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FIA Passcards

FIA FMA / ACCA Paper F2
Management Accounting

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Management Accounting

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Run through the **Passcards** as often as you can during your final revision period. The day before the exam, try to go through the **Passcards** again! You will then be well on your way to passing your exams.

Good luck!

1: Accounting for management

Topic List

- Planning, control and decision making
- Financial and management accounting
- Information and decision-making

Data is the raw material for data processing. Information is data that has been processed in such a way as to make it meaningful to its user. Management information is the information used by management to run an organisation. Some qualities of good information are as follows.

- *Relevance*
- *Clarity*
- *Completeness*
- *Accuracy*
- *Timeliness*
- *Manageable in volume*

Information is most likely to be used for planning, control or decision making in management accounting.

Planning involves

Establishing objectives

Selecting appropriate strategies

- Maximise profits
- Maximise shareholder value
- Minimise costs
- Maximise revenue
- Increase market share

Management is decision taking. Management at all levels within an organisation take decisions. Decision making involves a choice between alternatives.

Management control system

is a system which measures and corrects the performance of subordinates to ensure organisation's objectives/plans are being met.

Control

- An established organisation should have a system of management reporting that produces control information in a specific format at regular intervals.
- Effective control is not practical without planning. Planning without control is pointless.

Basic elements

- Planning
- Recording
- Carry out plan
- Comparing
- Evaluating
- Corrective action

Strategic planning

Strategic plans set or change objectives of an organisation. Examples include selection of products and markets, required levels of profitability and acquisition and disposal of major non-current assets.

Tactical planning

Tactical planning is concerned with decisions about the efficient and effective use of an organisation's resources to achieve the strategic objectives. Examples include planning direct sales resources, advertising and so on.

Operational planning

Operational planning is the task of ensuring that specific tasks are carried out effectively and efficiently. Individuals are given tasks which they are expected to achieve.

The data used to prepare financial accounts and management accounts are the same. The differences between these accounts arise because the data is analysed differently.

Financial accounts

- Prepared for external individuals
- Show performance of a defined period
- Legal requirements for limited companies to prepare FA
- Format of published FA determined by:
  - Law
  - IASs
  - IFRSs
- FA cover business as a whole
- FA information monetary (mostly)
- Historic picture of past operations

Management accounts

- Prepared for internal managers of an organisation
- Aid management in recording, planning and controlling organisation's activities
- Help decision-making process
- No legal requirements to prepare MA
- Format of MA at discretion of management
- MA can focus on specific areas of an organisation's activities
- MA incorporate non-monetary measures
- Historic record *and* future planning tool

Cost accounting information has limited use for decision-making.

Decision making is concerned with the future so there will always be some degree of uncertainty

Information for decision making should therefore incorporate uncertainty

However, even information which incorporates uncertainty, can never be risk free.

2: Sources of data

Topic List

- Data and information
- Types and sources of data
- Sampling

This chapter considers the ways in which data useful to the accountant can be collected.

You need to be aware of the way in which the various types of sample are determined and you need a good grasp of the benefits and limitations of the various sampling methods.

In terms of sources of data, you need an awareness of their strengths and limitations.

Data

... is the raw material for data processing.

Quantitative data

Data that can be measured.

- Temperature, degrees Fahrenheit or Celsius
- Time it takes to swim 50 lengths, hours or minutes

Qualitative data

Data that have attributes which cannot be measured. An example is whether one is male or female.

Information

... is data that has been processed in such a way as to make it meaningful to its user.

Some qualities of good information are as follows

- Relevance
- Timeliness
- Manageable in volume
- Accuracy
- Completeness
- Clarity

Quantitative information

... is capable of being expressed in numbers. It may be financial in nature eg. profit before tax is $5 million.

Qualitative information

... may not be expressed easily in terms of numbers, but more likely to reflect the quality of something eg. competition was fierce.

Types of data

In addition to being either quantitative or qualitative data may be further classified as:

Primary and secondary data

Primary data are data collected especially for a specific purpose. Raw data are primary data which have not been processed at all, and which are still just a list of numbers.

Secondary data are data which have already been collected elsewhere, for some other purpose, but which can be used or adapted for the survey being conducted.

Discrete and continuous data

Discrete data are data that can only be taken on a finite or countable number of values within a given range.

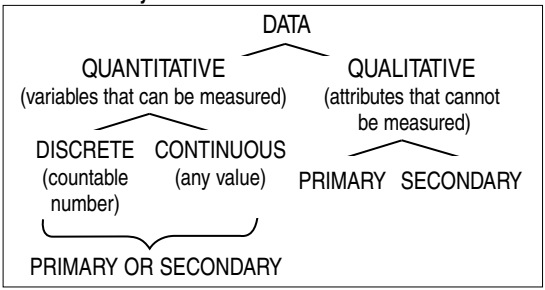
Continuous data are data which can take on any value. They are measured rather than counted.

Sample and population data

Sample data are data arising as a result of investigating a sample. A sample is a selection from the population.

Population data are data arising as a result of investigating the population. A population is the group of people or objects of interest to a data collector.

The diagram below should help you to remember the ways in which data may be classified.



Primary external sources: surveys

- **Postal questionnaires**
- **Interviews**

Interview types

- Personal interviews
- Store/shopping mall intercept surveys
- Focus groups
- Telephone interviews

Primary external data is often used to draw up the 'standard' within a control system. Customer survey data may provide the basis for sales targets, for example.

Source	Advantages ☑	Disadvantages ☒
Personal interviews	Higher response rate and more accurate responses	Time consuming and expensive
Focus groups	Inexpensive and quick	Dependent on interviewer skill and can be inhibiting
Telephone interviews	Quick, cheap and wide coverage	Bias and high refusal rates
Postal questionnaires	Relatively cheap and interviewer cannot influence participants	High refusal rates and misunderstanding

Secondary external sources

Limitations

- User will be unaware of limitations in the data
- Data may not be suitable for its intended use
- Data may be out of date
- Geographical area covered may not be appropriate

Examples

- Governments
- Trade journals
- Newspapers
- Internet
- Banks

Internal sources

Standard costing, budgeting and performance measurement control systems need to record a wide range of internal data such as the quantity of material used, prices paid and hours worked.

If all members of a population are examined, the survey is called a **census**. If it is not possible to survey the entire population, a **sample** is selected. The results from the sample are used to estimate the results of the whole population.

Random sample

Selected in such a way that every item in the population has an equal chance of being included

If random sampling is used, a **sampling frame** has to be constructed.

Drawbacks

- Might be expensive
- Can produce an unrepresentative sample
- Sampling frame might not exist

Sampling frame

A numbered list of all items in a population

Once such a list has been prepared, a random sample can be selected using **random number tables**.

If random sampling is too expensive, quasi-random sampling can be used.

If a sampling frame does not exist, non-random sampling must be used.

Quasi-random sampling

Provides a good approximation to random sampling but requires the existence of a sampling frame

Systematic sampling involves selecting every nth item after a random start.

Features

- ☑ Easy to use
- ☑ Reasonably random
- ☒ Biased sample might be chosen if the population has a regular pattern coinciding with the sampling interval

Stratified sampling involves dividing the population into categories from which random samples are taken.

Features

- ☑ Representative sample selected
- ☑ Sample structure reflects that of the population
- ☑ Inferences can be made about each category
- ☒ Requires prior knowledge of each population item

Multistage sampling involves dividing the population into sub-populations from which a small random sample is selected.

Features

- ☑ Does not require a sampling frame of the entire population
- ☑ Relatively cheap
- ☒ Not truly random
- ☒ Possibility of bias

Non-random sampling

Used when a sampling frame cannot be established

Quota sampling is commonly used by market researchers and involves stratifying the population and restricting the sample to a fixed number in each stratum.

Features

- ☑ Cheap and administratively easy
- ☑ Much larger samples can be studied
- ☑ No sampling frame required
- ☑ Can yield accurate enough information for many forms of commercial market research
- ☒ May result in certain bias

Cluster sampling involves selecting one definable subsection of the population as the sample, that subsection taken to be representative of the population in question.

Features

- ☑ Inexpensive to operate
- ☑ Good alternative to multistage sampling if a sampling frame does not exist
- ☒ Potential for considerable bias

3: Cost classification

Topic List

- Direct costs and indirect costs
- Fixed costs and variable costs
- Other cost classifications
- Responsibility centres and cost units

The classification of costs is an essential management accounting technique. Its main uses are as follows:

- *Determination of the cost of a unit of product or service*
- *Cost behaviour*
- *Absorption and marginal costing*

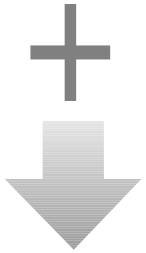
Once costs have been classified, a coding system can be applied to make it easier to manage cost data.

Direct cost

... is a cost that can be **traced in full** to the product, service or department that is being costed.

Direct costs include

- Direct materials
- Direct labour
- Direct expenses
- Total direct costs = prime cost



Total product cost

Indirect cost (overhead)

... is a cost that is incurred whilst making a product but which **cannot be traced directly** to the product, service or department.

Indirect costs include

- Indirect materials
- Indirect labour
- Indirect expenses
- Administration overhead
- Selling and distribution overhead

Fixed cost

... is a cost which is unaffected by changes in the level of activity.

Variable cost

... is a cost which tends to vary with the level of activity.

Fixed costs include

- Rent of a building
- Business rates
- Salary of a director

Costs may also be semi-fixed or semi-variable or mixed costs. For example, an electricity bill has a fixed standing charge and a variable cost per unit of electricity used.

Variable costs include

- Direct materials
- Direct labour
- Sales commission (varies with volume of sales)

Functional costs

... are classified as: **production** or **manufacturing costs**; administration costs; **marketing** or **selling** and **distribution costs**.

Product/Production costs

... are costs identified with a finished product and are part of the inventory value until they are sold when they become expenses (cost of goods sold).

Period costs

... are costs that are deducted as expenses during a period without ever being part of the inventory value.

Discretionary costs

... are costs which are likely to arise from decisions made during the budgeting process.

Avoidable costs

... are costs specific to an activity or business which would be avoided if the activity or business did not exist.

Unavoidable costs

... are costs which would be incurred whether or not the activity or business existed.

Controllable cost

... is a cost which can be influenced by management decisions and actions.

Uncontrollable cost

... is any cost that cannot be affected by management within a given time span.

Production costs (product costs)

... are costs identified with goods produced for resale → Used to value inventory and output

Non production costs

... are costs deducted as expenses during the period such as administration, selling, distribution and finance → Not included in inventory valuation and output

Examples

Administration – eg management, secretarial and accounting costs

Selling and distribution – eg advertising, delivery costs, sales staff salaries

Finance – eg cost of raising money to finance business such as a loan or overdraft

A responsibility centre is a department or organisational function whose performance is the direct responsibility of a specific manager.

Cost centre

... is a collecting place for costs before they are analysed further.

Cost centre managers are responsible for costs only

Profit centre

- Similar to a cost centre
- Responsible for costs *and* revenues

Revenue centre

... is a collecting place for revenues before they are analysed further.

Revenue centre managers are responsible for revenues only

Investment centre

- Profit centre with additional responsibilities
- Responsible for costs *and* revenues
- Responsible for capital investment and financing

Cost unit

... is a unit of product or service to which costs can be related.

Example

- Patient episode (in a hospital)
- Barrel (in the brewing industry)
- Room (in a hotel)

Cost object

... is any activity for which a separate measurement of cost is desired

Example

- The cost of a product
- The cost of a service
- The cost of operating a department

4: Cost behaviour

Topic List

- Levels of activity
- Cost behaviour patterns
- High-low method
- Linear equations

Cost behaviour is the way in which costs are affected by changes in the volume of output. Management decisions are often based on the ways in which costs behave. Knowledge of cost behaviour is essential for:

- *Budgeting*
- *Decision making*
- *Control accounting*

Costs are influenced by many factors. The most important factor is the level of activity or volume of output.

Level of activity may refer to

- Value of items sold
- Number of items sold
- Number of invoices issued
- Number of units of electricity consumed

Basic principles of cost behaviour

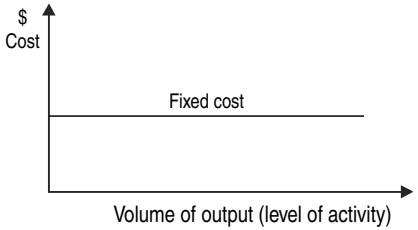
As the level of activity rises, costs will usually rise. It will generally cost more to produce 200 units of output than it will to produce 100 units of output.

In general, level of activity = volume of output

Fixed cost

... is a cost which tends to be unaffected by increases or decreases in the level of activity

Graph of fixed cost



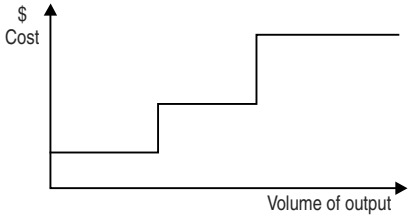
Examples

- Rent of a single factory building
- Straight line depreciation of a machine

Step cost

... is a cost which is fixed in nature but only within certain levels of activity

Graph of step cost



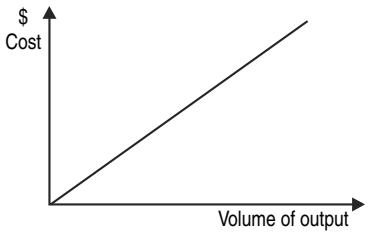
Examples

- Supervisors' salary costs
- Royalties

Variable cost

... is a cost which varies directly with the level of activity.

Graph of variable cost



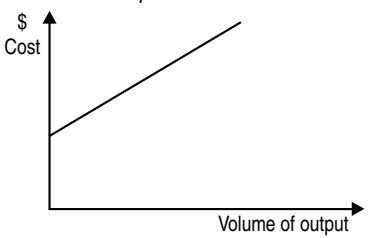
Examples

- Cost of raw materials
- Direct labour costs
- Sales commission

Mixed cost

... is also known as **semi-variable/semi-fixed** cost which contains both fixed and variable elements and is partly affected by changes in the levels of activity.

Graph of variable cost

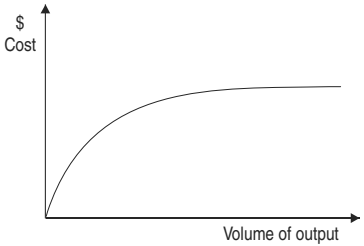


Examples

- Telephone bills
- Salesman's salary

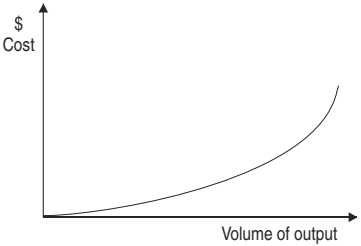
Non-linear or curvilinear variable cost

... is a cost which varies **disproportionalely** with increasing output.



Example

- Savings of scale



Example

- Piecework

It is generally assumed that costs are either:
- Variable
- Fixed
- Semi-variable

The fixed and variable elements of semi-variable costs can be determined by the **high-low method.**

Steps

1. Review past records of costs
   - Select period with **highest** activity level
   - Select period with **lowest** activity level
2. Adjust for inflation before comparing costs (if needed)
3. Determine
   - Total cost at high activity level (TCH)
   - Total cost at low activity level (TCL)
   - Total units at high activity level (TUH)
   - Total units at low activity level (TUL)

4 Calculate variable cost per unit = $\frac{\text{TCH} - \text{TCL}}{\text{TUH} - \text{TUL}}$

5 Determine fixed costs by substituting variable cost per unit at high or low activity level

Example

Highest activity level = 10,000 units at a cost of $4,000

Lowest activity level = 2,000 units at a cost of $1,600

Variable cost per unit $= \frac{\$(4,000 - 1,600)}{10,000 - 2,000} = \frac{\$2,400}{8,000} = \$0.30$

Fixed cost = $4,000 – $(10,000 × 0.3) = $1,000

A linear equation is a straight line and has the general form $y = a + bx$

where:

y = dependent variable

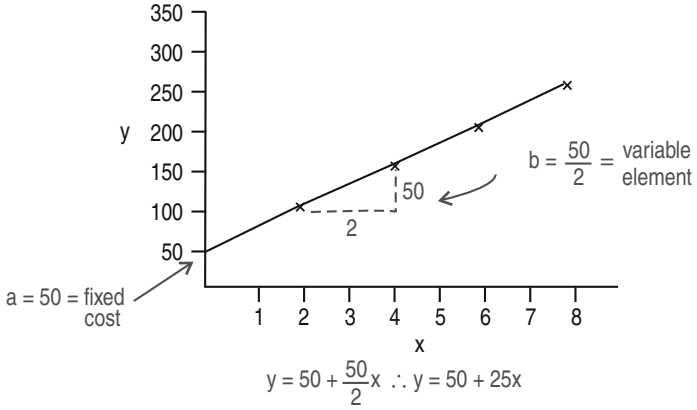
x = independent variable

a = constant (eg fixed cost)

called the intercept

b = constant (eg variable cost)

called the gradient



5: Presenting information

Topic List

- The format of reports
- Information in tables
- Information in charts

You will not be asked to draw a table, chart or graph but you may be asked to interpret information using one.

The format of reports

The purpose of reports, their subject matter, contents and style, vary widely, but there are certain **generally accepted principles.**

Title	Short but stating what the report is about
Identification	Report writer, report user and date
Contents page	If report is long a list of contents may be needed
Terms of reference	Purpose of the report, and any restrictions on its scope. Timescale if important
Sources of information	These should be acknowledged. If primary research carried out, its nature should be explained
Sections	Sections or sub-headings, paragraphs numbered and concerned with one basic idea
Appendices	Detailed explanations, charts and tables should be put into appendices and cross-referenced
Summary of recommendations	Will usually contain conclusion/recommendations about course of action. In a long report conclusions or recommendations may be stated at the beginning of the report (after the introduction and statement of terms of reference)
Prominence of important items	The most significant items in a report should be given prominence

A table

... is a matrix of information in rows and columns, with rows and columns having titles.

A table is **two-dimensional**. Set out in rows and columns it can only represent two variables

Example

Resources	*Product A*	*Product B*	*Product C*	*Total*
Direct material	X	X	X	X
Direct labour unskilled	X	X	X	X
Direct labour skilled	X	X	X	X
Direct expenses	X	X	X	X
Overheads	X	X	X	X
Total	X	X	X	X

Guidelines when presenting information in tabular form

- The table should be given a clear **title**
- All columns should be **clearly labelled**
- Where appropriate there should be clear **sub-totals**
- A **total column** may be presented (usually the right hand column)
- A **total figure** is often advisable at the bottom of each column of figures
- Information presented should be easy to read

A bar chart

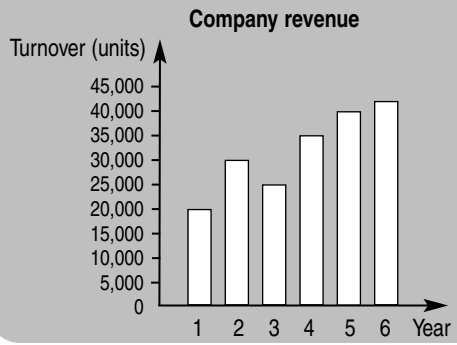
... is a method of presenting information in which quantities are shown in the form of bars on a chart, the length of the bars being proportional to quantities.

There are three main types of bar chart

- **Simple** bar charts
- **Component** bar charts, including **percentage component** bar charts
- **Multiple** (or compound) bar charts

A simple bar chart is a chart consisting of one or more bars, in which the length of each bar indicates the magnitude of the corresponding information.

Example: a simple bar chart



Simple bar charts serve two interpretation purposes

- They show the actual magnitude of each item
- They enable one to compare magnitudes by comparing the length of bars on the chart

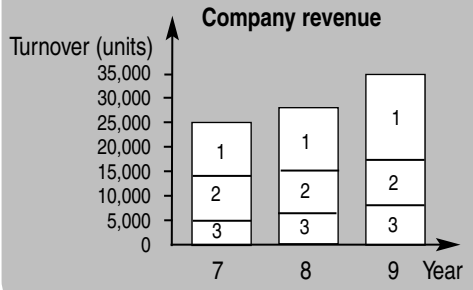
A component bar chart

... is a bar chart that gives a breakdown of each total into its components.

An interpretation of a component bar chart would show the following.

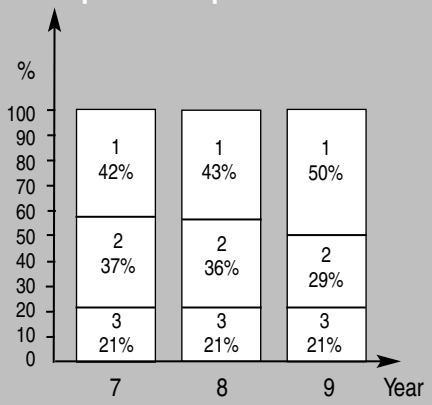
- How total sales have changed from year to year
- The components of each year's total

Example: a component bar chart



In a **percentage component bar chart** the lengths of sections of a bar vary according to the relative sizes of the components.

Example: a component bar chart

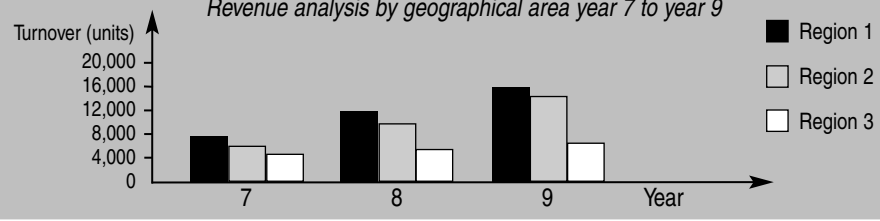


A multiple bar chart

... (or **compound bar chart**) is a bar chart in which two or more separate bars are used to present sub divisions of information.

Example: a multiple bar chart

Revenue analysis by geographical area year 7 to year 9



Multiple bar charts present similar information to component bar charts, except for the following.

- Multiple bar charts do not show a grand total (in the above example, the total sales each year) whereas component bar charts do.
- Multiple bar charts illustrate the comparative magnitudes of the components more clearly than component bar charts

6: Accounting for materials

Topic List

- Inventory control
- Inventory levels
- Accounting for materials
- Chapter example
- LIFO, FIFO & AVCO

*The investment in inventory is a very important one for most businesses. It is therefore vital that management establish and maintain an effective **inventory control system** which covers the following.*

- *The **ordering** of inventory*
- *The purchase of inventory*
- *The **receipt** of goods into store*
- *Storage*
- *The **issue** and maintenance of inventory at the most appropriate level*
- *Recording inventory movements accurately*

Ordering inventory

Inventory levels reach reorder level

↓

Stores department issues purchase requisition

↓

Purchase department draws up a purchase order, copies to

- Accounts
- Receiving department/stores

Receiving inventory

Goods delivered and delivery note signed

↓

Delivery checked to purchase order

↓

Goods received note (GRN) prepared

↓

GRN sent to accounts and matched with purchase order

↓

Invoice checked against PO and GRN

↓

Supplier paid

Issuing inventory

Materials requisition received	Inventory issued
Inventory transferred	Materials transfer note
Inventory returned to store	Materials returned note

Recording inventory levels

- Bin cards
- Stores ledger accounts
- Free inventory available for future use
- Perpetual inventory

Inventory count

Periodic

- Annually
- All items counted on a specific date

Continuous

- Each item checked at least once a year
- Specialist team

Why hold inventory?

- To ensure any unexpected demands can be met
- To meet any future shortages
- Bulk purchasing discounts available
- High inventory levels = increased holding costs
- Low inventory levels = increased ordering costs
- Low inventory levels = increased costs of running out of inventory

Important formulae

Reorder level = maximum usage × maximum lead time

Minimum level = reorder level – (average usage × average lead time)

Maximum level = reorder level + reorder quantity – (min. usage × min. lead time)

Average inventory = buffer inventory + 1/2 reorder quantity

Economic order quantity

is the reorder quantity which minimises the total costs associated with holding and ordering inventory.

$$EOQ = \sqrt{\frac{2C_O D}{C_H}}$$

Provided in exam

Economic batch quantity

is used instead of the EOQ when re-supply is gradual instead of instantaneous.

$$EBQ = \sqrt{\frac{2C_O D}{C_H(1 - D/R)}}$$

Provided in exam

Where: C_O = Cost of ordering a consignment from a supplier

C_H = Cost of holding one unit of inventory for one time period

D = Demand during time period

R = Production rate per time period

Material Control A/C

DR	**CR**
All **increases** in material inventory eg Materials purchased from suppliers Materials returned to stores from the production line	All **reductions** in material inventory eg Materials issued to production Materials returned to suppliers

We'll use the following information about receipts and issues of materials in the remainder of this chapter.

Date	*Receipts*		*Issues*		*Balance*	
	Quantity	*Value*	*Quantity*	*Value*	*Quantity*	*Value*
	Units	$	Units	$	Units	$
March 1					10	100
March 10	30	450				
March 12			25			
March 20	20	320				
March 23			15			

FIFO

FIFO assumes that materials are issued out of inventory in the order in which they were delivered into inventory.

Example - FIFO

March 12 issue = (10 × $10) + (15 × $15)=	$325
March 23 issue = 15 × $15	$225
Closing inventory = 20 × $16	$320
	$870

FIFO is an historical cost method.

Advantages ☑ and disadvantages ☒

- ☑ Logical, represents what is physically happening
- ☑ Easy to understand and explain
- ☑ Inventory valuation based on replacement cost
- ☒ Cumbersome to operate
- ☒ Cost comparison and decision making difficult due to price variations
- ☒ Issue prices can lag behind market value if inflation is high

LIFO

LIFO assumes that materials are issued out of inventory in the reverse order to which they were delivered.

Example - LIFO

March 12 issue = 25 × $15	$375
March 23 issue = 15 × $16	$240
Closing inventory = (5 × $16) + (5 × $15) + (10 × $10)	$255
	$870

Material issues are based on economic cost.

Advantages ☑ and disadvantages ☒

- ☑ Issues are at close to market value
- ☑ Current costs used in decisions
- ☒ Cumbersome to operate
- ☒ Opposite to what is physically happening
- ☒ Difficult to explain
- ☒ Decision making can be difficult due to price variations

AVCO

AVCO involves calculating a weighted average price by dividing total cost by total number of units in inventory. A new average price is calculated when a new receipt of material occurs.

Example

	$
March 12 issue at $(100 + 450)/40	
= $13.75 x 25	343.75
March 23 issue at $((13.75 x 15) + 320)/35	
= $15.04 x 15	225.60
Closing inventory = 20 x $15.04	300.80
	870.15

(The 15c is a rounding difference)

Advantages ☑ and disadvantages ☒

- ☑ Price fluctuations are smoothed out so decision making is easier
- ☑ Easier to administer than FIFO and LIFO
- ☒ Resulting price rarely an actual price
- ☒ Prices lag a little behind market values if there is gradual inflation

7: Accounting for labour

Topic List

- Measuring labour activity
- Remuneration methods
- Labour turnover
- Labour costs

We have already seen that the investment in inventory is a very important one for most businesses.

The other major cost for a business is labour.

Production

... is the volume of output produced.

Standard hour of production

... is the number of units produced by one worker working in the standard way at the standard rate for one hour.

Productivity

... is a measure of efficiency with which output has been produced.

Production volume ratio = Capacity ratio x Efficiency ratio

$$\frac{\text{Expected hours to make output}}{\text{Hours budgeted}} = \frac{\text{Actual hours worked}}{\text{Hours budgeted}} \times \frac{\text{Expected hours to make output}}{\text{Actual hours taken}}$$

Time work

- Wages = hours worked × rate per hour
- Overtime premium = extra rate per hour for hours over and above basic
- Quality more important than quantity
- No incentive for employee performance improvement

Piecework schemes

- Wages = units produced × rate per unit
- Guaranteed minimum wage
- Differential schemes pay higher rates for increased levels of productivity
- Output inspected carefully

Labour turnover is measured by the labour turnover rate.

$$\text{Labour turnover rate} = \frac{\text{Replacement}}{\text{Average number employees in period}}$$

Reasons for labour turnover

- Illness/accident
- Moving
- Marriage/pregnancy
- Better pay elsewhere
- No career enhancement

Costs

Preventative
- Medical services
- Welfare services
- Pension schemes

Replacement
- Selection and replacement
- Training
- More wastage due to inexperienced new staff

Prevention

Labour turnover may be prevented by offering satisfactory wages, hours and conditions and by improving employees' jobs so as to create job satisfaction. In addition, proper planning by management may lead to avoiding redundancies.

Direct labour costs

- Basic pay of direct workers
- Overtime worked at specific request of customers
- Overtime worked regularly by production department

Indirect labour costs

- Basic pay of indirect workers
- Overtime premium
- Bonuses
- Employer's NIC
- Idle time cost

WAGES CONTROL A/C

	DR		CR
	$		$
Net wages paid	X	Direct labour	X
PAYE/NIC deductions	X	Indirect labour	X
		Overtime premium	X
		Shift allowance	X
		Sick pay	X
	X	Idle time	X
	X		X

8: Accounting for overheads

Topic List

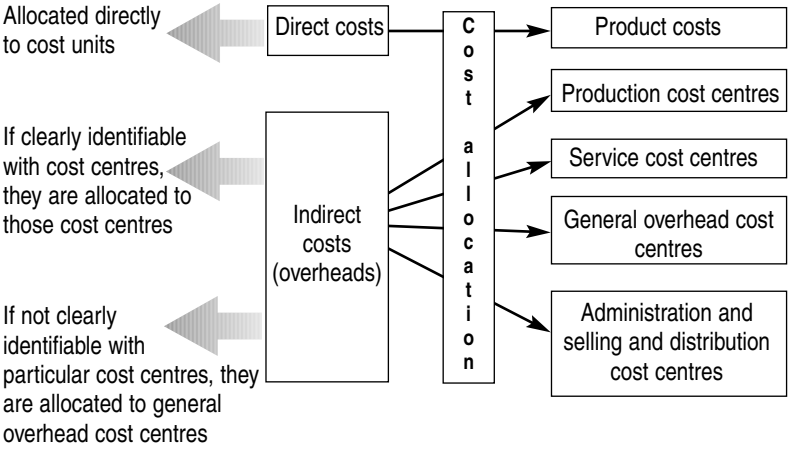
- Cost allocation
- Overhead apportionment
- Overhead absorption

Absorption costing is a method of accounting for overheads. It is basically a method of sharing out overheads incurred amongst units produced.

The three stages of absorption costing are:

- *Allocation*
- *Apportionment*
- *Absorption*

Allocation is the process by which whole cost items are charged directly to a cost unit or cost centre.



Example

Warehouse security guard:

- Cost of security guard charged to warehouse cost centre
- Cost of heat and light to general overhead cost centre

The first stage of overhead apportionment is the identification of all overheads as production, service, administration or selling and distribution.

The second stage of overhead apportionment is to apportion the costs of service cost centres (both directly allocated and apportioned) to production cost centres. This is known as reapportionment.

Direct method of apportionment

... ignores inter-service department work. The costs of each service centre are apportioned to production cost centres only.

Example

	Production departments			*Stores*		*Maintenance*
	A	*B*		*dept*		*dept*
Overhead costs	$10,030	$8,970		$10,000		$8,000
Cost of material reqs	$30,000	$50,000		–		$20,000
Maintenance hrs	8,000	1,000		1,000		–
	Basis	*Total cost*		*A*		*B*
Overheads of dept A and B		$19,000		$10,030		$8,970
Stores	Material req	$10,000	(3/8)	$3,750	(5/8)	$6,250
Maintenance	Maint hrs	$8,000	(8/9)	$7,111	(1/9)	$889
		$37,000		$20,891		$16,109

Step-down method of apportionment

... reapportions one of the service cost centre's overheads to all of the other centres which make use of its services. Then reapportions the overheads of the remaining service cost centre to the production departments only.

Example

Using the same information from the example on the direct method we have:

	Basis		*Dept A*		*Dept B*	*Stores*		Maintenance
Overheads			$10,030		$8,970	$10,000		$8,000
Stores	Material reqs	(3/10)	$3,000	(5/10)	$5,000	($10,000)	(2/10)	$2,000
						–		$10,000
Maintenance	Maintenance hrs	(8/9)	$8,889	(1/9)	$1,111			($10,000)
			$21,919		$15,081			–

In this example we have chosen to apportion the stores department first. Had we apportioned maintenance first, we would have reached a different answer.

Reciprocal method

... recognises work done by each service cost centre for other service cost centres and makes no difference which cost centre's costs are apportioned first.

Example

Using the same information from the example on the direct method we have:

	Basis		*Dept A*		*Dept B*		*Stores*		*Maintenance*
Overheads			$10,030		$8,970		$10,000		$8,000
Stores	Material reqs	(3/10)	$3,000	(5/10)	$5,000		($10,000)	(2/10)	$2,000
							–		$10,000
Maintenance	Maintenance hrs	(8/10)	$8,000	(1/10)	$1,000	(1/10)	$1,000		($10,000)
							$1,000		–
Stores	Material reqs	(3/10)	$300	(5/10)	$500		($1,000)	(2/10)	$200
							–		$200
Maintenance	Maintenance hrs	(8/10)	$160	(1/10)	$20	(1/10)	$20		($200)
							$20		–
Stores	Material reqs	(3/8)	$7	(5/8)	$13		($20)		
			$21,497		$15,503		–		

The final stage in absorption costing is the absorption of overheads into product costs using overhead absorption rates (OARs).

Bases of absorption

- Unit (identical units)
- Direct labour hour (labour intensive)
- Machine hour (machine intensive)

Departmental OARs

- Used instead of blanket (single factory) OARs
- Reflect different times spent by different products in production cost centres

Predetermined OARs

Many overheads are not known until the end of a period. If waited until end of period, would cause delays in invoicing, inventory valuations and so on. Random fluctuations in overheads would create variable OARs from month to month.

$$\frac{\text{Budgeted overheads allocated and apportioned to production cost centres}}{\text{Budgeted activity levels (hours, units etc) on which rate to be based}}$$

Over-/under-absorbed overheads

These arise because the OAR is predetermined from budget estimates. When actual overheads incurred and overheads absorbed using predetermined OARs, there will be an over or under absorption of overheads.

Reasons

1. Actual OH ≠ budgeted OH
2. Actual activity level ≠ budgeted activity level
3. 1 and 2 above (together)

Accounting for over/under absorption of overheads

STATEMENT OF PROFIT OR LOSS

Under-absorbed overhead	**Over-absorbed overhead**
DR (expense)	CR (expense reduction)
INSUFFICIENT absorbed overhead	TOO MUCH absorbed overhead

9: Absorption and marginal costing

Topic List

- Marginal costing principles
- Profit reconciliation
- MC versus AC

As you now know, absorption costing recognises fixed costs as part of the cost of a unit of output, ie as product costs. Marginal costing on the other hand treats all fixed costs as period costs. Each costing method therefore gives rise to different profit figures which you must be able to reconcile. Similarly, each costing method has relative advantages and disadvantages.

Marginal cost

... is the cost of one unit of product/service which would be avoided if that unit were not produced/provided = variable cost.

Contribution

... equals (sales revenue – variable (marginal) cost of sales). It is short for contribution towards covering fixed overheads and making a profit.

Marginal costing

- Only variable costs charged as cost of sales
- Closing inventories are valued at marginal cost
- Fixed costs are treated as period costs
- Period costs are charged in full to the statement of profit or loss
- If sales increase by one item, profit will increase by contribution for one item
- Contribution per unit is constant at all levels of output and sales

The difference in reported profits is calculated as the difference between the fixed production overhead included in the opening and closing inventory valuations using absorption costing.

MARGINAL COSTING → Closing inventories are valued at marginal production cost

ABSORPTION COSTING → Closing inventories are valued at full production cost

RECONCILIATION

	$
Marginal costing profit	X
Adjust for fixed overheads in inventory:	
+ increase / – decrease	X/(X)
Absorption costing profit	X

Inventory levels

Increase in a period

- Absorption costing reports higher profit
- Fixed overheads included in closing inventory
- Cost of sales decreased
- Hence, profit higher

Decrease in a period

- Absorption costing reports lower profit
- Fixed overheads included in opening inventory
- Cost of sales increased
- Hence, profit lower

Arguments in favour of absorption costing

- Fixed production costs are incurred in order to make output and so it is only 'fair' to charge all output with a share of these costs
- Closing inventory will be valued in accordance with IAS 2
- Appraising products in terms of contribution gives no indication of whether fixed costs are being covered

Arguments in favour of marginal costing

- Absorption costing information is irrelevant when making short-run decisions
- It is simple to operate
- There are no arbitrary fixed cost apportionments
- Fixed costs in a period will be the same regardless of the level of output and so it makes sense to charge them in full as a cost of the period
- It is realistic to value closing inventory items at the (directly attributable) cost to produce an extra unit
- Under/over absorption is avoided
- Absorption costing gives managers the wrong signals. Goods are produced, not to meet demand, but to absorb allocated overheads. Absorption costing profit may therefore be increased merely by producing in excess of sales. Production in excess of demand in fact increases the overheads (for example warehousing) the organisation must bear

10: Job, batch and service costing

Topic List

- Job and batch costing
- Features of service costing
- Service cost analysis

Job, batch and service costing are types of costing system. Job costing and batch costing are very similar systems.

You need to know the characteristics of the different costing systems for your exam.

A job

... is a cost unit which consists of a single order or contract.

Profit on jobs

Profit may be expressed either as a percentage of job cost (such as 25%) (25/100) mark up or as a percentage of price, such as 20% (25/125) margin.

Batch costing

is very similar to job costing.

$$\text{Cost per unit} = \frac{\text{Total batch cost}}{\text{No. units in batch}}$$

Features of job costing

- Work is undertaken to customers' special requirements
- Each order is of short duration
- Jobs move through operations as a continuously identifiable unit
- Jobs are usually individual and separate records should be maintained

→ Job costs are collected on a job cost sheet/card

Service costing

... is a costing method concerned with establishing the costs of services rendered.

Two main types of service

- Services provided by a company operating in a service industry
- Services provided by a company's service departments

Characteristics of services

- Intangibility
- Simultaneity
- Perishability
- Heterogeneity

Purpose of service costing

Many services are revenue earning but others are not. Hence the purpose of service costing might be to provide management information on costs and efficiency rather than to establish profit or loss.

Unit cost measures

Composite cost unit frequently appropriate

Examples

- Canteen – meal served
- Hospital – patient
- Hotel – occupied bed-night

Cost per service cost unit

$$\frac{\text{Total costs for period}}{\text{Number of service units provided in period}}$$

Organisations need to ascertain the **cost unit** most appropriate to its activities. Organisations within the same industry can make valuable comparisons if they use a common cost unit.

Objectives of service cost analysis

- Compare planned cost with actual cost
- Calculate a cost per unit of service
- Use cost per service unit as part of control function
- Calculate prices for services being sold to third parties
- Analyse costs to assist planning, control and decision making

Internal service situations

- Aim to control costs in service department
- Aim to control costs in the user department

Service industry situations

- Need to calculate a cost per unit for same reasons as job costs or contract costs are calculated

11: Process costing

Topic List

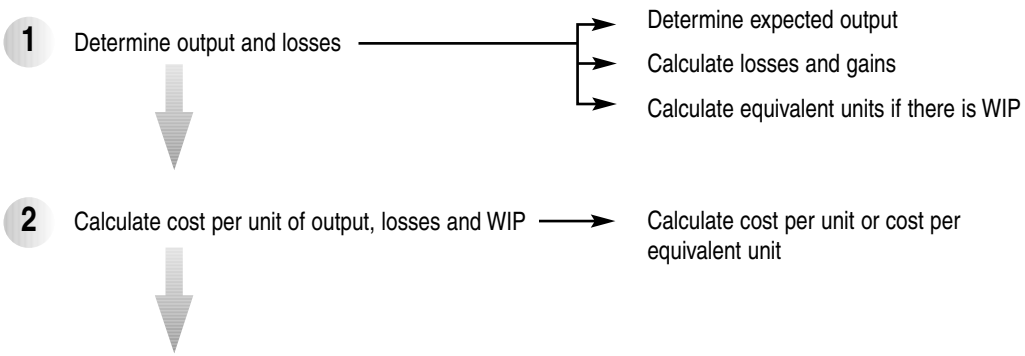
- Process costing framework
- Losses and gains
- Scrap
- Closing WIP
- Opening WIP

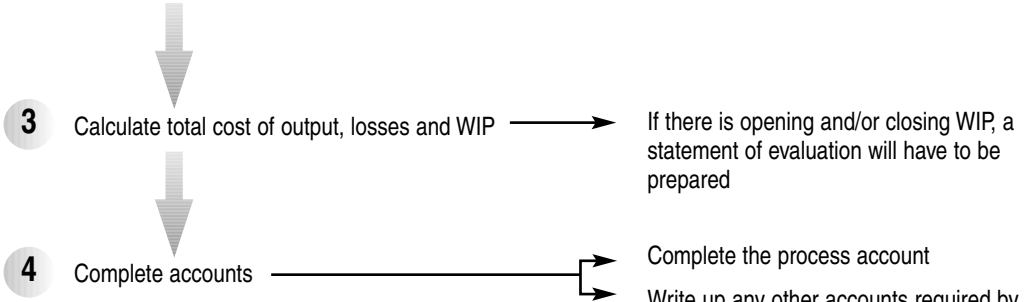
Process costing is a costing method used where it is not possible to identify separate units of production, or jobs, usually because of the continuous nature of the production processes involved. Features of process costing include the following:

- *The output of one process becomes the input of the next*
- *Closing WIP must be valued at the end of the process*
- *There is often a loss in process*
- *There may be by-products and/or joint products*

Process costing is centred around four key steps. The exact work done at each step will depend on whether there are normal losses, scrap, opening and closing inventory.

Steps




3
Calculate total cost of output, losses and WIP
If there is opening and/or closing WIP, a statement of evaluation will have to be prepared
4
Complete accounts
Complete the process account
Write up any other accounts required by question

Normal loss

... is the loss expected during a process. It is not given a cost.

Costs of normal loss are spread across expected units of output.

Cost per unit (normal loss) = $NIL

Abnormal loss

... arises when actual loss is greater than expected loss. It is given a cost.

Abnormal gain

... arises when actual loss is less than expected loss. It is given a 'negative cost'.

Abnormal losses/gains are taken to the profit and loss account for the period.They are valued at the same cost per unit as good units.

$$\text{Cost per unit} = \frac{\$\text{INPUT COSTS}}{\text{EXPECTED OUTPUT}}$$

Example

PROCESS ACCOUNT

	Units	$		Units	$
Costs incurred	1,000	4,500	Normal loss	100	–
			Abnormal loss	50	*250
			Output to finished goods	850	*4,250
	1,000	4,500		1,000	4,500

*Cost per unit = $4,500/(1,000 – 100) = $5

ABNORMAL LOSS ACCOUNT

	Units	$		Units	$
Process account	50	250	St of profit or loss	50	250

An abnormal gain would be a debit to the process account.

Revenue from scrap is treated as a reduction in costs.

REMEMBER! Only the scrap value of normal loss affects the process account.

Normal loss scrap value

- Material costs of process reduced by scrap value of normal loss
- DR Scrap account
- CR Process account

Abnormal gain scrap value

- Scrap value is less than expected because there is no normal loss
- DR Abnormal gain account
- CR Scrap account

Abnormal loss scrap value

- Cost of abnormal loss is reduced by the scrap value of abnormal loss
- DR Scrap account
- CR Abnormal loss account

Cash received from sale of scrap

- Cash received from sale of scrap completes the scrap account
- DR Cash
- CR Scrap account

Equivalent units of production provide a basis for apportioning costs between closing WIP and finished goods.

Steps

1 Prepare a statement of equivalent units

Input Units	*Output*	*Total* Units	%	*Material* Units	%	*Labour and overhead* Units	%
4,000	Completed production	3,200	100	3,200	100	3,200	100
	Closing stock	800	100	800	100	480*	60
4,000		4,000		4,000		3,680	

*800 × 60% = 480

2 Prepare a statement of cost (per equivalent unit)

Input	*Cost* $	*Equivalent units*	*Cost per unit* $
Material	6,000	4,000	1.50
Labour and o/head	4,416	3,680	1.20
	10,416		2.70

3 Prepare a statement of evaluation

	Equiv. units	*Cost per equiv. unit*	*Total value*	
			$	$
Completed production	3,200	2.70		8,640
Closing inventory: material	800	1.50	1,200	
labour and o/head	480	1.20	576	
				1,776
				10,416

4 Prepare the process account

PROCESS ACCOUNT

	Units	$		Units	$
Material	4,000	6,000	Finished goods	3,200	8,640
Labour and o/head		4,416	Closing inventory	800	1,776
	4,000	10,416		4,000	10,416

FIFO method

Assumption: first units completed in any period are the units of opening inventory

- Statement of equivalent units
- Statement of cost per equivalent unit

$$\frac{\text{Costs incurred in period}}{\text{Equivalent units}}$$

$$= \frac{\$26{,}400 \text{ (say)}}{2{,}640}$$

= $10 per equivalent unit

- Statement of evaluation

	Units		*Equivalent units*
Opening inventory units completed	500	*(40%)	200
Fully worked units	2,200	(100%)	2,200
Finished output	2,700		2,400
Closing inventory	300	(80%)	240
	3,000		2,640

*Percentage of work to complete opening inventory

	Equivalent units	*Valuation* $
Opening inventory units completed	200	2,000
Fully worked units	2,200	22,000
Closing inventory	240	2,400
		26,400

PROCESS ACCOUNT

	Units	$		Units	$
Opening inventory	500	*2,800	Finished goods:		
Materials	2,500		Opening inventory		
Conversion		26,400	completed	500	**4,800
cost			Fully worked units	2,200	22,000
				2,700	26,800
			Closing inventory	300	2,400
	3,000	29,200		3,000	29,200

*Brought forward value of opening inventory from previous period (say)

**2,800 (b/f) + $2,000 (current period)

Weighted average method

By this method no distinction is made between units of opening inventory and new units introduced to the process during the accounting period. The cost of opening inventory is added to costs incurred during the period and completed units of opening inventory are each given a value of one full equivalent unit of production.

Identification of losses/gains at different stages of the process

- If units are rejected as scrap or 'loss' at an inspection stage before the completion of processing, units of abnormal loss should count as a proportion of an equivalent unit, according to the volume of work done and materials added up to the point of inspection.
- Units of abnormal gain are *always* 100% complete.

Weighted average method

- Statement of equivalent units
- Statement of cost per equivalent unit

$$\frac{\text{Costs b/f in opening inventory + costs incurred in period}}{\text{Equivalent units}}$$

$$= \frac{\$(2{,}800 + 26{,}400)}{2{,}940} = \$9.932$$

- Statement of evaluation

	Units		*Equivalent units*
Opening inventory	500	(100%)	500
Fully worked units	2,200	(100%)	2,200
Finished output	2,700		2,700
Closing inventory	300	(80%)	240
	3,000		2,940

	Equivalent units	*Valuation* $
Output to finished goods	2,700 × $9.932	26,816
Closing inventory	240 × $9.932	2,384
		29,200

PROCESS ACCOUNT

	Units	$		Units	$
Opening inventory	500	2,800	Finished goods	2,700	26,816
Materials	2,500		Closing inventory	300	2,384
Conversion cost		26,400			
	3,000	29,200		3,000	29,200

12: Process costing, joint products and by-products

Topic List

Joint products

By-products

The Study Guide for Paper 1.2 gives the following guidance on joint products and by-products.

- *Distinguish between by-products and joint products*
- *Value by-products and joint products at the point of separation*
- *Prepare process accounts in situations where by-products and/or joint products occur*

Joint products

... are two or more products which are output from the same processing operation, but which are indistinguishable from each other up to their point of separation (split-off point).

Features

- Possess substantial sales value before or after further processing
- Important saleable items – should be separately costed
- Costs incurred up to the point of separation need to be apportioned between all joint products
- Apportioning costs assists
  - Stock valuation
  - Profitability analysis
  - Pricing

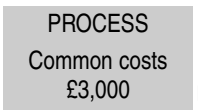
Two main methods

1. Physical measurement
2. Sales value at split-off point

Physical measurement method

Cost apportioned on basis of proportion that output of each product bears by weight or volume to the total output.

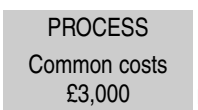
This method is unsuitable where products separate into different states during processing.



				Apportioned costs £
Joint product 1	500 tonnes	JP1	$^{500}/_{1,500}$ × £3,000	1,000
Joint product 2	1,000 tonnes	JP2	$^{1,000}/_{1,500}$ × £3,000	2,000
	1,500 tonnes			3,000

Sales values at split-off point

Costs apportioned according to the product's ability to produce income, ie in the following proportion: sales value of joint product ÷ total sales value of process's output.



		£			*Apportioned costs* £
Joint product 1	Sales value	5,000	JP1	$^{5,000}/_{15,000}$ × £3,000	1,000
Joint product 2	Sales value	10,000	JP2	$^{10,000}/_{15,000}$ × £3,000	2,000
		15,000			3,000

By-product

... is supplementary or secondary product which arises as the result of a process. The value of a by-product is small relative to that of the principal product.

By-product is usual occurrence

Calculate the **net proceeds** of the by-product and reduce process costs by this amount (CR Process account).

By-product is a one-off

Calculate the **net proceeds** of the by-product and treat as miscellaneous income in the P+L account.

Joint costs are never allocated to a by-product

Net proceeds = final saleable value **minus** post-separation costs

13: Alternative costing principles

Topic List

- Activity-based costing (ABC)
- Life cycle costing
- Target costing
- Total quality management (TQM)

Activity-based costing is an alternative to absorption costing.

Life cycle costing tracks and accumulates costs and revenues attributable to each product over the entire product life cycle.

Total quality management is the process of applying a zero defect philosophy to the management of all resources and relationships within an organisation. The idea is to develop a culture of continuous improvement focusing on meeting customer expectations.

Features of a modern manufacturing environment

- An increase in support services, which are unaffected by changes in production volume, varying instead with the range and complexity of products
- An increase in overheads as a proportion of total costs

Inadequacies of absorption costing

- Implies all overheads are related to production volume
- Developed at a time when organisations produced only a narrow range of products and overheads were only a small fraction of total costs
- Tends to allocate too great a proportion of overheads to larger products
- Leads to over production?

Outline of an ABC system

1. Identify major activities.
2. Identify **cost drivers** (factors which determine the size of an activity/cause the costs of an activity).
3. Collect costs associated with each activity into **cost pools**.
4. Charge costs to products on the basis of the number of an activity's cost driver they generate.

Cost drivers

- Volume related (eg labour hrs) for costs that vary with production volume in the short term (eg power costs)
- Transactions in support departments for other costs (eg number of production runs for the cost of setting-up production runs)

Merits of ABC

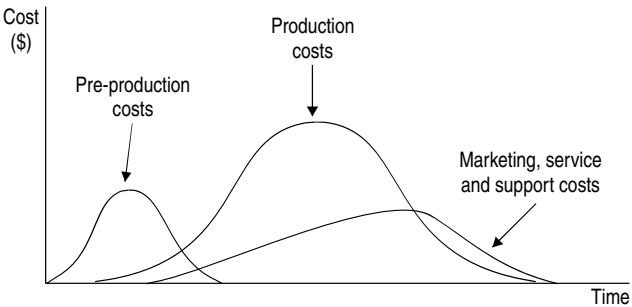
- Simple (once information obtained)
- Focuses attention on what causes costs to increase (cost drivers)
- Absorption rates more closely linked to causes of overheads because many cost drivers are used

Criticisms of ABC

- More complex and so should only be introduced if provides additional information
- Can one cost driver explain the behaviour of all items in a cost pool?
- Cost drivers might be difficult to identify

Life cycle costing

The costs incurred over a product's life cycle can be illustrated by the generic curves on the diagram below.



The four stages of the lifecycle are **introduction**, **growth**, **maturity** and **decline**.

How to maximise the return over the product life cycle

- Design costs out of products
- Minimise the time to market
- Minimise breakeven time
- Maximise the length of the life span
- Minimise product proliferation

Service life cycles

Services have life cycles, although R&D stages will not have such an impact. Consideration should be given as to how to carry out and arrange the different processes that form the service so as to minimise cost.

Traditional management accounting systems v Life cycle costing

1. Traditional management accounting systems are based on the financial year and so dissect the product life cycle into a series of annual sections, focusing in particular on reporting cost at the production stage of the life cycle. This means that profitability is assessed on an annual basis.
2. Such systems total all non-production costs and record them as a period expense.
3. They write off R&D expenditure against revenue from existing products so that existing products seem less profitable and are scrapped too quickly.

1. This approach tracks and accumulates a product's actual costs and revenues over the entire product life cycle, including the pre-production stage (when a large proportion of costs are committed), which means that a product's total profitability can be determined.
2. It traces non-production costs to individual products over complete life cycles.

Benefits of life cycle costing

- ☑ Full understanding of individual product profitability
- ☑ More accurate feedback information
- ☑ Cost reduction/minimisation and revenue expansion opportunities more apparent
- ☑ Increased visibility of non-production costs

Traditional approach to product costing

1. Develop a product
2. Determine the expected standard production cost
3. Set a selling price (probably based on cost)
4. Resulting profit

Costs are controlled through variance analysis at monthly intervals.

Target costing approach

	Competitive market price	→ A product concept is developed and the price customers would be willing to pay for the concept is determined.
–	Desired profit margin	
=	**Target cost**	→ The product must be capable of being produced for this amount (maybe in the long term), otherwise it will not be manufactured.

During the product's life the target cost will be continuously reviewed and reduced so that the price can fall. Continuous cost reduction techniques must therefore be used.

Target cost – steps

1. Determine product specification
2. Set selling price
3. Estimate required profit
4. Calculate target cost
5. Compile estimated cost
6. Calculate cost gap
7. Attempt to close the cost gap, eg 'design out' costs
8. Negotiate with customer

Options available to reduce cost

- Develop the product in an atmosphere of continuous improvement.
- Apply **value engineering techniques**.
- Collaborate closely with suppliers.
- Change production methods.
- Improve technologies/processes.
- Cut out non-value added activities.

Total quality management (TQM)

... is the process of applying a zero defects philosophy.

- Emphasis on **quality** not quantity contrasts with standard costing.
- Requires continual improvement which alters methods of working etc.
- Conflict with attainable standards, waste must be eliminated.
- **All** personnel responsible for quality rather than individual managers responsible for variances.
- Efficiency variances may focus attention on the wrong problems.

14: Forecasting

Topic List

- Cost forecasting: simple methods
- The components of time series
- Forecasting using time series analysis
- Linear regression analysis
- Index numbers

The key techniques covered in this chapter are time series analysis and linear regression analysis, and you must be able to use both to forecast costs and revenues.

A **forecast** is an estimate of what might happen in the future

Cost forecasting with scatter diagrams

1. Collect data of past volumes of output costs
2. Plot cost and output data on a graph
3. Draw a 'line of best fit' through the middle of the plotted points
4. Fixed costs = intercept on vertical axis
5. Variable cost per unit = (total cost (read from graph) – fixed cost) ÷ activity level

Cost forecasting with the high-low method

1. Select the periods with the highest and lowest activity levels
2. Deduct the cost of the low activity level from the cost of the high activity level, which is the variable cost of the difference in activity levels
3. Calculate the variable cost per unit (difference in variable costs ÷ difference in activity levels)
4. Calculate fixed cost (total cost at either output level – variable cost for output level chosen)

Forecasting problems

- Political, economic, environmental, technological and social changes make forecasting difficult.
- The further into the future the forecast, the more unreliable it is.
- The less data available for the forecast, the less reliable it is.
- The pattern of trend and seasonal variations may not continue.

Finding the trend (T) using moving averages

Example of an odd number of periods

Year (÷3)	*Sales*	*Moving total of 3 yrs' sales*	*Moving av. of 3 yrs' sales*
			TREND
20X0	390		
20X1	380	1,230*	410
20X2	460	1,290**	430
20X3	450		

* (390 + 380 + 460)
** (380 + 460 + 450)

Example of an even number of periods

Year	*Sales*	*Moving total of 4 yrs' sales*	*Moving average of 4 yrs' sales*	*Mid-point of 2 moving averages TREND*
20X1	600			
20X2	840			
		2,580*	645.0	
20X3	420			650.00
		2,620**	655.0	
20X4	720			
20X5	640			

*(600+840+420+720) **(840+420+720+640)

Finding the seasonal variations (S)

1 **Calculate the seasonal variations**

- **Additive model** (Y = T + S)
  S = actual – trend (S = Y – T)
- **Multiplicative/proportional model** (Y = T × S)
  S = actual ÷ trend (S = Y/T)

			Seasonal variation	
Wk 1	*Actual*	*Trend*	*Add model*	*Prop model*
M	80	92.70	–12.70	0.863
T	104	93.12	+10.88	1.117

2 **Take an average of the variations**

	Additive model		*Proportional model*	
	M	*T*	*M*	*T*
Wk 1	–12.70	+10.88	0.863	1.117
Wk 2	–12.80	+14.78	0.865	1.155
Total	–25.50	+25.66	1.728	2.272
Average	–12.75	+12.83	0.864	1.136

3 Adjust the total of the variations

Additive model: to zero

	Mon	*Tues*	*Wed*	*Thurs*	*Fri*	*Total*
Average	–12.75	+12.83	+0.91	+27.49	–32.43	–3.95
Adjustment (3.95/5)	+0.79	+0.79	+0.79	+0.79	+0.79	+3.95
Final estimate	–11.96	13.62	1.70	28.28	–31.64	0.00
Round to	–12	14	2	28	–32	

Proportional model: to number of items in cycle

	Mon	*Tues*	*Wed*	*Thurs*	*Fri*	*Total*
Average	0.8640	1.1360	1.0095	1.2890	0.6600	4.9585
Adjustment (5 – 4.9585)/5	0.0083	0.0083	0.0083	0.0083	0.0083	0.0415
Final estimate	0.8723	1.1443	1.0178	1.2973	0.6683	5.0000
Round to	0.87	1.14	1.02	1.3	0.67	

Additive model (Y = T + S)

Deseasonalised or seasonally-adjusted value = trend (T) = Y – S

Forecast value (Y) = (forecast T) + S

Examples

(1) If T = $560,000 and S = –$45,000, forecast = $515,000

(2) Suppose Y for weeks 1 to 4 is 120, 90, 110, 150 and S for weeks 1 to 4 is 20, –20, –10, 20 (with a four-week cycle)

- Calculate T (deseasonalised or seasonally-adjusted data) for weeks 1 to 4
  Wk 1: 120 – 20 = 100
  Wk 2: 90 – (–20) = 110
  Wk 3: 110 – (–10) = 120
  Wk 4: 150 – 20 = 130
- Determine increase/decrease in T (increasing by 10 units per week)
- Forecast T for weeks 5 and 6 (130 + 10 = 140 units, 140 + 10 = 150 units)
- Adjust T by appropriate seasonal variations to get forecast Y (week 5, Y = 140 + 20; week 6, Y = 150 – 20)

Proportional/multiplicative model ($Y = T \times S$)

- **Deseasonalised or seasonally-adjusted value = trend (T) = Y/S**
- **Forecast value (Y) = (forecast T) × S**

Examples

(1) If T = $560,000 and S = –15%, forecast = $560,000 × 85% = $476,000
If T = $560,000 and S = 15%, forecast = $560,000 × 115% = $644,000

(2) If S is 15% of T, forecast Y = 115% of T,
T = (100/115)% of Y
If S is –15% of T, forecast Y = (100 – 15)% of T
= 85% of T, T = (100/85)% of Y

(3)
- Calculate T for weeks 1 to 4 (say 100 units, 110 units, 121 units, 133 units) using moving averages
- Determine increase/decrease in T (increasing by 10% per week eg ((121 – 110)/110) × 100%)
- Forecast T for week 5 (133 units × 110% = 146 units)
- Adjust T by appropriate seasonal variations (say – 20% of T) to get forecast Y (146 × 80%)

(4)
- Calculate T for weeks 1 to 4 using moving averages
- Plot trend figures on a graph
- Extrapolate the trend line
- Read forecast trend for week 5, say, from the graph
- Adjust T by appropriate seasonal variations found from moving averages calculations

Accuracy of forecasts

Residual = (result predicted by trend line adjusted by seasonal variation) minus (actual result)

The lower the residuals, the more accurate the forecasts.

Forecasting and standards

A forecast value could be compared with a standard currently being used to assess the appropriateness of that standard.

Example

1

	Trend values (quarter)			
Year	*1st*	*2nd*	*3rd*	*4th*
1			18.75	19.375
2	20	20.5	21	21.5
3	22.125	22.75		

2 Average seasonal variations for quarters 1 to 4 are –0.1, +12.4, +1.1 and –13.4 respectively.

3 The trend line indicates an increase of about 0.6 per quarter, which can be checked as follows.

$$\frac{22.75\,(\text{Yr3Q}_2) - 18.75\,(\text{Yr1Q}_3)}{7\,(\text{Number of Qs})} = 0.57 \approx 0.6$$

4 Trend line forecast for year 4 quarter 1 is as follows.

YearQ						*Trend line*
3	2nd	actual trend		22.75, say		22.8
	3rd	forecast trend	=	22.8 + 0.6	=	23.4
	4th	forecast trend	=	23.4 + 0.6	=	24.0
4	1st	forecast trend	=	24.0 + 0.6	=	24.6

5 Final forecast = 24.6 – 0.1 (seasonal variation) = 24.5

6 If the multiplicative model variation for quarter 1 was 0.98, year 4 quarter 1 prediction = 24.6 × 0.98 = 24.1

Forecasting sales

1. Apply a regression line (trend line) $y = a + bx$, where y = sales and x = period of time.
2. Years (days/months) become the x variable by numbering them from 1 upwards.
3. A forecast (y) for a particular time period (x) is determined by substitution of the value for x into the trend line equation.

Example

Regression line = $400,000 + $300x

Forecast trend for quarter 9 (x = 9) = $400,000 + $(300 × 9) = $402,700

If the seasonal variation in quarter 9 is +10%, forecast sales are $402,700 × 110% = $442,970

More complex models

Not all models need to be linear. For example, $y = m + c^x$ is a non-linear function of time x.

Forecasting costs

A value for x (activity level) can be substituted into the equation and a value for y (total cost at that activity level) forecast.

Example

Regression analysis produces y = 17 + 3.6x (where x is in '000 units and y is in $'000). Fixed costs are therefore $17,000 and variable cost per unit is $3,600.

Predicted cost (y) if activity level (x) is 13,000 units = 17 + (3.6 × 13) = 63.8 = $63,800

Limitations of linear regression analysis

- Assumes a linear relationship between the dependent and independent variables
- Assumes the dependent variable depends only upon one variable (but when forecasting sales it may also depend on competitors' actions, state of the economy and so on, as well as time)
- Assumes that what has happened in the past provides a reliable guide for the future
- Only valid within the range of data used to determine the equation in the first place

Forecasting and indices

The effects of inflation need to be removed so that costs and revenues are comparable over time, the only factor affecting them being activity level. We do this by adjusting figures to a common basis using index numbers.

1. Remove the effects of price movements by adjusting data to a common basis, usually to the price level of the base period (cost × (100/index for the year in question)). This is the reverse of making costs more 'up to date'.
2. Apply a forecasting technique to the data from step 1.
3. Adjust the forecast produced in step 2 to take account of price movements (unadjusted forecast × (index for year in question/100)).

Product lifecycle

The product lifecycle model shows how sales of a product can be expected to vary over time.

Index numbers

Provide a standardised way of comparing the values, over time, of prices, wages, volume of output and so on. They are used extensively in business, government and commerce. No doubt you will be aware of some index numbers – for example, the RPI and the Financial Times All Share Index.

An index may be a price index or a quantity index

- **A price index measures the change in the money value of a group of items over time**. The Retail Prices Index (RPI) in the UK measures changes in the costs of items of expenditure of the average household.

Price index = $\frac{P_n}{P_0} \times 100$

where P_n is the price for the period under consideration and P_0 is the price for the base period.

- **A quantity index** (or volume index) **measures the change in the non-monetary values of a group of items over time** eg. productivity index, measuring changes in the productivity of various departments or groups of workers.

Quantity index = $\frac{Q_n}{Q_0} \times 100$

where Q_n is the quantity for the period under consideration and Q_0 is the quantity for the base period.

Composite index numbers

Most indices used in practice cover more than one item and are called **composite index numbers.** The RPI considers components such as food, alcoholic drink, tobacco and housing.

Weighted aggregate indices

Weighting involves multiplying each component value by its corresponding weight and adding these products to form an aggregate. This is done for both the base period and the period in question. The aggregate for the period under consideration is then divided by the base period aggregate.

The general form of a **weighted aggregate index is:**

$$\frac{\Sigma wv_n}{\Sigma wv_0}$$

where: w is the weighting factor

v_0 is the value of the commodity in the base period

v_n is the value of the commodity in the period in question

Prices are usually weighted by quantities and quantities are usually weighted by prices.

Laspeyre and Paasche indices

Laspeyre and Paasche indices are special cases of weighted aggregate indices.

A Laspeyre price index

... uses **quantities** consumed in the base period as weights. In the notation already used it can be expressed as follows.

Laspeyre price index = $\frac{\Sigma P_n Q_0}{\Sigma P_0 Q_0} \times 100$

A **Laspeyre quantity index** uses **prices** from the base period as weights and can be expressed as follows.

Laspeyre quantity index = $\frac{\Sigma P_0 Q_n}{\Sigma P_0 Q_0} \times 100$

Paasche indices

Paasche indices use **current time period weights**. In other words the weights are changed every time period.

A **Paasche price index** uses **quantities** consumed in the current period as weights and can be expressed as follows.

$$\textbf{Paasche price index} = \frac{\Sigma P_n Q_n}{\Sigma P_o Q_n} \times 100$$

A **Paasche quantity index** uses prices from the current period as weights and can be expressed as follows.

$$\textbf{Paasche quantity index} = \frac{\Sigma P_n Q_n}{\Sigma P_n Q_o} \times 100$$

15: Budgeting

Topic List

- Functions of a budget
- Computers and budgeting
- Flexible budgets

You must understand the budgeting process and be able to prepare functional and flexible budgets.

A budget

... is an organisation's plan for a forthcoming period, expressed in money terms

A budget's twofold role is to

- Compel planning
- Establish a system of control

Uses of budgets

- **Planning**
  - Force management to look ahead
  - Establish formal system of communicating plans and ideas usually
  - Co-ordinate activities
  - Quantify an organisation's objectives
- **Control**
  - Compare with actual results
  - Provide a framework for responsibility accounting
  - Motivate employees to improve their performance

Using computers in budgeting

Computers are used in budgeting to process large amounts of data and recalculate changes in key variables. They can also be used to evaluate different options and carry out 'what if' analysis. Spreadsheets and programs are used.

Spreadsheets

Pros and uses

- ☑ Forecasting
- ☑ Tax
- ☑ Profit projections
- ☑ Easy to use

Cons

- ☒ Danger of corruption of data or variables
- ☒ Can't calculate qualitative factors
- ☒ Minor errors can creep in

Fixed budgets

These are budgets which are set for a single activity level. Master budgets are fixed budgets.

versus

Flexible budgets

These are budgets which, by recognising different cost behaviours patterns, change as activity levels change.

Using flexible budgets for control

1. Produce a flexible budget based on the **actual** activity level.
2. Compare the flexible budget with the fixed budget, and with actual results.
3. Identify variances.

   Volume variance = difference between fixed budget and flexible budget

   Expenditure variance = difference between flexible budget and actual results

To **prepare a flexible budget**:

1. Decide whether costs are fixed, variable or semi-variable, and split semi-variable costs using the high/low or scattergraph methods
2. Calculate the budget cost allowance for each item = budgeted fixed cost* + (number of units × variable cost per unit)**

   * nil for variable cost ** nil for fixed cost

Example

MK Company has prepared budgeted profit forecasts based on 90%, 100% (50,000 units) and 105% activity. Actual results and budgets are as follows.

	Budgets			Actual
	90%	*100%*	*105%*	*(37,500 units sold)*
	$	$	$	$
Revenue	1,350,000	1,500,000	1,575,000	1,075,000
Costs				
Material cost	337,500	375,000	393,750	311,750
Labour cost	405,000	450,000	472,500	351,500
Prod overhead cost	120,000	130,000	135,000	117,500
Administration cost	70,000	70,000	70,000	66,500
	932,500	1,025,000	1,071,250	847,250
Profit	417,500	475,000	503,750	227,750

The flexed budget showing the revenue and costs associated with 37,500 units sold is as follows.

Example (continued)

	Flexed budget
	$
Revenue	1,125,000 (W1)
Costs	
Material cost	281,250 (W2)
Labour cost	337,500 (W3)
Production overhead cost	105,000 (W4)
Administration cost	70,000 (W5)
	793,750
Profit	331,250

Workings

1 37,500 × (1,500,000/50,000)

2 Material costs are variable, cost per unit = $375,000/50,000 = $7.50, budget cost allowance = $7.50 × 37,500

3 Labour costs are variable, cost per unit = $450,000/50,000 = $9, budget cost allowance = $9 × 37,500

4 Production overhead is a semi-variable cost.
At 90%, activity level = 50,000 × 0.9 = 45,000 units
Variable cost of (50,000 – 45,000) units = $(130,000 – 120,000)
∴ Variable cost per unit = $10,000/5,000 = $2 per unit
∴ Fixed cost = $130,000 – (50,000 × $2) = $30,000
Budget cost allowance = $(30,000 + (37,500 × 2))

5 Administration costs are a fixed cost

Suppose the fixed budget in the previous example was 100% activity, the budgetary control report would be prepared as follows. The budget variance are calculated by comparing the flexible budget and the actual results.

	Fixed budget	*Flexible budget*	*Actual results*	*Budget variance*
	$	$	$	$
Revenue	1,500,000	1,125,000	1,075,000	50,000 (A)
Costs				
Material cost	375,000	281,250	311,750	30,500 (A)
Labour cost	450,000	337,500	351,500	14,000 (A)
Production overhead cost	130,000	105,000	117,500	12,500 (A)
Administration cost	70,000	70,000	66,500	3,500 (F)
	1,025,000	793,750	842,250	53,500 (A)
Profit	475,000	331,250	227,750	103,500

Volume variance $143,750 (A)

Expenditure variance $103,500 (A)

Total variance $247,250 (A)

16: The budgetary process

Topic List

- A framework for budgeting
- Budget preparation
- Functional budgets
- Cash budgets

This chapter looks at how the budget is put together.

Uses of budgets

- Planning
- Communication
- Coordination
- Responsibility accounting
- Control
- Motivation

Budget committee functions

- Coordinating and allocating responsibility
- Issuing the budget manual
- Timetabling
- Providing information
- Comparing actual and budgeted results

The responsibility for preparing budgets should lie with the managers who are responsible for implementing them.

- Sales manager → sales budget
- Purchasing manager → material purchases budget
- Production manager → direct production cost budgets

Rewards for managers can be linked to their achievement of budget targets.

Budget manual contents

- Explanation of budgetary process objectives
- Organisational structures
- Outline of principal budgets
- Administrative details of budget preparation
- Procedural matters

The order of budget preparation

1. Identify the principal budget factor → The factor which limits the activities of an organisation
2. Prepare a sales budget (units of product **and** sales value) and then a finished goods inventory budget (to determine the planned change in finished goods inventory levels)
3. Prepare a production budget (sales ± budgeted change in finished goods inventory levels, in units)
4. Prepare production resources budgets (materials usage, machine usage, labour)
5. Prepare a materials inventory budget (to determine the planned change in materials inventory levels)
6. Prepare a raw materials purchases budget in units and value (usage ± budgeted change in materials inventory)
7. Prepare overhead budgets
8. Prepare the master budget (budgeted statement of profit or loss, budgeted statement of financial position, cash budget)

Functional (departmental) budgets include the sales budget, production budgets, materials and labour budgets.

Example

XYZ Company produces three products X, Y and Z. For the coming accounting period budgets are to be prepared based on the following information.

Budgeted sales

Product X	2,000 at $100 each
Product Y	4,000 at $130 each
Product Z	3,000 at $150 each

Budgeted usage of raw material

	RM11	RM22	RM33
Product X	5	2	–
Product Y	3	2	2
Product Z	2	1	3
Cost per unit	$5	$3	$4

Finished inventory budget

	X	*Y*	*Z*
Beginning	500	800	700
End	600	1,000	800

Raw materials inventory

	RM11	RM22	RM33
Beginning	21,000	10,000	16,000
End	18,000	9,000	12,000

	X	Y	Z
Expected hours per unit	4	6	8
Expected hourly rate (labour)	$3	$3	$3

(a) **Sales budget**

	X	Y	Z	Total
Sales quantity	2,000	4,000	3,000	
Sales price	$100	$130	$150	
Sales value	$200,000	$520,000	$450,000	$1,170,000

(b) **Production budget**

	X	Y	Z
	Units	Units	Units
Sales quantity	2,000	4,000	3,000
Closing inventory	600	1,000	800
	2,600	5,000	3,800
Less opening inventory	(500)	(800)	(700)
Budgeted production	2,100	4,200	3,100

Example (continued)

(c) **Material usage budget**

	Production Units	RM11 Units	RM22 Units	RM33 Units
Product X	2,100	10,500	4,200	–
Product Y	4,200	12,600	8,400	8,400
Product Z	3,100	6,200	3,100	9,300
Budgeted material usage		29,300	15,700	17,700

(d) **Material purchases budget**

	RM11 Units	RM22 Units	RM33 Units
Budgeted material usage	29,300	15,700	17,700
Closing inventory	18,000	9,000	12,000
	47,300	24,700	29,700
Less opening inventory	(21,000)	(10,000)	(16,000)
Budgeted material purchases	26,300	14,700	13,700
Standard cost per unit	$5	$3	$4
Budgeted material purchases	$131,500	$44,100	$54,800

Steps in the preparation of a cash budget

1. Set up a proforma.
2. Establish budgeted sales month by month. Bearing in mind the credit period taken by customers (debtors) and taking discounts into account, calculate when budgeted sales revenue will be received as cash and when opening receivables (debtors) will pay.
3. Establish when any other cash income will be received.
4. Establish, for each month, production quantities and hence materials usage quantities, materials inventory changes and the quantity and cost of materials purchases. Bearing in mind the credit period taken, calculate when cash payments to suppliers will be made and when the amount due to opening payables (creditors) will be paid.
5. Establish when any other cash payments (excluding non-cash items such as depreciation) will be paid.

Include at the foot of every column of your cash budget the opening cash position, the net cash flow and the closing cash position.

Potential cash positions

Cash position	Appropriate management action
Short-term surplus	■ Pay suppliers early to obtain discount ■ Attempt to increase sales by increasing receivables and inventories ■ Make short-term investments
Short-term shortfall	■ Increase accounts payable ■ Reduce receivables ■ Arrange an overdraft
Long-term surplus	■ Make long-term investments ■ Expand ■ Diversify ■ Replace/update non-current assets
Long-term shortfall	■ Raise long-term finance (such as via an issue of share capital) ■ Consider shutdown/disinvestment opportunities

PROFORMA CASH BUDGET

	Month 1	*Month 2*	*Month 3*
	$	$	$
Cash receipts			
Receipts from receivables	X	X	X
Loans etc	X	X	X
	X	X	X
Cash payments			
Payments to suppliers	X	X	X
Wages etc	X	X	X
	X	X	X
Opening balance	X	X	X
Net cash flow (receipts - payments)	X	X	X
Closing balance	X	X	X

Cash flow versus profit

These are likely to be different.

- Not all cash receipts affect statement of profit or loss income (eg issue of new shares)
- Not all cash payments affect statement of profit or loss expenditure (eg purchase of non-current assets)
- Some items in the statement of profit or loss are not cash flows (eg depreciation)
- Timing of cash receivables and payments may not coincide with statement of profit or loss recording (eg sales and receipts from receivables)

17: Making budgets work

Topic List

Behavioural effects of budgets and motivation

Budgets can be motivational but they can also produce undesirable negative reactions.

Budgets as targets

Can standards and budgets, as targets, motivate managers to achieve a high level of performance?

- **Ideal standards** are demotivating because adverse efficiency variances are always reported.
- **Low standards** are demotivating because there is no sense of achievement in attainment, no impetus to try harder.

A target must fulfil certain conditions if it is to motivate employees to work towards it.

- Sufficiently difficult to be challenging
- Not so difficult that it is not achieveable
- Accepted by employees as their personal goal

→ Link with degree of participation?

Goal congruence and dysfunctional decision making

Organisational goals = employees' goals
→ **goal congruence**

Manager's goals ≠ organisational goals
→ dysfunctional decision making

A well-designed control system can help to ensure goal congruence: continuous feedback prompting appropriate control action should steer the organisation in the right direction.

Budget setting styles

There are three styles:

- **Imposed** (from the top down)
- **Participative** (from the bottom up)
- **Negotiated**

In practice final budgets are likely to lie between what top management would really like and what junior managers believe is feasible.

Imposed approach

Advantages

- ☑ Enhance co-ordination between strategic plans and divisional objectives
- ☑ Less time-consuming

Disadvantages

- ☒ Imposed so can be demotivational
- ☒ Lower-level initiatives may be stifled
- ☒ Does not suit some employees

Participative approach

Advantages

- ☑ More realistic budgets
- ☑ Co-ordination, morale and motivation improved
- ☑ Increased management commitment to objectives

Disadvantages

- ☒ More time-consuming
- ☒ Budgetary slack may be introduced
- ☒ Does not suit some employees

Performance evaluation

An important source of **motivation** to perform well (to achieve budget targets, to eliminate adverse variances) is being kept informed about how actual results are progressing compared with target.

The information feedback about actual results should have the qualities of good information.

- **Clear** and **comprehensive** reports
- **Significant** variances highlighted for investigation
- **Timely** reports

Despite conventional assumptions, research suggests accounting performance measures lead to a lack of goal congruence.

Example

A production manager may be encouraged to achieve and maintain high production levels and to reduce costs, particularly if a bonus is linked to these factors. Such a manager is likely to be highly motivated. But, in terms of the effect on the organisation, the need to maintain high production levels could lead to slow-moving inventory, resulting in an adverse effect on cash flow.

Bonus/incentive scheme

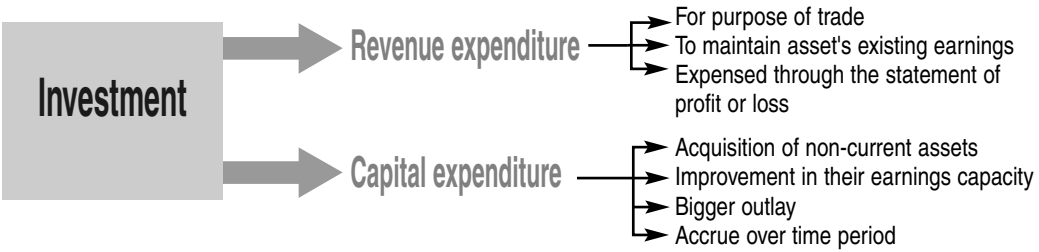
- Employee paid more for productivity
- Increased profits shared between employer and employee
- High day-rate system
- Bonus schemes (group and individual)
- Profit-sharing schemes
- Incentive schemes involving shares
- Value added incentive schemes

18: Capital expenditure budgeting

Topic List

What is capital expenditure?

Capital expenditure is often for very significant amounts. The need for it should be assessed before any firm commitments are made.



The correct and consistent **calculation of profit** for any accounting period depends on the correct and consistent **classification of items** as revenue or capital.

19: Methods of project appraisal

Topic List

- Payback
- Discounted cash flow
- NPV and IRR
- Relevant costs

This chapter considers how major investment projects are assessed. You must be able to use all of the methods shown, as well as being able to discuss their advantages and disadvantages.

Payback

Payback is the time taken for the cash inflows from a capital investment project to equal the cash outflows, usually expressed in years.

It is used as a minimum target/first screening method.

Advantages

- ☑ Simple to calculate and understand
- ☑ Concentrates on short-term, less risky flows
- ☑ Can identify quick cash generators

Disadvantages

- ☒ Ignores total project return
- ☒ Ignores time value of money
- ☒ Ignores timing of flows after payback period
- ☒ Arbitrary choice of cut-off

Example

	P	*Q*
	$'000	$'000
Investment	60	60
Year 1 profits	20	50
Year 2 profits	30	20
Year 3 profits	50	5

Q pays back first, but ultimately P's profits are higher on the same amount of investment.

Discounted cash flow analysis applies discounting arithmetic to the costs and benefits of an investment project, reducing value of future cash flows to present value equivalent.

Conventions of DCF analysis

- Cash flows incurred at beginning of project occur in year 0
- Cash flows occurring during time period assumed to occur at period-end
- Cash flows occurring at beginning of period assumed to occur at end of previous period

PV of cash flows in perpetuity

$1/r, r is cost of capital

Discounting

$$\text{Present value of } 1 = \frac{1}{(1+r)^n}$$

Annuity

$$\text{Present value of annuity of } 1 = \frac{1-(1+r)^{-n}}{r}$$

Where: r = Discount rate
n = number of periods

Net present value (NPV)

Net present value is the value obtained by discounting all cash flows of project by target rate of return/cost of capital. If NPV is positive, the project will be accepted, if negative it will be rejected.

Features of NPV

- Uses all cash flows related to project
- Allows timing of cash flows
- Can be calculated using generally accepted method

Example

Year	*Cash flow*	*PV factor 12%*	*PV of cash flow*
0	(90,000)	1.000	(90,000)
1	40,000	0.893	35,720
2	40,000	0.797	31,880
3	50,000	0.712	35,600
			13,000

→ This simple layout is not recommended for complex cash flows. See over for recommended layout

	Year 0	*Year 1*	*Year 2*	*Year 3*	*Year 4*	
Sales receipts		X	X	X	X	
Costs	___	(X)	(X)	(X)	(X)	
Sales less Costs		X	X	X	X	
Capital additions	(X)					
Capital disposals					X	
	(X)	X	X	X	X	
Discount factors	X	X	X	X	X	NPV is the sum
Present value	(X)	X	X	X	(X)	of present values

Rules of investment appraisal

Include

- ☑ Effect of tax allowances
- ☑ After-tax incremental cash flows
- ☑ Working capital requirements
- ☑ Opportunity costs

Exclude

- ☒ Depreciation
- ☒ Dividend/interest payments
- ☒ Sunk costs
- ☒ Allocated costs and overheads

Internal rate of return (IRR)

The IRR method calculates the rate of return at which the NPV is zero.

1. Calculate net present value using rate for cost of capital which
   - a. Is a whole number
   - b. May give NPV close to zero
2. Calculate second NPV using a different rate
   - a. If first NPV is positive, use second rate greater than first rate
   - b. If first NPV is negative, use second rate less than first rate
3. Use two NPV values to calculate IRR

$$IRR = A + \left(\left(\frac{a}{a - b} \right) (B - A) \right)\%$$

where:

A is lower of two rates of return used
B is higher of two rates of return used
a is NPV obtained using rate a
b is NPV obtained using rate b

NPV

- Simpler to calculate
- Better for ranking mutually exclusive projects
- Easy to incorporate different discount rates

NPV and IRR comparison

For conventional cash flows both methods give the same decision.

IRR

- More easily understood
- Can be confused with ARR
- Ignores relative size of investments
- May be several IRRs if cash flows not conventional

Avoidable cost

... is a cost which would not be incurred if the activity to which it related did not exist.

Opportunity cost

... is the benefit which would have been earned but which has been given up, by choosing one option instead of another.

Relevant costs

Differential cost

... is the difference in the cost of alternatives.

Controllable cost

... is an item of expenditure which can be directly influenced by a given manager within a given time span.

Non-relevant costs

Sunk cost

... is a past (historical) cost which is not directly relevant in decision making.

Fixed costs

Unless given an indication to the contrary, assume fixed costs are irrelevant and variable costs are relevant.

Direct and indirect costs may be relevant or irrelevant depending on the situation.

20: Standard costing

Topic List

Standard costing

Setting standards

A standard cost is an estimated unit cost built up from standards for each cost element. It is based on expected prices of the following.

- *Materials, labour and expenses*
- *Efficiency levels in the use of materials and labour*
- *Budgeted overhead costs and budgeted levels of activity*

Standard costing

... is a control technique that compares standard costs and revenues with actual results to obtain variances that are used to stimulate improved performance.

Uses

- To value inventories and cost production
- To act as a control device via variance analysis

The total standard cost of a product is built up from standards for each cost element

Examples

- Standard quantities of materials at standard prices
- Standard quantities of labour time at standard rates

STANDARD COST CARD

PRODUCT LW

	$
Direct material (standard quantity × standard price)	X
Direct labour (standard time × standard rate)	X
Standard direct cost	X
Variable production overhead (standard time × standard rate)	X
Standard variable cost of production	X
Fixed production overhead (standard time × standard rate)	X
Standard full production cost	X
Administration and marketing overhead	X
Standard cost of sales	X
Standard profit	X
Standard selling price	X

Material price standards

- Estimated by purchasing department
- Problems of allowing for inflation

Labour rate standards

- Set by reference to payroll records
- Average rate for each grade of employee
- Problem of wage rate inflation

Overhead rate standards

- Standard absorption rate = predetermined rate OAR

$$\text{OAR} = \frac{\text{Budgeted overheads}}{\text{Budgeted activity level}}$$

Material usage and labour efficiency

Technical specifications

- Standard product specification
- Standard operation sheet

Types of standard

- Ideal
- Attainable

Problems

- Inflation
- Choice of an efficiency standard
- Materials quality versus wastage
- Accounting for price variations/discounts
- Behavioural problems
- Cost of setting up
- Time to set up

21: Cost variances

Topic List

- Direct material cost variances
- Direct labour cost variances
- Variable production overhead variances
- Fixed production overhead variances
- Reasons and significance

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 (expected) and actual results is analysed. When actual results are better than expected results, we have a favourable variance (F). When actual results are worse than expected results we have an adverse (A) variance.

Direct material total variance

	$
1,000 units should have cost	100,000
but did cost	98,600
Direct material total variance	1,400 (F)

Example

Product LW has a standard direct material cost as follows.

10 kg of material M at $10 per kg = $100 per unit of M.

During a period, 1,000 units of LW were manufactured, using 11,700 kg of material M, which cost $98,600.

Direct material price

	$
11,700 kg of M should have cost	117,000
but did cost	98,600
Material M price variance	18,400 (F)

Direct material usage

1,000 units should have used (× 10 kg)	10,000 kg
but did use	11,700 kg
Usage variance in kgs	1,700 kg (A)
× standard cost per kilogram	× $10
Material M usage variance	$17,000 (A)

Direct material cost variance = material price variance + material usage variance

Direct labour total variance

	$
1,500 units of product LW should have cost (× $10)	15,000
but did cost	17,500
Direct labour total variance	2,500 (A)

Direct labour rate variance

	$
3,080 hours of grade A labour should have cost (× $5)	15,400
but did cost	17,500
Direct labour rate variance	2,100 (A)

Idle time variance = idle hours × standard rate per hour = 100 × $5 = $500 (A)

Example

The standard direct labour cost of product LW is as follows.

2 hours of grade A labour at $5 per hour = $10 per unit of product LW

During a period, 1,500 units of product LW were made, and the direct labour cost of grade A labour was $17,500 for 3,080 hours of work. 100 hours were recorded as idle time.

Direct labour efficiency variance

1,500 units of product LW should take (× 2 hours)	3,000 hrs
but did take (3,080 – 100)	2,980 hrs
Direct labour efficiency variance in hrs	20 hrs (F)
× standard rate per hour	× $5
Direct labour efficiency variance in $	100 (F)

Direct labour total variance = labour rate variance + labour efficiency variance + idle time variance

Example

The variable production overhead cost of product LW is as follows.

2 hours @ $1.50 = $3 per unit

During a period, 6,400 units of product LW were made. The labour force worked 820 hours, of which 60 were recorded as idle time. The variable overhead cost was $1,230.

Expenditure variance

	$
760 hours of var. prod. o'head should cost (× $1.50)	1,140
but did cost	1,230
Variable production overhead expenditure variance	90 (A)

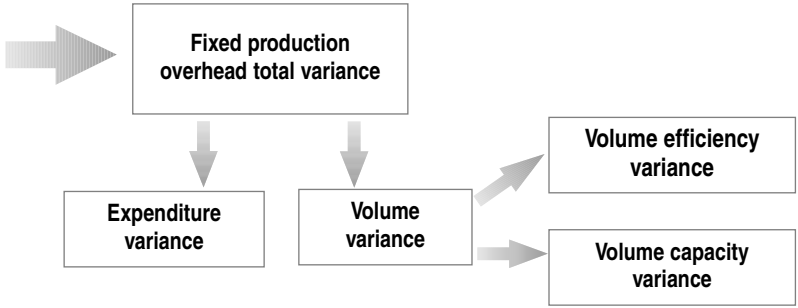
Efficiency variance

400 units of product LW should take (× 2 hrs)	800 hrs
but did take (active)	760 hrs
Variable prod. o'head efficiency variance in hours	40 hrs (F)
× standard rate per hour	× $1.50
Variable production overhead efficiency variance in $	$60 (F)

In an absorption costing system, fixed production overhead variances are an attempt to explain the under or over absorption of fixed production overheads.

Method of calculating cost variances for variable cost items is essentially same for materials, labour and overheads.

Calculation of fixed production overheads is very different



Example

Budgeted production 1,000 units of product A

Actual fixed overhead expenditure = $20,450

Time required to produce one unit of product A = 5 hours

Actual production = 1,100 units of A

Budgeted fixed overhead = $20,000

Actual hours worked = $5,400

Standard fixed overhead cost per unit of product A = $20 per unit

	$	
Fixed overhead incurred	20,450	Adverse variance because actual expenditure was greater than budgeted expenditure
Fixed overhead absorbed (1,100 × $20)	22,000	
Fixed overhead total variance	1,550 (F)	

→ over-absorbed overhead

	$	
Budgeted fixed overhead expenditure	20,000	
Actual fixed overhead expenditure	20,450	
Fixed overhead expenditure variance	450 (A)	

	$	
Actual production at std rate (1,100 × $20)	22,000	
Budgeted production at std rate (1,000 × $20)	20,000	
Fixed overhead volume variance	2,000 (F)	

Favourable variance because output was greater than expected

The fixed overhead volume variance can be further subdivided into a fixed overhead volume efficiency variance and a fixed overhead volume capacity variance

FIXED OVERHEAD VOLUME VARIANCE

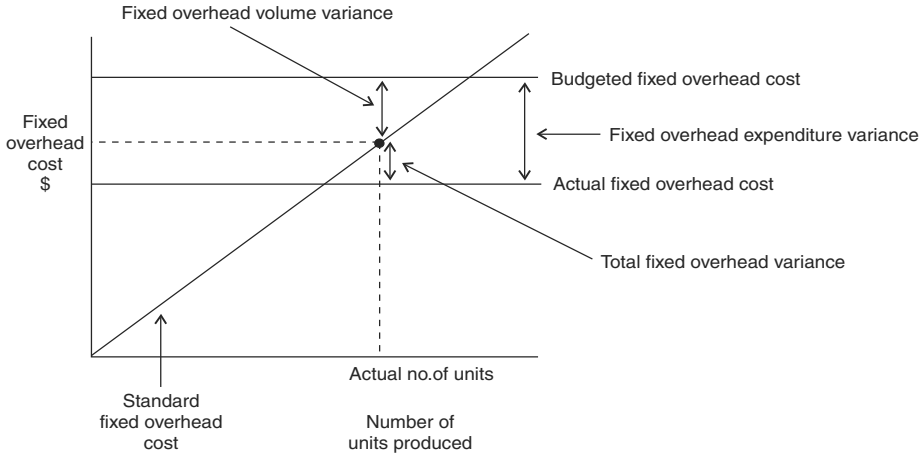
1,100 units should take (× 5 hrs)	5,500 hrs
but did take	5,400 hrs
Fixed overhead volume efficiency variance in hours	100 hrs (F)
× standard fixed overhead absorption rate per hour	× $4
Fixed overhead volume efficiency variance in $	$400 (F)

The volume efficiency variance is calculated the same way as the labour efficiency variance

Budgeted hours of work	5,000 hrs
Actual hours worked	5,400 hrs
Fixed overhead volume capacity variance in hours	400 hrs (F)
× standard fixed overhead absorption rate per hour	$4
Fixed overhead volume capacity variance in $	$1,600 (F)

The volume capacity variance is favourable because actual hours worked are greater than budgeted hours of work

Graph of fixed overhead costs and variances



Material price

Favourable	Adverse
■ Unforeseen discounts	■ Price increase
■ Change in material	■ Careless purchasing

Variable and fixed overhead

Favourable	Adverse
■ Cost savings	■ Excessive use

Material usage

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

Labour rate

Favourable	Adverse
■ Lower rate paid	■ Wage rate increase

Labour efficiency

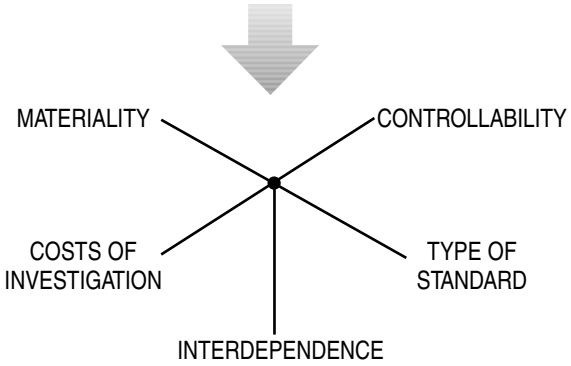
Favourable	Adverse
■ Motivated staff	■ Lack of training
■ Quality materials	■ Sub-std material

Interdependence

The cause of one variance (adverse) 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:



22: Sales variances and operating statements

Topic List

- Sales variances
- Operating statements
- Marginal versus absorption

The objective of cost variance analysis is to assist management in the control of costs. Costs are, however, only one of the factors which contribute to the achievement of planned profit. Sales are another important factor and sales variances can be calculated to aid management's control of their business.

Variances can be presented to management in operating statements.

Selling price variance

Is a measure of the effect on expected profit of a different selling price to standard selling price.

Example

The standard selling price of product H is $15. Actual sales in 2001 were 2,000 units at $15.30 per unit. Budgeted sales were 2,200 units and standard full cost per unit of H is $12.30.

Sales volume profit variance

Is the difference between actual units sold and the budgeted quantity, valued at the standard profit per unit.

Selling price variance

	$
Sales revenue from 2,000 units should have been (× $15)	30,000
but was (× $15.30)	30,600
Selling price variance	600 (F)

Favourable variance because the price was higher than expected

Sales volume profit variance

Budgeted sales volume	2,200
Actual sales volume	2,000
	200 (A)
× standard profit per unit ($15 – $12.30)	× $2.70
Sales volume profit variance	540 (A)

Adverse variance because actual sales were less than budgeted

Operating statement (absorption costing)

	$	$	$
Budgeted profit			X
Sales volume profit variance			X
Standard profit from actual sales			X
Variances			
Sales price	X		
Materials		X	
Labour	X		
Variable overheads	X		
Fixed overhead expenditure		X	
Fixed overhead volume	X		
	X	X	X
Actual profit			X

Operating statement (marginal costing)

	$	$	$
Budgeted contribution			X
Sales volume contribution variance			X
Standard contribution from actual sales			X
Variances			
Sales price	X		
Materials		X	
Labour	X		
Variable overheads		X	
	X	X	X
Actual contribution			X
Budgeted fixed costs		X	
Fixed cost expenditure variance		X	
Actual fixed overheads			X
Actual profit			X

If an organisation uses standard marginal costing instead of standard absorption costing, there will be two differences in the way variances are calculated.

1 In a standard marginal costing system, there will be no fixed overhead volume variance

2 Sales volume variance → Absorption costing, valued at standard profit margin

→ Marginal costing valued at standard contribution margin

3 Operating statement → Absorption costing begins with budgeted profit

→ Marginal costing begins with budgeted contribution

One way in which the examiner can test your understanding of variance analysis is to provide information about variances from which you have to 'work backwards' to determine the actual results. You need to take an algebraic approach.

23: Performance measurement

Topic List

- Performance measurement
- Financial + non-financial measures
- Ratio analysis
- Balanced scorecard

Performance measurement aims to establish how well something or somebody is doing in relation to a planned activity. Performance measurement is a vital part of the control process.

The performance of an organisation is most commonly done by calculating a number of ratios (both financial and non-financial).

Remember that different performance measures are appropriate for different businesses. You must also be aware when measuring performance of the influence of external conditions and the changes in them.

Performance measurement is a vital part of control and aims to establish how well something or somebody is doing in relation to a planned activity.

The **mission statement** encapsulates the vision of top management, what they are trying to achieve, and how they wish to achieve it. It is an important part of the process of controlling the whole organisation.

↓

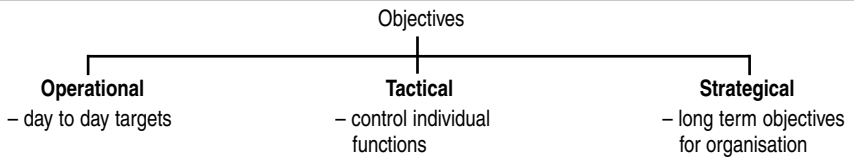
Strategic objectives are quantified embodiments of mission (timescales, profitability).

↓

A **critical success factor** is a performance requirement that is fundamental to competitive success.

↓

Key performance indicators are used to assess whether CSFs are being achieved.



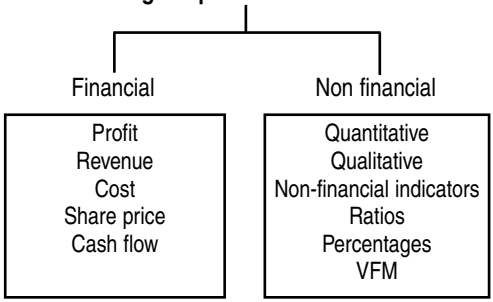
Uses and examples of performance indicators

- Identify problems (direct labour efficiency variance)
- Control costs (distribution as % of turnover)
- Identify how well resources are being managed (idle labour hours)
- Highlight how well the organisation is being managed (profit as % of turnover)
- Planning production and finished inventory levels (number of returns)

Yardsticks against which performance indicators can be compared

- Standards, budgets, targets
- Trends over time
- Results of other parts of the organisation
- Results of other organisations – external analysis

A range of performance measures



The performance measurement process must compare 'like with like'.

External factors such as market conditions and general economic conditions affect performance.

The use of **non-financial performance measures** has increased in recent years. They are considered to be leading indicators of financial performance.

Advantages of non-financial performance measures

- ☑ They can encourage managers to take a long-term view rather than focus on short-term financial targets.
- ☑ They are leading indicators of financial performance e.g. high levels of customer satisfaction now could indicate repeat sales are more likely in the future.

Non-financial objectives

- ☑ Welfare of employees
- ☑ Welfare of society
- ☑ Fulfilment of responsibilities to customers and suppliers

3Es

Economy – operating at minimum cost

Effectiveness – doing the right things

Efficiency – doing things right

Comparisons between performance of the private sector and state regulated entities can be difficult. State regulated entities can be constrained or enhanced by government regulation.

Differences between private and public sector

- Objectives – eg profit vs provision of service
- Income – eg sales vs government funding
- Market competition – usually none in public sector
- Success definition – more difficult to define in public sector

ROI or ROCE

Calculated as (profit/capital employed) × 100%, using operating profit and net current assets or long-term liabilities + capital

- Major measure of efficiency of profit-making organisations
- Measures **efficiency** with which capital employed (**input**) used to generate profit (**value of output**)
- If ROCE is 30%, 30c of profit is generated for every $1 of resources
- Increased by improving profit margins and/or increasing asset turnover

The **age of assets**, **depreciation rates** and **inventory valuation policy** affect ROCE.

RI

Calculated as controllable (traceable) profit – imputed interest charge on controllable investment

- Absolute measure
- Difficult to identify controllable profit
- Increases as assets get older

Gross profit margin

(Gross profit/revenue) × 100%

Comment

- Measure of the profitability of sales
- Increased by raising prices and/or negotiating lower prices with suppliers
- Focuses on trading and manufacturing activities
- Limitations: affected by the inventory valuation method used and fails to take account of differences in organisations' cost structures

Profit (or net or sales) margin or operating profit %

(Operating profit/revenue) × 100%

Comment

- Key measure of efficiency for profit-making organisations
- Measure of the **efficiency** with which sales (**input**) has been used to generate profit (**value of output**)
- Increased by charging higher prices or reducing costs
- Concerned with profit over which operational management can exercise day to day control (amount left after all direct costs and overheads have been deducted from sales revenue)
- May be an interdependency with the asset turnover ratio
- Limitations: affected by different inventory valuation and depreciation policies and fails to show differences in cost structures

Asset turnover

Calculated as (revenue/capital employed) using net current assets or long-term liabilities + capital

This is a key measure of **productivity** for many organisations, measuring how intensively capital employed has been used to generate sales. Again, the valuation of capital employed can have a significant effect on the ratio reported.

'New' non-current assets and/or a large non-current asset base can raise productivity but will reduce ROCE and asset turnover.

Asset turnover is expressed as 'n times' so that assets generate n times their value in annual turnover.

Link between ROCE, profit margin and asset turnover

ROCE = profit margin × asset turnover

ROCE can be increased by improving the profit margin and/or increasing asset turnover

Accounts receivable collection period

... is calculated as:

(receivables/turnover) × 365 days (or × 12 mths)

- This gives a rough measure of the average length of time it takes for a company's receivables to pay what they owe.
- Trend is important.
- Supermarkets' ratio should be low, exporting companies' probably high.
- Limitation: figure used for receivables might not be representative.

Accounts payable payment period

... is calculated as:

(payables/purchases) × 365 days (or × 12 mths)

Cost of sales can be used as an approximation for purchases.

- This gives a rough measure of the average length of time it takes for a company to pay what it owes.
- It helps to assess a company's liquidity. (An increase can be a sign of a lack of long-term finance or poor management of current assets, resulting in use of extended credit from suppliers, increased bank overdraft etc.)

Inventory turnover period

... indicates the average number of days for which inventory is held and is calculated as (inventory/cost of sales) × 365 days (or × 12 mths).

An increasing ratio indicates a slowdown in trading or a build up of inventory.

Inventory turnover (n number of times a year) is a measure of how vigorously a business is trading and is calculated as cost of sales/inventory.

The type of organisation and systems operated will impact on both ratios (eg JIT leads to high inventory turnover).

The **working capital period** (or **average age of working capital**) is calculated as (working capital/ cost of sales or operating costs) × 365 days.

Comments

- Provides an insight into working capital control (minimising funds tied up in net current assets while ensuring sufficient inventory, cash and credit facilities for trading).
- Identifies how long it takes to convert purchase of inventory into cash from sales.
- The lower the age, the better the control.
- If the ratio is too low there may be insufficient inventory and current assets to sustain trade, but taking too much credit may jeopardise relationships with suppliers.
- If the ratio is too high, the organisation must control receivables, reduce inventory levels and use credit facilities more efficiently.
- Limitations: working capital figure may not be representative and the ratio includes a subjective valuation of inventory.

Liquidity ratios

Current ratio

$X : 1$, where $X = \frac{\text{current assets}}{\text{current liabilities}}$ and

should be >1 otherwise the business may not be able to pay its debts on time.

Quick (or **acid test**) **ratio**

$X : 1$, where $X = \frac{(\text{current assets} - \text{inventory})}{\text{current liabilities}}$

Trend is important

Non-standard ratios

May be calculated which are relevant to a particular organisation. For example, you may calculate the percentage room occupancy for assessing the performance of a hotel, or the average age of rent arrears in months for a student housing society (which is simply the average age of debtors).

Capital gearing

... is concerned with the amount of debt in a company's long-term capital structure.

It is expressed as: $$\frac{\text{Prior charge capital}}{\text{Prior charge capital} + \text{shareholders equity}}$$

Interest cover

... shows whether a company is earning enough profits before interest and tax to pay its interest costs comfortably.

The ratio is: $$\frac{\text{PBIT}}{\text{Interest payable}}$$

Responsibility centre	Manager responsible for?	Financial performance measures
Cost centre	Costs	Variances
Revenue centre	Revenues only	Revenues
Profit centre	Costs and revenues	Controllable profit
Investment centre	Costs, revenues and assets	Return on Investment (ROI) Residual Income (RI)

Pros and cons of financial performance measures

- ☒ Controllable profit – which costs are controllable or traceable.
- ☑ ROI – ROI is a relative measure so can compare centres
- ☒ ROI and RI – RI uses an estimated cost of capital
  - Increase as assets get older so hold onto ageing assets
  - RI is an absolute measure so can't compare centres

Perspective	Detail	Examples
Financial	Concerned with satisfying shareholders	■ ROCE ■ Sales margin
Customer	Attempts to measure how customers view the organisation and how they measure customer satisfaction	■ Delivery speed, measured by time between order and delivery (((orders received in yr – net sales)/net sales) × 365 days) ■ Customer loyalty, measured by repeat business ((turnover from regular customers/total turnover) × 100%)
Process efficiency	Measures the quality of the organisation's outputs in terms of technical excellence and consumer needs	■ Total quality measurement (reworked faulty production as % of total production) ■ Training costs as a % of production costs ■ Resource utilisation measures (eg proportion of available hotel rooms occupied)
Growth	Emphasises the need for continual improvement of existing products and the ability to develop new products to meet customers' changing needs	Turnover from new products as % of total turnover

24: Applications of performance measures

Topic List

- Manufacturing
- Standard hour ratios and criticisms
- Service organisations
- Management performance measures
- Cost reduction
- Value analysis

Performance measurement in general and ratio analysis in particular are popular exam topics.

You must be able to derive performance indicators for particular scenarios presented in the exam.

Sales

- Customer rejects: total sales
- Late deliveries: on-time deliveries
- Flexibility measures
- Speed of service

Materials

- Standard costs
- Rejects
- Deliveries

Labour

- Standard performance
- Qualitative measures
- Rate and efficiency variances

Overheads

- Machine down time: total machine hours
- Value added: production cycle time

Valid comparisons can be made by bringing a figure 'more up to date' by multiplying by (recent index number/older index number).

Measures of performance using the standard hour

Capacity ratio

Similar to the fixed o/hd capacity variance and compares actual hours worked with budgeted hours and measures the extent to which planned available resources have been used.

(Actual hours worked/budgeted hours) × 100%

Activity (production volume) ratio

Similar to the fixed o/hd volume variance and compares standard hours produced and budgeted hours.

(Standard hours produced/budgeted hours) × 100%

Efficiency ratio

Similar to the fixed o/hd efficiency variance and measures the efficiency of the labour force by comparing standard hours produced and actual hours worked.

(Standard hours produced/actual hours worked) × 100%

Service organisations

... do not produce a physical product. Instead, they provide services.

Features of services

- Intangibility
- Simultaneity
- Perishability
- Heterogeneity

Types of service measurement

- Qualitative measures
- Quantitative measures
- Resource utilisation measures

It is important to distinguish between performance measures for managers and performance measures for what they manage.

Example

A skillful manager may succeed in improving the performance of the worst division in an organisation but the division may continue to be a poor performer in comparison with the other divisions. If the manager is assessed purely on the division's results he will not appear to be a good performer.

Important issues

- Assess the manager in relation to his area of responsibility
- Incorporate into measures only those items directly controllable by the manager

Possible management performance measures

- Subjective measures
- Judgement of outsiders
- Upward appraisal
- Accounting measures

Cost reduction

Aims to reduce costs below a previously accepted level, without adversely affecting the quality of the product/service being provided

CONTRAST WITH

Cost control techniques (such as budgetary control and standard costing), which are concerned with keeping the costs of operating a business within acceptable limits

Common sense approaches

- Improve efficiency of materials usage by reducing wastage
- Improve labour productivity by giving pay incentives
- Reduce material costs by improving stores control
- Reduce labour costs by replacing people with machines
- Save on finance costs by taking advantage of early payment discounts
- Improve control over spending decisions

Difficulties

- Resistance from employees
- Often introduced as rushed, desperate measures
- Costs are reduced in one cost centre, but extra costs appear in another
- Long-term factors should be considered
- Key area for cost reduction is product design and so once manufacturing begins there is less scope

Work study

Used to determine the most efficient methods of using labour, materials and machinery. There are two main parts.

Areas where work study can be applied

- Plant facilities, layout and space utilisation
- Analysis, design and improvement of work systems (say forms used or the telephone system), work places and work methods
- Setting standards
- Determining the most profitable, alternative combinations of personnel, materials and equipment

Method study involves systematically recording and critically examining existing and proposed ways of doing work. The aim of this is to develop and apply easier and more effective methods, and so reduce costs.

Work measurement involves establishing the time for a qualified worker to carry out a specified job at a specified level of performance.

Organisation & Methods (O&M)

A term for techniques, including method study and work measurement, that are used to examine clerical, administrative and management procedures in order to make improvements.

The real aim of work study and O&M is to decide the most efficient methods of getting work done. More efficient methods and tighter standards will improve efficiency and productivity, and so reduce costs.

Value analysis

Involves assessing the value of every aspect of a product (or service) in order to devise ways of achieving its purpose as economically as possible while maintaining the required standard of quality and reliability.

Conventional cost reduction techniques **v** **Value analysis**

Try to achieve the lowest production cost for a specific product design

Tries to find the least cost method of making a product that achieves its desired function

Aims to get rid of all unnecessary costs = costs that do not add value

Value is only added while a product is actually being processed

Typical considerations

- Can a cheaper (but as good or better) substitute material be found?
- Can unnecessary weight or embellishments be removed without reducing the product's attractiveness or desirability?
- Is it possible to use standardised or fewer components?

A **value-adding activity** cannot be eliminated without the customer perceiving a deterioration in the performance, function or other quality of a product.

Steps in value analysis

1. Select a product or service for study
2. Obtain and record information
3. Analyse the information and evaluate the product
4. Consider alternatives
5. Select the least cost alternative
6. Recommend a preferred alternative
7. Implement choice and follow up