.6	16,000	0.3
40,000	0.3	20,000	0.3
		24,000	0.3

- Sales promotion costs would be \$5,000 at a price of \$15 and \$12,000 at a price of \$17.
- Material costs are \$8 per unit.
- Labour and variable production overhead costs will be \$5 per unit up to 30,000 units and \$5.50 per unit for additional units.
- Fixed production costs will be \$38,000.

The management of PIB wish to allow for the risk of each pricing decision before choosing \$15 or \$17 as the selling price.

Required

Determine which sales price would be preferred if the management selected the alternative which did the following.

- Minimised the worst possible outcome of profit
- Maximised the best possible outcome of profit

Solution

The unit contribution will be as follows.

	<i>Price per unit</i>	
	<i>\$15</i>	<i>\$17</i>
Up to 30,000 units	\$2	\$4
Above 30,000 units	\$1.50	N/A

Sales price \$15

Units of sale	Unit contb'n	Total contb'n	Fixed costs	Profit	Probability	EV of profit
'000	\$	\$'000	\$'000	\$'000		\$'000
20	2	40	43	(3)	0.1	(0.3)
30	2	60	43	17	0.6	10.2
40	30 @ \$2 10 @ \$1.50	75	43	32	0.3	9.6
						<u>19.5</u>

Sales price \$17

Units of sale	Unit contb'n	Total contb'n	Fixed costs	Profit	Probability	EV of profit
'000	\$	\$'000	\$'000	\$'000		\$'000
8	4	32	50	(18)	0.1	(1.8)
16	4	64	50	14	0.3	4.2
20	4	80	50	30	0.3	9.0
24	4	96	50	46	0.3	13.8
						<u>25.2</u>

- (a) The price which minimises the worst possible outcome is \$15 (with a worst-possible loss of \$3,000).
- (b) The price which maximises the best possible outcome is \$17 (with a best-possible profit of \$46,000).

4 Using spreadsheets in budgeting

FAST FORWARD

Spreadsheet packages can be used to build business **models** to assist the forecasting and planning process. They are particularly useful for 'what if?' analysis.

A spreadsheet is a type of general purpose software package with **many business applications**, not just accounting ones. It **can be used to build a model**, in which data is presented in these **rows and columns**, and it is up to the model builder to determine what data or information should be presented in it, how it should be presented and how the data should be manipulated by the spreadsheet program. The most widely used spreadsheet packages are Lotus 1-2-3 and Excel.

The idea behind a spreadsheet is that the model builder should **construct a model as follows**.

- (a) Identify what data goes into each row and column and by **inserting text** (for example, column headings and row identifications).
- (b) **Specify how the numerical data in the model should be derived**. Numerical data might be derived using one of the following methods.
- **Insertion into the model via keyboard input.**
 - **Calculation from other data in the model** by means of a formula specified within the model itself. The model builder must insert these formulae into the spreadsheet model when it is first constructed.
 - **Retrieval from data on a disk file** from another computer application program or module.

4.1 The advantages of spreadsheets

The uses of spreadsheets are really only limited by your imagination, and by the number of rows and columns in the spreadsheet, but some of the more **common accounting applications** are listed below.

- Statement of financial position
- Cash flow analysis/forecasting
- General ledger
- Profit projections
- Profit statements
- Project budgeting and control

- Inventory records
- Job cost estimates
- Market share analysis and planning
- Sales projections and records
- Tax estimation

The great value of spreadsheets derives from their **simple format** of rows, columns and worksheets of data, and the ability of the data **users to have direct access themselves** to their spreadsheet model via their own PC. For example, an accountant can construct a cash flow model with a spreadsheet package on the PC on his desk: he can **create** the model, **input** the data, **manipulate** the data and **read or print the output** direct. He will also have fairly **instant access** to the model whenever it is needed, in just the time it takes to load the model into his PC. Spreadsheets therefore bring computer modelling within the everyday reach of data users.

4.2 The disadvantages of spreadsheets

Spreadsheets have disadvantages if they are not properly used.

- A **minor error in the design** of a model at any point can **affect the validity of data** throughout the spreadsheet. Such errors can be very difficult to trace.
- Even if it is properly designed in the first place, it is very **easy to corrupt** a model by accidentally changing a cell or inputting data in the wrong place.
- It is possible to **become over-dependent on them**, so that simple one-off tasks that can be done in seconds with a pen and paper are done on a spreadsheet instead.
- The possibility for experimentation with data is so great that it is possible to **lose sight of the original intention** of the spreadsheet.
- Spreadsheets **cannot take account of qualitative factors** since they are invariably difficult to quantify. Decisions should not be made on the basis of quantitative information alone.

In summary, spreadsheets should be seen as a **tool in planning and decision making**. The user must make the decision. It should be noted that a company may choose to integrate a software package into its own database rather than use a general purpose spreadsheet package. **Integrated software packages** such as Microsoft Works combine the most commonly used functions of many productivity software programs into one application.

4.3 'What if' analysis

Once a model has been constructed the consequences of changes in any of the variables may be tested by asking **'what if' questions, a form of sensitivity analysis**. For example, a spreadsheet may be used to develop a cash flow model, such as that shown below.

	A	B	C	D
		Month 1	Month 2	Month 3
1				
2	Sales	1,000	1,200	1,440
3	Cost of sales	(650)	(780)	(936)
4	Gross profit	350	420	504
5				
6	Receipts:			
7	Current month	600	720	864
8	Previous month		400	480
9		—	—	—
10		600	1,120	1,344
11	Payments	(650)	(780)	(936)
12		(50)	340	408
13	Balance b/f	—	(50)	290
14	Balance c/f	(50)	290	698

Typical 'what if' questions for sensitivity analysis

- (a) What if the cost of sales is 68% of sales revenue, not 65%?
- (b) What if payment from debtors is received 40% in the month of sale, 50% one month in arrears and 10% two months in arrears, instead of 60% in the month of sale and 40% one month in arrears?
- (c) What if sales growth is only 15% per month, instead of 20% per month?

Using the spreadsheet model, the answers to such questions can be obtained simply and quickly, using the editing facility in the program. The information obtained should provide management with a **better understanding** of what the cash flow position in the future might be, and what **factors are critical** to ensuring that the cash position remains reasonable. For example, it might be found that the cost of sales must remain less than 67% of sales value to achieve a satisfactory cash position.

Chapter Roundup

- The **high-low method** is an important quantitative technique the management accountant can use to analyse fixed and variable cost elements from total cost data.
- **Learning curve theory** may be useful for forecasting production time and labour costs in certain circumstances, although the method has many limitations.
- The formula for the learning curve is $Y = ax^b$, where b , the learning coefficient or learning index, is defined as $(\log \text{ of the learning rate} / \log \text{ of } 2)$. The learning curve formula can be used to solve all learning curve scenarios.
- **Expected values** can be used in budgeting to determine the best combination of expected profit and risk.
- **Spreadsheet packages** can be used to build business **models** to assist the forecasting and planning process. They are particularly useful for 'what if?' analysis.

Quick Quiz

- 1 The costs of production runs consist of a mix of fixed and variable elements. The lowest number of production runs during the year was 120 during February, the highest number 150 during October. If the total costs of production runs in February were \$80,000 and in October were \$95,000, calculate the fixed and variable cost elements.
- 2 List five limitations of learning curve theory.
- 3 Calculate the EV of revenue using the following information.

<i>Sales volume</i>	<i>Probability</i>	<i>Selling price</i> \$	<i>Probability</i>
10,000	0.2	3.00	0.1
12,000	0.7	3.50	0.1
13,000	0.1	4.50	0.8

- 4 Which of the following could be considered a disadvantage of using spreadsheets in the budgeting process?
 - A An error in spreadsheet design can affect the validity of the data.
 - B It is possible to become over-dependent on spreadsheets.
 - C Data may become corrupted.
 - D Spreadsheets cannot take account of qualitative factors.

Answers to Quick Quiz

1

	<i>Number of runs</i>	<i>Total costs</i> \$
High	150	95,000
Low	<u>120</u>	<u>80,000</u>
Difference	<u>30</u>	<u>15,000</u>

$$\text{Variable costs per run} = \frac{15,000}{30} = \$500$$

$$\text{Fixed costs} = 95,000 - (500 \times 150) = \$20,000$$

- 2
- (i) The learning curve phenomenon is **not always present**.
 - (ii) It assumes **stable conditions** at work which will **enable learning to take place**. This is not always practicable, for example because of **labour turnover**.
 - (iii) It must also assume a certain degree of **motivation** amongst employees.
 - (iv) Breaks between repeating production of an item must not be too long, or workers will **'forget'** and the learning process will have to begin all over again.
 - (v) It might be difficult to **obtain accurate data** to decide what the learning curve is.
 - (vi) **Workers might not agree** to a gradual reduction in production times per unit.
 - (vii) **Production techniques might change**, or product design alterations might be made, so that it takes a long time for a **'standard'** production method to emerge, to which a learning effect will apply.
- 3
- EV = $((10,000 \times 0.2) + (12,000 \times 0.7) + (13,000 \times 0.1)) \times ((3 \times 0.1) + (3.5 \times 0.1) + (4.5 \times 0.8))$
 = $11,700 \times \$4.25$
 = \$49,725
- 4 All of them.

Now try the question below from the Exam Question Bank

Number	Level	Marks	Time
Q14	Introductory	12	22 mins

Budgeting and standard costing

Topic list	Syllabus reference
1 The use of standard costs	D1 (a)
2 Deriving standards	D1 (b)
3 Budgets and standards compared	D1 (a)
4 Flexible budgets	D1 (c)
5 The principle of controllability	D1 (d)

Introduction

In this chapter we will be looking at **standard costs** and **standard costing**.

You will have studied standard costing before and have learned about the principles of standard costing and how to calculate a number of cost and sales variances. We obviously look at the topic in more depth for your studies of this syllabus.

We begin this chapter by reviewing the **main principles of standard costing** as well as looking in some detail at the **way in which standard costs are set**.

Flexible budgets are vital for both planning and control and we will look at how they are constructed and their use in the overall budgetary control process.

Study guide

		Intellectual level
D1	Budgeting and standard costing	
(a)	Explain the use of standard costs	2
(b)	Outline the methods used to derive standard costs and discuss the different types of cost possible	2
(c)	Explain and illustrate the importance of flexing budgets in performance management	2
(d)	Explain and apply the principle of controllability in the performance management system	2

Exam guide

The contents of this chapter are likely to be examined in conjunction with variance analysis, covered in the next chapter.

1 The use of standard costs

12/08

FAST FORWARD

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.

1.1 What is a standard cost?

Key term

A **standard cost** is an estimated unit cost.

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

STANDARD COST CARD				
Product: the Splodget, No 12345				
	<i>Cost</i>	<i>Requirement</i>		
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>	

Notice how it is **built up from standards for each cost element**: standard quantities of materials at standard prices, standard quantities of labour time at standard rates and so on. It is therefore 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

We will see how management arrives at these estimates later in the chapter.

But why should management want to prepare standard costs? Obviously to assist with standard costing, but what is the point of standard costing?

1.2 The uses of standard costing

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 which you will have covered in your earlier studies.
- **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.

- To assist in setting **budgets** and **evaluating managerial performance**.
- 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.
- To provide a prediction of future costs to be used in **decision-making** situations.
- To **motivate** staff and management by the provision of challenging targets.
- To provide guidance on possible ways of **improving efficiency**.

Although the various uses of standard costing should not be overlooked, we will be concentrating on the control aspect.

1.3 Standard costing as a control technique

Key terms

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**.



Question

Standard costing

What are the possible advantages for the control function of an organisation of having a standard costing system?

Answer

- Carefully planned standards are an aid to more accurate **budgeting**.
- Standard costs provide a **yardstick** against which actual costs can be measured.
- The setting of standards involves determining the **best** materials and methods which may lead to economies.
- A **target of efficiency** is set for employees to reach and **cost-consciousness** is stimulated.
- Variances can be calculated which enable the principle of '**management by exception**' to be operated. Only the variances which exceed acceptable tolerance limits need to be investigated by management with a view to control action.

- (f) Standard costs and variance analysis can provide a way of **motivation** to managers to achieve better performance. However, care must be taken to distinguish between controllable and non-controllable costs in variance reporting.

1.4 Where standard costing should be used

FAST FORWARD

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

Although standard costing can be used in a variety of costing situations (batch and mass production, process manufacture, jobbing manufacture (where there is standardisation of parts) and service industries (if a realistic cost unit can be established)), the **greatest benefit** from its use can be gained if there is a **degree of repetition** in the production process so that average or expected usage of resources can be determined. It is therefore most suited to **mass production** and **repetitive assembly work** and less suited to organisations which produce to customer demand and requirements.



Question

Standard service costing

Can you think of a service organisation that could apply standard costing?

Answer

One example could be restaurants which deal with standard recipes for meals. If a large number of meals are produced, say, for conference delegates, mass production systems will apply. Standards may not be calculated with the same accuracy as in manufacturing environments, but the principles are still relevant. Other examples are equally valid.

Exam focus point

The examiner is interested in whether a standard is 'meaningful'. Standards can be set for everything but not all would have meaning.

2 Deriving standards

FAST FORWARD

The **responsibility for deriving standard costs** should be shared between **managers able to provide the necessary information** about levels of expected efficiency, prices and overhead costs.

2.1 Setting standards for materials costs

Direct materials costs per unit of raw material will be estimated by the purchasing department from their knowledge of the following.

- Purchase contracts already agreed
- Pricing discussions with regular suppliers
- The forecast movement of prices in the market
- The availability of bulk purchase discounts
- The quality of material required by the production departments

The standard cost ought to include an allowance for **bulk purchase discounts**, if these are available on all or some of the purchases, and it may have to be a weighted average price of the differing prices charged for the same product by alternative suppliers.

A decision must also be taken as to how to deal with price **inflation**. Suppose that a material costs \$10 per kilogram at the moment, and during the course of the next 12 months, it is expected to go up in price by 20% to \$12 per kilogram. What standard price should be selected?

- (a) If the **current price** of \$10 per kilogram **were used in the standard**, the reported price variance would become adverse as soon as prices go up, which might be very early in the year. If prices go up gradually rather than in one big jump, it would be difficult to select an appropriate time for revising the standard.
- (b) If an **estimated mid-year price** of, say, \$11 per kilogram **were used**, price variances should be favourable in the first half of the year and adverse in the second half, again assuming that prices go up gradually. Management could only really check that in any month, the price variance did not become excessively adverse (or favourable) and that the price variance switched from being favourable to adverse around month six or seven and not sooner.

Standard costing is therefore more **difficult in times of inflation but it is still worthwhile**.

- Usage and efficiency variances will still be meaningful
- Inflation is measurable: there is no reason why its effects cannot be removed
- Standard costs can be revised, so long as this is not done too frequently

2.2 Setting standards for labour costs

Direct labour rates per hour will be set by reference to the payroll and to any agreements on pay rises with trade union representatives of the employees. A separate hourly rate or weekly wage will be set for each different labour grade/type of employee and an average hourly rate will be applied for each grade (even though individual rates of pay may vary according to age and experience).

Similar problems to those which arise when setting material standards in times of high inflation can be met when setting labour standards.

2.3 Setting standards for material usage and labour efficiency

To estimate the materials required to make each product (material usage) and also the labour hours required (labour efficiency), technical specifications must be prepared for each product by production experts (either in the production department or the work study department).

2.4 Setting standards for overheads

When standard costs are fully absorbed costs (standard costs can be used in both marginal and absorption costing systems), the **absorption rate** of fixed production overheads will be **predetermined** and **based on budgeted** fixed production **overhead** and planned **production volume**.

Production volume will depend on two factors.

- (a) **Production capacity** (or '**volume capacity**') measured perhaps in standard hours of output (a standard hour being the amount of work achievable at standard efficiency levels in an hour), which in turn reflects direct production labour hours.
- (b) **Efficiency of working**, by labour or machines, allowing for rest time and contingency allowances.

Suppose that a department has a work force of ten men, each of whom works a 36 hour week to make standard units, and each unit has a standard time of two hours to make. The expected efficiency of the work-force is 125%.

- (a) Budgeted capacity, in direct labour hours, would be $10 \times 36 = 360$ production hours per week.
- (b) Budgeted efficiency is 125% so that the work-force should take only 1 hour of actual production time to produce 1.25 standard hours of output.
- (c) This means in our example that budgeted output is 360 production hours $\times 125\% = 450$ standard hours of output per week. At 2 standard hours per unit, this represents production activity or volume of 225 units of output per week.



ABC carries out routine office work in a sales order processing department, and all tasks in the department have been given standard times. There are 40 clerks in the department who work on average 140 hours per month each. The efficiency ratio of the department is 110%.

Required

Calculate the budgeted output in the department.

Answer

Capacity = $40 \times 140 = 5,600$ hours per month
Efficiency = 110%
Budgeted output = $5,600 \times 110\% = 6,160$ standard hours of work per month.

2.5 Setting standards for sales price and margin

The **standard selling price** will depend on a number of factors including the following.

- Anticipated market demand
- Manufacturing costs
- Competing products
- Inflation estimates

The **standard sales margin** is the difference between the standard cost and the standard selling price.



Question

Standard setting

What problems do you think could occur when standards are being set?

Answer

The following problems can occur when setting standards.

- Deciding how to incorporate **inflation** into planned unit costs
- Agreeing on a **performance standard** (attainable or ideal)
- Deciding on the **quality** of materials to be used (a better quality of material will cost more, but perhaps reduce material wastage)
- Estimating materials prices where **seasonal price variations** or **bulk purchase discounts** may be significant
- Finding sufficient **time** to construct standards as standard setting can be time consuming
- Incurring the **cost** of setting up and maintaining a system for establishing standards

2.6 Types of standard

FAST FORWARD

There are four **types of standard**: **ideal**, **attainable**, **current** and **basic**. These can have an impact on employee motivation.

How demanding should a standard be? Should the standard represent perfect performance or easily attainable performance? There are four types of standard.

Key terms

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.

2.6.1 The impact on employee behaviour of the type of standard set

The type of standard set can have an impact on the behaviour of the employees trying to achieve those standards.

Type of standard	Impact
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.

3 Budgets and standards compared

FAST FORWARD

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

You will recall from previous chapters that a **budget is a quantified monetary plan for a future period, which managers will try to achieve. Its major function lies in communicating plans and coordinating activities within an organisation.**

On the other hand, a **standard** is a **carefully predetermined quantity target** which can be **achieved in certain conditions**.

Budgets and standards are **similar** in the following ways.

- (a) They both involve looking to the future and **forecasting** what is likely to happen given a certain set of circumstances.
- (b) They are both **used for control purposes**. A budget aids control by setting financial targets or limits for a forthcoming period. Actual achievements or expenditures are then compared with the budgets and action is taken to correct any variances where necessary. A standard also achieves control by comparison of actual results against a predetermined target.

As well as being similar, **budgets and standards are interrelated**. For example, a standard unit production cost can act as the basis for a production cost budget. The unit cost is multiplied by the budgeted activity level to arrive at the budgeted expenditure on production costs.

There are, however, **important differences between budgets and standards**.

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

4 Flexible budgets

6/11

FAST FORWARD

Comparison of a fixed budget with the actual results for a different level of activity is of little use for control purposes. **Flexible budgets** should be used to show what cost and revenues should have been for the actual level of activity.

Key term

A **flexible budget** is a budget which, by recognising different cost behaviour patterns, is designed to change as volume of activity changes.

If you previously studied F2, you will be familiar with this material.

4.1 Preparing a flexible budget

Step 1 The first step in the preparation of a flexible budget is the **determination of cost behaviour patterns**, which means **deciding whether costs are fixed, variable or semi-variable**.

Step 2 The second step in the preparation of a flexible budget is to calculate the **budget cost allowance** for each cost item.

$$\text{Budget cost allowance} = \text{budgeted fixed cost}^* + (\text{number of units} \times \text{variable cost per unit})^{**}$$

* nil for variable cost

** nil for fixed cost

Semi-variable costs therefore need splitting into their fixed and variable components so that the budget cost allowance can be calculated. One method for splitting semi-variable costs is the high/low method, which we covered in [Chapter 10](#).

4.2 Example: Preparing a flexible budget

(a) Prepare a budget for 20X6 for the direct labour costs and overhead expenses of a production department flexed at the activity levels of 80%, 90% and 100%, using the information listed below.

(i) The direct labour hourly rate is expected to be \$3.75.

(ii) 100% activity represents 60,000 direct labour hours.

(iii) *Variable costs*

Indirect labour	\$0.75 per direct labour hour
Consumable supplies	\$0.375 per direct labour hour
Canteen and other welfare services	6% of direct and indirect labour costs

(iv) Semi-variable costs are expected to relate to the direct labour hours in the same manner as for the last five years.

<i>Year</i>	<i>Direct labour hours</i>	<i>Semi-variable costs</i>
		<i>\$</i>
20X1	64,000	20,800
20X2	59,000	19,800
20X3	53,000	18,600
20X4	49,000	17,800
20X5	40,000 (estimate)	16,000 (estimate)

(v) *Fixed costs*

	<i>\$</i>
Depreciation	18,000
Maintenance	10,000
Insurance	4,000
Rates	15,000
Management salaries	25,000

(vi) Inflation is to be ignored.

(b) Calculate the budget cost allowance (ie expected expenditure) for 20X6 assuming that 57,000 direct labour hours are worked.

Solution

(a)	<i>80% level</i>	<i>90% level</i>	<i>100% level</i>
	<i>48,000 hrs</i>	<i>54,000 hrs</i>	<i>60,000 hrs</i>
	<i>\$'000</i>	<i>\$'000</i>	<i>\$'000</i>
Direct labour	180.00	202.50	225.0
<i>Other variable costs</i>			
Indirect labour	36.00	40.50	45.0
Consumable supplies	18.00	20.25	22.5
Canteen etc	12.96	14.58	16.2
Total variable costs (\$5.145 per hour)	246.96	277.83	308.7
Semi-variable costs (W)	17.60	18.80	20.0
<i>Fixed costs</i>			
Depreciation	18.00	18.00	18.0
Maintenance	10.00	10.00	10.0
Insurance	4.00	4.00	4.0
Rates	15.00	15.00	15.0
Management salaries	25.00	25.00	25.0
Budgeted costs	<u>336.56</u>	<u>368.63</u>	<u>400.7</u>

Working

Using the high/low method:

	\$
Total cost of 64,000 hours	20,800
Total cost of 40,000 hours	<u>16,000</u>
Variable cost of 24,000 hours	<u>4,800</u>
Variable cost per hour (\$4,800/24,000)	\$0.20

	\$
Total cost of 64,000 hours	20,800
Variable cost of 64,000 hours ($\times \$0.20$)	<u>12,800</u>
Fixed costs	<u>8,000</u>

Semi-variable costs are calculated as follows.

			\$
60,000 hours	$(60,000 \times \$0.20) + \$8,000$	=	20,000
54,000 hours	$(54,000 \times \$0.20) + \$8,000$	=	18,800
48,000 hours	$(48,000 \times \$0.20) + \$8,000$	=	17,600

(b) The budget cost allowance for 57,000 direct labour hours of work would be as follows.

		\$
Variable costs	$(57,000 \times \$5.145)$	293,265
Semi-variable costs	$(\$8,000 + (57,000 \times \$0.20))$	19,400
Fixed costs		<u>72,000</u>
		<u>384,665</u>

4.3 Flexible budgets and performance management

Budgetary control involves drawing up budgets for the areas of responsibility for individual managers (for example production managers, purchasing managers and so on) and of regularly **comparing** actual results against expected results. The differences between actual results and expected results are called **variances** and these are used to provide a guideline for control action by individual managers.

Note that individual managers are held responsible for investigating differences between budgeted and actual results, and are then expected to take corrective action or amend the plan in the light of actual events.

The wrong approach to budgetary control is to compare actual results against a fixed budget. Suppose that a company manufactures a single product, Z. Budgeted results and actual results for June 20X2 are shown below.

	<i>Budget</i>	<i>Actual results</i>	<i>Variance</i>
Production and sales of the cloud (units)	2,000	3,000	
	\$	\$	\$
Sales revenue (a)	<u>20,000</u>	<u>30,000</u>	10,000 (F)
Direct materials	<u>6,000</u>	<u>8,500</u>	2,500 (A)
Direct labour	4,000	4,500	500 (A)
Maintenance	1,000	1,400	400 (A)
Depreciation	2,000	2,200	200 (A)
Rent and rates	1,500	1,600	100 (A)
Other costs	<u>3,600</u>	<u>5,000</u>	1,400 (A)
Total costs (b)	<u>18,100</u>	<u>23,200</u>	5,100
Profit (a) – (b)	<u>1,900</u>	<u>6,800</u>	4,900 (F)

(a) Here the variances are **meaningless** for control purposes. Costs were higher than budget because the output volume was also higher; variable costs would be expected to increase above the costs

budgeted in the fixed budget. There is no information to show whether control action is needed for any aspect of costs or revenue.

- (b) For control purposes, it is necessary to know the following.
- (i) Were actual costs higher than they should have been to produce and sell 3,000 Zs?
 - (ii) Was actual revenue satisfactory from the sale of 3,000 Zs?

The **correct approach to budgetary control** is as follows.

- (a) **Identify fixed and variable costs**
- (b) **Produce a flexible budget using marginal costing techniques**

Let's suppose that we have the following estimates of cost behaviour for the company.

- (a) Direct materials, direct labour and maintenance costs are variable.
- (b) Rent and rates and depreciation are fixed costs.
- (c) Other costs consist of fixed costs of \$1,600 plus a variable cost of \$1 per unit made and sold.

Now that the cost behaviour patterns are known, a budget cost allowance can be calculated for each item of expenditure. This allowance is shown in a **flexible budget** as the expected expenditure on each item for the relevant level of activity. The budget cost allowances are calculated as follows.

- (a) Variable cost allowances = original budgets \times (3,000 units/2,000 units)
eg material cost allowance = $\$6,000 \times \frac{3}{2} = \$9,000$
- (b) Fixed cost allowances = as original budget
- (c) Semi-fixed cost allowances = original budgeted fixed costs
+ (3,000 units \times variable cost per unit)
eg other cost allowances = $\$1,600 + (3,000 \times \$1) = \$4,600$

The budgetary control analysis should be as follows.

	<i>Fixed budget</i> (a)	<i>Flexible budget</i> (b)	<i>Actual results</i> (c)	<i>Budget variance</i> (b) – (c)
Production and sales (units)	2,000	3,000	3,000	
	\$	\$	\$	\$
Sales revenue	<u>20,000</u>	<u>30,000</u>	<u>30,000</u>	<u>0</u>
Variable costs				
Direct materials	6,000	9,000	8,500	500 (F)
Direct labour	4,000	6,000	4,500	1,500 (F)
Maintenance	1,000	1,500	1,400	100 (F)
Semi-variable costs				
Other costs	3,600	4,600	5,000	400 (A)
Fixed costs				
Depreciation	2,000	2,000	2,200	200 (A)
Rent and rates	<u>1,500</u>	<u>1,500</u>	<u>1,600</u>	<u>100 (A)</u>
Total costs	<u>18,100</u>	<u>24,600</u>	<u>23,200</u>	<u>1,400 (F)</u>
Profit	<u>1,900</u>	<u>5,400</u>	<u>6,800</u>	<u>1,400 (F)</u>

Note. (F) denotes a favourable variance and (A) an adverse or unfavourable variance.

We can **analyse** the above as follows.

- (a) In selling 3,000 units the expected profit should have been, not the fixed budget profit of \$1,900, but the flexible budget profit of \$5,400. Instead, actual profit was \$6,800 ie \$1,400 more than we should have expected. One of the reasons for the improvement is that, **given output and sales of 3,000 units, costs were lower than expected** (and sales revenue exactly as expected).

	\$
Direct materials cost variance	500 (F)
Direct labour cost variance	1,500 (F)
Maintenance cost variance	100 (F)
Other costs variance	400 (A)
Fixed cost variances	
Depreciation	200 (A)
Rent and rates	100 (A)
	<u>1,400 (F)</u>

- (b) Another reason for the improvement in profit above the fixed budget profit is the **sales volume** (3,000 Zs were sold instead of 2,000).

	\$	\$
Sales revenue increased by		10,000
Variable costs increased by:		
Direct materials	3,000	
Direct labour	2,000	
Maintenance	500	
Variable element of other costs	<u>1,000</u>	
Fixed costs are unchanged		6,500
Profit increased by		<u>3,500</u>

Profit was therefore increased by \$3,500 because sales volumes increased.

- (c) A full variance analysis statement would be as follows.

	\$	\$
Fixed budget profit		1,900
<i>Variances</i>		
Sales volume	3,500 (F)	
Direct materials cost	500 (F)	
Direct labour cost	1,500 (F)	
Maintenance cost	100 (F)	
Other costs	400 (A)	
Depreciation	200 (A)	
Rent and rates	<u>100 (A)</u>	
		4,900 (F)
Actual profit		<u>6,800</u>

If management believes that any of these variances are large enough to justify it, they will investigate the reasons for them to see whether any corrective action is necessary or whether the plan needs amending in the light of actual events.



Question

Budget preparation

The budgeted and actual results of Crunch Co for September were as follows. The company uses a marginal costing system. There were no opening or closing stocks.

Sales and production	<i>Fixed budget</i>		<i>Actual</i>	
	1,000 units		700 units	
	\$	\$	\$	\$
Sales		20,000		14,200
<i>Variable cost of sales</i>				
Direct materials	8,000		5,200	
Direct labour	4,000		3,100	
Variable overhead	<u>2,000</u>		<u>1,500</u>	
		14,000		9,800
Contribution		<u>6,000</u>		4,400
Fixed costs		5,000		5,400
Profit/(loss)		<u>1,000</u>		<u>(1,000)</u>

Required

Prepare a budget that will be useful for management control purposes.

Answer

We need to prepare a **flexible budget for 700 units**.

	<i>Budget</i>		<i>Flexed budget</i>	<i>Actual</i>	<i>Variances</i>
	1,000 units	Per unit	700 units	700 units	
	\$	\$	\$	\$	\$
Sales	20,000	(20)	14,000	14,200	200 (F)
<i>Variable costs</i>					
Direct material	8,000	(8)	5,600	5,200	400 (F)
Direct labour	4,000	(4)	2,800	3,100	300 (A)
Variable production overhead	2,000	(2)	1,400	1,500	100 (A)
	14,000	(14)	9,800	9,800	
Contribution	6,000		4,200	4,400	
Fixed costs	5,000	(N/A)	5,000	5,400	400 (A)
Profit/(loss)	1,000		(800)	(1,000)	200 (A)

By **flexing** the budget in the question above we **removed the effect on sales revenue of the difference between budgeted sales volume and actual sales volume**. But there is still a variance of \$200 (F). This means that the actual *selling price* must have been different to the budgeted selling price, resulting in a \$200 (F) **selling price variance**.

4.4 Factors to consider when preparing flexible budgets

The mechanics of flexible budgeting are, in theory, fairly straightforward but in practice there are a number of points to consider before figures are simply flexed.

- Splitting mixed costs is not always straightforward.
- Fixed costs may behave in a step-line fashion as activity levels increase/decrease.
- Account must be taken of the assumptions upon which the original fixed budget was based. Such assumptions might include the constraint posed by limiting factors, the rate of inflation, judgements about future uncertainty, the demand for the organisation's products and so on.
- By flexing a budget, a manager is effectively saying "If I knew then what I know now, this is the budget I would have set". It is a useful concept but can lead to some concern as managers can become confused and frustrated if faced with continually moving targets.

4.5 The need for flexible budgets

We have seen that flexible budgets may be prepared in order to plan for variations in the level of activity above or below the level set in the fixed budget. It has been suggested, however, that since many cost items in modern industry are fixed costs, the **value** of flexible budgets in planning is dwindling.

- In many manufacturing industries, plant costs (depreciation, rent and so on) are a very large proportion of total costs, and these tend to be fixed costs.
- Wage costs also tend to be fixed, because employees are generally guaranteed a basic wage for a working week of an agreed number of hours.
- With the growth of service industries, labour (wages or fixed salaries) and overheads will account for most of the costs of a business, and direct materials will be a relatively small proportion of total costs.

Flexible budgets are nevertheless necessary, and even if they are not used at the planning stage, they must be used for budgetary control variance analysis.

5 The principle of controllability

FAST FORWARD

The **principle of controllability** is that managers of responsibility centres should only be held accountable for costs over which they have some influence.

5.1 Budget centres

Budgetary control is based around a system of **budget centres**. Each budget centre will have its own budget and a manager will be responsible for managing the budget centre and ensuring that the budget is met.

The selection of budget centres in an organisation is therefore a key first step in setting up a control system. What should the budget centres be? What income, expenditure and/or capital employment plans should each budget centre prepare? And how will measures of performance for each budget centre be made?

A well-organised system of control should have the following features.

Feature	Explanation
A hierarchy of budget centres	If the organisation is quite large a hierarchy is needed. Subsidiary companies, departments and work sections might be budget centres. Budgets of each section would then be consolidated into a departmental budget, departmental budgets in turn would be consolidated into the subsidiary's budget, and the budgets of each subsidiary would be combined into a master budget for the group as a whole.
Clearly identified responsibilities for achieving budget targets	Individual managers should be made responsible for achieving the budget targets of a particular budget centre.
Responsibilities for revenues, costs and capital employed	Budget centres should be organised so that all the revenues earned by an organisation, all the costs it incurs, and all the capital it employs are made the responsibility of someone within the organisation, at an appropriate level of authority in the management hierarchy.

Budgetary control and budget centres are therefore part of the overall system of **responsibility accounting** within an organisation.

Key term

Responsibility accounting is a system of accounting that segregates revenue and costs into areas of personal responsibility in order to monitor and assess the performance of each part of an organisation.

5.2 Controllable costs

FAST FORWARD

Controllable costs are items of expenditure which can be directly influenced by a given manager within a given time span.

Care must be taken to distinguish between controllable costs and uncontrollable costs in variance reporting. The **controllability principle** is that managers of responsibility centres should only be held accountable for costs over which they have some influence. From a **motivation** point of view this is important because it can be very demoralising for managers who feel that their performance is being judged on the basis of something over which they have no influence. It is also important from a **control** point of view in that control reports should ensure that information on costs is reported to the manager who is able to take action to control them.

Responsibility accounting attempts to associate costs, revenues, assets and liabilities with the managers most capable of controlling them. As a system of accounting, it therefore distinguishes between controllable and uncontrollable costs.

Most **variable costs** within a department are thought to be **controllable in the short term** because managers can influence the efficiency with which resources are used, even if they cannot do anything to raise or lower price levels.

A cost which is not controllable by a junior manager might be controllable by a senior manager. For example, there may be high direct labour costs in a department caused by excessive overtime working. The junior manager may feel obliged to continue with the overtime to meet production schedules, but his senior may be able to reduce costs by hiring extra full-time staff, thereby reducing the requirements for overtime.

A cost which is not controllable by a manager in one department may be controllable by a manager in another department. For example, an increase in material costs may be caused by buying at higher prices than expected (controllable by the purchasing department) or by excessive wastage (controllable by the production department) or by a faulty machine producing rejects (controllable by the maintenance department).

Some costs are **non-controllable**, such as increases in expenditure items due to inflation. Other costs are **controllable, but in the long term rather than the short term**. For example, production costs might be reduced by the introduction of new machinery and technology, but in the short term, management must attempt to do the best they can with the resources and machinery at their disposal.

5.2.1 The controllability of fixed costs

It is often assumed that all fixed costs are non-controllable in the short run. This is not so.

- (a) **Committed fixed costs** are those costs arising from the possession of plant, equipment, buildings and an administration department to **support the long-term needs of the business**. These costs (depreciation, rent, administration salaries) are largely **non-controllable in the short term** because they have been committed by longer-term decisions affecting longer-term needs. When a company decides to cut production drastically, the long-term committed fixed costs will be reduced, but only after redundancy terms have been settled and assets sold.
- (b) **Discretionary fixed costs**, such as advertising and research and development costs, are incurred as a result of a top management decision, but could be **raised or lowered at fairly short notice** (irrespective of the actual volume of production and sales).

5.2.2 Controllability and apportioned costs

Managers should only be held accountable for costs over which they have some influence. This may seem quite straightforward in theory, but it is not always so easy in practice to distinguish controllable from uncontrollable costs. **Apportioned overhead costs provide a good example.**

Suppose that a manager of a production department in a manufacturing company is made responsible for the costs of his department. These costs include **directly attributable overhead items** such as the costs of indirect labour employed and indirect materials consumed in the department. The department's overhead costs also include an apportionment of costs from other cost centres, such as rent and rates for the building it shares with other departments and a share of the costs of the maintenance department.

Should the production manager be held accountable for any of these apportioned costs?

- (a) Managers should not be held accountable for costs over which they have no control. In this example, apportioned rent and rates costs would not be controllable by the production department manager.
- (b) Managers should be held accountable for costs over which they have some influence. In this example, it is the responsibility of the maintenance department manager to keep maintenance costs within budget. But their costs will be partly variable and partly fixed, and the variable cost element will depend on the volume of demand for their services. If the production department's staff treat

their equipment badly we might expect higher repair costs, and the production department manager should therefore be made accountable for the repair costs that his department makes the maintenance department incur on its behalf.

- (c) Charging the production department with some of the costs of the maintenance department prevents the production department from viewing the maintenance services as 'free services'. Over-use would be discouraged and the production manager is more likely to question the activities of the maintenance department possibly resulting in a reduction in maintenance costs or the provision of more efficient maintenance services.

5.2.3 Controllability and dual responsibility

Quite often a particular cost might be the **responsibility of two or more managers**. For example, raw materials costs might be the responsibility of the purchasing manager (prices) and the production manager (usage). **A reporting system must allocate responsibility appropriately**. The purchasing manager must be responsible for any increase in raw materials prices whereas the production manager should be responsible for any increase in raw materials usage.

Attention!

You can see that there are **no clear cut rules** as to which costs are controllable and which are not. Each situation and cost must be reviewed separately and a decision taken according to the control value of the information and its behavioural impact.

Chapter Roundup

- 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.
- Standard costing is most suited to mass production and repetitive assembly work.
- The **responsibility for deriving standard costs** should be shared between **managers able to provide the necessary information** about levels of expected efficiency, prices and overhead costs.
- There are four **types of standard: ideal, attainable, current and basic**. These can have an impact on employee motivation.
- Budgets and standards are very similar and interrelated, but there are important differences between them.
- Comparison of a fixed budget with the actual results for a different level of activity is of little use for control purposes. **Flexible budgets** should be used to show what cost and revenues should have been for the actual level of activity.
- The **principle of controllability** is that managers of responsibility centres should only be held accountable for costs over which they have some influence.
- **Controllable costs** are items of expenditure which can be directly influenced by a given manager within a given time span.

Quick Quiz

1 Choose the appropriate words from those highlighted.
The **greatest/least** benefit from the use of standard costing can be gained if there is a degree of repetition in the production process.

Standard costing is therefore **most/less** suited to organisations which produce to customer demand and requirements and **most/less** suited to mass production.

2 Match the type of standard with the correct definition.

<i>Types of standard</i>	<i>Definitions</i>
Ideal	(a) Can be attained under perfect operating conditions
Attainable	(b) Can be attained if production is carried out efficiently, machines are properly operated and/or materials are properly used
Basic	(c) Based on current working conditions
Current	(d) Remains unchanged over the years and is used to show trends

3 Fill in the blanks.

Standard costing is difficult in times of inflation but it is still worthwhile.

- (a) and variances will still be meaningful.
- (b) Inflation is : there is no reason why its effects cannot be removed.
- (c) Standard costs can be, as long as this is not done

4 Provide three reasons why standard costing conflicts with schemes of continuous improvement and cost reduction programmes.

5 With what kind of standards is practical capacity associated?

6 Ideal standards are long-term targets.

True False

7 Fill in the gaps.

A flexible budget is a budget which, by recognising, is designed to as the level of activity changes.

8 An extract of the costs incurred at two different activity levels is shown. Classify the costs according to their behaviour patterns and show the budget cost allowance for an activity of 1,500 units.

	<i>1,000 units</i>	<i>2,000 units</i>	<i>Type of cost</i>	<i>Budget cost allowance for 1,500 units</i>
	<i>\$</i>	<i>\$</i>		<i>\$</i>
Fuel	3,000	6,000
Photocopying	9,500	11,000
Heating	2,400	2,400
Direct wages	6,000	8,000

9 Fill in the blanks.

A well-organised system of control should have the following features.

- (a) A hierarchy of
- (b) Clearly identified for achieving budget targets
- (c) Responsibilities for, and

- 10 Which of the following are not controllable by a production department manager?
- (a) Direct labour rate
 - (b) Variable production overheads
 - (c) Apportioned canteen costs
 - (d) Increases in raw material costs due to inflation
 - (e) Increases in overall material costs due to high levels of wastage caused by poor supervision of production workers
 - (f) An increase in the level of idle time because of poorly-maintained machines
 - (g) Depreciation
 - (h) Advertising for production workers

Answers to Quick Quiz

- 1 greatest
less
most
- 2 Ideal (a) Basic (d)
Attainable (b) Current (c)
- 3 (a) Usage and efficiency variances will still be meaningful.
(b) Inflation is measurable: there is no reason why its effects cannot be removed.
(c) Standard costs can be reviewed, as long as this is not done too frequently.
- 4 (a) Efforts to improve the efficiency of operations or reduce costs will alter quantities of inputs, prices and so on whereas standard costing is best used in a stable, standardised, repetitive environment.
(b) Predetermined standards conflict with a philosophy of continual improvement.
(c) Standard costs often incorporate a planned level of scrap in material standards. This is at odds with the aim of 'zero defects' inherent in continuous improvement programmes.
- 5 Attainable standards
- 6 True
- 7 cost behaviour patterns
flex or change
- 8 Variable \$4,500 Fixed \$2,400
Semi-variable \$10,250 Semi-variable \$7,000
- 9 (a) budget centres (c) revenues
(b) responsibilities costs
capital employed
- 10 (a)
(c)
(d)
(f) (if there is a maintenance department)
(g)
(h)

Now try the question below from the Exam Question Bank

Number	Level	Marks	Time
Q15	Examination	20	36 mins

12

Variance analysis

Topic list	Syllabus reference
1 Basic variances	Revision
2 The reasons for variances	Revision
3 Operating statements	Revision
4 Investigating variances	Revision
5 Materials mix and yield variances	D2 (a), (b), (c), (d)
6 Sales mix and quantity variances	D3 (a), (b)

Introduction

The **actual results** achieved by an organisation will, more than likely, be **different from the expected results** (the expected results being the standard costs and revenues which we looked at in the previous chapter). These differences are **variances** which you will have covered in your earlier studies.

We will **revise** the **basic variances**, the reasons behind them and their presentation in **operating statements** in sections 1–4 of this chapter.

We will go on to look at more complicated variances which are more likely to be examined in F5. For example, when a product requires two or more materials in its make-up, the **materials usage variance** can be split into a **materials mix variance** and a **materials yield variance**. Similarly, the **sales volume variance** can be split into a **sales mix variance** and a **sales quantity variance**.

Study guide

		Intellectual level
D2	Material mix and yield variances	
(a)	Calculate, identify the cause of, and explain mix and yield variances	2
(b)	Explain the wider issues involved in changing mix, eg cost, quality and performance measurement issues	2
(c)	Identify and explain the relationship of the material price variance with the material mix and yield variances	2
(d)	Suggest and justify alternative methods of controlling production processes	2
D3	Sales mix and quantity variances	
(a)	Calculate, identify the cause of, and explain sales mix and quantity variances	2
(b)	Identify and explain the relationship of the sales volume variances with the sales mix and quantity variances	2

Exam guide

Basic variances, the reasons behind them and their presentation in operating statements are assumed knowledge for F5. The variance calculations set in this paper are likely to be the more complicated variances such as materials mix and yield variances and sales mix and quantity variances. You will be required to **explain** them and **evaluate** performance.



One of the competencies you require to fulfil performance objective 14 of the PER is the ability to prepare regular variance analysis reports. You can apply the knowledge you obtain from this section of the text to help to demonstrate this competence.

1 Basic variances

Knowledge brought forward from earlier studies

- 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.
- When actual results are better than expected results, we have a **favourable variance (F)**. If actual results are worse than expected results, we have an **adverse variance (A)**.
- The **selling price variance** measures the effect on expected profit of a selling price different to the standard selling price. It is calculated as the difference between what the sales revenue should have been for the actual quantity sold, and what it was.
- The **sales volume variance** measures the increase or decrease in expected profit as a result of the sales volume being higher or lower than budgeted. It is calculated as the difference between the budgeted sales volume and the actual sales volume multiplied by the standard profit per unit.
- The material **total variance** is the difference between what the output actually cost and what it should have cost, in terms of material. It can be divided into the following two sub-variances.
- The **material price variance** is the difference between what the material did cost and what it should have cost.
- The **material usage variance** is the difference between the standard cost of the material that should have been used and the standard cost of the material that was used.

- The **labour total variance** is the difference between what the output should have cost and what it did cost, in terms of labour. It can be divided into two sub-variances.
- The **labour rate variance** is the difference between what the labour did cost and what it should have cost.
- The **labour efficiency variance** is the difference between the standard cost of the hours that should have been worked and the standard cost of the hours that were worked.
- The **variable production overhead total variance** is the difference between what the output should have cost and what it did cost, in terms of variable production overhead. It can be divided into two sub-variances.
- The **variable production overhead expenditure variance** is the difference between the amount of variable production overhead that should have been incurred in the actual hours actively worked, and the actual amount of variable production overhead incurred.
- The **variable production overhead efficiency variance** is the difference between the standard cost of the hours that should have been worked for the number of units actually produced, and the standard cost of the actual number of hours worked.
- **Fixed production overhead total variance** is the difference between fixed production overhead incurred and fixed production overhead absorbed. In other words, it is the under- or over-absorbed fixed production overhead.
- **Fixed production overhead expenditure variance** is the difference between the budgeted fixed production overhead expenditure and actual fixed production overhead expenditure.
- **Fixed production overhead volume variance** is the difference between actual and budgeted production/volume multiplied by the standard absorption rate per *unit*.
- **Fixed production overhead volume efficiency variance** is the difference between the number of hours that actual production should have taken, and the number of hours actually taken (that is, worked) multiplied by the standard absorption rate per *hour*.
- **Fixed production overhead volume capacity variance** is the difference between budgeted hours of work and the actual hours worked, multiplied by the standard absorption rate per *hour*.



Question

Various variances

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	<u>310</u>

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.

Answer

(a)	Price variance – A	\$
	7,800 kgs should have cost (× \$20)	156,000
	but did cost	<u>159,900</u>
	Price variance	<u><u>3,900</u></u> (A)
	Usage variance – A	
	800 units should have used (× 10 kgs)	8,000 kgs
	but did use	<u>7,800</u> kgs
	Usage variance in kgs	200 (F)
	× standard cost per kilogram	<u>× \$20</u>
	Usage variance in \$	<u><u>\$4,000</u></u> (F)
	Price variance – B	\$
	4,300 litres should have cost (× \$6)	25,800
	but did cost	<u>23,650</u>
	Price variance	<u><u>2,150</u></u> (F)
	Usage variance – B	\$
	800 units should have used (× 5 l)	4,000 l
	but did use	<u>4,300</u> l
	Usage variance in litres	300 (A)
	× standard cost per litre	<u>× \$6</u>
	Usage variance in \$	<u><u>\$1,800</u></u> (A)
(b)	Labour rate variance	\$
	4,200 hours should have cost (× \$6)	25,200
	but did cost	<u>24,150</u>
	Rate variance	<u><u>1,050</u></u> (F)
	Labour efficiency variance	
	800 units should have taken (× 5 hrs)	4,000 hrs
	but did take	<u>4,200</u> hrs
	Efficiency variance in hours	200 (A)
	× standard rate per hour	<u>× \$6</u>
	Efficiency variance in \$	<u><u>\$1,200</u></u> (A)
(c)	Fixed overhead expenditure variance	\$
	Budgeted expenditure (\$50 × 900)	45,000
	Actual expenditure	<u>47,000</u>
	Expenditure variance	<u><u>2,000</u></u> (A)

Fixed overhead volume variance

	\$
Budgeted production at standard rate (900 × \$50)	45,000
Actual production at standard rate (800 × \$50)	40,000
Volume variance	<u>5,000</u> (A)

Fixed overhead volume efficiency variance

	\$
800 units should have taken (× 5 hrs)	4,000 hrs
but did take	4,200 hrs
Volume efficiency variance in hours	200 (A)
× standard absorption rate per hour	× \$10
Volume efficiency variance	<u>\$2,000</u> (A)

Fixed overhead volume capacity variance

Budgeted hours	4,500 hrs
Actual hours	4,200 hrs
Volume capacity variance in hours	300 (A)
× standard absorption rate per hour (\$50 ÷ 5)	× \$10
	<u>\$3,000</u> (A)

Exam focus point

Basic variance calculations are **assumed knowledge** for F5 so it is **essential** to do more practice if you struggled with this question.

2 The reasons for variances**6/08, 12/09, 12/10**

Knowledge brought forward from earlier studies

In an examination question you should review the information given and use your imagination and common sense to suggest possible reasons for variances.

Variance	Favourable	Adverse	Calculation
Material price	Unforeseen discounts received	Price increase	Price \$
	Greater care in purchasing	Careless purchasing	Based on actual purchases What should it have cost? X
	Change in material standard	Change in material standard	What did it cost? (X) <u>X</u>
Material usage	Material used of higher quality than standard	Defective material	Usage Kgs
	More effective use made of material	Excessive waste	Based on actual production What should have been used? X
	Errors in allocating material to jobs	Theft	What was used? (X)
		Stricter quality control	<u>X</u> Difference valued at standard cost per kg <u>\$X</u>
		Errors in allocating material to jobs	

Variance	Favourable	Adverse	Calculation
Labour rate	Use of workers at a rate of pay lower than standard	Wage rate increase	Rate \$ Based on actual hours paid What should it have cost? X What did it cost? (X) <u>X</u>
Idle time	Possible if idle time has been built into the budget	Machine breakdown Non-availability of material Illness or injury to worker	Idle time Hrs Hours worked X Hours paid (X) Difference valued at \$X standard rate per hour
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	Efficiency Hrs Based on actual production How long should it have taken? X How long did it take? (X) <u>X</u> Difference valued at \$X standard rate per hour
**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	Based on actual hours worked \$ What should it have cost? X What did it cost? (X) <u>X</u>
Overhead volume	Production or level of activity greater than budgeted.	Production or level of activity less than budgeted	Units Budgeted units X Actual units (X) <u>X</u> Difference valued at \$X OAR per unit
Fixed overhead capacity	Production or level of activity greater than budgeted	Production or level of activity less than budgeted	Hrs Budgeted hrs worked X Actual hrs worked (X) <u>X</u> Difference valued at \$X OAR per hour
Selling price	Unplanned price increase	Unplanned price reduction	\$ For the quantity sold What revenue should have been generated X Actual revenue (X) <u>X</u>

Variance	Favourable	Adverse	Calculation
Sales volume	Additional demand	Unexpected fall in demand Production difficulties	Units Budgeted sales X Actual sales (X) X Difference valued at standard profit per unit X

3 Operating statements

6/08, 6/12

Knowledge brought forward from earlier studies

- An **operating statement** is a regular report for management which compares actual costs and revenues with budgeted figures and shows variances.
- There are several ways in which an operating statement may be presented. Perhaps the most common format is one which **reconciles budgeted profit to actual profit**. Sales variances are reported first, and the total of the budgeted profit and the two sales variances results in a figure for 'actual sales minus the standard cost of sales'. The cost variances are then reported, and an actual profit calculated.



Question

Operating statement

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
Variable overheads	2 hours at \$0.30 per hour	0.60
Fixed overhead	2 hours at \$3.70 per hour	7.40
Standard cost		<u>14.00</u>
Standard profit		<u>6.00</u>
Standing 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 8,500 hours at a cost of \$16,800

Actual operating hours amounted to 8,000 hours

Variable overheads amounted to \$2,600

Fixed overheads amounted to \$42,300

Required

Calculate all variances and prepare an operating statement for January.

Answer

	\$	
(a) 2,300 kg of material should cost ($\times \$4$)	9,200	
but did cost	<u>9,800</u>	
Material price variance		<u>600 (A)</u>
(b) 4,850 Widgets should use ($\times 0.5$ kgs)	2,425 kg	
but did use	<u>2,300 kg</u>	
Material usage variance in kgs		125 kg (F)
\times standard cost per kg	<u>$\times \\$4$</u>	
Material usage variance in \$		<u>\$ 500 (F)</u>
(c) 8,500 hours of labour should cost ($\times \$2$)	17,000	
but did cost	<u>16,800</u>	
Labour rate variance		<u>200 (F)</u>
(d) 4,850 Widgets should take ($\times 2$ hrs)	9,700 hrs	
but did take (active hours)	<u>8,000 hrs</u>	
Labour efficiency variance in hours		1,700 hrs (F)
\times standard cost per hour	<u>$\times \\$2$</u>	
Labour efficiency variance in \$		<u>\$3,400 (F)</u>
(e) Idle time variance 500 hours (A) $\times \$2$		<u>\$1,000 (A)</u>
(f) 8,000 hours incurring variable o/hd expenditure should cost ($\times \$0.30$)	2,400	
but did cost	<u>2,600</u>	
Variable overhead expenditure variance		<u>200 (A)</u>
(g) Variable overhead efficiency variance is the same as the labour efficiency variance: 1,700 hours (F) $\times \$0.30$ per hour		<u>\$ 510 (F)</u>
(h) Budgeted fixed overhead (5,100 units $\times 2$ hrs $\times \$3.70$)	37,740	
Actual fixed overhead	<u>42,300</u>	
Fixed overhead expenditure variance		<u>4,560 (A)</u>
(i) Actual production at standard rate (4,850 units $\times \$7.40$)	35,890	
Budgeted production at standard rate (5,100 units $\times \$7.40$)	<u>37,740</u>	
Fixed overhead volume variance		<u>1,850 (A)</u>
(j) 4,850 Widgets should have sold for ($\times \$20$)	97,000	
but did sell for	<u>95,600</u>	
Selling price variance		<u>1,400 (A)</u>
(k) Budgeted sales volume	5,100 units	
Actual sales volume	<u>4,850 units</u>	
Sales volume variance in units		250 units
\times standard profit per unit	<u>$\times \\$6$ (A)</u>	
Sales volume variance in \$		<u>\$1,500 (A)</u>
	\$	\$
Budgeted profit (5,100 units $\times \$6$ profit)		30,600
Selling price variance	1,400	(A)
Sales volume variance	<u>1,500</u>	(A)
		<u>2,900 (A)</u>
Actual sales (\$95,600) less the standard cost of sales (4,850 $\times \$14$)		<u>27,700</u>

OPERATING STATEMENT FOR JANUARY

	\$	\$	\$
Budgeted profit			30,600
Sales variances: price		1,400 (A)	
volume		<u>1,500 (A)</u>	
			<u>2,900 (A)</u>
Actual sales minus the standard cost of sales			<u>27,700</u>
Cost variances			
	(F)	(A)	
	\$	\$	
Material price		600	
Material usage	500		
Labour rate	200		
Labour efficiency	3,400		
Labour idle time		1,000	
Variable overhead expenditure		200	
Variable overhead efficiency	510		
Fixed overhead expenditure		4,560	
Fixed overhead volume		<u>1,850</u>	
	<u>4,610</u>	<u>8,210</u>	<u>3,600 (A)</u>
Actual profit for January			<u>24,100</u>
Check			
		\$	\$
Sales			95,600
Materials		9,800	
Labour		16,800	
Variable overhead		2,600	
Fixed overhead		<u>42,300</u>	
			<u>71,500</u>
Actual profit			<u>24,100</u>

Exam focus point

Producing operating statements and reconciling actual profit to budgeted profit is **assumed knowledge** for F5 so it is **essential** to do more question practice if you struggled with this question.

3.1 Operating statements in a marginal cost environment

Knowledge brought forward from earlier studies

- There are two main differences between the variances calculated in an absorption costing system and the **variances calculated in a marginal costing system**. In a marginal costing system the only fixed overhead variance is an expenditure variance and the sales volume variance is valued at standard contribution margin, not standard profit margin.



Question

Marginal cost operating statement

Returning to the question above, now assume that the company operates a marginal costing system.

Required

Recalculate any variances necessary and produce an operating statement.

Answer

- (a) There is no fixed overhead volume variance.
 (b) The standard contribution per unit is $\$(20 - 6.60) = \13.40 , therefore the sales volume variance of 250 units (A) is valued at $(\times \$13.40) = \$3,350$ (A).

The other variances are unchanged, therefore an operating statement might appear as follows.

OPERATING STATEMENT FOR JANUARY

	\$	\$	\$
Budgeted profit		30,600	
Budgeted fixed production costs		<u>37,740</u>	
Budgeted contribution		68,340	
Sales variances: volume		3,350 (A)	
price		<u>1,400 (A)</u>	
			<u>4,750 (A)</u>
Actual sales (\$95,600) minus the standard variable cost of sales $(4,850 \times \$6.60)$			63,590
	(F)	(A)	
Variable cost variances	\$	\$	\$
Material price		600	
Material usage	500		
Labour rate	200		
Labour efficiency	3,400		
Labour idle time		1,000	
Variable overhead expenditure		200	
Variable overhead efficiency	<u>510</u>		
	<u>4,610</u>	<u>1,800</u>	
			<u>2,810 (F)</u>
Actual contribution			66,400
Budgeted fixed production overhead		37,740	
Expenditure variance		<u>4,560 (A)</u>	
Actual fixed production overhead			42,300
Actual profit			<u>24,100</u>

Note. The profit here is the same on the profit calculated by standard absorption costing because there were no changes in inventory levels. Absorption costing and marginal costing do not always produce an identical profit figure.



One of the competencies you require to fulfil performance objective 12 of the PER is the ability to summarise and present financial information in an appropriate format for management purposes. You can apply the knowledge you obtain from this section of the text to help to demonstrate this competence.

4 Investigating variances

This topic should also be familiar to you from your earlier studies. The key points are recapped below.

Knowledge brought forward from earlier studies

The decision whether or not to investigate

- Before management decide whether or not to investigate the reasons for the occurrence of a particular variance, there are a number of **factors** which should be considered in assessing the **significance** of the variance.
- **Materiality.** Because a standard cost is really only an *average* expected cost, small variations between actual and standard are bound to occur and are unlikely to be significant. Obtaining an 'explanation' of the reasons why they occurred is likely to be time consuming and irritating for the manager concerned. For such variations **further investigation is not worthwhile** since such variances are not controllable.
- **Controllability.** Only controllable variances should be investigated. **Uncontrollable variances call for a change in plan, not an investigation into the past.**
- **The type of standard being used.** The efficiency variance reported in any control period, whether for materials or labour, will depend on the **efficiency level set**. If, for example, an ideal standard is used, variances will always be adverse. Similarly, if basic standards are used, variances are likely to be favourable.
- **Variance trend.** Although small variations in a single period are unlikely to be significant, small variations that occur consistently may need more attention. The trend **provides an indication of whether the variance is fluctuating within acceptable control limits or becoming out of control.**
- **Interdependence between variances.** 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 favourable.** For example, an adverse selling price variance might be counterbalanced by a favourable sales volume variance.
- **Costs of investigation.** The costs of an investigation should be weighed against the benefits of correcting the cause of a variance.

Variance investigation models

- The **rule-of-thumb** and **statistical significance** variance investigation models and/or statistical **control charts** can be used to determine whether a variance should be investigated.
- **The rule of thumb model.** This involves **deciding a limit** and if the size of a **variance is within the limit**, it should be considered **immaterial**. Only if it exceeds the limit is it considered materially significant, and worthy of investigation.
- **Statistical significance model.** Historical data is used to **calculate** both a standard as **an expected average** and the **expected standard deviation** around this average when the process is under control. By assuming that variances that occur are normally distributed around this average, a **variance will be investigated if it is more than a distance from the expected average that the estimated normal distribution suggests is likely if the process is in control.**
- **Statistical control charts.** By marking variances and control limits on a control chart, **investigation** is signalled not only when a particular **variance exceeds the control limit** but also when the **trend of variances shows a progressively worsening movement** in actual results (even though the variance in any single control period has not yet overstepped the control limit).

5 Materials mix and yield variances

6/10, 12/11

FAST FORWARD

The **materials usage variance** can be subdivided into a materials **mix** variance and a materials **yield** variance when more than one material is used in the product.

Exam focus point

The February 2010 edition of *Student Accountant* contains an article on material **mix** and **yield** variances written by the **examiner**. Ensure that you are familiar with this article.

Manufacturing processes often require that a number of different materials are combined to make a unit of finished product. When a product requires two or more raw materials in its make-up, it is often possible to **sub-analyse the materials usage variance into a materials mix and a materials yield variance**.

Adding a greater proportion of one material (therefore a smaller proportion of a different material) might make the materials mix **cheaper or more expensive**. For example the standard mix of materials for a product might consist of the following.

	\$
(² / ₃) 2 kg of material A at \$1.00 per kg	2.00
(¹ / ₃) 1 kg of material B at \$0.50 per kg	<u>0.50</u>
	<u>2.50</u>

It may be possible to change the mix so that one kilogram of material A is used and two kilograms of material B. The new mix would be cheaper.

	\$
(¹ / ₃) 1 kg of material A	1
(² / ₃) 2 kg of material B	<u>1</u>
	<u>2</u>

By changing the proportions in the mix, the **efficiency** of the combined material usage may change. In our example, in making the proportions of A and B cheaper, at 1:2, the product may now require more than three kilograms of input for its manufacture, and the new materials requirement per unit of product might be 3.6 kilograms.

	\$
(¹ / ₃) 1.2 kg of material A at \$1.00 per kg	1.20
(² / ₃) 2.4 kg of material B at \$0.50 per kg	<u>1.20</u>
	<u>2.40</u>

In establishing a materials usage standard, management may therefore have to balance the **cost** of a particular mix of materials with the **efficiency** of the yield of the mix.

Once the standard has been established it may be possible for management to exercise control over the materials used in production by calculating and reviewing mix and yield variances.

Key terms

A **mix variance** occurs when the materials are not mixed or blended in standard proportions and it is a measure of whether the actual mix is cheaper or more expensive than the standard mix.

A **yield variance** arises because there is a difference between what the input should have been for the output achieved and the actual input.

5.1 Calculating the variances

The **mix variance** is calculated as the **difference between the actual total quantity used in the standard mix and the actual quantities used in the actual mix, valued at standard costs**.

The **yield variance** is calculated as the **difference between the standard input for what was actually output, and the actual total quantity input (in the standard mix), valued at standard costs**.

5.2 When to calculate the mix and yield variance

A mix variance and yield variance are only appropriate in the following situations.

- (a) **Where proportions of materials in a mix are changeable and controllable**
 (b) **Where the usage variance of individual materials is of limited value because of the variability of the mix**, and a combined yield variance for all the materials together is more helpful for control

It would be totally inappropriate to calculate a mix variance where the materials in the 'mix' are discrete items. A chair, for example, might consist of wood, covering material, stuffing and glue. These materials are separate components, and it would not be possible to think in terms of controlling the proportions of each material in the final product. The usage of each material must be controlled separately.

5.3 Example: Materials usage, mix and yield variances

A company manufactures a chemical, Dynamite, using two compounds Flash and Bang. The standard materials usage and cost of one unit of Dynamite are as follows.

		\$
Flash	5 kg at \$2 per kg	10
Bang	10 kg at \$3 per kg	<u>30</u>
		<u>40</u>

In a particular period, 80 units of Dynamite were produced from 500 kg of Flash and 730 kg of Bang.

Required

Calculate the materials usage, mix and yield variances.

Solution

- (a) **Usage variance**

	<i>Std usage for actual output</i>	<i>Actual usage</i>	<i>Variance</i>	<i>Standard cost per kg</i>	<i>Variance</i>
	kgs	kgs	kgs	\$	\$
Flash	400	500	100 (A)	2	200 (A)
Bang	800	730	70 (F)	3	210 (F)
	<u>1,200</u>	<u>1,230</u>	<u>30 (A)</u>		<u>10 (F)</u>

The total usage variance of \$10 (F) can be analysed into a mix variance and a yield variance.

- (b) **Mix variance**

To calculate the mix variance, it is first necessary to decide how the total quantity of materials used (500 kg + 730 kg) should have been divided between Flash and Bang. In other words, we need to **calculate the standard mix of the actual quantity of materials used**.

Total quantity used (500 + 730)	kg <u>1,230</u>
Standard mix of actual use: $\frac{1}{3}$ Flash	kg 410
$\frac{2}{3}$ Bang	<u>820</u> <u>1,230</u>

The differences between what should have been used in the mix (as calculated above) and what was actually used is the mix variance (in kg) which should be converted into money values at standard cost.

	<i>Actual quantity standard mix</i>	<i>Actual quantity actual mix</i>	<i>Variance</i>	<i>Standard cost per kg</i>	<i>Variance</i>
	kgs	kgs	kgs	\$	\$
Flash	410	500*	90 (A)	2	180 (A)
Bang	820	730	90 (F)	3	270 (F)
	<u>1,230</u>	<u>1,230</u>	<u>—</u>		<u>90 (F)</u>

* When actual use exceeds standard use the variance is always adverse.

Note that the **total mix variance in quantity is zero**. This must always be the case since the expected mix is based on the total quantity actually used and hence the difference between the total expected and total actual is zero.

The favourable money variance is due to the greater use in the mix of the relatively cheap material, Flash.

(c) **Yield variance**

The yield variance can be calculated in total or for each individual material input.

In total

Each unit of output (Dynamite) requires	5 kg of Flash, costing	\$10
	10 kg of Bang, costing	\$30
	<u>15 kg</u>	<u>\$40</u>

1,230 kg should have yielded (\div 15 kg)	82 units of Dynamite
but did yield	<u>80 units of Dynamite</u>
Yield variance in units	2 units (A)

\times standard cost per unit of output	\times \$40
Yield variance in \$	<u>\$80 (A)</u>

The adverse yield variance is due to the output from the input being less than standard.

For individual materials

This is calculated as the **difference between what the usage should have been for the output actually achieved and the actual usage in the standard mix**, converted into money values at standard cost.

	Standard quantity standard mix	Actual quantity standard mix	Variance	Standard cost per kg	Variance
	kgs	kgs	kgs	\$	\$
Flash	400	410	10 (A)	2	20 (A)
Bang	<u>800</u>	<u>820</u>	<u>20 (A)</u>	3	<u>60 (A)</u>
	<u>1,200</u>	<u>1,230</u>	<u>30 (A)</u>		<u>80 (A)</u>



Question

Mix and yield variances

The standard materials cost of product D456 is as follows.

		\$
Material X	3 kg at \$2.00 per kg	6
Material Y	5 kg at \$3.60 per kg	18
		<u>24</u>

During period 2, 2,000 kgs of material X (costing \$4,100) and 2,400 kgs of material Y (costing \$9,600) were used to produce 500 units of D456.

Required

Calculate the following variances.

- (a) Price variances
- (b) Mix variances
- (c) Yield variances – in total and for each individual material

(a)	2,000 kg of X should cost ($\times \$2$)	\$ 4,000
	but did cost	<u>4,100</u>
	Material X price variance	<u>100 (A)</u>
	2,400 kg of Y should cost ($\times \$3.60$)	8,640
	but did cost	<u>9,600</u>
	Material Y price variance	<u>960 (A)</u>

(b)	Total quantity used (2,000 + 2,400) kgs	kg <u>4,400</u>
	Standard mix for actual use: $\frac{3}{8}$ X	kg 1,650
	$\frac{5}{8}$ Y	<u>2,750</u>
		<u>4,400</u>

	<i>Actual quantity standard mix</i>	<i>Actual quantity actual mix</i>	<i>Variance</i>	<i>Standard cost per kg</i>	<i>Variance</i>
	kgs	kgs	kgs	\$	\$
X	1,650	2,000	350 (A)	2.00	700 (A)
Y	<u>2,750</u>	<u>2,400</u>	<u>350 (F)</u>	3.60	<u>1,260 (F)</u>
	<u>4,400</u>	<u>4,400</u>	<u>—</u>		<u>560 (F)</u>

(c)	In total	
	Each unit of D456 requires	\$6
	3 kg of X, costing	<u>\$18</u>
	5 kg of Y, costing	<u>\$24</u>
	<u>8 kg</u>	
	4,400 kg should have yielded ($\div 8$ kg)	550 units
	But did yield	<u>500 units</u>
	Yield variance in units	50 units (A)
	\times standard cost per unit of output	\times <u>\$24</u>
	Yield variance in \$	<u>\$1,200 (A)</u>

For individual materials					
	<i>Standard quantity standard mix</i>	<i>Actual quantity standard mix</i>	<i>Variance</i>	<i>Standard cost per kg</i>	<i>Variance</i>
	kgs	kgs	kgs	\$	\$
X	1,500	1,650	150 (A)	2.00	300 (A)
Y	<u>2,500</u>	<u>2,750</u>	<u>250 (A)</u>	3.60	<u>900 (A)</u>
	<u>4,000</u>	<u>4,400</u>	<u>400 (A)</u>		<u>1,200 (A)</u>

Exam focus point

With all variance calculations, it is vital that you do not simply learn formulae. You must have a thorough understanding of what your calculations are showing. This is especially true of the variances we will look at in this section and in section 6.

5.4 Example: Losses, mix and yield

Coope and Sorcerer Co make product T42 in a continuous process, for which standard and actual quantities in month 10 were as follows.

	Standard			Actual		
	Quantity	Price	Value	Quantity	Price	Std cost of actual usage
	kg	per kg	\$	kg	per kg	\$
Material P	40,000	2.50	100,000	34,000	2.50	85,000
Material Q	20,000	4.00	80,000	22,000	4.00	88,000
	<u>60,000</u>		<u>180,000</u>	<u>56,000</u>		<u>173,000</u>

Losses occur at an even rate during the processing operation and are expected to be 10% of materials input. Actual output during the month was 53,000 kgs.

Required

Calculate total usage, mix and yield variances.

Solution

Usage variance

Output of 53,000 kgs should have used input of $53,000/90\% = 58,889$ kgs.

∴ Standard input should have been as follows.

		Kg
P	$\frac{2}{3} \times 58,889 =$	39,259
Q	$\frac{1}{3} \times 58,889 =$	<u>19,630</u>
		<u>58,889</u>
		Kg
	P	Q
53,000 kg of T42 should need	39,259 kg	19,630 kg
but did need	<u>34,000 kg</u>	<u>22,000 kg</u>
Usage variance in kg	5,259 kg (F)	2,370 kg (A)
× standard price per kg	× \$2.50	× \$4
Usage variance in \$	<u>\$13,148 (F)</u>	<u>\$9,480 (A)</u>
Total usage variance	<u>\$3,668 (F)</u>	

Yield variance

Each kg of T42 requires $(1 \times 100/90)$ kg of input costing \$3.33 ($\$180,000/(60,000 \times 90\%)$)

56,000 kg should have yielded ($\div 100/90$)	50,400 kg
but did yield	<u>53,000 kg</u>
Yield variance in kgs	2,600 kg (F)
× standard cost per kg of T42	× \$3.33
Yield variance in \$	<u>\$8,667 (F)</u>

Mix variance

Total quantity used 56,000.00 kg

Standard mix for actual use:	2/3 P	37,333.33 kg
	1/3 Q	<u>18,666.67 kg</u>
		<u>56,000.00 kg</u>

	P	Q
Mix should have been	37,333.33 kg	18,666.67 kg
but was	<u>34,000.00 kg</u>	<u>22,000.00 kg</u>
Mix variance in kg	3,333.33 kg (F)	3,333.33 kg (A)
× standard cost per kg	× \$2.50	× \$4.00
Mix variance in \$	<u>\$8,333.00 (F)</u>	<u>\$13,333.00 (A)</u>
Total mix variance	<u>\$5,000 (A)</u>	

(Note that there is a difference between the sum of the mix and yield variances and the usage variance due to rounding.)

Exam focus point

Question 5 of the December 2011 exam asked candidates to calculate materials usage, mix and yield (quantity) variances. The examiner noted that some candidates calculated the variances in kg but did not convert them into a monetary value using the standard costs for each ingredient.

Variances need to be given a value in order to be used properly within a business. It is not sufficient to simply stop at quantity!

5.5 The issues involved in changing the mix

The materials mix variance indicates the **cost** of a change in the mix of materials and the yield variance indicates the **productivity** of the manufacturing process. A change in the mix can have wider implications. For example, rising raw material prices may cause pressure to change the mix of materials. Even if the yield is not affected by the change in the mix, the **quality** of the final product may change. This can have an adverse effect on sales if customers do not accept the change in quality. The production manager's performance may be measured by mix and yield variances but these **performance measures** may fail to indicate problems with falling quality and the impact on other areas of the business. **Quality targets** may also be needed.

5.6 Alternative methods of controlling production processes

In a modern manufacturing environment with an emphasis on quality management, using mix and yield variances for control purposes may not be possible or may be inadequate. Other control methods could be more useful.

- Rates of wastage
- Average cost of input calculations
- Percentage of deliveries on time
- Customer satisfaction ratings
- Yield percentage calculations or output to input conversion rates

We will be considering performance measures in more detail in [Chapter 13](#).

6 Sales mix and quantity variances

FAST FORWARD

The **sales volume variance** can also be analysed further into a sales mix variance and a sales quantity variance.

6.1 Sales volume variance

You should be familiar with how to calculate the sales volume variance from your earlier studies. It measures the increase or decrease in the standard profit or contribution as a result of the sales volume being higher or lower than budgeted. It is calculated as the difference between actual sales units and budgeted sales units, multiplied by the standard profit per unit.

6.2 Sales mix and quantity variances

6/11

If a company **sells more than one product**, it is possible to analyse the overall sales volume variance into a sales mix variance and a sales quantity variance.

Key terms

The **sales mix variance** occurs when the proportions of the various products sold are different from those in the budget.

The **sales quantity variance** shows the difference in contribution/profit because of a change in sales volume from the budgeted volume of sales.

6.3 When to calculate the mix and quantity variances

A sales mix variance and a sales quantity variance are only meaningful where management can control the proportions of the products sold.

In particular, sales mix variances are only of use if there is some kind of link between the products in question.

- (a) Complementary products, such as pancake mix and lemon juice
- (b) Substitute products, such as branded and 'own-label' goods
- (c) Same products, different sizes
- (d) Products produced within a limiting factor environment

6.4 The units method of calculation

The sales mix variance is calculated as the difference between the actual quantity sold in the standard mix and the actual quantity sold in the actual mix, valued at standard margin per unit. The sales quantity variance is calculated as the difference between the actual sales volume in the budgeted proportions and the budgeted sales volumes, multiplied by the standard margin.

6.5 Example: Sales mix and quantity variances

Just Desserts Limited makes and sells two products, Chocolate Crunch and Strawberry Sundae. The budgeted sales and profit are as follows.

	<i>Sales</i> Units	<i>Revenue</i> \$	<i>Costs</i> \$	<i>Profit</i> \$	<i>Profit per unit</i> \$
Chocolate Crunch	400	8,000	6,000	2,000	5
Strawberry Sundae	300	12,000	11,100	900	3
				<u>2,900</u>	

Actual sales were 280 units of Chocolate Crunch and 630 units of Strawberry Sundae. The company management is able to control the relative sales of each product through the allocation of sales effort, advertising and sales promotion expenses.

Required

Calculate the sales volume variance, the sales mix variance and the sales quantity variance.

Solution

- (a) **Volume profit variance**

	<i>Chocolate Crunch</i>	<i>Strawberry Sundae</i>
Budgeted sales	400 units	300 units
Actual sales	280 units	630 units
Sales volume variance in units	120 units (A)	330 units (F)
× standard margin per unit	× \$5	× \$3
Sales volume variance in \$	<u>\$600 (A)</u>	<u>\$990 (F)</u>
Total sales volume variance		<u>\$390 (F)</u>

The favourable sales volume variance indicates that a potential increase in profit was achieved as a result of the change in sales volume compared with budgeted volume. Now we will see how to analyse this favourable variance into its mix and quantity elements.

(b) **Mix variance**

When we look at the mix of sales in this example it is apparent that a bigger proportion than budgeted of the less profitable Strawberry Sundae has been sold, therefore the **sales mix variance** will be adverse. The method for calculating the variance is as follows.

- (i) Take the **actual total of sales** and **convert** this total into a **standard or budgeted mix**, on the assumption that sales should have been in the budgeted proportions or mix.
- (ii) The difference between actual sales and 'standard mix' sales for each product is then converted into a variance by multiplying by the standard margin.

Total quantity sold (280 + 630)		Units <u>910</u>
Budgeted mix for actual sales:	$\frac{4}{7}$ Chocolate Crunch	520
	$\frac{3}{7}$ Strawberry Sundae	<u>390</u>
		<u>910</u>

	<i>'Should' mix</i> <i>Actual quantity</i> <i>Standard mix</i>	<i>'Did' mix</i> <i>Actual quantity</i> <i>Actual mix</i>	<i>Difference</i>	\times <i>Standard margin</i>	<i>Variance</i>
Chocolate Crunch	520 units	280 units	240 (A)	\times \$5	\$1,200 (A)
Strawberry Sundae	<u>390 units</u>	<u>630 units</u>	<u>240 (F)</u>	\times \$3	<u>\$720 (F)</u>
	<u>910 units</u>	<u>910 units</u>	<u>—</u>		<u>\$480 (A)</u>

The profit would have been \$480 higher if the 910 units had been sold in the budgeted mix of 4:3.

(c) **Quantity variance**

The sales quantity variance is calculated as follows.

	<i>Actual sales</i> <i>Standard mix</i>	<i>Standard sales</i> <i>Standard mix</i>	<i>Difference</i> <i>in units</i>	\times <i>Standard profit</i>	<i>Variance</i>
Chocolate Crunch	520 units	400 units	120 units (F)	\times \$5	\$600 (F)
Strawberry Sundae	<u>390 units</u>	<u>300 units</u>	<u>90 units (F)</u>	\times \$3	<u>\$270 (F)</u>
	<u>910 units</u>	<u>700 units</u>	<u>210 units</u>		<u>\$870 (F)</u>

(d) **Summary**

	\$
Sales mix variance	480 (A)
Sales quantity variance	<u>870 (F)</u>
Sales volume variance	<u>390 (F)</u>

If an organisation uses standard marginal costing instead of standard absorption costing then standard contribution rather than standard profit margin is used in the calculations.

Exam focus point

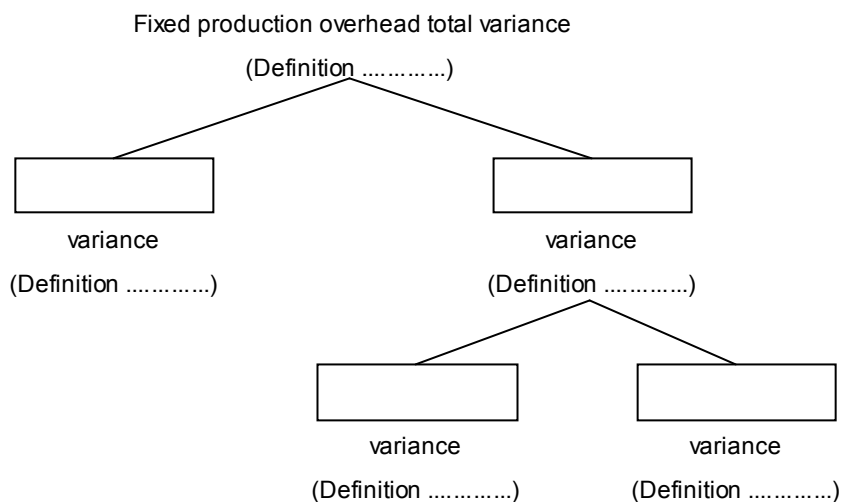
Try not to confuse the sales volume profit variance with the sales quantity profit variance. The examiner had noted that candidates often learn formulae to churn out calculations, but do not appreciate what variances mean to a business. Make sure you understand why sales mix and quantity variances occur.

Chapter Roundup

- The **materials usage variance** can be subdivided into a materials **mix** variance and a materials **yield** variance when more than one material is used in the product.
- The **sales volume variance** can also be analysed further into a **sales mix variance** and a **sales quantity variance**.

Quick Quiz

- 1 *Fill in the blanks.*
The material price variance is the difference between and
The material usage variance is the difference between and
- 2 If closing inventories of raw materials are valued at standard cost, the material price variance is calculated on material purchases in the period.
True False
- 3 Are variable production overhead variances based on hours paid or hours worked?
- 4 *Fill in the boxes in the diagram with the names of the variances and add the appropriate definition number from the list below.*



Definitions

- 1 The difference between actual and budgeted production, multiplied by the standard absorption rate per unit
 - 2 The difference between budgeted hours of work and the actual hours worked, multiplied by the standard absorption rate per hour
 - 3 The under or over absorption of fixed production overhead
 - 4 The difference between budgeted fixed production overhead expenditure and actual fixed production overhead expenditure
 - 5 The difference between the number of hours that actual production should have taken, and the number of hours actually taken, multiplied by the standard absorption rate per hour
- 5 The sales volume variance is valued at the standard selling price per unit.
True False

6 Match the following causes of variances to the appropriate variance.

Variances		Causes	
(a)	Favourable labour efficiency	(1)	Inexperienced staff in the purchasing department
(b)	Adverse sales volume	(2)	Materials of higher quality than standard
(c)	Adverse material price	(3)	Unexpected slump in demand
(d)	Adverse selling price	(4)	Production difficulties
(e)	Adverse fixed production overhead volume	(5)	Strike
(f)	Idle time	(6)	Poor machine maintenance

7 Match the three pairs of interrelated variances.

- | | |
|-----------------------------|--------------------------------|
| (a) Adverse selling price | (e) Adverse materials price |
| (b) Favourable labour rate | (f) Favourable materials usage |
| (c) Adverse materials usage | (g) Adverse sales volume |
| (d) Favourable sales volume | (h) Idle time |

8 Choose the appropriate words from those highlighted.

The materials mix variance is calculated as the difference between the **standard/actual** total quantity used in the **standard/actual** mix and the **standard/actual** quantities used in the **standard/actual** mix, valued at **standard/actual** costs.

9 Choose the appropriate words from those highlighted.

The materials yield variance is calculated on the difference between the **standard/actual** input for **standard/actual** output, and the **standard/actual** total quantity input (in the **standard/actual** mix), valued at **standard/actual** costs.

10 The total yield variance in quantity is zero.

True False

11 Choose the appropriate words from those highlighted

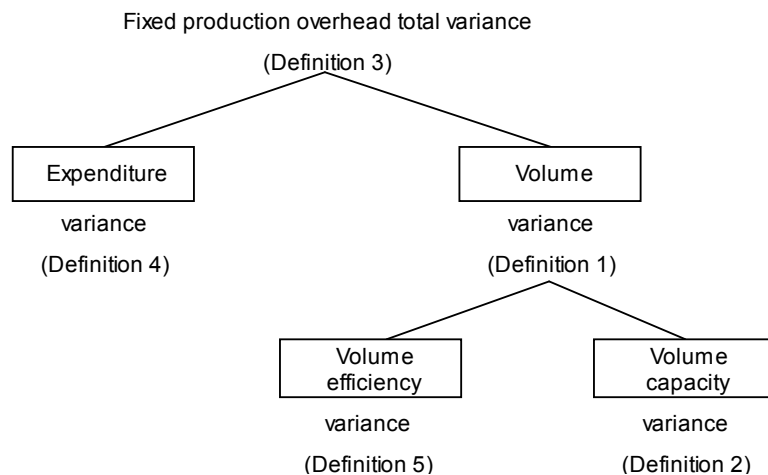
The sales mix variance is calculated as the difference between the **standard/actual** quantity sold in the **standard/actual** mix and the **standard/actual** quantity sold in the **standard/actual** mix, valued at **standard/actual** margin per unit.

12 Choose the appropriate words from those highlighted

The sales quantity variance is calculated as the difference between the **standard/actual** sales volume in the budgeted proportions and the budgeted sales volumes, multiplied by the **standard/actual** margin.

Answers to Quick Quiz

- 1 The material price variance is the difference between what the material did cost and what it should have cost.
The material usage variance is the difference between the standard cost of the material that should have been used and the standard cost of the material that was used.
- 2 True
- 3 Variable production overhead variances are based on hours worked.
- 4



- 5 False. It is valued at the standard profit margin per unit.
- 6 (a) (2) (d) (3)
(b) (3) or (4) or (5) (e) (4) or (5) or (6)
(c) (1) (f) (5) or (6)
- 7 (a) and (d)
(b) and (c)
(e) and (f)
- 8 The materials mix variance is calculated as the difference between the actual total quantity used in the standard mix, and the actual quantities used in the actual mix, valued at standard costs.
- 9 The materials yield variance is calculated as the difference between the standard input for actual output, and the actual total quantity input (in the standard mix), valued at standard costs.
- 10 False. It is the total mix variance in quantity which is zero.
- 11 The sales mix variance is calculated as the difference between the actual quantity sold in the standard mix and the actual quantity sold in the actual mix, valued at standard margin per unit.
- 12 The sales quantity variance is calculated as the difference between the actual sales volume in the budgeted proportions and the budgeted sales volumes, multiplied by the standard margin.

Now try the question below from the Exam Question Bank

Number	Level	Marks	Time
Q16	Examination	20	36 mins

13

Behavioural aspects of standard costing

Topic list	Syllabus reference
1 Planning and operational variances	D4 (a), (b), (c), (d)
2 Behavioural aspects of standard costing	D5 (a), (b), (c)

Introduction

In this chapter we discuss the effects of standard costs and variances on staff motivation and action.

Managers' acceptance of the use of variances for performance measurement, and their **motivation**, is likely to increase if they know they will not be held responsible for poor planning and faulty standard setting. **Planning and operational variances** are used to highlight those variances which are **controllable** and those which are **non-controllable**.

We also discuss the problems of using standard costing in the modern, rapidly changing business environment.

Study guide

		Intellectual level
D4	Planning and operational variances	
(a)	Calculate a revised budget	2
(b)	Identify and explain those factors that could and could not be allowed to revise an original budget	2
(c)	Calculate, identify the cause of and explain planning and operational variances for: <ul style="list-style-type: none"> (i) sales, including market size and share (ii) materials (iii) labour, including the effect of the learning curve 	2
(d)	Explain the manipulation issues in revising budgets	2
D5	Behavioural aspects of standard costing	
(a)	Describe the dysfunctional nature of some variances in the modern environment of JIT and TQM	2
(b)	Discuss the behavioural problems resulting from using standard costs in rapidly changing environments	2
(c)	Discuss the effect that variances have on staff motivation and action	2

Exam guide

Planning and operational variances are highly examinable and behavioural aspects of standard costing may form the discussion part of a question.

1 Planning and operational variances

FAST FORWARD

A planning and operational approach to variance analysis divides the total variance into those variances which have arisen because of inaccurate planning or faulty standards (**planning variances**) and those variances which have been caused by adverse or favourable operational performance, compared with a standard which has been revised in hindsight (**operational variances**).

So far in this text we have been looking at variances which are calculated using what we will call the conventional approach to variance analysis, whereby an actual cost is compared with an original standard cost. In this section of the chapter we will be examining planning and operational variances. They are not really alternatives to the conventional approach, they merely provide a much more detailed analysis.

Basically, the planning and operational approach attempts to divide a total variance (which has been calculated conventionally) into a group of variances which have arisen because of **inaccurate planning** or **faulty standards** (planning variances) and a group of variances which have been caused by adverse or favourable **operational performance** (operational variances, surprisingly enough!).

Planning and operational variances may seem confusing if you do not have a really good grasp of the conventional approach and so, before you go any further, make sure that you understand everything that we covered so far in this Text. Go back over any areas you are unsure about. Only when you are happy that you have mastered the basics should you begin on this section.

Key terms

A **planning variance** (or **revision variance**) compares an original standard with a revised standard that should or would have been used if planners had known in advance what was going to happen.

An **operational variance** (or **operating variance**) compares an actual result with the revised standard.

Planning and operational variances are based on the principle that variances ought to be reported by taking as the **main starting point**, not the original standard, but a **standard** which can be seen, in hindsight, to be the **optimum** that should have been **achievable**.

Exponents of this approach argue that the monetary value of variances ought to be a realistic reflection of what the **causes** of the variances have cost the organisation. In other words they should show the cash (and profit) gained or lost as a consequence of operating results being different to what should have been achieved. Variances can be valued in this way by **comparing actual results with a realistic standard or budget**. Such variances are called **operational variances**.

Planning variances arise because the **original standard and revised more realistic standards are different** and have nothing to do with operational performance. In most cases, it is unlikely that anything could be done about planning variances: they are **not controllable by operational managers but by senior management**.

In other words the **cause of a total variance** might be one or both of:

- Adverse or favourable operational performance (**operational variance**)
- Inaccurate planning, or faulty standards (**planning variance**)

1.1 Calculating total planning and operational variances

We will begin by looking at how to split a total cost variance into its planning and operational components.

1.1.1 Example: Total cost planning and operational variances

At the beginning of 20X0, WB set a standard marginal cost for its major product of \$25 per unit. The standard cost is recalculated once each year. Actual production costs during August 20X0 were \$304,000, when 8,000 units were made.

With the benefit of hindsight, the management of WB realises that a more realistic standard cost for current conditions would be \$40 per unit. The planned standard cost of \$25 is unrealistically low.

Required

Calculate the planning and operational variances.

Solution

With the benefit of hindsight, the **realistic standard should have been \$40**. The variance caused by favourable or adverse **operating** performance should be calculated by comparing actual results against this realistic standard.

	\$
Revised standard cost of actual production (8,000 × \$40)	320,000
Actual cost	304,000
Total operational variance	<u>16,000</u> (F)

The variance is favourable because the actual cost was lower than would have been expected using the revised basis.

The **planning** variance reveals the extent to which the original standard was at fault.

Revised standard cost	8,000 units × \$40 per unit	320,000
Original standard cost	8,000 units × \$25 per unit	200,000
Planning variance		<u>120,000</u> (A)

It is an adverse variance because the original standard was too optimistic, overestimating the expected profits by understating the standard cost. More simply, it is adverse because the revised cost is much higher than the original cost.

Planning variance	\$ 120,000 (A)
Operational variance	<u>16,000 (F)</u>
Total	<u>104,000 (A)</u>

If **traditional variance analysis** had been used, the total cost variance would have been the same, but all the '**blame**' would appear to lie on actual results and operating inefficiencies (rather than some being due to faulty planning).

Standard cost of 8,000 units ($\times \$25$)	\$ 200,000
Actual cost of 8,000 units	<u>304,000</u>
Total cost variance	<u>104,000 (A)</u>



Question

Planning and operational variances

Suppose a budget is prepared which includes a raw materials cost per unit of product of \$2 (2 kg of copper at \$1 per kg). Due to a rise in world prices for copper during the year, the average market price of copper rises to \$1.50 per kg. During the year, 1,000 units were produced at a cost of \$3,250 for 2,200 kg of copper.

What are the planning and operational variances?

Answer

Operational variance

Actual cost (for 1,000 units)	\$ 3,250
Revised standard cost (for 1,000 units) (2,000 kg \times \$1.50)	<u>3,000</u>
Total operational variance	<u>250 (A)</u>

Planning variance

Revised standard cost (1,000 \times 2 kg \times \$1.50)	\$ 3,000
Original standard cost (1,000 \times 2 kg \times \$1)	<u>2,000</u>
Total planning variance	<u>1,000 (A)</u>

1.2 Operational price and usage variances

So far we have only considered planning and operational variances in total, without carrying out the usual two-way split. In the question above, for instance, we identified a total operational variance for materials of \$250 without considering whether this operational variance could be split between a usage variance and a price variance.

This is not a problem so long as you retain your grasp of knowledge you already possess. You know that a **price** variance measures the difference between the actual amount of money paid and the amount of money that should have been paid for that quantity of materials (or whatever). Thus, in our example:

Actual price of actual materials (2,200 kg)	\$ 3,250
Revised standard price of actual materials (\$1.50 \times 2,200 kg)	<u>3,300</u>
Operational price variance	<u>50 (F)</u>

The variance is favourable because the materials were purchased more cheaply than would have been expected.

Similarly, a **usage** variance measures the difference between the actual physical quantity of materials used or hours taken and the quantities that should have been used or taken for the actual volume of production.

Those physical differences are then converted into money values by applying the appropriate standard cost.

In our example we are calculating **operational variances**, so we are not interested in planning errors. This means that the **appropriate standard cost is the revised standard cost** of \$1.50.

Actual quantity should have been	2,000 kgs
but was	<u>2,200 kgs</u>
Operational usage variance in kgs	200 kgs (A)
× revised standard cost per kg	× \$1.50
Operational usage variance in \$	<u>\$300 (A)</u>

The two variances of course reconcile to the total variance as previously calculated.

	\$
Operational price variance	50 (F)
Operational usage variance	<u>(300) (A)</u>
Total operational variance	<u>250 (A)</u>

1.3 Planning price and usage variances

We can also split the total planning variance into two. For example, if two planning errors have been made, one affecting price and one usage, the effect of each can be analysed.

1.3.1 Example: Planning price and usage variances

The standard materials cost of a product is 5 kgs × \$7.50 per kg = \$37.50. Actual production of 10,000 units used 54,400 kgs at a cost of \$410,000. In retrospect it was realised that the standard materials cost should have been 5.3 kgs per unit at a cost of \$8 per kg.

Required

Calculate the materials planning variances in as much detail as possible.

Solution

Calculate the **total** materials planning variance first, to give you a point of reference.

Total materials planning variance

		\$
Original flexed budget cost	(10,000 × \$37.50)	375,000
Revised flexed budget cost	(10,000 × 5.3 kgs × \$8)	<u>424,000</u>
		<u>49,000 (A)</u>

Planning price variance

$$\begin{aligned} & \text{Actual units} \times \text{revised standard usage} \times (\text{original standard price} - \text{revised standard price}) \\ & = 10,000 \text{ units} \times 5.3 \text{ kgs} \times (\$7.50 - \$8.00) = \underline{\underline{\$26,500 (A)}} \end{aligned}$$

Planning usage variance

$$\begin{aligned} & \text{Actual units} \times \text{original standard price} \times (\text{original standard usage} - \text{revised standard usage}) \\ & = 10,000 \text{ units} \times \$7.50 \times (5 \text{ kgs} - 5.3 \text{ kgs}) = \underline{\underline{\$22,500 (A)}} \end{aligned}$$

Planning price variance + planning usage variance = total planning variance

$$\$26,500 + \$22,500 = \$49,000 (A)$$

1.4 Operational variances for labour and overheads

Precisely the same argument applies to the calculation of operational variances for labour and overheads, and the examples already given should be sufficient to enable you to do the next question.



Question

Operational and planning variances

A new product requires three hours of labour per unit at a standard rate of \$6 per hour. In a particular month the budget is to produce 500 units. Actual results were as follows.

Hours worked	1,700
Production	540 units
Wages cost	\$10,500

Within minutes of production starting it was realised that the job was extremely messy and the labour force could therefore claim an extra 25c per hour in 'dirty money'.

Required

Calculate planning and operational variances in as much detail as possible.

Answer

Keep calm and calculate the *total* variance in the normal way to begin with. Then you will understand what it is that you have to analyse. Next follow through the workings shown above, substituting the figures in the exercise for those in the example.

Total labour variance

	\$
540 units should have cost ($\times 3 \text{ hrs} \times \6)	9,720
But did cost	10,500
	<u>780 (A)</u>

Planning variance

	\$
Revised standard cost ($540 \times 3 \text{ hrs} \times \6.25)	10,125
Original standard cost ($540 \times 3 \text{ hrs} \times \6.00)	9,720
	<u>405 (A)</u>

Operational rate variance

	\$
Actual cost of actual units	10,500
Revised cost of actual units ($1,700 \times \$6.25$)	10,625
	<u>125 (F)</u>

Operational efficiency variance

540 units should have taken ($\times 3 \text{ hrs}$)	1,620 hrs
but did take	1,700 hrs
Operational efficiency variance in hours	80 hrs
\times revised standard rate per hour	$\times \$6.25$
Operational efficiency variance in \$	<u>\$500 (A)</u>

1.5 Planning and operational sales variances

12/07

Our final calculations in this section deal with planning and operational sales variances.

1.5.1 Example: Planning and operational sales variances

Dimsek budgeted to make and sell 400 units of its product, the role, in the four-week period no 8, as follows.

	\$
Budgeted sales (100 units per week)	40,000
Variable costs (400 units × \$60)	<u>24,000</u>
Contribution	16,000
Fixed costs	<u>10,000</u>
Profit	<u>6,000</u>

At the beginning of the second week, production came to a halt because inventories of raw materials ran out, and a new supply was not received until the beginning of week 3. As a consequence, the company lost one week's production and sales. Actual results in period 8 were as follows.

	\$
Sales (320 units)	32,000
Variable costs (320 units × \$60)	<u>19,200</u>
Contribution	12,800
Fixed costs	<u>10,000</u>
Actual profit	<u>2,800</u>

In retrospect, it is decided that the optimum budget, given the loss of production facilities in the third week, would have been to sell only 300 units in the period.

Required

Calculate appropriate planning and operational variances.

Solution

The **planning** variance compares the revised budget with the **original budget**.

Revised sales volume, given materials shortage	300 units
Original budgeted sales volume	<u>400 units</u>
Planning variance in units of sales	100 units(A)
× standard contribution per unit	× \$40
Planning variance in \$	<u>\$4,000 (A)</u>

Arguably, **running out of raw materials is an operational error** and so the loss of sales volume and contribution from the materials shortage is an opportunity cost that could have been avoided with better purchasing arrangements. The operational variances are variances calculated in the usual way, except that actual results are compared with the revised standard or budget. There is a sales volume variance which is an **operational variance**, as follows.

Actual sales volume	320 units
Revised sales volume	<u>300 units</u>
Operational sales volume variance in units (possibly due to production efficiency or marketing efficiency)	20 units (F)
× standard contribution per unit	× \$40
	<u>\$800 (F)</u>

These variances can be used as **control information** to reconcile budgeted and actual profit.

	\$	\$
<i>Operating statement, period 8</i>		
Budgeted profit		6,000
Planning variance	4,000 (A)	
Operational variance – sales volume	<u>800 (F)</u>	
		3,200 (A)
Actual profit in period 8		<u><u>2,800</u></u>

You will have noticed that in this example sales volume variances were **valued at contribution forgone**, and there were no fixed cost volume variances. This is because contribution forgone, in terms of lost revenue or extra expenditure incurred, is the nearest equivalent to **opportunity cost** which is readily available to management accountants (who assume linearity of costs and revenues within a relevant range of activity).



Question

Planning and operational sales variances

KSO budgeted to sell 10,000 units of a new product during 20X0. The budgeted sales price was \$10 per unit, and the variable cost \$3 per unit.

Although actual sales in 20X0 were 10,000 units and variable costs of sales were \$30,000, sales revenue was only \$5 per unit. With the benefit of hindsight, it is realised that the budgeted sales price of \$10 was hopelessly optimistic, and a price of \$4.50 per unit would have been much more realistic.

Required

Calculate planning and operational variances.

Answer

The only variances are selling price variances.

Planning (selling price) variance

	<i>Total</i>
	\$
Revised budget (10,000 × \$4.50)	45,000
Original budget (10,000 × \$10.00)	<u>100,000</u>
Planning variance	<u><u>55,000 (A)</u></u>

The original variance was too optimistic and so the planning variance is an adverse variance.

Operational (selling price) variance

	\$
Actual sales (10,000 × \$5)	50,000
Revised sales (10,000 × \$4.50)	<u>45,000</u>
Operational (selling price) variance	<u><u>5,000 (F)</u></u>

The total difference between budgeted and actual profit of \$50,000 (A) is therefore analysed as follows.

	\$
Operational variance (selling price)	5,000 (F)
Planning variance	<u>55,000 (A)</u>
	<u><u>50,000 (A)</u></u>



Question

Sales volumes

PG budgeted sales for 20X8 were 5,000 units. The standard contribution is \$9.60 per unit. A recession in 20X8 meant that the market for PG's products declined by 5%. PG's market share also fell by 3%. Actual sales were 4,500 units.

Required

Calculate planning and operational variances for sales volume.

Answer

Planning variance

	Units
Original budgeted sales	5,000
Revised budget sales (–5%)	<u>4,750</u>
	250 A
@ Contribution per unit of \$9.60	<u>\$2,400</u>

Operational variance

	Units
Revised budget sales	4,750
Actual sales	<u>4,500</u>
	250 A
@ Contribution per unit of \$9.60	<u>\$2,400</u>

The fall in **market size** is uncontrollable by the management of PG and therefore results in a **planning** variance. The fall in **market share** is controllable and forms part of the **operational** variance.

Exam focus point

The examiner is very keen that candidates should understand the practical problems involved with these variances and do not just concentrate on the mechanics of the calculations.

1.6 Calculating a revised budget

12/07

The syllabus requires you to be able to calculate a revised budget, which could involve revising standards for sales, materials and/or labour so that only operational variances are highlighted when actual results are compared to the revised budget.

1.6.1 Example: Revised budget

A company produces Widgets and Splodgets which are fairly standardised products. The following information relates to period 1.

The standard selling price of Widgets is \$50 each and Splodgets \$100 each. In period 1, there was a special promotion on Splodgets with a 5% discount being offered. All units produced are sold and no inventory is held.

To produce a Widget they use 5 kg of X and in period 1, their plans were based on a cost of X of \$3 per kg. Due to market movements the actual price changed and if they had purchased efficiently the cost would have been \$4.50 per kg. Production of Widgets was 2,000 units.

A Splodget uses raw material Z but again the price of this can change rapidly. It was thought that Z would cost \$30 per tonne but in fact they only paid \$25 per tonne and if they had purchased correctly the cost would have been less as it was freely available at only \$23 per tonne. It usually takes 1.5 tonnes of Z to produce 1 Splodget and 500 Splodgets are usually produced.

Each Widget takes 3 hours to produce and each Splodget 2 hours. Labour is paid \$5 per hour. At the start of period 1, management negotiated a job security package with the workforce in exchange for a promised 5% increase in efficiency – that is, that the workers would increase output per hour by 5%.

Fixed overheads are usually \$12,000 every period and variable overheads are \$3 per labour hour.

Required

Produce the original budget and a revised budget allowing for controllable factors in a suitable format.

Solution

Original budget for Period 1

	\$
Sales revenue $((2,000 \times \$50) + (500 \times \$100))$	150,000
Material costs X $(2,000 \times 5\text{kg} \times \$3)$	30,000
Material costs Z $(500 \times \$30 \times 1.5)$	22,500
Labour costs $((2,000 \times 3 \times \$5) + (500 \times 2 \times \$5))$	35,000
Variable overheads $((2,000 \times 3 \times \$3) + (500 \times 2 \times \$3))$	21,000
Fixed overheads	12,000
Profit	<u>29,500</u>

Revised budget for Period 1

	\$
Sales revenue $((2,000 \times \$50) + (500 \times \$100))$	150,000
Material costs X $(2,000 \times 5\text{kg} \times \$4.5)$	45,000
Material costs Z $(500 \times \$23 \times 1.5)$	17,250
Labour costs $((2,000 \times 3 \times \$5) + (500 \times 2 \times \$5)) \times 0.95$	33,250
Variable overheads $((2,000 \times 3 \times \$3) + (500 \times 2 \times \$3)) \times 0.95$	19,950
Fixed overheads	12,000
Profit	<u>22,550</u>

1.6.2 When should budget revisions be allowed?

A budget revision should be allowed if something has happened which is **beyond the control** of the organisation or individual manager and which makes the original budget unsuitable for use in performance management.

Any adjustment should be **approved by senior management** who should look at the issues involved **objectively** and **independently**. **Operational issues** are the issues that a budget is attempting to control so they should **not** be subject to revision. However, it can be very **difficult to establish** what is due to operational problems (controllable) and what is due to planning (uncontrollable).

1.7 The value of planning and operational variances

Advantages of a system of planning and operational variances

- The analysis highlights those variances which are **controllable** and those which are **non-controllable**.
- **Managers' acceptance** of the use of variances for performance measurement, and their **motivation**, is likely to increase if they know they will not be held responsible for poor planning and faulty standard setting.
- The **planning and standard-setting processes** should improve; standards should be more accurate, relevant and appropriate.
- Operational variances will provide a '**fairer**' reflection of actual performance.

The limitations of planning and operational variances, which must be overcome if they are to be applied in practice.

- It is difficult to **decide in hindsight** what the **realistic standard** should have been.
- It may become **too easy to justify all the variances as being due to bad planning**, so no operational variances will be highlighted.
- Establishing realistic revised standards and analysing the total variance into planning and operational variances can be a **time consuming** task, even if a spreadsheet package is devised.
- Even though the intention is to provide more meaningful information, **managers may be resistant** to the very idea of variances and refuse to see the virtues of the approach. Careful presentation and explanation will be required until managers are used to the concepts.

2 Behavioural aspects of standard costing

FAST FORWARD

The **role of standards and variances** in the modern business environment is open to question.

2.1 Standard costing and new technology

Standard costing has traditionally been associated with labour-intensive operations, but it can be applied to capital-intensive production too.

It is quite possible that with advanced manufacturing technology variable overheads are incurred in relation to machine time rather than labour time, and **standard costs should reflect this** where appropriate.

With **computer aided design/computer aided manufacture (CAD/CAM)** systems, the planning of manufacturing requirements can be computerised, so that standard costs can be constructed by computer, saving administrative time and expense while providing far **more accurate standards**.

2.2 Total quality management (TQM)

FAST FORWARD

In the context of **TQM**, quality means getting it right first time and improving continuously.

Key term

Total quality management (TQM) is the process of applying a zero defects philosophy to the management of all resources and relationships within an organisation as a means of developing and sustaining a culture of continuous improvement which focuses on meeting customers' expectations.

Mark Lee Inman listed 'eight requirements of quality' in an ACCA *Students' Newsletter* article, which could be seen as the **characteristics of total quality management programmes**.

- Organisation wide there must be acceptance that the only thing that matters is the customer.
- There should be recognition of the all-pervasive nature of the customer-supplier relationship, including internal customers; passing sub-standard material to another division is not satisfactory
- Instead of relying on inspection to a predefined level of quality, the cause of the defect in the first place should be prevented.
- Each employee or group of employees must be personally responsible for defect-free production or service in their domain.
- There should be a move away from 'acceptable' quality levels. Any level of defects must be unacceptable.
- All departments should try obsessively to get thing right first time; this applies to misdirected phone calls and typing errors as much as to production.
- Quality certification programmes should be introduced.
- The cost of poor quality should be emphasised; good quality generates savings.

2.3 Standard costing and TQM

6/12

Standard costing concentrates on **quantity** and ignores other factors contributing to effectiveness. In a **total quality environment**, however, quantity is not an issue; quality is. Effectiveness in such an environment therefore centres on high quality output (produced as a result of high quality input and the elimination of non-value adding activities) and the cost of failing to achieve the required level of effectiveness is measured not in variances, but in terms of **internal and external failure costs**, neither of which would be identified by a traditional standard costing analysis.

Standard costing systems might measure, say, **labour efficiency** in terms of individual tasks and level of **output**. In a total quality environment, labour is more likely to be viewed as a number of **multi-task teams** who are responsible for the completion of a part of the production process. The effectiveness of such a team is more appropriately measured in terms of **re-working** required, **returns** from customers, **defects** identified in subsequent stages of production and so on.

Traditional feedback control would seek to eliminate an adverse material price variance by requiring managers to source cheaper, possibly lower quality supplies. This may run counter to the aim of maximising quality of output.

2.3.1 Can standard costing and TQM co-exist?

Arguably, there is little point in running both a total quality management programme and a standard costing system simultaneously.

- (a) Predetermined standards are at odds with the philosophy of **continual improvement** inherent in a total quality management programme.
- (b) Continual improvements are likely to alter methods of working, prices, quantities of inputs and so on, whereas standard costing is most appropriate in a stable, standardised and repetitive environment.
- (c) Material standard costs often incorporate a planned level of scrap. This is at odds with the TQM aim of **zero defects** and there is no motivation to 'get it right first time'.
- (d) Attainable standards, which make some allowance for wastage and inefficiencies are commonly set. The use of such standards conflicts with the **elimination of waste** which is such a vital ingredient of a TQM programme.
- (e) Standard costing control systems make individual managers **responsible** for the variances relating to their part of the organisation's activities. A TQM programme, on the other hand, aims to make **all personnel** aware of, and responsible for, the importance of supplying the customer with a quality product.



Question

TQM and variance analysis

One of the basic tenets of total quality management is 'get it right first time'. Is variance reporting a help or a hindrance in this respect?

Answer

In theory it should not be of any relevance at all, because variances will not occur. In practice an organisation will not get everything right first time and variance reporting may still draw attention to areas for improvement – **if the standard and 'being right' are the same thing.**

2.4 Standard costing and new philosophy

It has been argued that traditional variance analysis is unhelpful and **potentially misleading** in the modern organisation, and can make managers focus their attention on the wrong issues, for example **over-producing** and stockpiling finished goods, because higher production volumes mean that overheads are spread over more units. Here are two examples.

- (a) **Efficiency variance.** Adverse efficiency variances should be avoided, which means that managers should try to prevent idle time and to keep up production. In a TQM environment using just-in-time manufacturing, action to eliminate idle time could result in the manufacture of unwanted products that must be held in store and might eventually be scrapped. Efficiency variances could focus management attention on the wrong problems.
- (b) **Materials price variance.** In a JIT environment, the key issues with materials purchasing are supplier reliability, materials quality, and delivery in small order quantities. Purchasing managers shouldn't be shopping around every month looking for the cheapest price. Many JIT systems depend on long-term contractual links with suppliers, which means that material price variances are not relevant for control purposes.

The **role of standards and variances in the modern business environment** is viewed as follows by George Brown (a previous ACCA examiner).

'The rate of change in product type and design due to technological improvement, customer requirements and increased competition has led to rapid change in how businesses operate. The need to respond to customer demands for speedy availability of products, shortening product life cycles and higher quality standards has contributed to a number of changes in the way businesses operate...just-in-time systems...total quality programmes...greater emphasis on the value chain...accurate product costing and pricing information...improved speed and flexibility of information availability...' ('Standard costing – a status check')

Standard costing, on the other hand, is most appropriate in a stable, standardised and repetitive environment and one of the main objectives of standard costing is to ensure that processes conform to standards, that they do not vary, and that variances are eliminated. This may seem **restrictive and inhibiting in the business environment of the twenty first century**. (In fact, in the article referred to above, George Brown attempts to show that concerns about the restrictive and inhibiting nature of standard costing have been raised since it was first used and that efforts have continuously been made (such as planning and operating variances) to redesign standards and variances to maintain their relevance in an environment of change.)

2.5 Other problems with using standard costing in today's environment

- (a) Variance analysis concentrates on only a **narrow range of costs**, and does not give sufficient attention to issues such as quality and customer satisfaction.
- (b) Standard costing places **too much emphasis on direct labour costs**. Direct labour is only a small proportion of costs in the modern manufacturing environment and so this emphasis is not appropriate.
- (c) Many of the variances in a standard costing system focus on the control of **short-term variable costs**. In most modern manufacturing environments, the majority of costs, including direct labour costs, tend to be fixed in the short run.
- (d) The use of standard costing relies on the existence of **repetitive operations** and relatively **homogeneous** output. Nowadays many organisations are forced continually to respond to customers' changing requirements, with the result that output and operations are not so repetitive.
- (e) Standard costing systems were **developed** when the **business environment** was more **stable and less prone to change**. The current business environment is more dynamic and it is not possible to assume stable conditions.
- (f) Standard costing systems **assume** that **performance to standard is acceptable**. Today's business environment is more focused on continuous improvement.
- (g) Most standard costing systems produce **control statements weekly or monthly**. The modern manager needs much more prompt control information in order to function efficiently in a dynamic business environment.

2.6 The role in modern business of standards and variances

Two surveys ((Puxty and Lyall (1989) and Drury *et al* (1993)) have confirmed the **continued wide use of standard costing systems**. Drury *et al*, for instance, showed that 76% of the responding organisations operated a standard costing system.

- **Planning**. Even in a TQM environment, budgets will still need to be quantified. For example, the planned level of prevention and appraisal costs needs to be determined. Standards, such as returns of a particular product should not exceed 1% of deliveries during a budget period, can be set.
- **Control**. Cost and mix changes from plan will still be relevant in many processing situations.
- **Decision making**. Existing standards can be used as the starting point in the construction of a cost for a new product.
- **Performance measurement**. If the product mix is relatively stable, performance measurement may be enhanced by the use of a system of planning and operational variances.

- **Product pricing.** Target costs may be compared with current standards, and the resulting 'cost gap' investigated with a view to reducing it or eliminating it using techniques such as value engineering.
- **Improvement and change.** Variance trends can be monitored over time.
- **Accounting valuations.** Although the operation of a JIT system in conjunction with backflush accounting will reduce the need for standard costs and variance analysis, standards may be used to value residual inventory and the transfers to cost of sales account.



Question

Variance analysis and improving product quality

AB Co has been receiving an increasing number of customer complaints about a general weakness in the quality of its products in recent months. The company believes that its future success is dependent on product quality and it is therefore determined to improve it.

Required

Describe the contribution that variance analysis can make towards the aim of improved product quality.

Answer

Variance analysis can be used to enhance product quality and to keep track of quality control information. This is because variance analysis measures both the planned use of resources and the actual use of resources in order to compare the two.

As variance analysis is generally expressed in terms of purely quantitative measures, such as quantity of raw materials used and price per unit of quantity, issues of quality would appear to be excluded from the reporting process. Quality would appear to be an excuse for spending more time, say, or buying more expensive raw materials.

Variance analysis, as it currently stands, therefore needs to be **adapted** to take account of quality issues.

- Variance analysis reports should routinely include **measures such as defect rates**. Although zero defects will be most desirable, such a standard of performance may not be reached at first. However there should be an expected rate of defects: if this is exceeded then management attention is directed to the excess.
- The **absolute number of defects** should be measured *and their type*. If caused by certain materials and components this can shed light on, say, a favourable materials price variance which might have been caused by substandard materials being purchased more cheaply. Alternatively, if the defects are caused by shoddy assembly work this can shed light on a favourable labour efficiency variance if quality is being sacrificed for speed.
- It should also be possible to provide **financial measures for the cost of poor quality**. These can include direct costs such as the wages of inspection and quality control staff, the cost of time in rectifying the defects, and the cost of the materials used in rectification.
- Measures could be built into materials price and variance analysis, so that the **materials price variance** as currently reported includes a **factor reflecting the quality of materials purchased**.



Question

Adapting standard costing

Can you think of some ways in which a standard costing system could be adapted so that it is useful in the modern business environment?

Answer

Here are some ideas.

- (a) **Non-financial measures** can be included within management control reports. Examples include number of defects, percentage of on-time deliveries, and so on.
- (b) Even when output is not standardised, it may be possible to identify a number of **standard components and activities** whose costs may be controlled effectively by the setting of standard costs and identification of variances.
- (c) The use of computer power enables standards to be **updated rapidly** and more frequently, so that they remain useful for the purposes of control by comparison.
- (d) The use of **ideal standards** and **more demanding performance levels** can combine the benefits of **continuous improvement** and standard costing control.
- (e) **Information**, particularly of a non-financial nature, can be **produced more rapidly** with the assistance of **computers**. For example the use of on-line data capture can enable the continuous display of real time information on factors such as hours worked, number of components used and number of defects.

Chapter Roundup

- A planning and operational approach to variance analysis divides the total variance into those variances which have arisen because of inaccurate planning or faulty standards (**planning variances**) and those variances which have been caused by adverse or favourable operational performance, compared with a standard which has been revised in hindsight (**operational variances**).
- The **role of standards and variances** in the modern business environment is open to question.
- In the context of **TQM**, quality means getting it right first time and improving continuously.

Quick Quiz

- 1 A planning variance compares what with what?
- 2 If a planning efficiency variance is valued at an original standard rate, the planning rate variance is valued at the original efficiency level.
True False
- 3 Complete the table below to show a possible response to each of the traditional performance measures and a consequence of that response.

Measurement	Response	Consequence of action
Purchase price variance		
Labour efficiency variance		
Cost of scrap		
Scrap factor included in standard costs		

- 4 *Fill in the missing words.*
 - (a) Standard costing concentrates on whereas the issue in TQM is
 - (b) Using standard costing, the cost of failing to achieve the required level of effectiveness is measured in ; in TQM, it is measured in terms of
 - (c) Standard costing systems might measure labour efficiency in terms of
In a TQM environment, effectiveness is more appropriately measured in terms of

Answers to Quick Quiz

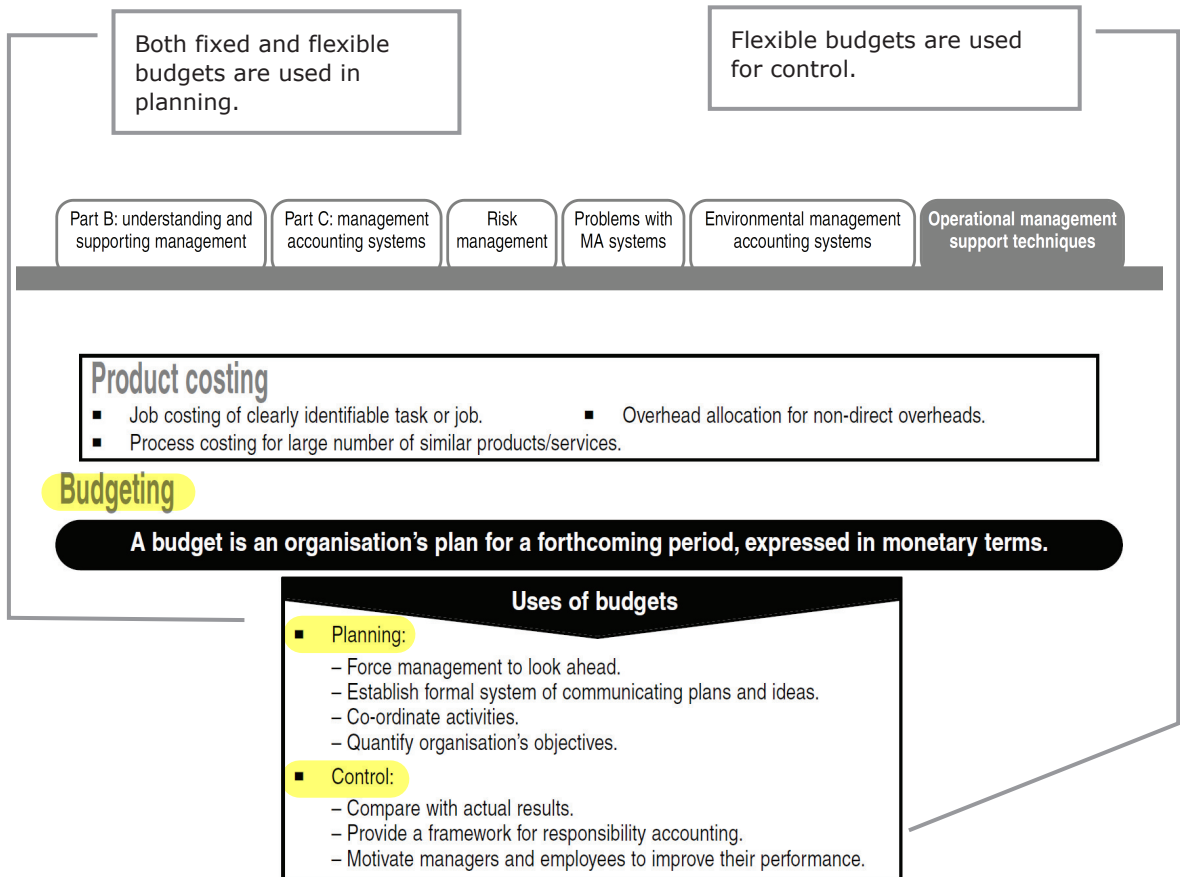
- 1 A planning variance compares an original standard with a revised standard that should or would have been used if planners had known in advance what was going to happen.
- 2 False. It is valued at the revised efficiency level.
- 3

Measurement	Response	Consequence of action
Purchase price variance	Buy in greater bulk to reduce unit price	Excess stocks Higher holding costs Quality and reliability of delivery times ignored
Labour efficiency variance	Encourage greater output	Possibly excess stocks of the wrong products
Cost of scrap	Rework items to reduce scrap	Production flow held up by re-working
Scrap factor included in standard costs	Supervisor aims to achieve actual scrap = standard scrap	No motivation to get it right first time

- 4
 - (a) quantity quality
 - (b) variances internal and external failure costs
 - (c) individual tasks and level of output reworking required, returns, defects

Now try the question below from the Exam Question Bank

Number	Level	Marks	Time
Q17	Introductory	14	25 mins



Fixed budgets

- Prepared on the basis of an estimated volume of production and an estimated volume of sales.
- Not adjusted (in retrospect) to reflect actual activity levels.
- Used for planning and to define the broad objectives of the organisation.

Fixed budgets are the starting point for the on-going budgeting process, and provide a plan or target.

Flexible budgets

- Recognise different cost behaviour patterns and how they change as activity levels change.
- Can show the effect of the actual volumes of output and sales differing from budgeted volumes at the planning stage.
- Actual results are compared to a flexed budget (*what results should have been at actual output and sales volumes*) as a control procedure during/at the end of a period.
- Variances between what *did* happen and what *should have* happened at the activity level are analysed and provide guidelines for management control action.

Variance analysis

Material price

Favourable	Adverse
Unforeseen discounts	Price increase
Material std changed	Careless purchasing

Material usage

Favourable	Adverse
Higher quality material	Defective material
Effective use of material	Excessive waste

Variable and fixed overhead

Favourable	Adverse
Cost savings	Excessive use

Labour rate

Favourable	Adverse
Lower rate paid	Wage rate increase

Idle time

Machine breakdown
Illness/injury

Labour efficiency

Favourable	Adverse
Motivated staff	Lack of training
Quality materials	Sub-standard material

Fixed overhead variances are not calculated when marginal costing is used.

- Part B: understanding and supporting management
- Part C: management accounting systems
- Risk management
- Problems with MA systems
- Environmental management accounting systems
- Operational management support techniques

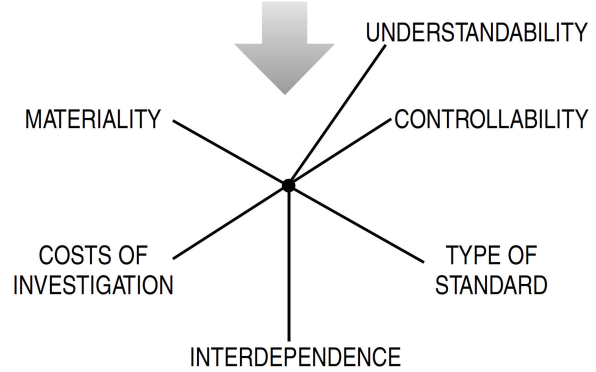
It can be very difficult to maintain relevant and usable standard costs for a product or unit.

Interdependence of variances

The cause of one adverse variance might be wholly or partly explained by the cause of another favourable variance.

- Material price and usage variances.
- Material price and labour efficiency variances.
- Labour rate and efficiency variances.

Significant variances should be investigated. Factors to take into account:



Working capital management

