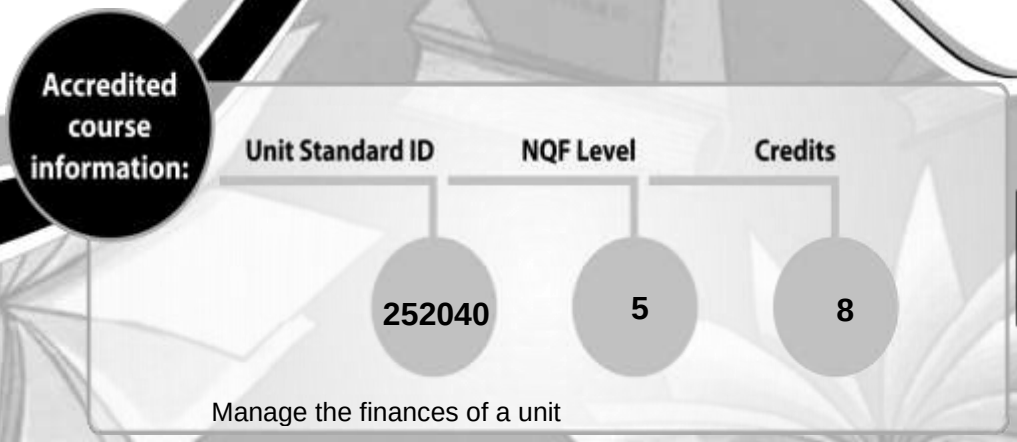
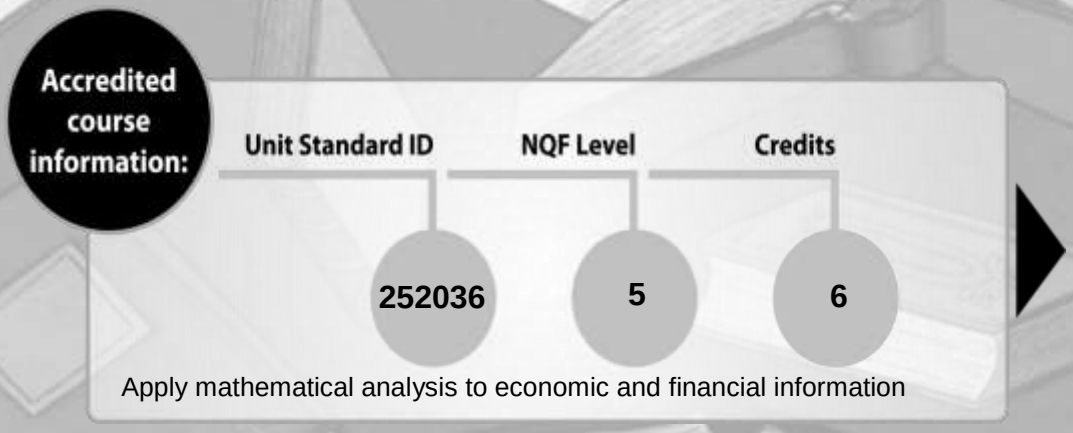
NATIONAL CERTIFICATE: GENERIC MANAGEMENT 59201 CLUSTER 5





LEARNER GUIDE

TRAINING FORCE
Linking Training to Industry

Investing in your talent!

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LEARNING UNIT ONE 1

ASSESSMENT CRITERIA

Manage the finances of a unit 252040

SPECIFIC OUTCOME 1 - 5

- Demonstrating an understanding of the key concepts of managerial finance.
- Interpret financial statements.
- Describe and prepare financial forecasts.
- Draft budgets according to the operational plan of the unit.
- Supervise financial management of a unit against given requirements.

UNDERSTAND THE KEY CONCEPTS OF MANAGERIAL FINANCE

Financial figures, by themselves, usually do not mean much. When you compare the financial figures with specific other numbers, you can learn much about how your organisation is doing. For example, you can compare the planned expenses depicted in your budget with your actual expenses to see if your spending is on track. You could also use ratios to analyse the financial figures. A ratio is a comparison made by dividing one figure by another, such as how salaries are related to the total expenses for a department to find the implications thereof.

DIFFERENCE BETWEEN FINANCE AND ACCOUNTING

Finance has been called "The science of money". It studies the principles and the methods of obtaining control of money from those who have saved it, and of administering it to those into whose control it passes.

"Finance is the process of conversion of accumulated funds to productive use. It is so intermingled with other economic forces that there is difficulty in appreciating the role it plays."

Howard and Upton in their book *introduction to Business Finance* defined finance "as that administrative area or set of administrative functions in an organisation which relates with the arrangement of cash and credit so that the organisation may have the means to carry out its objectives as satisfactorily as possible".

In simple terms ***finance*** is defined as ***the activity concerned with the planning, raising, controlling and administering of the funds used in the business***. Thus, finance is the activity concerned with the raising and administering of funds used in business.

Financial management is a managerial activity which is concerned with the planning and controlling of the firm's financial resources. Financial Management is an integral part of the overall management of other disciplines and fields of study like economics, accounting, production, marketing, personnel and quantitative methods. The relationship of financial management with other fields of study is explained as follows:

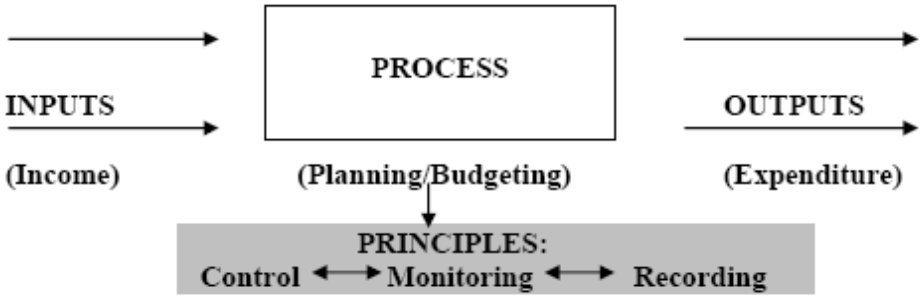
Finance

Accounting and finance are closely related. Accounting is an important input in the financial decision-making process. ***Accounting is concerned with the recording of business transactions.*** It generates information relating to business transactions and reporting them to the concerned parties. The end product of accounting is financial statements, namely profit and loss accounts, Statements of Financial Position (balance sheets) and the statements of changes in financial position. The information contained in these statements assists the financial managers in evaluating the past performance and future direction of the firm (decisions) in meeting certain obligations like payment of taxes and so on. Thus, accounting and finance are closely related.

The financial analysis starts with accounting. Accounting is a service-based profession that provides reliable and relevant financial information for making decisions.

Accounting is the method in which financial information is gathered, processed and summarised in financial statements and reports.

- The management and recording of the flow of money
- Planning the future use of money
- Ensuring that the money is well spent and not misused
- Building the financial sustainability of the organisation

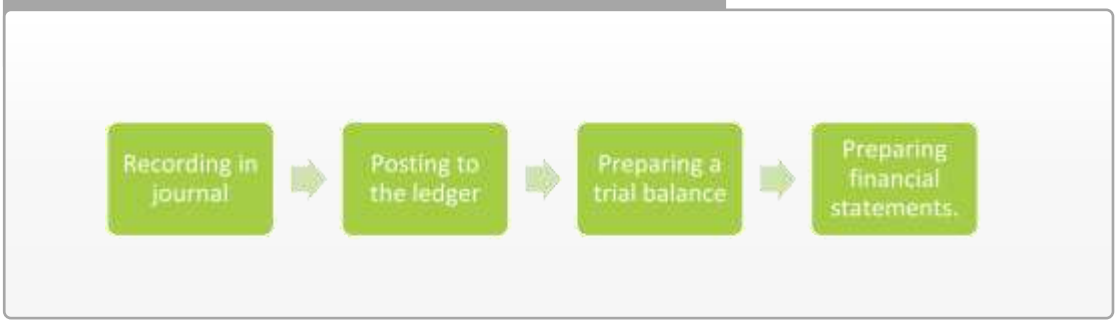


THE ACCOUNTING CYCLE

The accounting cycle is a series of steps in recording an accounting event from the time a transaction occurs to its reflection in the financial statements (also called the bookkeeping cycle).

The steps in the accounting cycle are:

Accounting cycle



This procedure is further described as:

1. **Analyse transactions.** The accounting process begins with analysing transactions. The company first looks at the source documents which describe the transactions and events. Source documents can be either hard copy or electronic. Some examples of source documents include bank statements, cheques, and purchase orders.

2. **Journalise/ enter transactions in the journal.** When the company journalises, the accountant applies the rules of double-entry accounting. Double-entry accounting means that each transaction must be recorded in at least two accounts, or that the debits must equal the credits. After applying the rules of debits and credits, the accountant should then record the transactions in a journal, or journalise. A journal is a complete record of each transaction.

3. **Post to ledger accounts**. Posting involves transferring information from the journal to the ledger. A ledger is simply a collection of all accounts – it shows all of the number of detail about a company's accounts.

4. **Prepare a Trial balance.** To verify that the company's debits equal the credits, an unadjusted trial balance is prepared. A trial balance is a list of all accounts and their balances at a point in time. The information used in a trial balance comes from the ledger. The account balances from the ledger are used to create the trial balance. We call this trial balance an unadjusted trial balance because it is prepared before the adjusting entries.

5. **Make adjusting entries.** Adjusting entries involve bringing an asset or liability account balance to its proper amount and updating the corresponding revenue or expense account. Adjusting entries are recorded in the general journal and then posted to the ledger. All adjusting entries are made at the end of the accounting period.

6. **Prepare Adjusted Trial balance**. This trial balance is called the adjusted trial balance because it is prepared AFTER the adjusting entries. This trial balance is used to verify that the debits equal the credits and also is used to prepare the financial statements.

7. **Prepare financial statements.** The financial statements must be prepared in a very specific order. The order for the financial statements is Statement of Comprehensive Income (income statement), statement of retained earnings, Statement of Financial Position (balance sheet), and the statement of cash flows. This order is important because the information provided in the Statement of Comprehensive Income (income statement) is used in the statement of retained earnings, and information from the statement of retained earnings is used in the Statement of Financial Position (balance sheet).

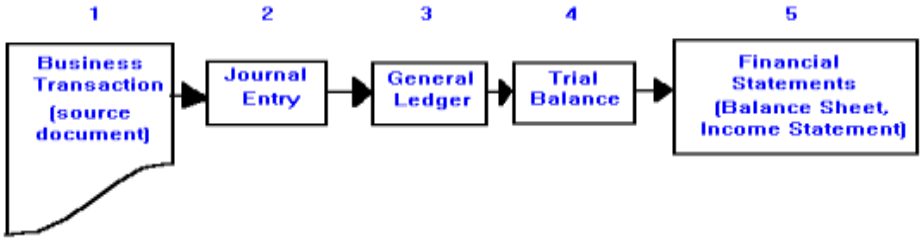
8. **Journalise and post-closing entries**. Closing entries are prepared after the financial statements are completed. The purpose of closing entries is to prepare the accounts for recording transactions and events for the next period.

9. **Prepare an after closing Trial balance**. For many companies, this is the last step in the accounting cycle, as the company is now ready to start the new accounting period. A post-closing trial balance should only contain the debit and credit balance for permanent accounts because these are the only accounts that are remaining after the closing process. Once again the purpose of this trial balance is to ensure that the debits equal the credits and that all temporary accounts have a zero balance.

10. **Reversing entries** are optional. These entries reverse certain adjustments in the next period.

It's important to realise when the steps occur. Steps 1 to 3 occur often throughout the accounting time period. Steps 4 to 10 occur only at the end of the accounting period.

The main steps of the accounting cycle can be represented by the following graphic (reduced to 5 main steps):



International Financial Reporting Standards - IFRS vs GAAP

Many people and organisations make decisions based on financial information that accountants prepare. That is why it is important for these people to understand how this information is measured. To facilitate this communication, accountants establish rules that business people can use to ensure they are talking about the same thing.

All the rules of accounting and accounting measurement are collected in one group called International Financial Reporting Standards (IFRS) (Note: South Africa used to use Accepted Accounting Principles (GAAP) and are subject to specific statutory regulations.

As a basis for financial analysis, we need to understand some basics first, such as:

- Statutory regulations
- IFRS

Statutory Regulations

Accounting Records

In terms of the Companies Act, 2008, all companies must keep accounting records in one of the eleven official languages. At a minimum, these records must include:

- the assets and liabilities of the company;
- a fixed-assets register;
- cash receipts and payments;
- details of goods purchased and sold; and
- annual stock-taking (inventory) statements.

The accounting records must be such as to fairly present the state of affairs and business of the company and explain the transactions and financial position of the trade or business of the company.

Annual Financial Statements

The Companies Act, 2008 aims to provide a flexible regime that balances accountability and transparency, with less of a regulatory burden. To that end, it sets certain common requirements for all companies. Differentiated requirements depend on the company's wider responsibility to the public and the social and economic impact that the company's operations have. The following provisions illustrate this flexibility:

- All companies must prepare annual financial statements (AFSs) unless the company can satisfy the Commission that it meets certain criteria.
- Public companies are subjected to a more demanding regime, with the added requirement that their AFSs have to undergo an annual audit.
- All companies have to file annual returns with the Commission.

- Public companies have to file a copy of their audited AFSs with their annual return.
- Public companies must appoint a company secretary, auditors and an audit committee.
- Certain private companies with a greater responsibility to the wider public as a consequence of their significant social or economic impact may be required to have their AFSs audited. All other companies must be either voluntarily audited or independently reviewed.
- All financial statements, or a summary thereof, must satisfy the prescribed financial reporting standards. These standards may vary for different categories of companies but must be consistent with International Financial Reporting Standards as set by the International Accounting Standards Board.
- All public and certain private companies must appoint an auditor.

Thus the law (which is part of an organisation's business environment) requires that an organisation's annual financial statements shall be set out by specific financial reporting frameworks.

This manual will refer to the appropriate IFRS standards in the terminology that it is published. Thus standards will be referred to as IAS x. IAS stands for International Accounting Standard, and the 'x' denotes the number of the standard for example "IAS 2".

The framework deals with:

1. The objective of financial statements which is to:
    - To provide financial information about the:
        i. Financial position
        ii. Performance
        iii. Changes in financial position

    of an organisation that is useful to a wide range of users for making economic decisions, such as investors, employees, lenders of finance, suppliers of trade credit, customer, government and the general public.
2. The qualitative characteristics that determine the usefulness of information in financial statements
3. The elements from which financial statements are constructed
4. The concepts of capital and maintenance

It is important to note that financial statements, even though they may comply with the framework, should be treated with care for the following reasons:

- They do not necessarily supply all the financial information required
- They are historically based
- They do not necessarily provide non-financial information

To expand your knowledge, it is suggested that you acquire and read guidelines to IFRS in South Africa. These guidelines should be available from:

- Your organisation (probably through your finance department)
- Your organisation's auditors
- A supplier or publisher of financial publications

IFRS Standards

Some of the IFRS standards referred to in this manual include:

Standard	Topic
IAS 1	Presentation of financial statements
IAS 2	Inventories
IAS 16	Accounting for property, plant and equipment
IAS 18	Revenue

Presentation of financial statements

IAS 1 sets out how financial statements should be presented. Organisations that follow these practices will be able to compare their financial statements with:

- Their own organisation's previous financial statements
- Financial statements of other organisations that follow these practices

Financial statements should 'fairly present' the financial position of an organisation. Organisations financial statements that adhere to IAS disclose relevant interpretations and provide additional disclosures when necessary, are presumed to be fairly presented and should contain a note to this effect.

IAS 1 defines a complete set of financial statements as comprising of the following:

Let's examine the Statement of Financial Position (balance sheet) as an example of a financial statement:

The Statement of Financial Position (balance sheet) comprises two main sections:

- **Assets** (The properties used in the operation or investment activities of a business)
- **Liabilities** (Claims by creditors to the property /assets of a business until they are paid) and Equity (The owner's rights to the property (assets) of the business; also called proprietorship and net worth)

An organisation is required to present current and non-current assets and current and non-current liabilities separately unless a liquidity approach allows for a fairer presentation. The liquidity approach presents assets and liabilities in order of liquidity and is adopted by organisations that do not have a identifiable operating cycle, for example, financial institutions.

Operating Cycle	An operating cycle is a period between the purchasing of raw materials and the realisation of cash (or cash equivalents) for the finished product
Current assets	Currents assets are those assets that are: • Expected to be settled in the normal course of the organisation's operating cycle • Due to be settled within twelve months of the Statement of Financial Position (balance sheet) date • Primarily for trading purposes • The organisation does not have an unconditional right to defer settlement of the liability for at least twelve months after the Statement of Financial Position (balance sheet) date
Non-current assets	Any assets that do not fall into the current asset definition
Current liabilities	Current liabilities are those liabilities that are: • Expected to be settled in, or held for sale or consumption in the normal course of the organisations operating cycle • Expected to be settled within twelve months of the Statement of Financial Position (balance sheet) date • Primarily for trading purposes
Non-current liabilities	Any liabilities that do not fall under the current liabilities definition
Equity	The difference between total assets and total liabilities

IAS 1 is a comprehensive statement and the full implications of IAS 1 are not dealt with here. Only the aspects that are relevant to later topics in this manual have been covered.

Inventories

IAS 2 relates to accounting for inventories (or stock).

Inventories are defined by IAS 2 as assets:

- held for sale in the ordinary course of business, or
- in the process of production for sale, or

- in the form of materials or supplies to be consumed in the production process or the rendering of services.

As such, inventories include:

- finished goods for sale,
- work-in-progress,
- raw materials,
- consumables (as specified in the third point above),
- merchandise
- products and services

Accounting for inventories

The main concern in accounting for inventories is the cost to be recognised as an asset. Inventory is recognised as an asset when:

Costing inventories

Inventories are valued at historical cost. This is the total cost of purchase and production and other costs that were incurred to place the inventory in the condition and location that it is valued in.

Cost of purchase	These costs include the purchase price which will include freight (transport) and handling costs plus any applicable taxes (such as import duties etc.) and any other costs that can be directly attributed to acquiring the inventory. Any taxes that can be recovered must be excluded, and any trade rebates or discounts must also be excluded.
Cost of production	These costs are the conversion, processing or conversion costs incurred to place the inventory in the condition and location that it is valued in. Cost of production includes costs relating directly to the units of production such as direct labour. Cost of production also includes an allocation of fixed and variable production overheads.
Other costs	Other costs are included only if they are incurred to place the inventory in the condition and location that it is valued in, for example, storage costs directly related to the production process.

Specific exclusions

IAS 2 excludes the following from the cost of inventories:

- selling expenses,
- general administration overheads,
- storage costs of finished goods and
- abnormal waste incurred in the production process which does not relate to placing the inventory in the condition and location that it is valued in.

Net realisable value

Inventory should be measured at the lower of:

- Cost; and
- Net realisable value

One of the conditions (noted earlier) for inventory to be recognised as an asset is that there are probable future benefits to be derived from the asset. If the future economic benefit of the inventory is less than the cost of the inventory, then the value of the inventory should be diminished to reflect the anticipated future revenues. In other words, inventory should be written down to net realisable value. These write-downs may be reversed if circumstances change.

IAS 2 defines net realisable value as the estimated selling price in the ordinary course of business less the estimated costs of completion and the estimated costs to make the sale.

Note: IAS 2 is a comprehensive statement, and the full implications of IAS 2 are not dealt with here. Only the aspects that are relevant to later topics in this manual have been covered.

PROPERTY, PLANT AND EQUIPMENT

Property, plant and equipment are defined as tangible assets that:

- are used in the production or supply of goods and services, for rental to others or administrative purposes; and
- are expected to be used for more than one accounting period.

IAS 16 relates to accounting for property, plant and equipment and deals with two major issues in accounting for property, plant and equipment:

1. Timing– the timing of recognition of property, plant and equipment
2. Charges – determining carrying charges and related depreciation charges

Recognition of property, plant and equipment

Property, plant and equipment should be recognised as assets when:

- It is probable that future economic benefits associated with the item will flow to the organisation, and
- the cost of the item can be measured reliably.

Charges for property, plant and equipment

Cost	The cost of property, plant and equipment is determined by the amount of cash (or cash equivalents) paid or the fair value given to acquire the asset at the time of its acquisition, or the value of the asset as determined by the specific requirements of other International Financial Reporting Standards (IFRS).
Fair value	Is the amount for which an asset could be exchanged or a liability settled between willing, knowledgeable parties in an arm's length transaction?
Useful life	Useful life is either: • the period over which an asset is expected to be of use to an organisation; or • the number of production units (or similar) expected to be produced by the asset.
Residual value	Residual value is the estimated value that an organisation would currently realise from the disposal of the asset if the asset were already of the age and condition expected at the end of its useful life. Estimated costs of disposal would need to be deducted from the estimated value of the asset to determine residual value.
Depreciable amount	The depreciable amount is the cost of an asset less the asset's residual value.

Depreciation

This is the allocation of the depreciable amount of an asset over its useful life. Property, plant and equipment should initially be measured at cost.

Carrying amount	The amount at which an asset is valued after deducting accumulated depreciation and impairment losses. Property, plant and equipment should initially be measured at cost.
Impairment loss	The amount by which the carrying amount of an asset exceeds its recoverable amount

The cost of property, plant and equipment includes:

Cost of purchase	These costs include the purchase price which will include freight (transport) and handling costs plus any applicable taxes (such as import duties etc.) and any other costs that can be directly attributed to bringing the asset to the location and condition required for it to be capable of operating in its intended manner. Any taxes that can be recovered must be excluded, and any trade rebates or discounts must also be excluded.
Cost of disposal	These costs are the estimated costs of disposing of the asset. However, if the asset is used for producing inventory, then these costs will be capitalised to the inventories and not included in the cost of the asset.
Excluded costs	When the asset is in the location and condition required for it to be capable of operating in its intended manner, then costs will no longer be capitalised.

IAS 16 highlights the three most common methods of depreciation:

- Straight-line
- Diminishing balance
- Sum-of-the-units

Note: IAS 16 is a comprehensive statement, and the full implications of IAS 16 are not dealt with here. Only the aspects that are relevant to following topics in this manual have been covered.

Revenue

IAS 18 relates to accounting for revenue (or sales, turnover, fees, etc). Revenue is the income stream generated during the ordinary activities of an organisation.

- Revenue should be accounted for at fair value which is the amount for which an asset could be exchanged or a liability settled between willing, knowledgeable parties in an arm's length transaction. Furthermore:
- Revenue should be net of trade discounts and rebates

When a transaction is financed ' interest-free' the fair value is calculated by discounting all future cash receipts using an imputed rate of interest. The difference between the fair value of the transaction and the discounted value of all the future cash receipts is recognised as interest revenue.

When the revenue generated by a transaction includes an amount for subsequent maintenance or servicing (no warranties), then the amount that is identified for maintenance or servicing should be

deferred and only recognised, on an appropriate basis, as revenue over the period which the maintenance or servicing takes place.

Interest, royalties and dividends

Revenue resulting from interest, royalties and dividends should be recognised when:

- The amount of the revenue can be measured reliably
- It is probable that the economic benefits of the transaction will flow to the organisation

IAS 18 requires the following disclosure:

- The accounting policies adopted for the recognition of revenue, including the methods adopted to determine the stage of completion of transactions involving the rendering of services
- The amount of each significant category of revenue recognised during the period. These categories include:
  - The sale of goods
  - The rendering of services
  - Interest
  - Royalties
  - Dividends; and
  - The amount of revenue arising from the exchanges of goods or services, analysed by category.

Note: IAS 18 is a comprehensive statement, and the full implications of IAS 18 are not dealt with here. Only the aspects that are relevant to later topics in this manual have been covered.

Note: IAS 17 deals with the recognition of income from leases and IAS 28 deals with profits from associates. These are beyond the scope of this manual.

Using IFRS in Financial Analysis

The statutory requirements and the IFRS requirements must be considered while doing financial analysis and working through this learner guide. Remember that for internal reporting and analysis purposes an organisation has to abide by IFRS. However, the organisation must be consistent in its treatment of financial recording and analysis if the recording and analysis are to be of value to the organisation. It is therefore recommended that organisations adopt IFRS for internal use where possible.

IFRS includes numerous guidelines and conventions that help ensure that reported financial information is accurate, objective and reasonably consistent for all types of business so that results from one business can be compared to those from another.

Although accountants apply International Financial Reporting Standards, there is room for variation among different businesses (and among different accountants) in the application of IFRS.

Consistency is required within a particular business. However, different policies in different businesses can affect their reported results and distort the picture of where your business stands about other businesses.

In this regard, consider that:

- The time at which sales show up on a Statement of Comprehensive Income (income statement) may differ from business to business. A more aggressive approach may accelerate income items by reporting them at the earliest possible moment, while a more conservative approach may postpone revenues.
- Depreciation charges for financial reporting purposes on essentially similar assets can differ from business to business, depending on accounting policies about depreciation methods and useful lives.
- Inventory accounting policies may differ. A business using first-in, first-out (FIFO) accounting will show higher profits in a period of rising prices than will a business using last-in, first-out (LIFO) accounting. Note that LIFO is not in terms of IFRS.
- Policies may differ regarding expensing. One business may charge an item to income immediately as an expense, while another business may capitalise the same item and report a higher profit.
- Different methods of treating the cost of developing a product will affect the cost of goods sold and affect the gross profit reported.
- Extraordinary or nonrecurring charges may or may not be reflected in operating income, depending on your accounting policies.
- The treatment of tax items may vary from one business to the next.

For all these reasons, when you are comparing your financial statements to industry standards or those of another business, take the results with a grain of salt.

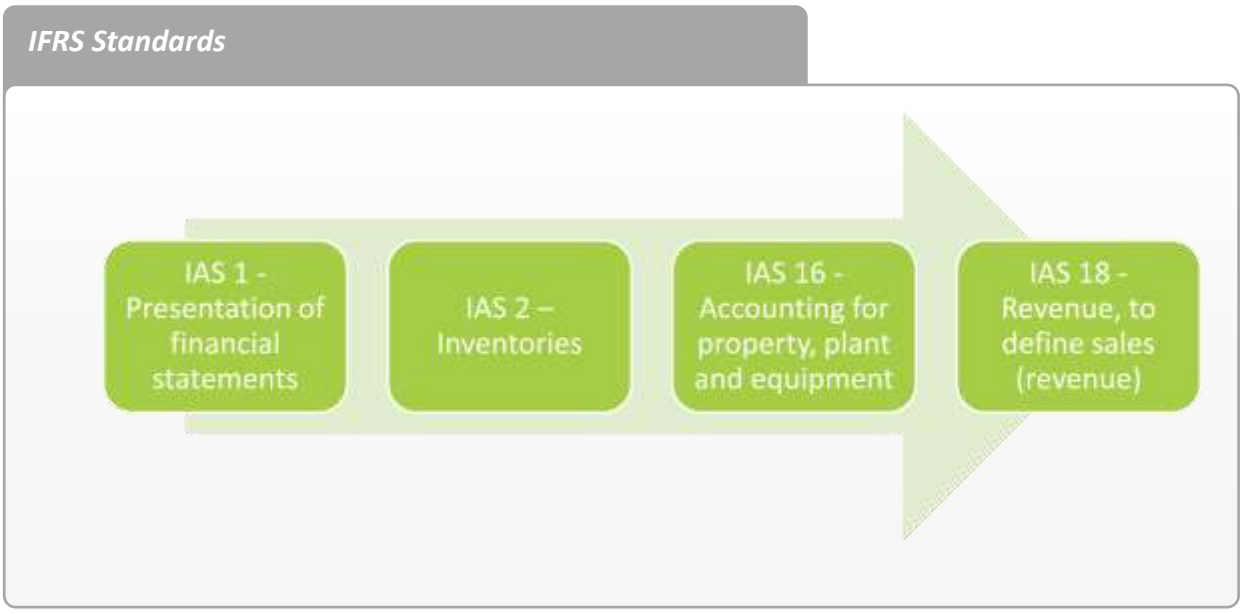
Calculating Ratios according to IFRS

IFRS includes numerous guidelines and conventions that help ensure that reported financial information is accurate, objective and reasonably consistent for all types of business so that results from one business can be compared to those from another.

Although accountants apply International Financial Reporting Standards, there is room for variation among different businesses (and among different accountants) in the application of IFRS

Consistency is required within a particular business. However, different policies in different businesses can affect their reported results and distort the picture of where your business stands about other businesses.

IFRS Standards that are useful and important in using ratios to analyse financial statements include:



Other IAS statements impact on defining and valuing assets, but these are beyond the scope of this learner guide.

Financial Relationships

The Relationship between the Financial Statements:

The financial statements of a company are developed from the bookkeeping process of the business. As the company records the financial transactions of the firm over an accounting period, the financial statements begin to appear. They are developed through recording the transactions in the accounting journal and the general ledger. The financial statements come together from those records. The financial statements are based on the accounting equation.

The Statement of Comprehensive Income (income statement) and the Accounting Equation

The Statement of Comprehensive Income (income statement) (statement of profit and loss) shows how profitable the firm is. A positive net income means the firm is making money. A negative net income means the firm is losing money. The Statement of Comprehensive Income (income statement) is developed from the accounting entries for revenues and expenses over the accounting period.

The accounting equation is stated as:

Assets = Liabilities + Owner's Equity

In the accounting equation, owner's equity is made up of revenue and expenses. Revenue increases owner's equity and expenses decrease owner's equity (the money the owners have invested in the company). Since the firm's Statement of Financial Position (balance sheet) is based on the accounting equation, with owner's equity a component of the left side of the Statement of Financial Position (balance sheet), this is the tie to the Statement of Comprehensive Income (income statement).

The Statement of Retained Earnings

The Statement of Retained Earnings is developed after the Statement of Comprehensive Income (income statement) because it uses data from the Statement of Comprehensive Income (income statement). The net income from the Statement of Comprehensive Income (income statement) is either retained by the firm or paid out as dividends or a combination of both.

The Statement of Financial Position (balance sheet) and the Accounting Equation

The business firm's Statement of Financial Position (balance sheet) shows how much money the firm is worth -- its net worth. The Statement of Financial Position (balance sheet) items is stated regarding book value. The two sides of the accounting equation mirror the format of the Statement of Financial Position (balance sheet). The two sides of the Statement of Financial Position (balance sheet) have to balance since every asset has to be purchased with either a liability, like a bank loan, or owner's equity, such as a portion of the retained earnings.

The Statement of Financial Position (balance sheet) is an indicator of net worth while the Statement of Comprehensive Income (income statement) or statement of profit and loss is an indicator of profitability.

The Statement of Cash Flows

The Statement of Cash Flows uses data from both the Statement of Comprehensive Income (income statement) and Statement of Financial Position (balance sheet). It is the financial statement that is developed last due to this fact.

THE ROLE OF BUDGETING AND FORECASTING IN STRATEGIC PLANNING

Strategic planning is a structured and coordinated approach to developing long-term organisational goals and for developing strategies to accomplish them. It is typically used to facilitate communication, to accommodate divergent interests, and to foster decision making through leadership and consensus building.

One of the primary purposes of strategic planning is to set the stage for the annual budget process, providing a roadmap for annual resource allocation decisions.

The budget process consists of activities that encompass the development, implementation, and evaluation of a plan for the provision of services and capital assets.

Budgeting is **implementing a business plan on paper** before any resources are committed to production; it helps you predict the consequences of an adjustment in your operation before ever

making the adjustment. While records serve as a record of the past, **budgets are an anticipation of the future.** After budgets are done, they become a **standard for monitoring** what happens in operation.

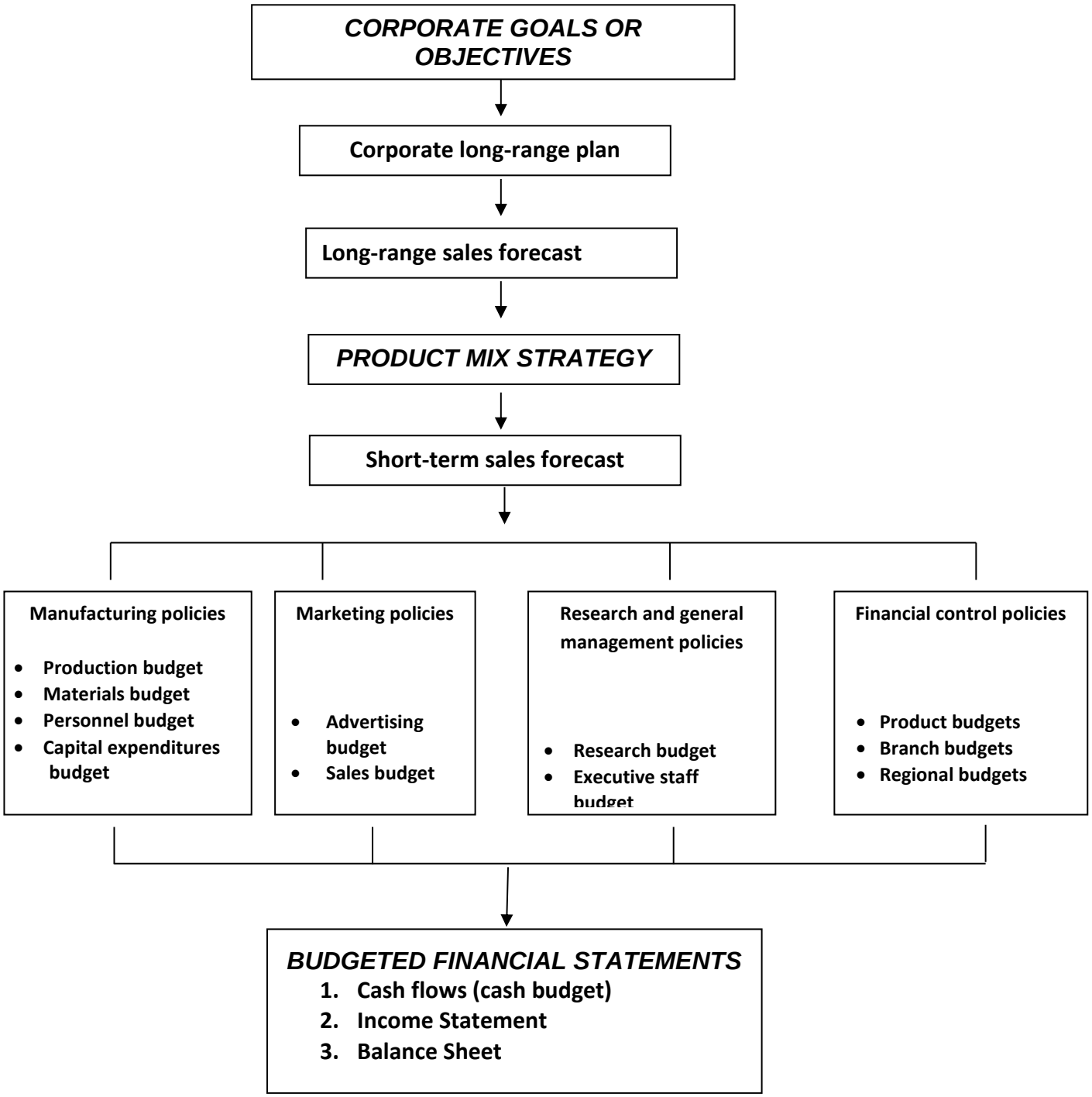
Budgets are usually **compiled and re-evaluated on a periodic basis**. A budget is a tool that managers use to translate **plans** into quantitative terms. Through budgeting, managers ensure that they have the resources available to carry out the plans to reach the organisation's goals.

Depending on the nature of the business, detailed plans may be formulated for the next few months, the next year, the next 5 years, or even longer.

*A company engaged in heavy **construction** is constantly submitting tenders that may or may not be successful; therefore, it cannot plan as far ahead as an **electric utility company**. The utility company can base its projections on population growth, which is predictable for 5- to 10-year periods. It must plan asset acquisitions years ahead, because of the long lead times involved in constructing dams, nuclear power plants, etc.*

The budget system of an organisation provides an integrated picture of the organisation's operations as a whole. It enables the manager of each business unit to see the relation of his/her part of the enterprise to the totality of the company.

The **total budgeting process in an organisation** can be depicted as follows:



At the outset you need to establish what positive expectations – goals – you have for your business and the plans you will put in place to help you reach those goals. Goal-setting is a critical factor because without a target, there is nothing to aim for and little chance of anything being hit or achieved.

A budget provides a right way of directing your business towards goals in terms of both expenses and revenues. It gives a constant overview of costs incurred and revenues raised, which then allows for the micro control of both of those elements.

Communicate your long-term plan to all concerned with drawing up budgets. Get the right people involved from the start. Internally, staff members with financial responsibilities should have a role, as well as those who head specific projects, and those accountable for devising sales targets and production costs.

THE ACCOUNTING CONVENTIONS APPLIED IN FINANCIAL MANAGEMENT

In drawing up accounting statements, whether they are external "financial accounts" or internally-focused "management accounts", a clear objective has to be that the accounts fairly reflect the true "substance" of the business and the results of its operation.

The theory of accounting has, therefore, developed the concept of a ***"true and fair view"***. The true and fair view is applied in ensuring and assessing whether accounts do indeed portray the business' activities accurately.

To support the application of the "true and fair view", accounting has adopted certain concepts and conventions which help to ensure that accounting information is presented accurately and consistently.

Accounting Conventions

The most commonly encountered convention is the **"historical cost convention"**. This requires transactions to be recorded at the price ruling at the time, and for assets to be valued at their original cost.

Under the "historical cost convention", therefore, no account is taken of changing prices in the economy.

The other conventions you will encounter in a set of accounts can be summarised as follows:

Monetary measurement	Accountants do not account for items unless they can be quantified in monetary terms. Items that are not accounted for (unless someone is prepared to pay something for them) include things like workforce skill, morale, market leadership, brand recognition, quality of management etc.
Separate Entity	This convention seeks to ensure that private transactions and matters relating to the owners of a business are segregated from transactions that relate to the business.

Realisation	With this convention, accounts recognise transactions (and any profits arising from them) at the point of sale or transfer of legal ownership - rather than just when cash changes hands. For example, a company that makes a sale to a customer can recognise that sale when the transaction is legal - at the point of contract. The actual payment due from the customer may not arise until several weeks (or months) later - if the customer has been granted some credit terms.
Materiality	An important convention. As we can see from the application of accounting standards and accounting policies, the preparation of accounts involves a high degree of judgement. Where decisions are required about the appropriateness of a particular accounting judgement, the "materiality" convention suggests that this should only be an issue if the judgement is "significant" or "material" to a user of the accounts. The concept of "materiality" is an important issue for auditors of financial accounts.

Accounting Concepts

Four important accounting concepts underpin the preparation of any set of accounts:

Going Concern	Accountants assume, unless there is evidence to the contrary, that a company is not going broke. This has important implications for the valuation of assets and liabilities.
Consistency	Transactions and valuation methods are treated the same way from year to year, or period to period. Users of accounts can, therefore, make more meaningful comparisons of financial performance from year to year. Where accounting policies are changed, companies are required to disclose this fact and explain the impact of any change.
Prudence	Profits are not recognised until a sale has been completed. Also, a cautious view is taken for future problems and costs of the business (they are "provided for" in the accounts" as soon as there is a reasonable chance that such costs will be incurred in the future.
Matching (or "Accruals")	Income should be properly "matched" with the expenses of a given accounting period.

Key Characteristics of Accounting Information

There is general agreement that, before it can be regarded as useful in satisfying the needs of various user groups, accounting information should satisfy the following criteria:

Criteria	What it means for the preparation of accounting information
Understandability	This implies the expression, with clarity, of accounting information in such a way that it will be understandable to users - who are assumed to have a reasonable knowledge of business and economic activities
Relevance	This implies that to be useful, accounting information must assist a user to form, confirm or maybe revise a view - usually in the context of making a decision (e.g. should I invest, should I lend money to this business? Should I work for this business?)

Consistency	This implies consistent treatment of similar items and application of accounting policies
Comparability	This implies the ability for users to be able to compare similar companies in the same industry group and to make comparisons of performance over time. Much of the work that goes into setting accounting standards is based on the need for comparability.
Reliability	This implies that the accounting information that is presented is truthful, accurate, complete (nothing significant missed out) and capable of being verified (e.g. by a potential investor).
Objectivity	This implies that accounting information is prepared and reported in a "neutral" way. In other words, it is not biased towards a particular user group or vested interest

THE FINANCIAL REPORTS PUBLISHED IN THE ORGANISATION

The organisation is required to create the following financial statements. These financial statements are what we will be using later to do a financial analysis:

- **A Statement of Financial Position (balance sheet)**

Our Company Statement of Financial Position For the Period Ended 201X	
Assets	R15,000
Total Assets	15,000
Liabilities	4,000
Equity Contributed Capital Retained Earnings	 10,000 1,000
Total Equity	11,000
Total Liability and Equity (Claims)	**15,000**

The Statement of Financial Position (balance sheet) lists the assets and the corresponding claims (i.e., liabilities and equity). Logically, the assets must have the source, so they balance with the claims. That is why the total claims are equal to the total assets.

The Statement of Financial Position is a good example of the use of the accounting equation:

- **A Statement of Comprehensive Income (income statement)**

Our Company Statement of Comprehensive Income For the Period Ended 201X	
Revenues (i.e., assets increase)	R5,000
Expenses (i.e., assets decrease)	R2,000
Net Income (i.e., change in net assets)	R*3,000*

The Statement of Comprehensive Income measures the difference between the assets increase and the assets decrease. The assets increase from the operating activities is labelled revenues. The asset decrease is called expenses. The difference between revenues and expenses is called net income (if revenues are greater than expenses) or net loss (if vice versa).

- **A statement of changes in equity**

Our Company Statement of Changes in Equity For the Period Ended 201X	
Beginning Contributed Capital Plus: Capital Acquisition	R 0 10,000
Ending Contributed Capital	10,000
Beginning Retained Earnings Plus: Net Income Less: Distributions	0 3,000 (2,000)
Ending Retained Earnings	1,000
Total Equity	*11,000*

The Statement of Changes in Equity is used to explain the effects of transactions on equity during the accounting (reporting) period. This statement includes the beginning and ending balances for the amount of contributed capital; it also reflects any new capital acquisitions made during the period. Moreover, the statement shows the portion of the net earnings retained in the business.

- **A Statement of Cash Flows**

Our Company Statement of Cash Flows For the Period Ended 201X	
Cash Flows from Operating Activities	
Cash Receipts from Revenue	R7,000
Cash payments for Expenses	(4,500)
Net Cash Flow from Operating Activities	2,500
Cash Flows from Investing Activities	0
Cash Flows from Financing Activities	
Cash Receipts from Borrowed Funds	4,000
Cash Receipts from Capital Acquisitions	10,000
Cash Payments for Distributions	(1,500)
Net Cash Flow from Financing Activities	12,500
Net Increase in Cash	15,000
Plus: Beginning Cash Balance	0
Ending Cash Balance	*R15,000*

The Statement of Cash Flows shows how a company obtained and used cash. The sources of cash are called **cash inflows,** and the uses are known as **cash outflows**. The statement classifies cash inflows and cash outflows into three categories:

1. financing activities - describe the cash transactions associated with the resource providers (i.e., owners and creditors);
2. investing activities - include cash received or spent by the business on productive assets and investments in the debt or equity of other companies;
3. operating activities - explain the cash generated by revenue and the cash spent on expenses.

- **Notes to Financial Statements**

Notes are added to the financial statements to explain what the figures cannot, such as how motor vehicles are depreciated and to report on specific high or low figures in the statements.

The notes to the financial statements (sometimes called footnotes) are also an integral part of the overall picture. If the Statement of Comprehensive Income (income statement), Statement of Financial Position (balance sheet) and statement of cash flows are the heart of the financial statements, then the

footnotes are the arteries that keep everything connected. If you are not reading the footnotes, you are missing out on much information.

The footnotes list important information that could not be included in the actual ledgers. Could you imagine if the company listed out individual expenses on the Statement of Comprehensive Income (income statement) instead of putting them under one or two neat headings? The Statement of Comprehensive Income (income statement) would be 20 pages long!

The notes will list relevant things like outstanding leases, the maturity dates of outstanding debt and even details on where the revenue came from. Generally speaking, there are two types of footnotes:

- **Accounting Methods -** This type of footnote identifies and explains the major accounting policies of the business. This portion of the footnotes will tell you the nature of the company's business, when its fiscal year starts and ends, how inventory costs are determined and any other significant accounting policies that the company feels that you should be aware of. This is especially important if a company has changed accounting policies. It may be that an organisation is practising "cookie jar accounting" and is changing policies only to take advantage of current conditions to hide poor performance.

- **Disclosure -** The second type of footnote provides additional disclosure that just could not be put in the financial statements. The financial statements in an annual report are supposed to be clean and easy to follow. To maintain this cleanliness, other calculations are left for the footnotes. For example, details of long-term debt such as maturity dates and the interest rates at which debt was issued can give you a better idea of how borrowing costs are laid out. Other areas of the disclosure include everything from pension plan liabilities for existing employees to details about ominous legal proceedings in which the company is involved.

The majority of investors and analysts read the Statement of Financial Position (balance sheet), Statement of Comprehensive Income (income statement) and Statement of Cash Flows but, for whatever reason, the footnotes are often ignored.

In South Africa, a directors' report is to be included in the financial statements. This is a requirement of the Companies Act 1973 (updated 2009).

A Financial Audit is an independent evaluation performed to attest to the fairness, accuracy, and reliability of financial data.

It is important to note that auditor reports on financial statements are only an opinion on whether the information presented is correct and free of material misstatements, whereas all other determinations are left for the user to decide.

INTERPRET FINANCIAL STATEMENTS

Interpreting Financial Statements

Financial statements are used to do financial analysis. Financial statements are accounting reports prepared periodically to inform the owner, creditors and other interested parties as to the financial condition and operating results of the business.

Purpose of Financial Analysis

The purpose of financial analysis varies in every organisation, but generally, it would include:

- to determine whether the organisation achieved its main objective which is the maximisation of profit
- to determine whether the organisation will be able to repay interest and capital on long-term loans
- to determine whether an organisation will be able to service its short-term debts from liquid funds
- to determine whether a company will be able to honour commitments relating to guarantees supplied
- to establish if certain investments yield a fair and acceptable return
- to establish whether a company has the potential to issue further ordinary shares, preference shares or debentures
- to establish, if an organisation is underperforming, what the problem areas are
- to make recommendations in connection with the take-over, reconstruction or amalgamation of organisations
- to evaluate the ability of an organisation to pay personnel and supply other benefits to personnel
- to establish tax policy
- to prepare and use national income statistics
- to regulate the operations of organisations

Financial Analysis Users

There are two broad categories of accounting information and financial analysis users:

- external
- internal

External Users

Accounting information that is designed to satisfy the needs of resource owners (external users) is called financial accounting. Investors, creditors and brokers, to name a few, represent external users; they are interested in a company because they have money invested, etc.

Internal Users

Managerial accounting provides information that is useful to internal users in running a business. The group of internal users includes managers, employees and unions that show interest in accounting information due to their direct concern for the prosperity of a business.

Users and their Information Requirements

From the above, you will realise that there are many users of financial analysis information, such as:

- **Management**: Management is interested in the information contained in the financial statements in order to carry out it's planning, decision making and control responsibilities.
- **Owners**: Regardless of the form of the enterprise, the owners, partners, members, trustees and shareholders will be interested in the total financial well-being of the enterprise. This includes the profit potential, financial stability and growth potential. Owners need information to assist them in deciding if they should buy, sell or retain their investment.
- **Potential investors**: The providers of risk capital and their advisors (brokers, auditors, economists) are concerned with the risk inherent in and return provided by, their investment and also the ability of the enterprise to pay dividends.
- **Employees**: Employees and their representative groups (e.g. trade unions) are interested in information pertaining to the stability and profitability of employers. They are also interested in information which enables them to assess the ability of the enterprise to provide remuneration, retirement benefits and employment opportunities.
- **Lenders of money**: Lenders of money are interested in information enabling them to assess whether their loans and the interest payable on these loans, will be paid when due.
- **Suppliers and other trade creditors**: Suppliers and other creditors are interested in information enabling them to establish whether amounts owing to them will be paid when due. Trade creditors, as opposed to lenders, are likely to be interested in an enterprise over a shorter period, unless they are dependent on the enterprise (being a major customer) for their continued existence.
- **Customers**: Customers are interested in information about the continued existence of an enterprise if they are involved with it over the long term or if they are dependent on the enterprise being their chief supplier.
- **Governments and their agencies**: Governments and their agencies are interested in the allocation of resources and therefore, the activities of enterprises. Agencies such as these would include the Receiver of Revenue, the Departments of Statistics, Trade and Industry, Health and so forth. These agencies require the information to regulate the activities of enterprises, to determine taxation policies and as the basis for national income and other similar statistics.

  The public and consumer organisations: Enterprises affect members of the public in a variety of ways. For instance, enterprises may make a substantial contribution to the local economy in

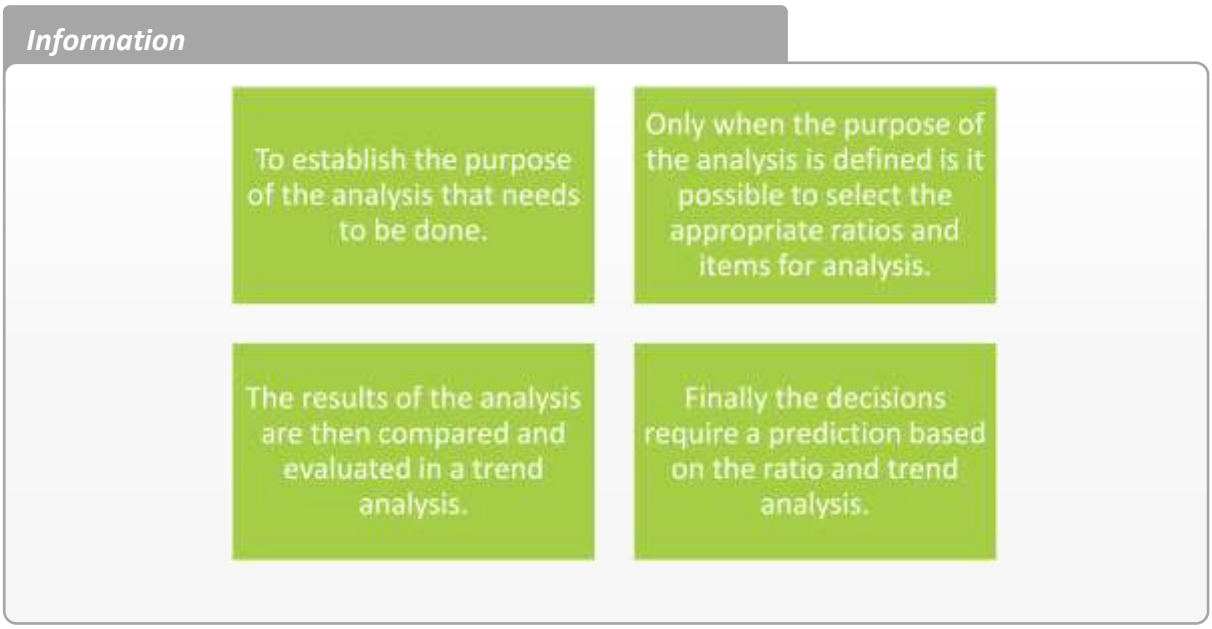
many ways, including the number of people they employ and their patronage of local suppliers. Financial statements may assist the public by supplying information in connection with trends and recent developments in the prosperity of the enterprise and the range of its activities.

Management of an organisation needs to measure the success of their activities. Their success needs to be measured relative to their past performance as well as their competitors. Financial analysis is not easy as there are many ways of interpreting data that is often complex and voluminous.

ANALYSE FINANCIAL STATEMENTS

The primary financial statements of a company are prepared to provide information to the users of these statements to help them make an economic decision. Such decisions are made within the context of environmental factors which impact on the company. The analysis of financial statements must, therefore, be conducted with insight into the expected economic conditions which will prevail in the industry and economy.

The main considerations in every analysis are:



Financial analysis is used to fulfil one of the key challenges facing an organisation - establishing how well the organisation is performing. This is also known as a financial health check or organisational viability and is also referred to as organisational sustainability.

Trends and Ratios

Using trends and ratios to analyse financial reports provides the organisation (management) with an understanding of financial information.

In assessing the significance of various financial data, experts engage in ratio analyses, the process of determining and evaluating financial ratios. A financial ratio is a relationship that indicates something about a company's activities, such as the ratio of the company's current assets, current liabilities or between its accounts receivable and its annual sales. The basic sources for these ratios are the company's financial statements that contain figures on assets, liabilities, profits, or losses.

Financial analysis is done by doing a comparative analysis. It is conducted by setting consecutive Statement of Financial Position (balance sheet), Statement of Comprehensive Income (income statement) or statement of cash flow side-by-side and reviewing changes in individual categories on a period to period multi-period basis. The most important item revealed by comparative financial statement analysis is a trend.

Financial ratios are only meaningful when compared with other information. Since they are most often compared with industry data, ratios help an individual understand a company's performance relative to that of competitors; they are often used to track performance over time.

Ratio analysis can reveal much about a company and its operations. However, there are several points to keep in mind about ratios:

- First, financial statement ratios are "flags" indicating areas of strength or weakness. One or even several ratios might be misleading, but when combined with other knowledge of a company's management and economic circumstances, ratio analysis can tell much about a corporation.
- Second, there is no single correct value for a ratio. The observation that the value of a particular ratio is too high, too low, or just right depends on the perspective of the analyst and the company's competitive strategy.
- Third, a ratio is meaningful only when it is compared with some standard, such as an industry trend, ratio trend, a ratio trend for the specific company being analysed, or a stated management objective.
- In **trend analysis**, financial ratios are compared over time, typically years. Year-to-year comparisons can highlight trends, pointing to the need for action. Trend analysis works best with five years of data.

Ratio Analysis

Ratio analysis involves expressing one piece of financial information (for example profit) in terms of another (for example total assets). Ratio analysis cannot be performed using only one set of figures.

Ratio analysis involves the comparison of ratios either with ratios of other companies and/or with previous ratios within the same organisation.

Step 1: Selection of Ratio Analysis

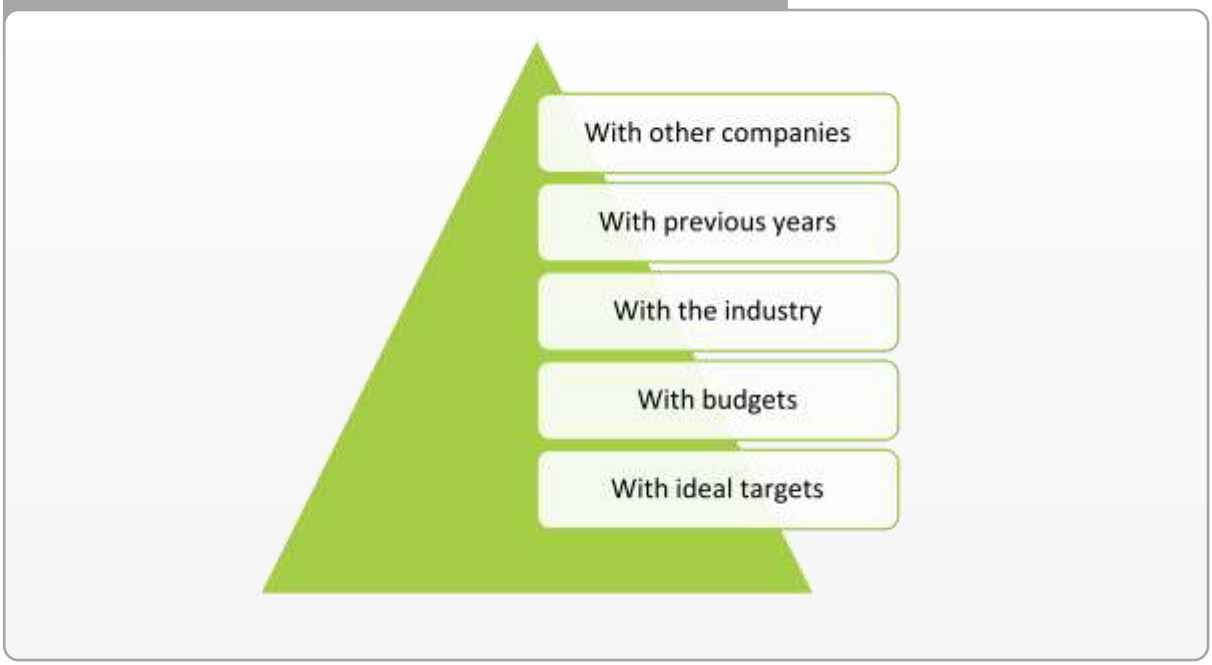
There are many possible ratios which could be selected. The objective of the analysis is the criteria used when deciding upon the relevant ratios to be selected. The analyst must be convinced that the number and denominator line items selected have a relationship which is meaningful. It is probable that a number of relevant ratios may be identified and selection from among these will be necessary to avoid information overload. You need to identify:

- What is the purpose of the analysis?
- What are the appropriate tools to use?

Step 2: Comparison of Ratio Analysis

The use of ratios for comparison between companies is limited by the differing accounting policies and the lack of uniformity in disclosure between organisations' financial statements. This makes the comparison of ratio outcomes difficult between organisations. You need to identify who or what you are going to compare the ratio analysis with:

Comparison of ratio analysis



Step 3: Evaluation of Ratio Analysis

Factors such as the size of a company, outside influences on the company during the period under review, seasonal differences which arose within the period bounded by the two Statement of Financial Position (balance sheet) dates and which may not be reflected in either of the two Statements of Financial Position (balance sheets), must be noted when evaluating the ratio analysis. You need to identify:

- Is it good or bad?
- Was the result expected?
- If bad, why?

- If good, maintainable?
- Who/what is responsible?

Step 4: Prediction based on Ratio Analysis

The decision to be made resulting from the analysis of historical data will require considering many variables for the present and future. The general judgement must be exercised as any mechanical application is likely to be questionable. You need to identify:

- What is likely to happen if no action is taken?
- What improving action is possible?

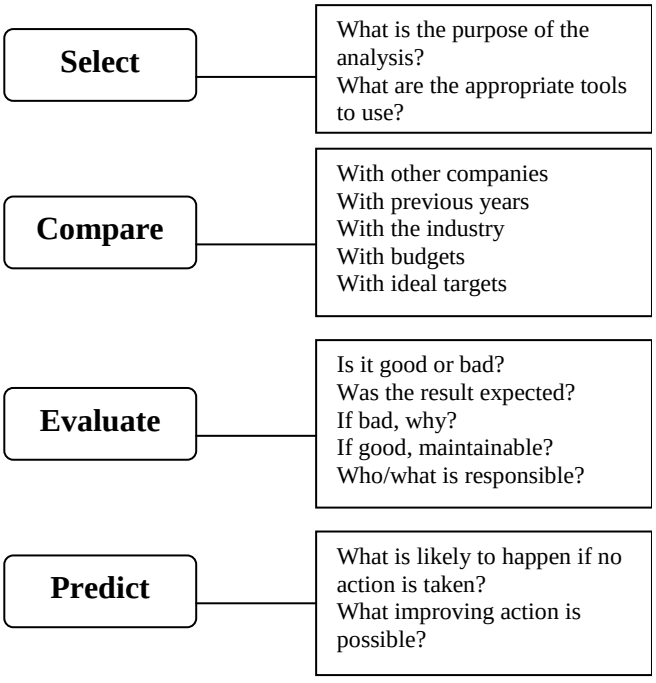
Ratios are calculated to provide you with information about four aspects of a business's operations:

- Profitability
- Liquidity
- Efficiency
- Leverage

Note: The categories must not be considered to be mutually exclusive, as the selection of a ratio for the primary purpose of establishing liquidity, for example, may include a ratio with we have place into the efficiency category.

To summarise:

To do a financial analysis, the manager needs to establish the purpose of the analysis. Once the purpose of the analysis has been established, the approach usually follows the typical stages illustrated below:



APPLY RATIOS TO MEASURE PROFITABILITY AND LIQUIDITY

Profitability Ratios

Profitability ratios determine if returns will be generated to ensure the sustainability of an organisation. They attempt to reflect the profit per rand of sales or the profit per rand or capital invested.

Profitability ratios offer a glimpse into a company's operational performance and help business owners determine if they are maximising their bottom line. They also offer insights into the return a company is generating from its assets and invested capital. These ratios should be compared to a period over period basis (i.e. year to year).

While these ratios may vary from industry to industry, standard profitability ratios include:

• **Gross margin percentage**	Gross margin= gross margin X 100 Sales Expressed as a percentage (%)
• **Net margin**	Net margin= Net profit to ordinary shareholders X 100 Sales Expressed as a percentage (%)
• **Net Profit margin on sales**	Profit margin = net profit after taxes Sales gives the profit per rand of sales
• **Return on assets before interest and tax (ROABIT)**	ROABIT= Net operating profit X 100 Total assets Expressed as a percentage (%)
• **Return on capital employed (ROCE)**	ROCE= Net operating profit X 100 Shareholders' equity + long-term loans Expressed as a percentage (%) Measures the net profit before tax before the providers of long-term capital have been rewarded by using the profit before interest has been deducted.
• **Return on equity (ROE)**	ROE= Net profit to ordinary shareholders X 100 Shareholders' Equity Expressed as a percentage (%) Measures the residual net profit which is available to ordinary shareholders.
• **Return on net worth**	Return on Net Worth = net profit after taxes net worth measures the rate of return on the stockholder's investment

Liquidity Ratios

Liquidity ratios help you determine your company's ability to generate sufficient amounts of cash to meet any current or short-term obligation.

Liquidity ratios focus on a company's ability to pay its bills when they come due. Bankers and suppliers use liquidity ratios to measure a company's creditworthiness. If liquidity ratios remain relatively high for a prolonged period, too much capital may be invested in liquid assets (for example, cash, short-term investments, accounts receivable, inventory) and too little capital may be devoted to increasing shareholder value. If liquidity ratios remain relatively low, a company may not have sufficient liquidity to meet ongoing financial obligations.

Liquidity ratios include:

• **Current Ratio**	Current Ratio = current assets current liabilities (e.g.) 1,21 expressed as 1,21 : 1 The current ratio is the most commonly used measure of short-term creditors covered by assets that are expected to be converted to cash in a period roughly corresponding to the maturity of the claims.
• **Acid Test Ratio** (Quick Ratio)	Acid Test Ratio = current assets - inventory current liabilities (e.g.) 0,45 expressed as 0,45 : 1 measures the organisation's ability to pay off short-term obligations without relying on the sale of inventories (typically the least liquid of an organisation's current assets)

APPLY RATIOS TO MEASURE WORKING CAPITAL AND ASSET UTILISATION

Efficiency ratios enable you to evaluate how effectively your company uses its fixed and current assets. Assets are compared to turnover to see how the relative use of assets over the period has performed in generating sales rands.

Turnover or efficiency ratios measure the activity or changes in certain assets, including accounts receivable, accounts payable and inventory. Poor turnover indicates resources are invested in non-income producing assets. The ratios presume that a "proper" balance should exist between sales and the various asset accounts-inventories, accounts receivable, fixed assets and others.

Efficiency ratios include:

• **Fixed assets turnover** (sales or gross revenue)	Fixed assets turnover = sales fixed assets = turnover fixed assets (e.g.) 3,5 expressed as 3,5 times measures the extent to which fixed assets have been efficient in generating sales
• **Total assets turnover**	Total assets turnover = sales total assets = turnover total assets (e.g.) 2,4 expressed as 2,4 times measures the extent to which all assets have been efficient in generating sales
• **Days' inventory**	Days' inventory = inventory X 365 days Cost of sales expressed as days measures the quantity of inventory on hand about the quantity purchased each day
• **Debtors collection period**	Average collection period = receivables sales per day or = debtors X 365 days credit sales expressed as days measures how long debtors take to pay their accounts, by measuring the number of days from the date of sale to the payment date
• **Creditors settlement period**	Creditors settlement period = creditors X 365 days credit purchases expressed as days measures the time taken to settle debts with creditors. Credit purchases for the year can be calculated by adding the cost of sales and the closing inventory less the initial inventory.
• **Inventory turnover**	Inventory turnover = sales Inventory When calculating and analysing the inventory turnover ratio note that sales are at market prices; if inventories are carried at cost, as they are, it would be more appropriate to use the cost of goods sold in place of sales in the numerator of the formula.

Working Capital Turnover Ratio

This ratio represents the number of times the working capital is turned over in year and is calculated as follows:

Formula of Working Capital Turnover Ratio:

Following formula is used to calculate working capital turnover ratio

Working Capital Turnover Ratio = Cost of Sales / Net Working Capital

The two components of the ratio are cost of sales and the net working capital. If the information about cost of sales is not available, the figure of sales may be taken as the numerator. Net working capital is found by deduction from the total of the current assets the total of the current liabilities.

Example:

Cash	10 000
Bills Receivables	5 000
Sundry Debtors	25 000
Stock	20 000
Sundry Creditors	30 000
Cost of sales	150 000

Calculate working capital turnover ratio

Calculation:

Working Capital Turnover Ratio = Cost of Sales / Net Working Capital

Current Assets = R10 000 + R5 000 + R25 000 + R20 000 = R60 000

Current Liabilities = R30 000

Net Working Capital = Current assets – Current liabilities

= R60 000 − R30 000

= R30 000

So the working Capital Turnover Ratio = 150 000 / 30 000

= 5 times

Significance:

The working capital turnover ratio measures the efficiency with which the working capital is being used by a firm. A high ratio indicates efficient utilisation of working capital and a low ratio indicates otherwise.

However, a very high working capital turnover ratio may also mean lack of sufficient working capital which is obviously not a good situation.

APPLY RATIOS TO MEASURE RETURN

Leverage Ratios

Leverage ratios provide information about a business's ability to meet its long-term obligations. These ratios examine the financing structure of the business. They focus on the combination of owner's equity and outside financing (long and short term) used by the company.

Leverage ratios indicate how well a company's uses borrowed funds (rather than stockholders' equity or investments) to expand its business. The goal is to borrow funds at a low interest rate and invest in a business activity that produces a rate of return exceeding the target rate of return for investments.

Leverage ratios include:

• **Debt ratio** (Total Debt to Total Assets)	Debt Ratio = $\frac{\text{total debt}}{\text{total assets}}$ X 100 expressed as percentage (%) measures the percentage of total funds provided by creditors (e.g.) 20% indicates that for every R1 used to purchase total assets, 20 cents of the financing was provided by parties other than the ordinary shareholders.
• **Debt to equity ratio**	Debt to equity = $\frac{\text{long-term loans}}{\text{Shareholders' equity}}$ X 100 expressed as percentage (%) compares long-term loans and shareholders' equity (e.g.) 30% indicates that for every R1 of capital proved by ordinary shareholders, 30 cents was raised through long-term loans.
• **Interest cover** (Times Interest Earned)	Interest cover = $\frac{\text{Net operating profit before interest and tax}}{\text{Interest}}$ X 100 expressed as times measures the number of times which the net profit is able to cover the interest which is due without resultant financial embarrassment to the organisation because of inability to meet annual interest costs.

Leverage ratios, which measure the funds supplied by owners as compared with the financing provided by the organisation's creditors, have a number of implications:

- First, creditors look to the equity, or owner-supplied funds, to provide a margin of safety. If owners have provided only a small proportion of total financing, the risks of the organisation are borne mainly by the creditors.
- Second, by raising funds through debt, the owners gain the benefits of maintaining control of the organisation with a limited investment.
- Third, if the organisation earns more on the borrowed funds than it pays in interest, the return to the owners is magnified. For example, if assets earn 6 percent and debt costs only 4 percent, there is a 2 percent differential accruing to the stockholders.

Leverage cuts both ways, however; if the return on assets falls to 3 percent, the differential between that figure and the cost of debt must be made up from equity's share of total profits. In the first instance, where assets earn more than the cost of debt, leverage is favourable, in the second, it is unfavourable.

Organisations with low leverage ratios have less risk of loss when the economy is in a recession, but they also have lower expected returns when the economy booms. Conversely, organisations with high leverage ratios run the risk of large losses but also have a chance of gaining high profits. The prospects of high returns are desirable, but investors are averse to risk. Decisions about the use of leverage, then, must balance higher expected returns against increased risk.

In practice, leverage is approached in two ways:

1. One approach examines Statement of Financial Position (balance sheet) ratios and determines the extent to which borrowed funds have been used to finance the organisation.
2. The other approach measures the risks of debt by Statement of Comprehensive Income (income statement) ratios designed to determine the number of times fixed charges are covered by operating profits. These sets of ratios are complementary and most analysts examine both leverage ratios.

MAKE RECOMMENDATIONS BASED ON RATIO ANALYSIS

One of the uses of ratios is to determine the profitability of an organisation. Profitability is an indicator of the viability of an organisation or its ability to sustain itself into the future.

An organisation uses profitability ratios to determine the financial health of the organisation. This type of analysis is of interest to many different parties, such as:

- The board of directors will use these to analyse the financial health of the organisation. This will assist in the measurement of how well their strategic objectives have been met in the past as well as helping to plan their future strategy based on the current strength of the organisation.
- Department managers will use these ratios to assess the profitability and sustainability of their business units.
- External users, such as shareholders and providers of capital and finance to the organisation will use these ratios to help determine the level of risk that they face in terms of their investments or lendings.

We will use information from the following Statement of Financial Position (balance sheet) and Statement of Comprehensive Income (income statement) summaries to work through some examples. We will refer to this set of information as **Document Set 1**.

ABC Company is a retail company with its main business being the purchase of CD's from manufacturers, which are then sold in bulk to retail outlets and music shops. The figures provided below are not set out in accordance with IFRS, but rather as a financial analyst would prepare them – in a spreadsheet format.

ABC Company LTD

Statement of Financial Position information at 30 June

	20X1		20X2		20X3		20X4
	R		R		R		R
EQUITY AND LIABILITIES							
Shareholders' equity	45 745		44 651		49 225		59 218
Non-current loan	6 719		11 187		14 314		21 670
Current liabilities	7 228		8 436		13 217		18 453
Creditors	4 246		4 827		8 986		12 810
Other	2 982		3 609		4 231		5 643
	59 692		**64 274**		**76 756**		**99 341**
ASSETS							
Fixed assets							
Tangible assets	29 444		32 499		43 908		64 047
Investments	12 032		11 881		8 102		5 608
Current assets	18 216		19 894		24 746		29 686
Inventory	3 807		12 041		15 074		17 224
Debtors	8 183		5 614		8 939		11 406
Cash resources	6 226		2 266		733		1 056
Total assets	**59 692**		**64 274**		**76 756**		**99 341**

ABC Company LTD

Statement of Comprehensive Income (income statement) for the Year Ended information at 30 June

	20X1		20X2		20X3		20X4
	R		R		R		R
Sales (gross revenue)	128 415		141 481		195 016		275 855
Cost of goods sold	106 634		125 605		162 383		230 822
Gross margin	21 781		15 876		32 633		45 033
Revenue from investments	2 982		2 376		827		897
	24 7863		18 252		33 460		45 930
Expenses	12 302		13 934		16 939		18 375
Operating expenses	4 026		4 320		4 520		5 026
Selling expenses	2 364		3 142		3 862		4 216
Depreciation	5 912		6 472		8 557		9 133
Net operating profit	12 461		4 318		16 521		27 555
Interest	816		1 454		2 290		3 900
Net profit before tax	11 645		2 864		14 231		23 655
Taxation	4 658		958		6 057		9 462
Net profit attributable to ordinary shareholders	6 987		1 906		8 174		14 193
Dividends	3 600		3 000		3 600		4 200
Net profit for year	3 387		(1 094)		4 574		9 993
Accumulated profit at beginning of year	12 358		15 745		14 651		19 255
Accumulated profit at end of the year	15 745		14 651		19 225		29 218

Additional information from financial statement notes:

- All sales and purchases are on credit
- Information for the previous accounting year: Sales R119 122

Note: The 20X4 figures from Document Set 1 are used to illustrate calculation of all the ratios which follow in the rest of the learner guide.

Applying Ratios to measure Profitability

We have selected five primary aspects of profitability which are commonly identified in various industries. The ratios attempt to reflect the profit per rand of sales or the profit per rand of capital invested, such as:

- Gross margin
- Net margin
- Return on assets before interest and tax
- Return on capital employed
- Return on equity

Note: The 20X4 figures from Document Set 1 are used to illustrate calculation of all the ratios which follow in the rest of the learner guide.

Gross margin percentage (GM)	Gross margin = $\frac{\text{gross margin}}{\text{Sales}}$ X 100 = $\frac{45\,033}{275\,855}$ X 100 = 16,3%

This ratio indicates the percentages by which the total selling price is greater than the cost prices.

- A gross margin percentage of 16,3% indicates that for every R1 of sales, 16,3 cents was gross profit. The remaining 83,7 cents in each rand is the cost price of the goods.

The trend for ABC Company shows:

	20X1	**20X2**	**20X3**	**20X4**
Gross margin	17,0	11,2	16,7	16,3

When comparing this with previous years, the ratio has dropped from 17,0% in 20X120X1 to the current 16,3%. It is apparent that ABC Company had pressure on its gross margin in 20X2, as gross margin fell to 11,2 %. This could have been from two sources:

- Pressure on selling prices as a result of competition in the industry
- Upward pressure on costs as a result of inflation or other cost factors.

- It is important to note that the rand amount of gross margin has more than doubled over the period as a result of the growth of sales.

Net margin (NM)	Net margin = Net profit to ordinary shareholders X 100 Sales = 14 193 X 100 275 855 = 5,2%

This ratio indicates the percentages by which the total selling price eventually becomes net profit.

- The net margin percentage of 5,2% indicates that for every R1 of goods sold, 5,2 cents eventually becomes profit attributable to the ordinary shareholders.
- If turnover increases, then each time R1 is received, 5,2 cents will accrue to ordinary shareholders as net profit.
- The faster the turnover, the greater will be the accumulation of 5,2 cents and the larger the ultimate net profit.

The trend for ABC Company shows:

	20X1	**20X2**	**20X3**	**20X4**
Net margin	5,4	1,3	4,2	5,2

The net margin has followed similar trend to that of the gross margin, with the percentage achieved in 20X1 being the high point.

- It would seem that following the slump in 20X2, ABC Company has recovered well and it is likely that the net margin will increase in 20X5.

Return on assets before interest and tax (ROABIT)	ROABIT = Net operating profit X 100 Total assets = 27 555 X 100 99 341 = 27,7%

ROABIT ratio indicates how well total assets have been used in earning profit, before any parties are rewarded by distribution of the profit, including the South African Revenue Service (SARS) in the form of tax ad the providers of debt capital by way of interest.

- Every rand invested in total assets earned 27,7 cents

The trend for ABC Company shows:

ROABIT	**20X1**	**20X2**	**20X3**	**20X4**
	20,9%	6,7%	21,5%	27,7%

The ROABIT has had a drastic drop in 20X2 and 20X4 is the best achievement in the four-year period.

Return on capital employed (ROCE)	ROCE = Net operating profit X 100 Shareholders' equity + long-term loans = 27 555 X 100 59 218 + 21 670 = 27 555 X 100 80 888 = 34,1%

Return on capital employed has been calculated using only long-term capital and attempting to measure the net profit before tax and before the providers of long-term capital have been rewarded, by using the profit before interest has been deducted.

- A return of 34,1% indicates that for every R1 of total long-term capital employed, 34,1 cents has been earned before tax.
- This means that 34,1 cents in every R1 is available to pay interest, tax and shareholders.

The trend for ABC Company shows:

ROCE	**20X1**	**20X2**	**20X3**	**20X4**
	23,8%	7,7%	26,0%	34,1%

Apart from 20X2, the organisation was quite profitable.

Return on equity (ROE)	ROE = Net profit to ordinary shareholders X 100 Shareholders' Equity = 14 193 X 100 59 218 = 24,0%

The return on equity is the residual net profit which is available to ordinary shareholders. When net profit is divided by the shareholders' equity, the result is the return on shareholders' funds. While not arithmetically sound, the net profit for the year attributable to ordinary shareholders is customarily divided by the shareholders' equity at the end of the year.

The trend for ABC Company shows:

ROE	**20X1**	**20X2**	**20X3**	**20X4**
	15,3%	4,3%	16,6%	24,0%

A return of 24% is likely to be considered as more than satisfactory by the shareholders.

Note: It can be seen from the figures that interest expense of R3 900 when compared with long-term loans of R21 670 indicates an average interest rate of 18% for the year. As interest is a tax deductible expense, the effective cost to the company is less than 18%, because the interest expense made the amount on which company tax is calculated, smaller. The company thus pays less tax than it would have paid had there been no interest. The interest expense has shielded the company from the 30% tax it otherwise would have had to pay, had it not borrowed funds and thus been unable to deduct the interest from its taxable income.

Applying Ratios to measure Working Capital and Asset Utilisation

We have selected five ratios to assess the efficiency of the company in managing its fixed and current assets. Assets are compared to turnover to see how the relative use of assets over the period has performed in generating sales rands. The three most important working capital items are also tested to determine whether they have been efficiently used. The five ratios which we will be calculating are:

- Fixed assets turnover
- Total asset turnover
- Days' inventory
- Debtors collection period
- Creditors settlement period

Note: The 20X4 figures from Document Set 1 are used to illustrate calculation of all the ratios which follow in the rest of the learner guide.

Fixed assets turnover (sales or gross revenue)	Fixed assets turnover = $\frac{\text{sales}}{\text{fixed assets}}$ = $\frac{\text{turnover}}{\text{fixed assets}}$ = $\frac{275\,855}{64\,046}$ = 4,31 times

The fixed assets turnover measures the extent to which fixed assets have been efficient in generating sales.

- It indicates that for every R1 invested in fixed assets, R4,31 was generated in sales during 20X4.

The trend for ABC Company shows:

Fixed assets turnover	**20X1** 4,36	**20X2** 4,36	**20X3** 4,44	**20X4** 4,31

The trend over the four-year period has been consistent and this is a good indicator of stability in non-current tangible asset management.

Total assets turnover	Total assets turnover = sales / total assets = turnover / total assets = 275 855 / 99 341 = 2,78 times

This ratio is similar to the fixed assets turnover and measures the extent to which total assets have generated sales.

The trend for ABC Company shows:

Total assets turnover	**20X1** 2,15	**20X2** 2,20	**20X3** 2,54	**20X4** 2,78

The trend has been more positive than that of the fixed asset turnover ratio and the expectation is that it will continue to increase, indicating improvement in the management of current assets relative to the revenue from sales.

Days' inventory	Days' inventory = inventory X 365 days / Cost of sales = 17 224 X 365 days / 230 822 = 27,24 days

Days' inventory ratio measures the quantity of inventory on hand in relation to the quantity purchased each day.

The trend for ABC Company shows:

Days' inventory	**20X1**	**20X2**	**20X3**	**20X4**

	13,03	34,91	33,88	27,24

The number of days' inventory has shown considerable fluctuation over the four-year period.

- The major difference between 20X1 and 20X2 may have arisen as a result of a change in policy to keep more inventory on hand, or may have resulted from the decline in trading activity in 20X2 which is evident in all the ratios for that year.
- It appears that inventory is beginning to move more quickly and the improvement to 27,24 days in 20X4 may signal an attempt to return to the efficiency which was achieved in 20X1.
- Inventory is clearly the most significant current asset. Changes in this ratio have an impact on the current ratio as can be from the trends in these two ratios over the last three years.

Debtors collection period	Average collection period = $\frac{\text{debtors X 365 days}}{\text{credit sales}}$ = $\frac{\text{11 406 X 365 days}}{\text{275 855}}$ = 15,09 days

The debtors collection period shows how long debtors take to pay their accounts, by measuring the number of days from the date of sale to the payment date.

- The debtor's collection period assumes that all sales are on credit. While this may not always be the case, the comparisons do provide useful information.

The trend for ABC Company shows:

Debtors collection period	**20X1**	**20X2**	**20X3**	**20X4**
	23,26	14,48	16,73	15,09

This period has fluctuated from a short collection period of 14,48 days in 20X2 to a high of 23,26 days in 20X1.

- This current year's figure of 15 days seems to be within the range maintained apart from the unfortunate lapse in 20X1.

Creditors settlement period	Creditors settlement period = $\frac{\text{creditors X 365 days}}{\text{credit purchases}}$

To calculate the time taken to settle debts with creditors, the credit purchases for the year must be known. As the opening and closing inventory as well as the cost of sales for each year are known, it is possible to calculate credit purchases, assuming that all purchases take place on credit:

Credit purchases for the year = cost of sales + closing inventory – opening inventory

= 230 822 + 17 224 – 15 074

= R232 972

	Creditors settlement period	= creditors X 365 days credit purchases = 12 810 X 365 days 232 972 = 20,07 days

The creditors settlement period measures how long it takes the company to pay its creditors. It is determined in the same way as the debtor's collection period, except that creditors and cost of sales are substituted for debtors and sales respectively.

The trend for ABC Company shows:

	20X1	**20X2**	**20X3**	**20X4**
Creditors settlement period	14,50	13,17	19,82	20,07

Creditors are settled promptly although it is apparent that in the last two years, ABC Company has adopted a policy of keeping the creditors waiting marginally longer.

- This may be a symptom of its liquidity problems and scrutiny of the Statement of Financial Position (balance sheet) indicates that very low bank and cash resources are currently on hand.
- Note that sound management of working capital would try to ensure that the debtor's collection period is shorter than the creditors payment period, an objective which has only been achieved in recent years.

Making Recommendations after an Analysis

Once the ratio and trend analysis has been done, the analyst is in a position to make certain recommendations based on the outcome of the analysis. The components of the calculations are used to create a better outcome of future analysis and to make the required recommendations.

See Appendix A for an example of such an analysis report.

DESCRIBING AND PREPARING FINANCIAL FORECASTS

Business entities need to plan for the future; they must also consider alternative management strategies and prepare capital and operating budgets; in addition, they must consider alternative funding and cash budget possibilities. An important part of the planning process is the preparation of prospective financial statements that attempt to predict the outcome of the business entity's activities in future periods.

Financial forecasts and **financial projections** are prospective financial statements that present an entity's expected financial position, results of operations, and cash flows in future periods under two different conditions.

Financial forecasts assume that the entity will continue to function in the manner in which it is currently functioning. For example, that a retail store chain will continue to do business in the manner in which it is currently engaged. The financial forecast presents the predicted results for the next year.

Financial projections, on the other hand, make one or more hypothetical assumptions about an entity's future course of action. For example, if the retail store chain were considering a Website at which it would also sell merchandise - in addition to the merchandise sold in the stores - a financial projection would provide expected results. Financial forecasts and projections should be distinguished from *pro forma* financial statements, which show the effect of a hypothetical future event on the historical financial statements results[1].

It is critical to your business success that you prepare realistic forecasts of your future business performance. You need to forecast your operations for three to five years in order to guide your business growth. You will need realistic forecasts to support your business plan if you need a loan or investor funds. The elements of and influences on pro forma statements include

Prior Financial Statements

Of course you will have to use previous financial statements if your business has been operating for some time. From your prior financial statements, you will use sales and revenue levels, business ratios, average expenses, and any relevant information about your accounts receivable or payable. You should expect your prior financial statements to show financial improvement for each year of operation.

Internal Factors

The status of your operations is important in preparing pro forma statements and projections. For example, you must consider whether your business needs to relocate due to expansion, or your business needs to buy expensive new equipment to replace older models. You also must consider your competition, how you are measuring up to them, and whether you need a new marketing plan to be more competitive. Also, consider whether your company needs additional personnel or additional training.

External Factors

The status of the country's economy is very relevant to your company's future. Certain businesses may be affected by the status of the global economy. It is important to understand the industry trends to be certain that your product or services will continue to be marketable.

Projected Financial Statement

The pro forma financial statements will include estimated future sales, expenses, and profits. These items need to be broken down in order to be meaningful. The sales estimates should state which salesperson, which department, or which region will generate the sales. The estimated expenses must be broken down into general and administrative, operating expenses, depreciation, and taxes.

Analysing Past Performance, Recognising Opportunities and Planning for the Future

Part of your role as a manager requires that you analyse past performance, recognise opportunities and plan for the future of your unit.

It's easy to focus only on the day-to-day running of your business, especially in the early stages. But once you're up and running, it can pay dividends to think about longer-term and more strategic planning.

This is especially true as you take on more staff, create departments within the business, appoint managers or directors and become distanced from the everyday running of the business.

Reviewing your progress will be particularly useful if you feel:

- uncertain about how well the business is performing
- unsure if you're getting the most out of the business or making the most of market opportunities
- your business plan may be out of date, e.g. you haven't updated it since you started trading
- your business is moving in a direction different to the one you had planned
- the business may be becoming unwieldy or unresponsive to market demands

Retrieved from: http://www.infoentrepreneurs.org/en/guides/review-your-business-performance/

Good decision making is an essential skill for career success generally, and effective leadership particularly. If you can learn to make timely and well-considered decisions, then you can often lead your team to spectacular and well-deserved success. However, if you make poor decisions, your team risks failure and your time as a leader will, most likely, be brutally short.

An organised and systematic decision-making process usually leads to better decisions. Without a well-defined process, you risk making decisions that are based on insufficient information and analysis. Many variables affect the final impact of your decision. However, if you establish strong foundations for decision making, generate good alternatives, evaluate these alternatives rigorously, and then check your decision-making process, you will improve the quality of your decisions.

"Why is it that some people recognise business opportunities where many others see only problems? Opportunities are everywhere, yet many people do not see them. Successful entrepreneurs, however, have the capacity to see what others do not"

Jeffry Timmons (1941–2008) Professor of Entrepreneurship, known as a pioneer of both entrepreneurship research and education

Successful business unit managers, too, have the ability to look at the successes and failures of the past and see opportunities for growth and doing things better.

All of your estimates and projections must logically flow from previous years' financial statements, so that you have a benchmark or standard to evaluate future performance.

Identifying Opportunities for Growth

Once the analysis has been done, the analyst is in a position to identify where the organisation can change tactics and do things differently in order to create a better outcome of the ratio analysis and ensure growth.

Here are three easy ways to uncover potential opportunities:

1. Examine your current client base

The cost of securing a new client can be anywhere from five to 15 times that of securing a repeat client. Consequently, developing strategies that generate repeat business on a regular basis is essential to a business's bottom line. It goes without saying that you need to provide quality service in the first place for your clients to come back. But after a transaction is completed between you and a client, do you have ways to stay in touch and stay top of mind? Do you provide reasons and incentives for repeat businesses? Can you up sell some of your past and current clients with a new service or product you have? Do they have family, friends, and associates you can offer your services to? Assuming that you provided an excellent work to your clients, they can be your biggest fans who will gladly promote and endorse you.

2. Look at how you are currently receiving clients

A business's client source is generally tied to its marketing effort. Besides identifying the appropriate marketing vehicles to reach your target clients, it is important to track the effectiveness of your tactics. Are your clients mostly through word of mouth referrals? Do they usually find you online? Are they typically attendees to speaking engagements you have throughout the year? Do your strategic alliances send the majority of your clients? Once you have identified the successful sources, explore creative ways to take those sources to the next level.

3. Identify complementary services/products that will open up a different market for you

Products and services that complement what you offer the market can affect the demand curve. For example, you may sell hot dogs, while a complementary business offers hot dog rolls. If the price of the hot dog rolls increases, it can cause the demand for hot dogs to decrease. As a result, the demand curve shifts to the left, and the price for hot dogs would also increase.

IDENTIFY TYPES AND FORMATS OF FINANCIAL FORECASTS

The following guidelines for preparation of financial forecasts are excerpted from the American Institute of Certified Public Accountants' (AICPA) publication, *Guide for Prospective Financial Information*.

1. **Financial forecasts should be prepared in good faith.** Good faith in this context includes making a diligent effort to develop appropriate assumptions and exercising care not to mislead a third-party reader. Good faith precludes preparing a financial forecast with either undue optimism or pessimism.
2. **Financial forecasts should be prepared with appropriate care by qualified personnel.** Appropriate care means that diligence and proper attention should be exercised in the preparation of the financial forecasts.
3. **Financial forecasts should be prepared using appropriate accounting principles.** The accounting treatment applied to events and transactions contemplated in financial forecasts should be the same as the accounting treatment expected to be applied in recording the events when or if they occur.
4. **The process used to develop financial forecasts should provide for seeking out the best information that is reasonably available at the time.** The reliability of the basic data should be considered in the process of preparing the financial forecasts and the use of an appropriate level of detail is another key consideration.
5. **The information used in preparing financial forecasts should be consistent with the plans of the entity.** Financial forecasts should be consistent with the expected economic effects of anticipated strategies, programs, and actions. An indication of the entity's plans can often be found in its budgets, goals, and policies.
6. **Key factors should be identified as a basis for the assumptions.** Key factors are those significant matters upon which an entity's future results are expected to depend and are basic to the entity's operations.
7. **Assumptions used in preparing financial forecasts should be appropriate.** Recognizing that assumptions are the essence of developing financial forecasts, the quality of the underlying assumptions largely determines the quality of financial forecasts. Assumptions should be reasonable and suitably supported.
8. **The process used to develop financial forecasts should provide the means to determine the relative effect of variations in the major underlying assumptions.** Particular attention should be devoted to those assumptions (1) to which the attainment of forecasted results is particularly sensitive and (2) for which the probability of variation is high.
9. **The process used to develop financial forecasts should provide adequate documentation of both the financial forecasts and the process used to develop them.** Documentation makes

possible review and approval of financial forecasts by the responsible party. It facilitates comparison of the financial forecasts with actual financial results, and it provides the discipline necessary for developing reliable financial forecasts.

10. **The process used to develop financial forecasts should include, where appropriate, the regular comparison of the financial forecasts with attained results.** Comparison of prospective financial results with actual results for the prospective period and for prior periods for which financial forecasts were prepared provides an historical measure of success in developing financial forecasts.

11. **The process used to prepare financial forecasts should include adequate review and approval by the responsible party at the appropriate levels of authority.** The ultimate responsibility should rest with the responsible party at the highest level of authority. The review should be conducted in sufficient depth to assure the responsible party of the soundness of the process used to develop the financial forecasts

Trend Analysis

A trend analysis tries to predict the future movements of figures on financial statements and/or their ratios. Many people believe that history repeats itself, so it is important to analyse any trends from historical financial data in order to predict the future.

A comparison of financial statements over several years reveals the direction, speed and extent of a trend(s).

The analysis is done by restating the amount of each item or group of items as a percentage. Such percentages are calculated by selecting a base year and then assigning a weight of 100 to the amount of each item in the base year statement. Thereafter, the amounts of similar items or groups of items in prior or subsequent financial statements are expressed as a percentage of the base year amount. The resulting figures are called index numbers or trend ratios.

A trend analysis can be done in two ways, such as:

1. Using a spreadsheet

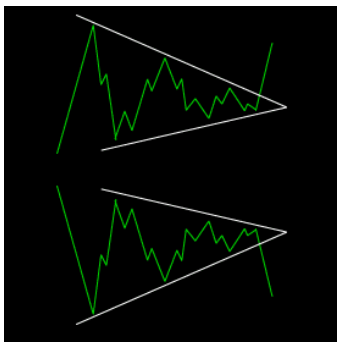
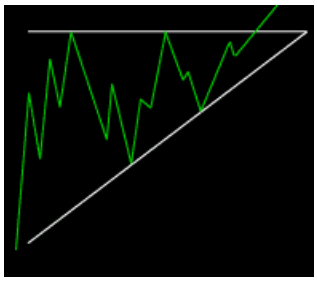
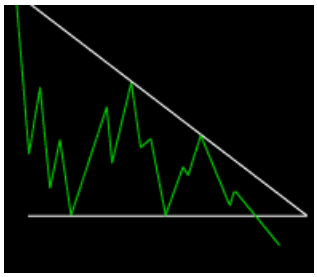
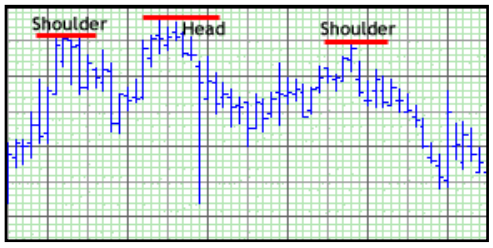
Using a spreadsheet

PROFITABILITY RATIOS:	Year 1	Year 2	Year 3	Year 4	Year 5
Net Sales to Gross Sales	100.0%	100.0%	100.0%	100.0%	100.0%
Gross Profit Margin on Sales	84.1%	96.2%	96.3%	98.2%	98.8%
Net Profit Margin (Pre-tax)	-202.5%	20.7%	41.9%	63.4%	75.4%
Net Profit Margin (After-tax)	-202.5%	20.7%	23.2%	36.2%	43.4%
Operating Expense to Sales	285.6%	74.3%	53.3%	34.2%	23.0%
Operating Profit to Sales	-185.6%	25.7%	46.7%	65.8%	77.0%

Basic Earning Power	**-118.6%**	**33.4%**	**68.3%**	**86.3%**	**78.6%**
Return on Assets (After-tax)	**-118.6%**	**33.4%**	**37.8%**	**49.4%**	**45.2%**
Return on Equity	**-329.7%**	**59.5%**	**52.3%**	**60.2%**	**52.7%**

2. Graphically

It is valuable to create charts of the comparisons done when trying to identify trends, as the charts would show various patterns or trends such as:

Symmetrical Triangle 	The converging trendlines give this pattern its distinct triangular shape. It is created by drawing two trendlines that connect a series of sequentially lower peaks and a series of sequentially higher troughs. As the pattern develops, these trendlines act as barriers that prevent the data from dramatically moving in any one direction. Symmetrical triangle patterns are regarded as very reliable - they can also be extremely profitable and drastic change (up or down) normally occurs after the trend
Ascending Triangle 	The first trendline is drawn horizontally at a level that has prevented the data from moving higher on several occasions. The second trendline is drawn so that it connects a series of increasing troughs, which is often considered to be a graphical representation of an increase in demand. An ascending triangle is generally deemed to be a continuation pattern, meaning that once it breaks above the upper resistance, it usually continues in the direction of the prior trend
Descending Triangle 	The major difference between the Ascending and Descending triangular chart patterns becomes apparent when you examine how the two trendlines are drawn. Notice how the horizontal trendline is drawn at a level that has prevented the data from heading lower, rather than preventing it from going higher like it was in the ascending version. This type of pattern is usually identified in downtrends
Head and Shoulders 	The head and shoulders pattern is one of the most reliable chart patterns used by analysts. When the head and shoulders pattern is formed, it is used to predict a change in the direction of the current uptrend. It rises to a peak and subsequently declines; it rises above the former peak and declines again; and finally, rises again - but not to the second peak - and declines once more
Double Bottom	This pattern is used by analysts to predict a shift from a previous downtrend to a new uptrend. A double bottom is

	formed by data that has created a series of two relatively equal lows with a small peak in the middle

An analysis of trends can be done for the department or organisation when you compare different financial statement sets (per year) with each other. You can also do a trend analysis for an industry or compare your organisation with another – even if the other organisation is much bigger, by using the ratio analysis outcomes.

IDENTIFY SOURCES OF FINANCIAL FORECASTS

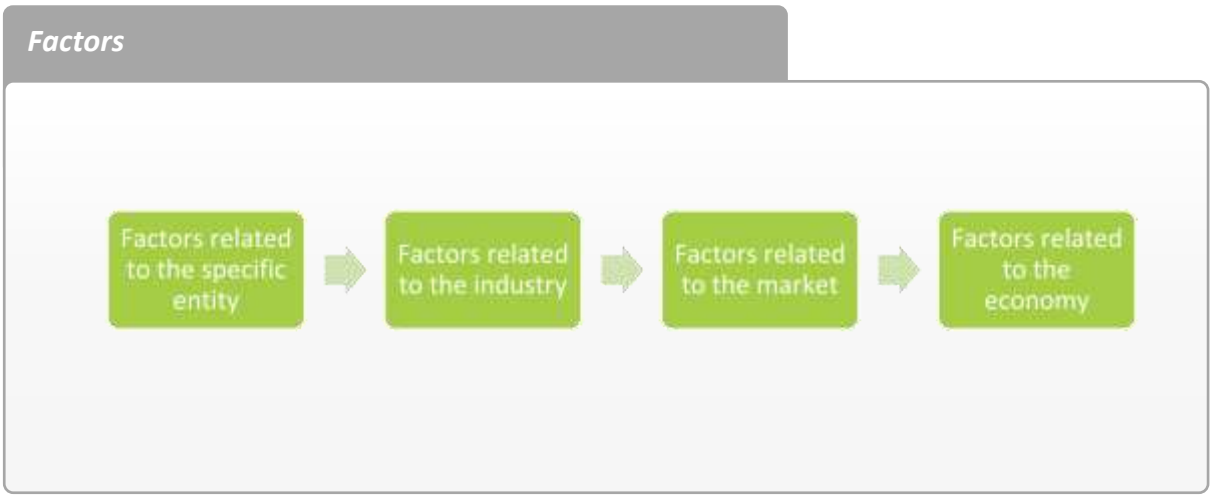
Your financial forecast will be based on information gathered from industry and market research. Since you will be responsible for achieving the predetermined financial objectives, make sure your estimates and assumptions are realistic. Be consistent and make sure that your financial forecast reflects the rest of the business plan. For example, your sales forecast should reflect the capacity of production equipment mentioned in the operational section.

Combine the components of your financial forecasts to generate projected financial statements, (balance sheet, profit and loss statement). You may need help from your accountant to assemble the figures in the conventional format, but the research and operational assumptions should be your own.

You can develop your own financial forecast by using the spreadsheets to complete the individual components. Then add the timing dimension (when you expect to receive payment and the amount) over 12 months to generate an annual cash flow forecast.

OUTLINE FACTORS IN PREPARING FINANCIAL FORECASTS

The preparation of prospective financial statements requires considerable knowledge of the organisation's business and the factors that are likely to determine its future results. The following key factors related to future results must be considered in the preparation of such statements:



Factors Related to the Specific Entity. The principal cost elements of the entity's doing business must be considered. Depending on the entity, these elements may include such costs as payroll and benefits, needed employees, raw materials, products the entity sells, freight or shipping, and advertising.

Another consideration is the availability of resources. For example, are the expert, specialised, or skilled workers available to meet the needs of the entity under the plan as initially proposed? Are the raw materials and/or products for resale available? Can the delivery system be organised to accomplish the task? Are the company's physical facilities sufficient for the uses and for the capacities contemplated?

Factors Related to the Industry. Factors related to the industry in which the entity is operating must be considered. Is the industry one in which companies are very competitive? Are competitive industries emerging? Is obsolescence emerging within the industry? Are there regulatory considerations and requirements? Is new technology being introduced into the industry? What are the economic conditions within the industry?

Factors Related to the Market. Market factors must be considered. What are the trends in business or consumer demand related to the services or goods being sold by the entity? Are competitive companies emerging, perhaps with new or different products? Is unique marketing required? Are there pricing developments to be factored into the forecast?

Factors Related to the Economy. Numerous factors related to the economy must be considered. What are the economic conditions in the country? What are critical economic trends? Is the economy inflationary, deflationary, or stable? What is the trend with regard to labour availability? What are the financing considerations in relation to the economy? What are interest rates? Are there significant factors related to long-term versus short-term financing? Is a public stock offering a possible financing option?

INCORPORATE FACTORS IN THE PREPARATION OF FINANCIAL FORECASTS

When preparing the financial forecasts for your business unit you must take the factors impacting on the organisation into account in terms of how they relate to your business unit:

Factors Related to the Specific Unit. The principal cost elements of the unit's operation, such as staffing requirements, raw materials, and running costs.

Factors Related to the Industry. How does competition affect the work of the unit? Are you affected by obsolescence or outdated technology? Are there regulatory considerations and requirements? Is there still growth in your industry?

Factors Related to the Market. Is your product or service still in demand or do you have to look for innovative ways to create a new demand? Is your pricing still market-related?

Factors Related to the Economy. Factors related to the economy which will probably need to be considered in your unit are: strength of the rand, rate of inflation, supply of skilled labour and labour unrest, interest rates and the petrol price.

ANALYSE FINANCIAL FORECASTS TO DETERMINE VIABILITY

The concept of the going concern is an important accounting concept. Financial Statements are usually prepared with the assumption that the enterprise is a going concern, without evidence to the contrary. This assumption implies that the business will continue its operations for the foreseeable future.

Financial viability implies that:

- The company will continue its operations in the foreseeable future.
- The enterprise is sufficiently profitable (or will be in the future) to continue its operations.
- There is inherent worth in continuing operations.

This is related to the concept of ongoing profits. It is important to note that sometimes companies do not make a profit every year – especially in the first few years of operations. A businessperson would examine financial statements for their financial viability and also take a view on the inherent worth of the company.

An analysis of profitability alone is not sufficient to determine the viability of an organisation. The capability of the organisation to pay its way in the future is important. The capacity of an organisation to pay its way depends on its level of liquidity.

Evaluating Financial Viability

In order to evaluate the financial viability of an organisation, a combination of the following information is required:

- **Financial performance** - a measure of the difference (i.e. profit/loss, surplus/deficit) between revenue and expenses that arises from operations for a period of time
- **Financial position** – the "position" at a point in time assessed in terms of assets, liabilities and public equity
- **Cash flow** – the sources and uses of cash relating to operations, investing in assets and financing the organisation for a period of time

Using Liquidity Ratios to Analyse the Organisation's Viability

These ratios help to determine whether the company will be able to meet its financial obligations in the short term. It is a measure of liquidity reflected by the working capital, which is the difference between current assets and current liabilities. Two ratios have been selected, both of which are frequently used by management:

- Current ratio
- Acid test ratio

Note: The 20X4 figures from Document Set 1 are used to illustrate calculation of all the ratios which follow in the rest of the learner guide.

Current Ratio	Current Ratio = current assets / current liabilities = 29 686 / 18 453 = 1,61 expressed as 1,61:1

The current ratio is the most commonly used measure of short-term creditors covered by assets that are expected to be converted to cash in a period roughly corresponding to the maturity of the claims.

The trend for ABC Company shows:

	20X1	**20X2**	**20X3**	**20X4**
Current Ratio	2,52:1	2,35:1	1,87:1	1,61:1

The current ratio has shown a consistent decline over the four-year period, from a high of 2,52 in 20X1 to a low of 1,61 in 20X4.

- From a scrutiny of the Statement of Financial Position (balance sheet) it is apparent that the current liabilities have increased relatively more than the current assets over the four-year period. This may be a cause for concern and ABC Company would be well advised to ensure that is has adequate cash resources on hand in order to meet its short-term commitments.

Acid Test Ratio (Quick Ratio)	Acid Test Ratio = $\frac{\text{current assets - inventory}}{\text{current liabilities}}$ = $\frac{(29\,686 - 17\,224)}{18\,453}$ = 0,68 expressed as 0,68:1

The Acid Test Ratio measures the organisation's ability to pay off short-term obligations without relying on the sale of inventories (typically the least liquid of an organisation's current assets).

- This ratio is the real test of liquidity as it removes inventory, which is not easily converted into cash, from the calculation of current assets.
- To interpret this ratio it may be said that the company has 68 cents in cash and near cash to meet every R1 which will require repayment in the short term.

The trend for ABC Company shows:

	20X1	**20X2**	**20X3**	**20X4**
Acid Test Ratio	1,99:1	0,93:1	0,73:1	0,68:1

The acid test ratio has also declined dramatically

over the last four years from a high of 2,19 to its current low level of 0,68.

- Unless convinced that liquidity will not be a problem, it would be well advised to take the necessary steps to redress the trend away from liquidity.

Using Leverage Ratios to Analyse the Organisation's Viability

The leverage ratios examine the financing structure of the organisation. They focus on the combination of owner's equity and the outside financing (long and short term) used by the company. Three ratios have been selected or this purpose:

- Debt ratio
- Debt to equity ratio
- Interest cover

Note: The 20X4 figures from Document Set 1 are used to illustrate calculation of all the ratios which follow in the rest of the learner guide.

Debt ratio (Total Debt to Total Assets)	Debt Ratio = total debt X 100 total assets = 21 670 + 18 453 X 100 99 341 = 40,4%

The debt ratio has been defined as total debt compared to tatal assets. The total debt includes long-term loans and current liabilities. The ratio of 40,4% indicates that for every R1 used to purchase total assets, 40,4 cents of the financing was provided by parties other than the ordinary shareholders.

The trend for ABC Company shows:

	20X1	**20X2**	**20X3**	**20X4**
Debt Ratio	23,4%	31,5%	35,8%	40,4%

It is apparent that over the four-year period ABC Company has moved towards a policy of using more debt to finance its assets.

Debt to equity ratio	Debt to equity = long-term loans X 100 Shareholders' equity = 21 670 X 100 59 218 = 36,6%

The debt to equity ratio concentrates only on long-term debt, i.e. debt that requires a reward in the form of interest. The comparison is between long-term loans and shareholders' equity. The ratio may be interpreted to mean that for every R1 of capital provided by ordinary shareholder, 36,6 cents was raised through long-term loans.

The trend for ABC Company shows:

	20X1	**20X2**	**20X3**	**20X4**
Debt to equity	14,7%	26,5%	29,1%	36,6%

The debt to equity ratio has been a little erratic over the four years, but a definite trend to increasing this ratio is apparent, with the highest percentage of debt to equity over the four years in 20X4.

Interest cover (Times Interest Earned)	Interest cover = Net operating profit before interest and tax X 100 Interest = 27 555 X 100 3 900 = 7,07 times

The interest cover / times interest earned ration shows the number of times which the net profit is able to cover the interest which is due. It is calculated before tax and interest in order to reflect the position most accurately.

The trend for ABC Company shows:

	20X1	**20X2**	**20X3**	**20X4**
Interest cover	15,27	2,97	7,21	7,07

In the difficult year of 20X2, ABC Company's creditors were most at risk of not receiving their interest as net profit achieved less than three times the required interest expense. Had it not been for investment income, the profit would only just have covered the interest commitment.

DRAFT BUDGETS AND SUPERVISE FINANCIAL MANAGEMENT OF A UNIT

After completing this module, the learner will be able to draft budgets according to the operational plan of the unit and supervise financial management of a unit against given requirements, by successfully completing the following:

- Link budget plans to operational objectives
- Establish operational objectives in line with the unit's strategic plan
- Formulate the budget according to standard operating procedures
- Review the drafted budget, reflect on and modify it to ensure alignment to the operational plan of the unit
- Agree monitoring systems and adhere to them, according to standard operating procedures
- Monitor expenditure reports for the year for each team within the unit against given criteria
- Implement corrective actions where necessary in accordance with the entity's policies and procedures

DRAFTING BUDGETS AND SUPERVISING FINANCIAL MANAGEMENT

Budgeting is the process of planning financial activities for an upcoming accounting period, usually a year. It requires analysing how a business is currently performing and setting objectives for improving its future financial health. Specific revenue and expense expectations are identified with the intention of increasing a business's profits while keeping expenses in check.

Link Budget Plans to Operational Objectives

In some organisations the preference is for **'top-down' budgeting**: Budgets are imposed by top managers with little or no consultation with lower-level managers. Most companies however prefer the process of **"bottom-up" budgeting**: Budgets are prepared by those who must implement them. The budgets are then sent for approval to higher level managers.

In order to strengthen a business's financial health, budgeting is necessary. Since the financial activities of a business can become quite complex, a budget is needed to outline a plan that managers and employees can follow. Budgeting provides the structure that is required in order to implement effective pricing and spending efforts.

Budgeting offers five main benefits:

1. **Budgeting facilitates planning -** Planning is the main key to budgeting. A business that plans its future financial activities is one that will have a vision for success. Budget planning requires a

business to articulate its vision for the future and how it will accomplish it. Strategies are developed and deadlines are identified to accomplish the established budget.

The planning aspect of budgeting also helps a business establish benchmarks that it can use to measure its progress toward achieving its financial objectives.

2. **Budgeting enhances communication -** Budgets communicate the spending and sales expectations of the managers and employees within an organisation. Communication is enhanced when the individuals responsible for enforcing and meeting financial expectations can find these guidelines in a budget. Managers and employees know what their boundaries are for the upcoming accounting period and can adjust their spending and sales activities accordingly.
3. **Budgeting reinforces accountability -** Since budgets are communicated to those individuals responsible for implementing them, accountability is reinforced. The responsible managers and employees can be consulted if any deviations from the budget occur. Budgets enable accountable individuals to make wise financial decisions by giving them the information they need.
4. **Budgeting identifies problems -** Budget planning requires a business to identify any financial problems that are developing. Since a budgeted financial statement is broken into months or quarters, deviations from the budget can alert members of management to potential problems. Assigning specific numbers to financial expectations helps draw attention to situations the business needs to investigate.
5. **Budgeting motivates employees -** The clear guidelines that are outlined in a budget provide a method by which managers and employees can be rewarded for their efforts. It is easy to evaluate managers' and employees' performance by identifying whether the financial objectives articulated in the budget are met. The compensation that individuals will receive if they meet the financial expectations in the budget will motivate them to adhere to it.

In general, there are three different types of budgets:

1. **Operating Budget**: This is often referred to as the annual budget and shows how much money will be needed over a longer period, such as a year or for the duration of a specific project of programme. Budget amounts are usually divided into major categories, such as salaries, benefits, equipment, office supplies, etc. These major categories can be divided into smaller specific items if needed. The more detailed the categories, the more accurate the budget.
2. **Cash Budget**: shows the amount of cash you expect to receive and pay in the near term, such as a month.
3. **Capital Budget**: shows how much money you have to spend if you want to buy, operate ad maintain major pieces of equipment, such as buildings, cars, computers, furniture, etc.

When you are required to create a budget, it is imperative that you understand exactly what you are budgeting for. You need to understand what the company's vision, strategy and goals are; what the activities are that you need to budget for; and what the overall expectations of the budget is.

Establish Operational Objectives

Setting Budget Objectives

Objectives provide the direction you need when establishing a budget. The guidance objectives provide will ensure that your budgeting decisions relate back to promoting the overall financial health of your

business. Without objectives, you risk making budgeting decisions that are misguided or simply not as effective as they could be.

In order to set effective objectives, you can follow four steps:

1. **Use the data from the previous accounting periods -** Since the first step of creating a budget is to analyse financial statements from previous accounting periods, you have already identified the strengths and weaknesses of your business's financial operations. Use the figures provided from the ratio analysis to determine which financial activities are in need of improvement and which ones are healthy.
2. **Address strengths and weaknesses -** Once you have determined which financial activities are inadequate, create objectives that address these weaknesses. Since you also identified which financial activities are strong, you can use this information to direct your efforts toward the areas that truly need attention.

   For example, if your day's sales outstanding is poor, you might decide to set a somewhat ambitious objective that decreases the amount of time it takes after making a sale to collect money from a customer. Conversely, if your debt-to-total-assets ratio is strong, you could set an objective that was less ambitious for decreasing the amount of debt your business owes.
3. **Assess resources required -** It is important that you examine your objectives to determine if you have the resources necessary to achieve them. If the resources are unavailable, it will be impossible to meet your objectives.

   For example, imagine that one of your objectives for the upcoming accounting period is to improve your total assets turnover ratio by increasing the number of sales your company makes. You would have to determine whether or not you have the manpower available to accomplish this objective. Specifically, you would have to decide if you have enough sales people to handle the increase in projected sales.
4. **Make adjustments to objectives -** If you discover that you do not have sufficient resources to meet your objectives, you must adjust your objectives appropriately. Slight modifications might be all that are necessary to make your objectives achievable. However, a more creative strategy might be required to adjust your objectives.

   For example, imagine that you do not have enough sales people to generate an increase in sales by a certain percentage. You'll have to adjust your objective to reflect a lower, more reasonable figure and look for another financial activity that could be used to accommodate this adjustment, such as increasing your sales price or lowering sales commissions.

Any objective you set for your budget should possess these characteristics:

- *Specific*. A budget must be as specific as possible in order for any person who refers to the budget to be able to fully understand what needs to be accomplished.
- *Measurable*. In order to assess the budget's progress, you should develop measurable objectives. For example, if you wanted to cut the cost of office stationery then a specific percentage should be chosen.
- *Achievable*. It is important to set challenging budgets, but they must be attainable. A budget that sets out unachievable goals will cause frustration and lead to the process losing its impact.
- *Relevant*. Budgets must be relevant to the overall objective of the organisation. If budgets serve no purpose, it is a waste of time and money to create them. Budgets should relate to the financial health of the organisation.

- *Time-based*. Establishing a timeline for goals involves identifying deadlines and milestones. Using milestones allows the team to track its progress and helps break the goal into manageable segments.

Guidelines for Avoiding Budget Traps

- **Losing sight of your objectives -** Sometimes the process of budgeting becomes overwhelming resulting in the focus becoming more on the process of budgeting than the objectives of the budget. It is therefore important that you focus every decision toward the achievement of your objectives.
- **Failing to keep objectives realistic -** Often people overstate income and or expense projections and then become disappointed when the numbers on the budget do not match actual performance. Therefore, it is crucial that you compare all objectives for the upcoming accounting period with actual performances from previous periods. Also, carefully examine all assumptions made about the organisation and the economic environment for the upcoming accounting period.
- **Using an incorrect approach -** Historical-base budgeting is the process of basing your objectives for the upcoming accounting period on the previous period's actual performance. Some persons automatically use the previous accounting period's performance as the budgeted amount for the upcoming period, adding an inflationary increase.

  The problem with this budgeting approach is that consideration is often not given to whether the previous accounting period's performance was good or poor. If the financial activities from the previous accounting period were inadequate, using these figures as a guideline for the upcoming accounting period will simply prolong poor performance.
- **Accepting arbitrary changes -** Objectives are set for a reason: to guide the financial activities for an upcoming accounting period. Therefore, any deviations from the plan for achieving a budget objective should be investigated and, if found to be inappropriate, stopped.
- **Believing that sales have to increase -** It is often believed that sales have to increase with each new accounting period. In fact, some individuals think that if sales do not significantly increase each accounting period, the company's efforts have been a failure. However, this is not always true.
- **Inflexible budgets -** Another difficulty with budgets is that they are often inflexible. Sometimes situations change beyond the control of those responsible for the budget. For example, an operating budget based on annual sales of R10 000 000 may be completely unrealistic if sales are reforecast to R15 000 000 by the time half the accounting period has passed. Since the cost of operations generally increases when more items are produced to meet increased demand, it would be unreasonable to expect those responsible for the operating budgets to keep to the original budget.

  To overcome this potential problem, organisations use variable budgeting. Variable budgets show how each item should vary as the level of activity or output varies.

Formulate the Budget

Budgeting allows a company to be cost effective by carefully monitoring operating expenses. Weekly, monthly, or quarterly monitoring of budget projections through performance reports allows a company to take corrective measures on short notice where and when necessary.

When we are compiling a budget, we would have to analyse the items in the budget from previous years or even the items in other business units, such as:

Costs	Explanation
Fixed	These are costs which do not change i.e. they are fixed, irrespective of how much we produce or sell. An example of a fixed cost would be that of the rental which we are paying for our premises
Variable	These are costs which vary as production varies i.e. the more we produce, the more our variable costs will increase. An example of variable costs would be electricity i.e. the more we produce, the more electricity we will use up in the form of lighting etc. This is only one example of a variable cost. There are many others: advertising, wages, postage etc.
Product	Product costs refer to costs which are associated with the production of the particular units or outputs being sold and these costs are charged against revenues made from the sale of the product. Examples of product costs include material, labour etc.
Period	Period costs are costs which are associated with certain periods of time and therefore expire when the particular time period to which they refer has lapsed. Examples of period costs include depreciation, salaries, rent expense etc.
Opportunity	Opportunity Costs refer to the loss of an opportunity, as a result of rejecting an alternative use of our resources, whether these resources be Land, Labour, Capital or Entrepreneurship. The concept of opportunity cost is often associated with the question " What If...?" In other words, opportunity cost refers to the cost involved of our choosing one option (Option A) at the expense / instead of another option (Option B).
Controllable	Controllable costs are those costs which can be influenced or controlled, either through production or size, as a result of direct management intervention
Non-Controllable	Non-controllable costs refer to those costs which cannot be influenced by management. Examples of non-controllable costs would be the rate of interest that the company has to pay for any monies which it has borrowed from the bank
Future	Future costs refer to those costs that may need to be incurred by the business in the future. It is important to realise that these costs will always only be estimates, as the operation will never have any guarantee as to what is going to happen to the price of things in the future
Past	Past costs refer to those costs which the business has incurred in the past, to assist it with its performance / operation. What is important to realise is that these past costs can often serve as an indication of what the future costs of the business are going to be. Past costs can thus be used for budgeting and forecasting processes, but they must be used with care, as they are no guarantee of what is going to happen in the future. Past costs can also be used for controlling purposes, as well as being able to give management an idea as to what they are spending most of their money on

A manager would prepare a budget to determine whether he/she can achieve their profit goals. To do this, you must project your fixed costs and your variable costs. From these three figures -- targeted profit, fixed expenses and variable expenses -- you can determine your required level of income:

- Many businesses start with a forecast of profits and work up to a forecast of sales.
- Even large corporations can determine the required return on investment that shareholders require, then work back to planned revenue goals.
- Alternatively, you can start with a sales forecast, but don't forget the bottom line must still give you the required return.

Example of a Cash Budget

	Cash Budget for KAURY LIMITED			**Date**: Dec 20X6		
	Month		**Jan**		**Feb**	**March**
	CASH BALANCE					
	Beginning of the month	10 000		10 900	11 700	
A.	**RECEIPTS**					
	Cash Receipts:					
	Cash sales		20 000		24 000	28 000
	Collections from Debtors		5 000		6 000	4 000
	TOTAL CASH RECEIPTS	**25 000**		**30 000**	**32 000**	
B.	**PAYMENTS**					
	Cash Payments:					
	Purchases		11 000		15 000	17 000
	Salaries and Wages		8 500		9 500	9 000
	Rent		2 400		2 400	2 400
	Telephone		450		550	600
	Advertising		900		1 000	1 100
	Payments to Creditors		850		750	650
	TOTAL CASH PAYMENTS		**24 100**		**29 200**	**30 750**
	NET CASH FLOW					
	Surplus/deficit		900		800	1 250
	Beginning Cash Balance	10 000		10 900	11 700	
	Ending Cash Balance	**10 900**		**11 700**	**12 950**	

The Cash Budget consists of two sections: **Cash Receipts and Cash Payments**. Remember that the cash receipts section also includes monies which you have received from your debtors, whilst the cash payments section also needs to include payments which you will make to your creditors, as well as the payment of loans, bank over drafts etc.

- The cash budget is compiled to give the business an idea as to when and how much additional funds it may require, which could, for example be obtained from a bank. It is thus advisable to do the cash budget at the beginning of the businesses financial year, so that adequate and timely provision can be made to obtain outside sources of finance. The cash Budget is also very important in that it forms an essential part of the financial planning process to ensure the survival of the business.
- When drawing up the cash budget of the business, remember to include both fixed (rent) and variable (advertising) expenses. Remember that the variable expenses will change from month to month, hence the name "variable". To determine the extent of the change in the variable expenses of the business, you will need to look at past trends of the business (if it is already in business), the expenses of your competitors / market related businesses and /or such things as inflation. The latter is just one reason why it is so important to keep simple, clear and accurate financial records, as it is these financial records which are often used as a source of projections.

- When forecasting the income and expenses of the business, remember to work on the prudence principle i.e. overestimate the business expenses and underestimate Sales or Income. By following this principle there is a good chance that your projections will be more realistic.
- Remember that the closing balance for January will become the opening balance for February.

Analysing Past Trends in the Budget

You can use an Income and Expenditure Statement to determine the revenue and expenditure for your department. The purpose of an Income and Expenditure Statement is to clearly show how much money was made and how much was spent within a given time period.

An income and expenditure statement is a report of the money you made and the money that you spent during a period of time. You can do a statement for a month, a quarter or a year or any time period.

- **Income -** For the purposes of this module, income is defined as money that has been made within the time period of the statement. It is an important accounting concept to correctly account for income within the time period of the financial statement. This means that you should include in your income calculation money that you have made but not yet received. For example, if you were a trader and sold goods but had not yet received the money (because you had given your customer some credit terms) you should nonetheless include the sale as income for the period, even if the customer only pays you after the end of the period.
- **Expenditure -** For the purposes of this module, expenditure is defined as the costs that have been incurred within the time period of the statement. As with the concept of income, you should accrue for expenditures incurred within the time-period even if you have not paid for them. If, for example, you were doing a household income and expenditure statement for the end of September and you had not received your water and lights account, nor paid it for September, you should nonetheless include it (or a reasonable estimate) in the income and expenditure statement for September. This ensures that you have an accurate statement of the real expenditures incurred within the period.

At the end of the income and expenditure statement, you subtract Expenditure from Income and the remaining portion is what an enterprise would call Profit. If expenditures were more than Income, the negative difference is what an enterprise would call Loss.

Example

Best Ltd produces the chemical flavours used to flavour foodstuffs. They have been in operation since 1958 and continue to run as a family owned private business. Because they are incorporated as a company, they are required to produce Annual Financial Statements. Interested parties, such as the owners of the company, clients and suppliers who do business with them and SARS, the Receiver of Revenue, may review these financial statements and make decisions on the results accordingly.

Best Ltd	
Statement of Income and Expenditure	
For the period 1 September 2XX9 to 31 October 2X10	
	R
Income	
Sales	1,500,000
Less: Purchases	700,000
Gross Profit	800,000
Less: **Expenditure**	
Accounting Fees	1,200
Cleaning Materials	5,000
Computer Expenses	20,000
Motor & Travel	50,000
Rental of Factory Premises	200,000
Stationery & Office Expenses	20,000
Staff Refreshments	10,000
Salaries	400,000
Staff Training	1,000
UIF	4,000
Workman's Compensation	4,000
Net Profit	84,800

REVIEW AND MODIFY THE DRAFTED BUDGET

Once complete, the drafted budget is reviewed, reflected on and modified to ensure alignment to the operational plan of the unit.

The frequency with which a manager monitors the budget and checks for variances will differ: a sales person or production supervisor usually checks his/her performance daily, while the production or sales manager might check weekly.

Determine what caused the variance:

- Have we lost orders?
- Have we spent too much on raw materials?
- Have we used more materials than we thought we would?
- Have we spent too little or too much on promotion?

Variance analysis entails measuring actual performance against the standards and the coordinated plan. A variance is the **difference between budgeted and actual performance.** A deviation from the standard could be favourable or unfavourable, i.e. positive or negative.

React and report to everyone else who needs to know. If someone else has a variance, you need to ask yourself what it means to your bit of the business. What corrective action do you need to take?

A production variance occurs when a machine fails. If this is likely to cause a prolonged problem, Production should let Marketing know, as Marketing might commit the business to orders which cannot be filled, or spend money advertising products which cannot be delivered.

A budget is not cast in stone. The manager needs to take appropriate action to either get the original budget back on track, or revise the original budget commitment to take new facts into account, depending on how significant the variance is.

Questions the manager would ask, are:

- Should we reduce costs?
- Should we increase promotional expenditure to continue to maintain sales?
- Should we increase production to meet higher than expected sales figures?
- Should Marketing cut back because Production can't keep up?
- Should the whole budget be revised to meet the new position?

SUPERVISE FINANCIAL MANAGEMENT OF A UNIT

If it can't be measured, it can't be managed

What gets measured gets watched

What gets watched gets done

Unknown author

Financial management consists of planning for the future of a business enterprise to ensure a positive cash flow. It includes the administration and maintenance of financial assets, as well as the process of identifying and managing risks.

The primary concern of financial management is the assessment rather than the techniques of financial quantification. A financial manager looks at the available data to judge the performance of the enterprise.

Some experts refer to financial management as the science of money management.

At the corporate level, the main aim of the process of managing finances is to achieve the various goals a company sets at a given point of time.

Businesses also seek to generate substantial amounts of profits, following a particular set of financial processes.

Financial managers aim to boost the levels of resources at their disposal. Besides, they control the functioning on money put in by external investors. Providing investors with sufficient amount of returns on their investments is one of the goals that every company tries to achieve. Efficient financial management ensures that this becomes possible.

From the business unit's point of view, the manager's role in its financial management is associated with financial planning and financial control.

Financial planning seeks to quantify various financial resources available and plan the size and timing of expenditures.

Financial control refers to monitoring cash flow. Inflow is the amount of money coming into the unit, while outflow is a record of the expenditure being made by the unit. Managing this movement of funds in relation to the budget is essential for the unit's successful financial management.

A business unit manager must be able to:

- Interpret financial reports including Statements of Comprehensive Income (income statements), Profit and Loss statements, Statement of Cash Flows and Statement of Financial Position (balance sheet) statements
- Improve the allocation of working capital within business operations
- Review and fine tune financial budgeting, and revenue and cost forecasting
- Look at the funding options for business expansion, including both long and short term financing
- Review the financial health of the company or business unit using ratio analyses
- Apply critical financial decision-making techniques to assess whether to proceed with a project

Financial Performance Measurement Techniques

Planning, budgeting, and performance measurement transform strategy into action. They complete the strategic process of goal setting, strategy formulation, and implementation. Goals and strategy are the products of strategic thinking. The products of planning are objectives, timetables, budgets, and a baseline to measure and analyse performance.

Financial performance measurement is about using any of many different mathematical measures to evaluate how well a company is using its resources to make a profit. Common examples of performance measurement include operating income, earnings before interest and taxes, and net asset value. It is important to note that no one measure of performance should be taken on its own. Rather, to arrive at a true sense of how a company is doing, one must use as many different measures as possible together.

Getting on top of financial measures of your performance is an important part of running a growing business, especially in the current economic climate.

Measuring your profitability:

Most growing businesses ultimately target increased profits, so it's important to know how to measure profitability. The key standard measures are:

- **Gross profit margin -** how much money is made after direct costs of sales have been taken into account, or the contribution as it is also known.
- **Operating margin -** this lies between the gross and net measures of profitability. Overheads are taken into account, but interest and tax payments are not. For this reason, it is also known as the EBIT (earnings before interest and taxes) margin.
- **Net profit margin -** this is a much narrower measure of profits, as it takes all costs into account, not just direct ones. All overheads, as well as interest and tax payments, are included in the profit calculation.
- **Return on capital employed -** this calculates net profit as a percentage of the total capital employed in a business. This allows you to see how well the money invested in your business is performing compared with other investments you could make with it, like putting it in the bank.

Other key accounting ratios:

There are a number of other commonly used accounting ratios that provide useful measures of business performance. These include:

- **liquidity** ratios, which tell you about your ability to meet your short-term financial obligations
- **efficiency** ratios, which tell you how well you are using your business assets
- **financial leverage or gearing** ratios, which tell you how sustainable your exposure to long-term debt is

Principles of performance measurement

- **All significant work activity must be measured.**

- Work that is not measured or assessed cannot be managed because there is no objective information to determine its value. Therefore, it is assumed that this work is inherently valuable regardless of its outcomes. The best that can be accomplished with this type of activity is to supervise a level of effort.
- Unmeasured work should be minimised or eliminated.
- Work measurement must include the resources (manpower, expenses, and investment) required to accomplish the desired results.

- **Desired performance outcomes must be established for all measured work.**
  - Outcomes provide the basis for establishing accountability for results rather than just requiring a level of effort.
  - Desired outcomes are necessary for work evaluation and meaningful performance appraisal.
  - Defining performance in terms of desired results is how managers and supervisors make their work assignments operational.
- **A time phased performance baseline must be developed to evaluate total organisational performance.** This baseline must incorporate all organisational activity. This includes:
  - Operating performance outcomes that define the desired results from operations and the operational resources (manpower, material, assemblies, etc.) required to achieve these results.
  - Financial performance outcomes that define the expected revenue and expense results, and investment required to support operating activity.
  - Schedule performance that defines when these results and investment are expected to occur.

  This baseline provides the standard for evaluating organisational results, determining variances from the plan, and implementing corrective action.
- **Operating and financial performance reporting must be synchronized with the same reporting periods and reporting frequency.**
  - Reporting periods and frequency must be consistent with the time phasing of the performance baseline.

- **Performance reporting and variance analyses must be accomplished frequently.**
  - Frequent reporting enables timely corrective action.
  - Timely corrective action is needed for effective management control.

Develop the Performance Measurement Baseline

- **Work should be planned at the organisational level accountable for the results of that work.**
  - This planning establishes accountability for variance analysis and corrective action.

- Work planning may include breaking down the work into lower level results and resource requirements. Examples:
    - Subdividing marketing expense requirements into advertising, promotion, administrative, etc.
    - Subdividing production manpower requirements into direct manpower, indirect manpower, and overhead manpower.
    - Subdividing sales expectations into product A sales, product B sales, etc.
- The lower the level of work planning and reporting, the more accurate will be the variance analysis.
- Meaningful work planning cannot go lower than the organisation's management reporting capability.
- Work planning includes identifying the desired results from the work activity and estimating the physical and financial resources needed to accomplish these results.

- **Operational planning begins by determining the operating results to be achieved and estimating the physical resources needed to achieve them.**
    - Estimating relationships used to relate operating results and physical resources should be formalised so they can be monitored during performance measurement.
        - Example- direct production man-hours per unit produced.
- **Financial planning involves estimating the income and expense results from the operating plan and the investment needed to support the plan.**
    - Estimating relationships used to relate physical activity and resources to income, expense, and investment rands should be formalised so they can be monitored during performance measurement.
        - Example- revenue per unit sold.
- **The performance measurement baseline integrates operational and financial planning results and displays them on a common timeline.**
    - Operational and financial planning results and resource requirements may be summarised to the organisational level accountable for the results of that work.
        - Summary reporting may be more convenient for upper management needs.
        - Lower reporting levels must still be maintained for variance analysis.
- **Operating plans and budgets must be consistent with the performance measurement baseline.**
    - Functional operating budgets lower than the baseline can be used to provide an incentive to managers and supervisors but operating budgets may not exceed the baseline values.
        - When operating budgets are less than the baseline the resource requirements must be reduced commensurately to preserve the estimating relationships used to develop the budget.

- **Changes to the performance measurement baseline must be controlled and justified.**

- No retroactive changes to completed work are permissible since this negates any meaningful variance analysis.

Agree and Adhere to Monitoring Systems

The key aspects to financial controls and monitoring are:

1. Accounting Records (or Accounts Receivable and Payable):

Establish a process that records every financial transaction by maintaining paper files, an electronic database, and copying all records in a virtual library. You need to be able to demonstrate what funds were received and how funds were spent.

Accounting records should be consistent. Choose a method and regular schedule for tracking income and expenses according to your organisation's policies and procedures. This is important in case the organisation is audited.

2. Financial Planning:

Financial planning converts your unit's objectives into a budget. The budget serves as a critical planning guide for you and your staff. It is a record of how you intend to spend the funds received. Financial planning allows you to review your unit, examining successes and challenges in the past. Planning also enables you to make projections and set targets, informing strategies for future success.

3. Financial Monitoring and Reporting:

Drawing from the information in the accounting records, you can create internal reports that help monitor progress by comparing budgets to actual expenses. Frequent reviews and monitoring allow you to measure your unit's progress and help inform decision-making about the unit's or a project's future.

Internal reports, sometimes called management reports, allow you to be forward thinking as you assess the financial status of the unit and what will be needed to realise your goals.

Accounting records are also the source for creating external financial reports that demonstrate to stakeholders how funds have been spent.

Management may require financial reports at the completion of a project or periodically during a project's implementation.

4. Internal Controls:

Controls are financial practices that help safeguard your assets and ensure that money is being handled properly. Controls help detect errors in accounting, prevent fraud or theft, and help support the people responsible for handling your unit's finances.

Examples of how to ensure that funds are spent transparently and in a manner for which they are intended:

- Have two people approve and sign the expenses over a certain amount of money
- Keep records that cannot be altered by numbering receipts, using a system where the data entry corresponds with a specific invoice or contract
- Assign qualified and experienced personnel to manage accounts
- Assign different staff in your unit distinct responsibilities related to managing income. For example, one person is responsible for authorising expenses, another is responsible for handling cash, and another is responsible for recording transactions
- Develop a procedural manual for record-keeping

Monitor Expenditure Reports

Expenditure is defined as: "Actual payment of cash or cash-equivalent for goods or services, or a charge against available funds in settlement of an obligation as evidenced by an invoice, receipt, voucher, or other such document.

Revenue expenditure is cash used in payment for goods and services consumed in a short period.

A capital expenditure is cash used in purchase of fixed assets that last one year or more."

Your team will report back on expenditures at the frequency and in the format required by your organisation. Your role is to control the submissions, analyse the reports and pick up variances timeously in order to strategise and implement corrective actions.

Implement Corrective Actions where Necessary

Variance Analysis

- **The purpose of variance analysis is to determine the corrective action needed (if any) to accomplish the desired operating and financial results.**
  - Variance analysis effectiveness is directly proportional to the level of detail used to develop the performance measurement baseline.
    - Comparing the estimating relationships used to develop the baseline with current measured values provides advance notice of the accuracy of the baseline estimates.
    - Comparing the baseline to an estimate using these updated relationships will show how current results are impacting final performance.
  - The decision whether to take corrective action is driven by the impact of current performance on estimated final results.
  - Variance analysis contributes to learning and understanding the system dynamics that causes the observed results.

- **Variance analysis has the following objectives.**
  - Analyse the impact of current performance on final operating and financial results.

    - This will determine whether corrective action is indicated.
    - If the estimated final results are unacceptable, corrective action is needed.
  - Determine the root causes of the existing variances.
  - Determine the corrective action needed to achieve the desired results.
- **Operating results must be reported promptly and on a consistent schedule.**
  - Timely corrective action requires prompt variance analysis.
  - Performance reporting should include the data needed to analyse the estimating relationships that were used to develop the baseline.

LEARNING UNIT TWO 2

ASSESSMENT CRITERIA

Apply mathematical analysis to economic and financial information. 252036

SPECIFIC OUTCOME 1 - 3

- Use mathematical techniques to collect and organise data.
- Apply mathematical techniques to calculate and represent financial and economic data.
- Apply mathematical analysis to indicate economic relationships.

USE MATHEMATICAL TECHNIQUES TO COLLECT AND ORGANISE DATA

After completing this module, the learner will be able to use mathematical techniques to collect and organise data, by successfully completing the following:

- Select appropriate methods for collecting, recording and organising financial and economic data
- Collect financial and demographic data relevant to the unit
- Record financial and demographic data relevant to the unit in a usable format

USING MATHEMATICAL TECHNIQUES TO COLLECT AND ORGANISE DATA

The Concise Oxford Dictionary defines statistics as "Numerical facts systematically collected" and statistic as "Statistical fact or item".

Statistics entails all aspects of information: collecting, organising, comprehending, communicating, and interpreting.

Data (singular is *datum*): things known or assumed as the basis for inference (drawing conclusions) or calculation

The word "Statistics" originally referred to collections of facts (not necessarily numerical) about the State. According to modern usage, however, it refers to collections of numerical facts or estimates and is not restricted to the State.

The word "statistics", when used in the plural, refers to the figures themselves, suitably classified and tabulated together with any secondary statistics derived from them, such as percentages or averages.

"Statistics", when used in the singular, refers to the study which deals with the collection, analysis and interpretation of figures. This is also called Statistical Method.

Statistical Method can be broadly divided into two categories, namely descriptive and mathematical statistics:

- **Descriptive Statistics.** Compiles and presents data exactly as recorded. Descriptive statistics is the most basic form of statistics and lays the foundation for all statistical knowledge
- **Mathematical Statistics.** Based on the theory of probability, it attempts to draw precise general conclusions from the data

We are going to be focusing on Mathematical Statistics in the course of this module.

Purpose of statistics

Statistics are all around us. In fact, it would be difficult to go through a full week without using statistics. Imagine watching a football game where no one kept score. The action itself might provide enough excitement to hold your attention for a while, but think of all the drama that would be lost if winning and losing weren't at issue.

Without statistics we couldn't plan our budgets, pay our taxes, enjoy games to their fullest, or evaluate performance...

Anyone who manages anything, whether it's the family budget, a large corporation's finances or a soccer team, the largest of manufacturing or retail companies, or the smallest of spaza shops, needs statistical information and method for both routine and special purposes, such as the day-to-day running of the business or club, or making new investments.

Both the manager in a large company and the sole proprietor of the corner café require sales statistics in order to detect changes in the pattern of sales, so that they can identify a problem when it occurs and rectify it before it becomes an even bigger problem.

Therefore, the purpose of statistics is not simply to prove a point or satisfy curiosity, but to enable correct decisions to be taken; decisions which are usually based either on comparisons or on estimates.

For example, if we tell our manager that our team has produced 500 tons of a certain product this week, she must have some standard of comparison to tell her if that is satisfactory.

She may know that our team normally produces 600 tons a week, or that our team's capacity is actually 650 tons a week, or she may be told that another team, with half as many workers, has produced 350 tons this week.

Such comparisons provide information on which action can be taken.

Estimates based on present knowledge are also essential to government and industry alike when formulating plans for the future:

For example, a local authority planning to build a new school must estimate the numbers of children likely to require admission during the next few years.

A manufacturing company deciding whether to build a new plant requires estimates of future demand, as well as knowledge of current trade and production statistics.

Such estimates will be based partly on statistics of population, incomes, regional employment, etc. and partly on a mathematical analysis of past records, while projecting into the future.

The essential function of statistics is control. The team leader does not need statistics to tell him/her what is going on in the workplace- s/he knows the workers, the work going through, when a machine breaks down, etc. However, the manager cannot know it all and depends on the statistics which are supplied to him/her to exercise control and make decisions.

Limitations of statistics

Remember, statistics deal only with the measurable aspects of things and can, therefore, seldom give the complete solution to a problem. They provide a basis for judgment, but not the whole judgment.

More often than not, statistics are used (consciously or subconsciously) to justify decisions that have been reached on other grounds.

Forecasts can sometimes be proved incorrect or invalid by political events, economic crises, new inventions and other unforeseen circumstances.

It is therefore important that the limitations of statistics are understood by both those who compile them and those who use them.

SELECT METHODS FOR WORKING WITH FINANCIAL AND ECONOMIC DATA

Financial data are defined as follows: “a full fiscal year’s data on a company's performance in terms of profits, revenues, operating income, etc. when accompanied by discussion of significant events that have affected performance”.

Financial data include, but are not limited to, the documentation of the charges for services, costs of providing services, revenues generated from services and revenues from other sources.

The primary goal of financial data analysis is to maximise the wealth of the shareholders and the overall profitability of the company. Financial managers maximise the wealth of the shareholders by applying such concepts as credit and inventory management.

Economic data are usually numerical time-series, i.e., sets of data (covering periods of time) for part or all of a single economy or the international economy. When they are time-series the data sets are usually monthly but can be quarterly and annual. The data may be adjusted in various ways (for ease of further analysis), most commonly adjusted or unadjusted for seasonal fluctuations.

Economic data may also describe functions or inter-relationships between variables [where the inter-relationships may be theoretical (e.g. a production function) rather than factual], and they may describe a static as opposed to a dynamic relationship (e.g., an input-output matrix as opposed to a series showing changes of automobile output over time).

Thousands of data sets are available. At the level of an economy, these are compiled by use of national accounts. Such data include the major components of Gross National Product, Gross National Expenditure, Gross National Income, and a whole range of series including output, orders, trade, confidence, prices and financial series (e.g., money and interest rates). At the international level there are many series including international trade, international financial flows, direct investment flows (between countries) and exchange rates.

Within a country the data series are usually produced by one or more statistical organisations, e.g., a government or quasi-government organisation and/or the central bank. International statistics are produced by several international bodies and firms, including the International Monetary Fund and the Bank for International Settlements.

Demographic Data

Demographic data are the characteristics of a human population as used in government, marketing or opinion research, or the demographic profiles used in such research. Commonly used demographics include sex, race, age, income, disabilities, mobility (in terms of travel time to work or number of vehicles available), educational attainment, home ownership, employment status, and even location. Distributions of values within a demographic variable, and across households, are both of interest, as well as trends over time. Demographics are frequently used in economic and marketing research.

Demographic trends describe the changes in demographics in a population over time. For example, the average age of a population may increase over time. It may decrease as well. Certain restrictions may be set in place changing those numbers, e.g. in China with the one child policy.

Methods for Collecting Data

There are two types of data:

- Primary data
- Secondary data

When obtaining mathematical information, the investigator must take care to use science and technology effectively and critically, showing responsibility to the environment and health of others.

Primary data are data collected directly by the investigator or by the organisation employing the investigator.

Primary data are collected by a variety of methods:

- observation
- personal interview
- check sheets
- electronic data capture
- experiments simulated on a computer
- controlled laboratory or field experiments.

Secondary data are collected by someone else and are available in published sources; for example, quarterly profits published in the Finance Week are secondary data.

- **Literature study -** This is a source of secondary data from which information may be gleaned. To access this form of secondary data we need to read published books, articles and other literature by experts on our subject.

Example of secondary data:

Economic and financial indicators

Jun 24th 2010

From *The Economist* print edition

Inflation in **America** fell by a fifth of a percentage point to 2% in May. On a seasonally adjusted basis, prices fell by 0.2% from a month earlier. On June 23rd the Federal Reserve voted to keep interest rates unchanged, remarking that underlying inflation had trended lower in recent months.

The number of new houses sold in **America** during the month of May fell by nearly a third from a month earlier, to an annual pace of 300,000, 18.3% lower than the corresponding rate a year earlier.

America's current-account deficit for the 12 months to the end of the first quarter widened to $391.9 billion from $378.4 billion for the year to the previous quarter.

Inflation in **Canada** eased to 1.4% in May from 1.8% in April. Excluding energy prices, inflation slowed by a tenth of a percentage point to 1.0% last month.

The **euro area's** current-account deficit shrank to $48.9 billion in the 12 months to the end of April from $52.6 billion in the year to the previous month.

Industrial output in **Taiwan** surged by 30.7% in the year to the end of May.

Inflation in **Malaysia** edged up by a tenth of a percentage point to 1.6% in May. Prices rose by 0.3% from the month earlier, the first month-on-month increase since January.

Hong Kong's inflation rate rose by 0.1 percentage points to 2.5% in May.

From: http://www.economist.com/markets/indicators/

Check sheets

A check sheet / checklist is structured and the questions are closed.

Advantages of checklists are that:

- they are easy and convenient to answer;
- the responses are easy to measure;

- the data can be processed in a uniform way.

The respondents can only choose which answer best describes them and because the respondent is offered little choice the researcher only needs to count up how many respondents agreed with a specific response.

Disadvantages of checklists are that:

- The respondent may be irritated by not being able to find his or her preferred answer among the given alternatives.
- The checklist may produce results that lack accuracy because the questions are answered at a very superficial level. The respondents may want to qualify or explain their responses but not have the opportunity to do so.

This problem may especially be faced by a respondent presented with a situation (or, incident) who is then asked to check which attitude he most identifies with, with regard to the incident. The checklist is not always the most practical method of gauging the opinions and beliefs of the respondent.

An example of a checklist:

Which mode of transport do you take to work? [Check which]		
1	Car	
2	Bus	
3	Train	
4	Taxi	

If a researcher has made provision for all possible alternative answers to each question, and if the respondent need merely tick the answer that applies, the questionnaire is called a checklist.

Observation

To find out how much of a thing exists, or to find out what the result is of combining one ingredient with another, the best thing to do is to look. Often, looking at the condition of the subject or at the results of an experiment can yield a satisfactory answer. This is called observation.

Observation is the most obvious form of primary data collection. If you want to know the product yield in a chemical reaction, observe the reaction and measure the results. This is a very effective method of data collection.

Example

How many cars enter the Canal Walk parking garage at entrance 5 on an average weekday morning between 5am and 7 am?

	Monday	Tuesday	Wednesday	Thursday	Friday
5:00 - 5:59	𝍸 III	𝍸 I	𝍸 𝍸 I𝍸	𝍸	𝍸
6:00 - 6:59	𝍸 𝍸 I𝍸	𝍸 𝍸 II𝍸 I	𝍸 𝍸 I𝍸 III	𝍸 𝍸 I𝍸	𝍸 𝍸 𝍸 𝍸 𝍸 I

This table is an example of a tally sheet. A tally sheet is useful if we want to know how much of a certain thing exists or is present.

Questionnaires

Market researchers and others use questionnaires to aid them in their research. A questionnaire is a sheet containing questions. A respondent needs to answer the questions.

First, the mode of data collection must be decided upon (*e.g., mail, telephone, or in person*). Once this has been determined a questionnaire can then be developed and pre-tested.

Planning the questionnaire is one of the most critical stages in the survey development process. Social and behavioural scientists have given a great deal of thought to the design issues involved.

Questionnaire construction has elements that often appear to be just plain common sense, but, when they are implemented, may involve some subtlety. It is common sense to require that the concepts be clearly defined and questions unambiguously phrased; otherwise, the resulting data are apt to be seriously misleading.

Consider how we might apply this strategy in a survey to estimate the incidence of robbery victimisation. One might start out by simply asking, "Were you robbed during the last six months?" Although apparently straightforward and clear-cut, the question does present an ambiguous stimulus. Many respondents are unaware of the legal distinction between *robbery* (involving personal confrontation of the victim by the offender) and *burglary* (involving breaking and entering but no confrontation).

Therefore, in such a survey, the questions on robbery victimisation would not mention "robbery." Instead, there are several questions used; when taken together, they seek to capture the desired responses by using more universally understood phrases.

Example from the National Crime Victim Survey Questionnaire:

I'm going to read some examples that will give you an idea of the kinds of crimes this study covers.

As I go through them, tell me if any of these happened to you in the last 6 months, that is since _____ _____, 201_.

Was something belonging to YOU stolen, such as-

a. Things that you carry, like luggage, a wallet, purse, briefcase, book-

b. Clothing, jewellery, or calculator-

c. Bicycle or sports equipment-

d. Things in your home-like a TV, stereo, or tools-

e. Things from a vehicle, such as a package, groceries, camera, cassette tapes- OR

f. Did anyone ATTEMPT to steal anything belonging to you?

Briefly describe incident(s)

Designing a suitable questionnaire entails more than well-defined concepts and distinct phraseology. Attention must also be given to its length. Long questionnaires are apt to induce **respondent fatigue and errors arising from inattention, refusals, and incomplete answers**. They may also contribute to higher non-response rates in subsequent surveys involving the same respondents.

There are other factors to take into account when planning a questionnaire. These include such diverse considerations as: the order in which the questions are asked. their appearance, even such things as the questionnaire's physical size and format.

Respondents are more likely to cooperate if the **questions are simple, clear, easy to answer, and personally relevant** to them. It is recommended that questionnaires be written at the **9th-grade (standard 7)** reading level.

When you think you've finished the individual questions, step back and look at the questionnaire as a whole. Remember, the questionnaire is a total package and needs to be considered as such:

- It needs a strong introduction conveying to the respondent what the survey is about.
- It should indicate why the questions are being asked.
- It needs interesting and readily answerable questions at the beginning to gain respondent attention and build rapport.
- The conclusion should be gentle and friendly, expressing gratitude for the respondent's time and effort.

The questions need to flow well from one to the next, and designers should be aware that earlier questions provide information and context to the respondents that they may use in later answers. Often the answer to one question may influence the answer to a later question. *For instance*, suppose respondents are asked first, How do you feel about your job? and later on How do you feel about life in general?

Answers to the second question may be tempered by the first question. Because respondents have already reported their feelings about their job, including those feelings in the second answer may be redundant.

On the other hand, if their job is very important to them, then the answer to the first question may be used when constructing the second answer. These so-called "order effects" are difficult to predict and often become apparent only through pre-tests of the questionnaire, in which different orderings of the questions are compared.

Interviews

In the interview, the researcher talks to the respondent and obtains information directly. This can be **advantageous** because it is flexible and in-depth. When a respondent speaks, the interviewer is able to redirect the questioning to deal with the unexpected. The researcher can ascertain why the respondent answers a certain way. People will more readily answer questions in an interview than they will in a questionnaire.

Interviewing is sometimes difficult because it costs a great deal in time and money. It can reach out to far fewer respondents than the questionnaire. It takes a great deal of experience and expertise on the part of the interviewer to prepare an interview schedule (the list of questions to be asked) and to ask questions in a way that allows valid conclusions to be drawn from the responses.

Surveys

These are very simple questionnaires which require very little from the respondent. An example in the arena of workplace training may require the respondent to tick the appropriate box in answering the following questions:

Example

1. In which department do you work?		
2. Are you currently studying?	[yes]	[no]
3. If not, how recently have you completed a study program?	[within the past 12 months]	[more than 12 months ago]
4. What is the highest qualification you have?		

- **Shortcuts to avoid when conducting a survey**

Conducting a credible survey entails scores of activities, each of which must be carefully planned and controlled. Taking shortcuts can invalidate the results and badly mislead the users of the information gathered.

Here are three shortcuts to avoid:

- Not pre-testing procedures
- Not sufficiently following up on non-respondents
- Sloppy work and inadequate quality controls.

A pre-test of the questionnaire and procedures is the only way of finding out if everything "*works*"- especially if a survey employs new techniques or a new set of questions. Because it is rarely possible to foresee all the potential misunderstandings or biasing effects of different questions and procedures, it is vital for a well-designed survey operation to include provision for a pre-test. There should usually be a series of small-scale pilot studies to test the feasibility of the individual techniques (if new) or to perfect the questionnaire concepts and wording.

This should be followed by a full-scale "*dress rehearsal*" to find out if everything connects together as intended.

Failure to follow up non-respondents can ruin an otherwise well-designed survey. It is not uncommon for the initial response rate in many surveys to be under 50 percent.

Sloppy execution of a survey can seriously damage results. Without proper checking, errors may go undetected. With good procedures, on the other hand, they might even have been prevented.

Difficulties may arise at any point during these basic steps of the survey process:

- **Organisation**-The survey taker determines who is to be sampled and what is to be learned about the sample.
- **Questionnaire Design**-Based on the goal of the survey, questions for survey respondents are prepared and arranged in a logical order to create the survey questionnaire.
- **Sampling**-A repeatable plan is developed to randomly choose a sample capable of meeting the survey's goals. Then a sample is selected.
- **Data Collection**-A plan for contacting the sample and collecting information from participants is developed and carried out.
- **Data Processing**-Collected data are entered into the computer and checked for accuracy.
- **Analysis-**The results of the survey are compiled and disseminated.

A final problem that can be encountered during surveys is “Interviewer bias” , which can easily arise in highly-charged emotive or political inquiries, for example, when the interviewer misunderstands a reply, marks a wrong code on the answer sheet, or even interprets an answer incorrectly as a result of his/her own view on the topic.

Replies can also be biased through forgetfulness on the part of the people interviewed, by the desire to make a good impression on the interviewer, or by the fear that a truthful answer may result in something to their disadvantage. In such cases, it may be better to leave a form or questionnaire to be filled in and collected later.

Collecting demographic data

Collection of demographic data can be broadly categorised into two methods:

- direct and
- indirect.

Direct demographic data collection is the process of collecting data straight from statistics registries which are responsible for tracking all birth and death records and also records pertaining to marital status and migration.

Perhaps the most common and popular methods of direct collection of demographic data is the census. The census is commonly performed by a government agency and the methodology used is the individual or household enumeration.

The interval between two census surveys may vary depending on the government conducting. In some countries, a census survey is conducted once a year or once every two years and still others take a census once every 10 years. Once all the data collected are in place, information can be derived from individuals and households.

The indirect method of demographic data collection may involve only certain people or informants in trying to get data for the entire population. For instance, one of the indirect demographic data methods is the sister method. In this method, a researcher only asks all the women about the number of their sisters who have died or have had children who have died and at what age they died.

From the collected data, the researchers will draw their analysis and conclusions based on indirect estimates on birth and death rates and then apply some mathematical formula so they can estimate trends representing the whole population. Other indirect methods of demographic data collection may be to collect existing data from various organisations that have done a research survey and collate these data sources in order to determine trends and patterns.

Methods for Recording Data

Once the researcher has collected all the relevant figures, s/he has to sort them into a reasonably compact statement.

Both the final report, as well as the intermediate stages will consist largely of statistical tables, as they are a convenient way of summarising the data in an orderly manner and of presenting the results concisely and intelligibly. To record data, you could use:

- **Worksheets** are generally kept as a permanent record of the calculations performed on the data, both as a guide for future investigations and for reference in case figures are queried or further detail is required.
- The great advantage of **charts** is that the important features stand out immediately, for example comparisons and trends, which would normally only be revealed by careful checking of figures.

It is important to remember that charts must not depict too many items and the colours must also be clearly distinguishable, as confusion could arise.

Most of the charts occurring in statistics are graphs or similar to graphs in that they represent relations between two variables, for example we have time-series charts, which show how one variable, such as output, sales, population or prices, varies with time.

The most common types of charts are:

- Pie charts
- Line graphs
- Bar charts
- Stack bar charts
- Histograms

We will discuss them in more detail in Module 6.

Methods for Organising Data

Data that have been collected are not very useful in their raw form. They have to be processed or worked with so that we may draw helpful conclusions from them. This means the data must be organised or arranged in a way that makes sense, e.g.:

- A very simple way of organising data is to **arrange them in ascending order**; that is, write all the numbers down arranged in order from smallest to largest.
- Another important aspect of organising data is to **work out or calculate various features of the sets of data** you have obtained.

  This means working out the **averages** of the data (we use the mean, median and mode). These averages are called "measures of central tendency", and they give us an indication of how close the data points are to one another.

  Another important feature of data is something called "measures of dispersion". This tells us how the data points are spread, how far apart they are from each other, or how scattered they are. Here we calculate the **range**, the **standard deviation** and the **variance**.

  We will be looking at these calculations in Module 6.

Methods for Analysing Data

Data collected should be organised before it can be compared. This makes it easy to use and make meaningful analysis.

When analysing data (whether from questionnaires, interviews, focus groups, etc.), always start by reviewing your research goals, i.e. the reason you undertook the research in the first place. This will help you organise your data and focus your analysis.

Example:

If you wanted to improve a program by identifying its strengths and weaknesses, you can organise data into program strengths, weaknesses and suggestions to improve the program. If you wanted to fully understand how your program works, you could organise data in the chronological order in which customers or clients go through your program. If you are conducting a performance improvement study, you can categorise data according to each measure associated with each overall performance result, e.g., employee learning, productivity and results.

Graphical Analysis

Graphical analysis means displaying the data in a variety of visual formats that make it easy to see patterns and identify differences among the results set. There are many different graphing options available to display data, the most common are Bar, Pie, and Line charts.

Frequency Distributions

A frequency distribution is a table, which summarises data into intervals or classes each with corresponding frequencies. Frequency means the number of times an item occurs.

Example:

The following are the masses of 20 soccer players:

75kg, 81kg, 70kg, 63kg, 75kg, 67kg, 65kg, 75kg, 70kg, 82kg, 70kg, 75kg, 65kg, 59kg, 72kg, 59kg, 72kg, 82kg, 64kg. 68kg.

In order to get a clear picture of the data, we should reorganise this data in a manner that it will be easy to read, use and analyse.

The following are considerations in constructing frequency distributions:

- Determine the data range i.e. the difference between the largest and smallest data values. For instance, the range of the above data is 82kg – 59kg = 23kg
- Decide on the width and number of intervals or classes. If you decide on the intervals 50kg - 59kg, 60kg – 69kg, 70kg – 79kg, 80kg – 89kg, then the number of classes will be 4 and the class width will be 10kg.

- However, if you decide on the intervals 55kg – 59kg, 60kg – 64kg, 65kg – 69kg, 70kg – 74kg, 75kg – 79kg and 80kg – 84kg, then the number of classes will be 6, with class width being 5kg. The numbers 50kg – 59kg, 60kg – 69kg etc. are called class limits.
- Determine the class boundaries. Some books do not differentiate between class boundaries and class limits. Class boundaries are the averages of limits of consecutive classes or intervals. For instance, the intervals 60kg – 64kg and 65kg – 69kg are consecutive. The class boundaries of the two will be $\frac{64kg + 65kg}{2} = 64.5kg$

The class marks will be the midpoints of the resulting class boundaries. Doing this for the 6 classes will give the following table:

Class limits	Class boundaries	Class marks
55kg – 59kg	54.5 – 59.5	57 i.e. $\frac{59.5 + 54.5}{2}$
60kg – 64kg	59.5 – 64.5	62
65kg – 69kg	64.5 – 69.5	67
70kg – 74kg	69.5 – 74.5	72
75kg – 79kg	74.5 – 79.5	77
80kg – 84kg	79.5 – 84.5	82

Frequency tables are another form of basic analysis. These tables show the possible responses, the total number of respondents for each part, and the percentages of respondents who selected each answer. Frequency tables are useful when a large number of response options are available, or the differences between the percentages of each option are small. In most cases, pie or bar charts are easier to work with than frequency tables.

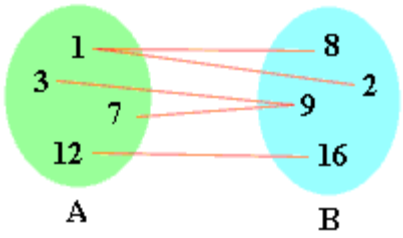
Response	Count	Percent
Market Analysis	76	13.7%
Quantitative Analysis	150	27.0%
Strategic Planning	56	10.1%
Product Planning	33	5.9%
Promotional Communication	243	43.8%

Creating sales tools	152	27.4%
Providing channel support	157	28.3%

Cross Tabulation

Cross tabulations, or cross tabs, are a good way to compare two subgroups of information. Cross tabs allow you to compare data from two questions to determine if there is a relation between them.

Relation is a set of ordered pairs, e.g.



Like frequency tables, cross tabs appear as a table of data showing answers to one question as a series of rows and answers to another question as a series of columns.

Base Question	Female	Male
Product Manager	57.2%	53.4%
Director	12.6%	14.2%
Product Marketing Manager	24.7%	23.1%
Program Manager	2.8%	1.5%
Technical Product Manager	2.8%	7.7%
Total Counts	215	337

Cross tabs are used most frequently to look at answers to a question among various demographic groups. The intersections of the various columns and rows, commonly called cells, are the percentages of people who answered each of the responses. In the example above, females and males had relatively similar distribution among various job titles, with the exception of the tile of "Technical Product Manager", where 2.5 times as many males had the title as compared to females. For analysis purposes, cross tabs are a great way to do comparisons.

Trend Analysis

Depending on what type of information you are trying to know about your audience, you will have to decide what analysis makes sense. It can be as simple as reviewing the graphs, or conducting in-depth comparisons between questions sets to identify trends or relationships. For most surveyors, a basic analysis using charts, cross tabulations, and filters is sufficient.

Often, trends and patterns are more obvious and recommendations more effective when presented visually. Ideally, when making comparisons between one or more groups of respondents, it is best to show a chart of each group's responses side-by-side. This side-by-side comparison allows your audience to quickly see the differences you are highlighting and will lead to more support for your conclusions.

COLLECT FINANCIAL AND DEMOGRAPHIC DATA

Financial data relevant to the unit

Whether you are selling vuvuzelas in Nigel or cuddly toys in Somerset West, as a manager, having the skills and means to manage the day-to-day numbers and financial data is vital.

By efficiently tracking your financial data you will be able to save money and avoid legal and financial problems.

What data are important?

Any data that will prevent your business unit from operating at a loss or acting inappropriately needs to be collected and analysed.

Running a business unit is like running a small business- it is all about making informed decisions quickly, based on real and up-to-date data.

If your sales data are wrong, then you will not be able to project your cash flow very accurately. The old adage of ‘rubbish in, rubbish out’ is just as applicable today as it has ever been.

A business normally tracks:

- Profitability
- Value of sales made
- Value of outstanding debts
- How much the business has spent
- How much the business owes to its suppliers
- How much the business is borrowing

- How much is in the bank (and in each account if you use current and high interest accounts)
- Major cash commitments; for example, you might need to service or renew equipment which will result in a large, unavoidable invoice some time in the future

Financial data and your business unit

You are in the best position to decide which key numbers you need to track to understand how your business unit is performing – financial data for your business unit[2]:

- Typically, a 'people' business (one that earns money from charging for people's time) will want to monitor the value of work in progress (often abbreviated as WIP) in addition to the basics. WIP is the value of work done that you haven't invoiced yet. Often the first thing you know about a problem with a customer or client is when there's a problem getting an invoice paid. If you are building a large amount of WIP you might be in difficulty without knowing it. Good cash flow management means keeping WIP to a minimum.
- Typically a sales and distribution business (one that buys products and sells them on - possibly in a repackaged form - for a profit) will want to monitor the following in addition to the basics:
  - Stock value. The value of stock held by the business that hasn't been sold yet. High stock levels might be necessary in order to respond quickly to customer needs (especially if you stock a wide range of products that need to be provided to customers quickly or they will go somewhere else). However, high stock levels can also represent a major investment in cash with an impact on cash flow and profitability (if you cannot sell it for a decent profit). Monitoring stock levels for different products can also reveal overstocking of that product that might lead you to conduct a promotion while there is still a market for it.
  - Ratio of price to cost. The amount you charge for a product divided by the cost of its components. This is a rough and ready indicator of profitability. This figure might also show up an error in pricing.
  - Value of returns. A high level might indicate a flaw in the products or that you are mis-selling in some way.
  - Credit limits. If you deal with a large number of customers it can be difficult to keep track of how much each one owes you. Most companies therefore assign credit limits for each customer and investigate any new sale that breaches the credit limit to decide whether or not to accept the order
- Typically a manufacturing business will track the same numbers as a sales and distribution business with the added complication of tracking:
  - Manufacturing costs.
  - Sub-contract costs.
  - Manufacturing consumable costs

Demographic data relevant to the unit

As the business unit manager, the types of data you would be interested in would primarily relate to the following groups of people:

- Customers
- Employees
- **Customers -** Any business exists to serve its customers and therefore needs to know who its target market is. For the purposes of this example[3], three different businesses will be used to demonstrate what demographic customer information looks like. First the business type will be named, and then the sample demographic information:
    - An upscale bakery in a trendy neighbourhood: Married, 30- to 50-year olds, R50 000 to R100 000 income that either work in the area or own homes in the area.
    - Cell phone dating service: Single, 18- to 25-year-olds, R36 000 to R140 000 a year that rent or share rent with roommates.
    - In-home medical care service: Single women, 65- to 86-year olds, higher-than-normal health needs but still living independently in their own home.
- **Employees -** Demographic data you may be required to collect could relate to affirmative action and employment equity requirements; for example, race, gender and disability statistics.

  You could also be looking at the data regarding age when planning your unit's staffing needs, especially if many of your experienced, key personnel are nearing retirement age.

  In addition, you could be assessing training needs and gather data related to schooling and qualifications.

RECORD FINANCIAL AND DEMOGRAPHIC DATA

Record financial data relevant to the unit

Spreadsheets are probably one of the most important tools available to you to help manage your business unit's finances. When drawing up a spreadsheet, remember that the simpler the spreadsheet the fewer chances there will be for errors to creep in and the easier it will be to maintain.

Example:

To track sales and billing you could create a spreadsheet with the following column names:

- Column 1 = Reference. This refers to your invoice number

- Column 2 = Paid? This can have a simple red/green colour code to indicate if an invoice has been paid. When an invoice is paid you simply turn the cell green and enter the date of payment
- Column 3 = Date. This is the date the invoice was raised
- Column 4 = Customer name
- Column 5 = Item sold. A brief description of the product or service supplied
- Column 6 = Goods. This is the total value of the goods including VAT
- Column 7 = Goods VAT. This is the VAT you are charging (if applicable). To calculate the VAT amount from a gross value divide by 114 and then multiply by 14
- Column 8 = Goods ex-VAT

To track expenses or purchases you could create a spreadsheet with the following columns:

- Column 1 = Date. The date of the purchase
- Column 2 = Supplier details
- Column 3 = Notes. These explains in more detail, where needed, about the purchase Column 4 = Cheque number if paying by cheque
- Column 5 onwards = Listing of typical expenditure items such as heating, lighting, general expenses, travel, marketing

To track cash flow the spreadsheet will probably have the following columns:

- Column 1 = a list of the following: income, cash sales, capital or loans, other income. These would then be totalled going across the page in monthly columns. It will then list the expenditure such as materials, wages, insurances, postage, rent and rates. These would then be totalled in a similar monthly way to the income finance data
- Column 2 onwards = Monthly forecast and actual cash status. Each month will have a forecast and actual cash amount with the end of month actual being carried across to the next month. This way you can track the status of your cash flow month by month

Profit and loss accounts can be created from these two spreadsheets that will give you a month by month picture of the performance of your business unit and, hopefully, a final monthly profit number for you to sit back and enjoy.

Record demographic data relevant to the unit

Demographic data relating to your unit can usually be obtained from the Human Resources department.

The data is usually recorded in a codified format similar to the following:

Facility where qualifications were achieved:

01 = State / local institutions for persons with disabilities
02 = Primary School
03 = Secondary school
04 = College / technical college
05 = University

Career aspirations:

01 = Obtain Full or Part Time Paid Employment

02 = Upgrade Skills to Enable Retention of Current Job

04 = Obtain a Matric

05 = Obtain a degree

06 = Enter Post-Matric Education

07 = Improve Academic / Literacy Skills

APPLY MATHEMATICAL TECHNIQUES TO CALCULATE AND REPRESENT DATA

Before a large number of observations can be analysed, they must be sorted into a convenient number of groups, or classes.

The data must be sorted according to the numerical value of some characteristic, called a variable.

Variables are things that we measure, control, or manipulate in research. They differ in many respects, most notably in the role they are given in our research and in the type of measures that can be applied to them.

Thus a number of people might be sorted according to their height, age, weight, or any other characteristic capable of being measured.

Variables differ in "how well" they can be measured, i.e. in how much measurable information their measurement scale can provide. There is obviously some measurement error involved in every measurement, which determines the "amount of information" that we can obtain. Another factor that determines the amount of information that can be provided by a variable is its "type of measurement scale." Specifically variables are classified as: (a) nominal, (b) ordinal, (c) interval or (d) ratio.

- **Nominal variables** allow for only qualitative classification. That is, they can be measured only in terms of whether the individual items belong to some distinctively different **categories**, but we cannot quantify or even rank order those categories. For example, all we can say is that two individuals are different in terms of variable A (e.g. they are of different races), but we cannot say which one "has more" of the quality represented by the variable. Typical examples of nominal variables are gender and race.
- **Ordinal variables** allow us to rank order the items we measure in terms of which has less and which has more of the quality represented by the variable, but still they do not allow us to say "how much more." A typical example of an ordinal variable is the socio-economic status of families. For example, we know that upper-middle is higher than middle, but we cannot say that it is, for example, 18% higher.
- **Interval variables** allow us not only to rank order the items that are measured, but also to quantify and compare the sizes of differences between them. For example, temperature, as measured in degrees Celsius, constitutes an interval scale. We can say that a temperature of 40 degrees is higher than a temperature of 30 degrees, and that an increase from 20 to 40 degrees is twice as much as an increase from 30 to 40 degrees.
- **Ratio variables** are very similar to interval variables; in addition to all the properties of interval variables, they feature an identifiable absolute zero point, thus they allow for statements such as x is two times more than y. Typical examples of ratio scales are measures of time or space. For example,
- as the Kelvin temperature scale is a ratio scale, not only can we say that a temperature of 200 degrees is higher than one of 100 degrees, but we can also correctly state that it is twice as high. Interval scales do not have the ratio property. Most statistical data analysis procedures do not distinguish between the interval and ratio properties of the measurement scales.

The number of items in any group is called the frequency of that group, and the resulting distribution is called the frequency distribution.

Here is a simple example of a frequency distribution showing 500 families classified according to the number of children in the family.

Frequency distribution of 500 families

No of children in family	No of families
0	179
1	205
2	78
3	26
4	7
5	3
6	1
7	0
8	1
Total	500

Continuous and discrete variables

A variable that can take only discrete (whole) values, is called discrete or discontinuous- a man cannot have 6.3 children, there cannot be 5.2 houses in the street, or 3.5 rooms in a house.

A continuous variable, on the other hand, can take any value within a range- temperature need not be an exact number of degrees, but may be measured to several decimal places, e.g. 37.5°C and every object whose temperature is rising or falling will, during the process, take every possible temperature between the final and initial values. Similar examples are the speed of a vehicle and the height of a growing plant. In other words, a continuous variable can take an infinite number of values.

Statisticians use summary measures to describe patterns of data. Measures of central tendency refer to the summary measures used to describe the most "typical" value in a set of values. The two most common measures of central tendency are the mean and the median.

CALCULATE AVERAGES AND STANDARD DEVIATIONS

Mean

Mean is the average value within an entire or partial series. It is commonly referred to as the **"average"** and calculated by adding up all the totals and dividing by the number of items:
1+2+3+4+5=15 ÷5 = 3

Example:

Let's say you are writing about Best Meat Co. and the salaries of its nine employees.

The CEO makes R700 000 per year

Two managers each make R350 000 per year

Four factory workers each make R105 000 per year

Two apprentices make R63 000 per year.

So you add R700 000 + R350 000 + R350 000 + R105 000 + R105 000 + R105 000 + R105 000 + R63 000 + R63 000 (all the values in the set of data), which gives you R1 946 000. Then divide that total by 9 (the number of values in the set of data).

That gives you the mean (average), which is R216 222.

Not a bad average salary. But be careful when using this number. After all, only three of the nine workers at ABC make that much money. And the other six workers don't even make half the average salary.

So what statistic should you use when you want to give some idea of what the average worker at ABC is earning? This is where the median comes in.

Median

The median of a sequence of items is the middle item after the entire sequence has been arranged in either ascending or descending order. This is often used to measure the location for a frequency or probability distribution.

Example:

If 37 items are arrayed in order of magnitude, the median is the value of the middle one, i.e. of the 19th. If there are 38 items, there are two that have an equal claim to be central, namely the 19th and the 20th, so the median is taken as the average of these two.

Therefore, if five men shoot and score 48,55,59,67 and 70, the median score is 59, but if a 6th man scores 62, the median is ½ (59+62), which is 60,5.

Whenever you find yourself referring to "the average worker" this, or "the average household" that, you don't want to use the mean to describe those situations. You want a statistic that tells you something about the worker or the household in the middle. That's the median.

Again, this statistic is easy to determine because the median literally is the value in the middle. Just line up the values in your set of data, from largest to smallest, or in descending order the one in the dead-centre is the median.

For the Best Meat Co., here are the workers' salaries again, written in descending order:

R700 000

R350 000

R350 000

R105 000

R105 000

R105 000

R105 000

R63 000

R63 000

That's a total of 9 employees. So the one halfway down the list, the fifth value, is R105 000. That's the median. (If halfway lies between two numbers, divide them by two, e.g. R105 000 and R90 000 would give you a median of R97 500)

Comparing the mean to the median for a set of data can give you an idea how widely the values in your dataset are spread apart. In this case, there's a somewhat substantial gap between the CEO at Best Meat Co. and the workers. (Of course, in the real world, a set of just nine numbers won't be enough to tell you very much about anything. But we're using a small dataset here to help keep these concepts clear.)

Here's another illustration of this: Ten people are riding on a bus in Kraaifontein. The mean income of these passengers is R90 000 a year. The median income of those riders is also R90 000 a year. Joe Soap

gets off the bus. Patrice Motsepe gets on. The median income of the passengers remains R90 000 a year. But the mean income is now somewhere in the neighbourhood of R20 million or so. You now could say that the average income of the passengers is R20 million, but those other nine passengers didn't become millionaires just because Patrice Motsepe got on their bus.

As measures of central tendency, the mean and the median each have advantages and disadvantages. The pros and cons of each measure are summarised below:

The median may be a better indicator of the most typical value if a set of scores has an outlier. An **outlier** is an extreme value that differs greatly from other values; for example, Patrice Motsepe's income in the example above.

However, when the sample size is large and does not include outliers, the mean score usually provides a better measure of central tendency.

The **max** (maximum) is the largest value in a series of numbers

Min (minimum) is the smallest value in your dataset

Mode is the value or values that appear most frequently within your data set

Range is the difference between the Max and Min in a series of numbers. The formula for range is: Range = Max – Min; for example, consider the following numbers: 1, 3, 4, 5, 5, 6, 7, 11. For this set of numbers, the range would be 11 - 1 or 10

Calculate the standard deviation

The standard deviation is the average of all the averages of several sets of data. Statisticians use the standard deviation to calculate how close the various sets of data are to the mean of all the data sets.

Standard Deviation

$$S=\sqrt{\frac{\sum(X-M)^2}{n-1}}$$

where

Σ = Sum of

X = Individual score

M = Mean of all scores

N = Sample size (Number of scores)

First, you need to determine the mean. The mean of a list of numbers is the sum of those numbers divided by the quantity of items in the list (add all the numbers up and divide by how many there are).

Then, subtract the mean from every number to get the list of deviations. Create a list of these numbers. It's OK to get negative numbers here. Next, square the resulting list of numbers (multiply them with themselves).

Add up all of the resulting squares to get their total sum. Divide your result by one less than the number of items in the list.

To get the standard deviation, just take the square root of the resulting number

Example:

List of numbers: 1, 3, 4, 6, 9, 19

Mean: (1+3+4+6+9+19) / 6 = 42 / 6 = 7

List of deviations: -6, -4, -3, -1, 2, 12

Squares of deviations: 36, 16, 9, 1, 4, 144

Sum of deviations: 36+16+9+1+4+144 = 210

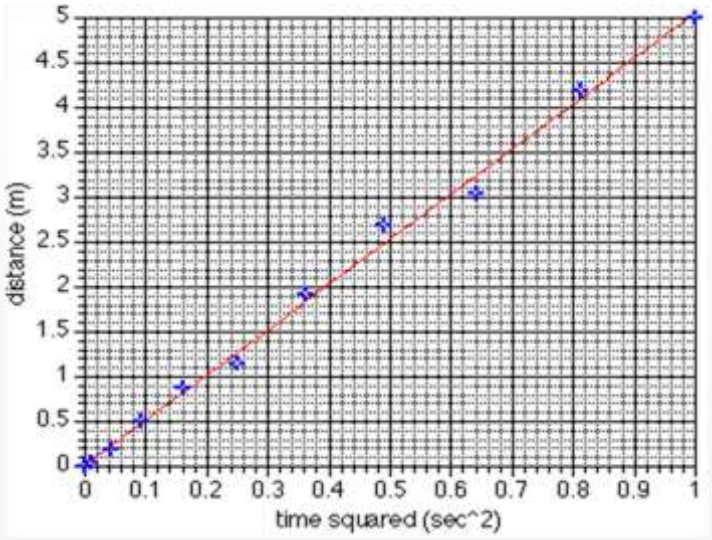
Divided by one less than the number of items in the list: 210 / 5 = 42

Square root of this number: square root (42) = The standard deviation is about 6.48

CALCULATE THE LINES OF BEST FIT

At times trends are difficult to determine by just looking at tables. Then it is useful to draw a line of “best fit”. A line of best fit (or "trend" line) is a straight line that best represents the data on a scatter plot (see 2.3 for information on scatter plots). This line may pass through some of the points, none of the points, or all of the points, but it gives you a good idea of the trend displayed by the data.

Example

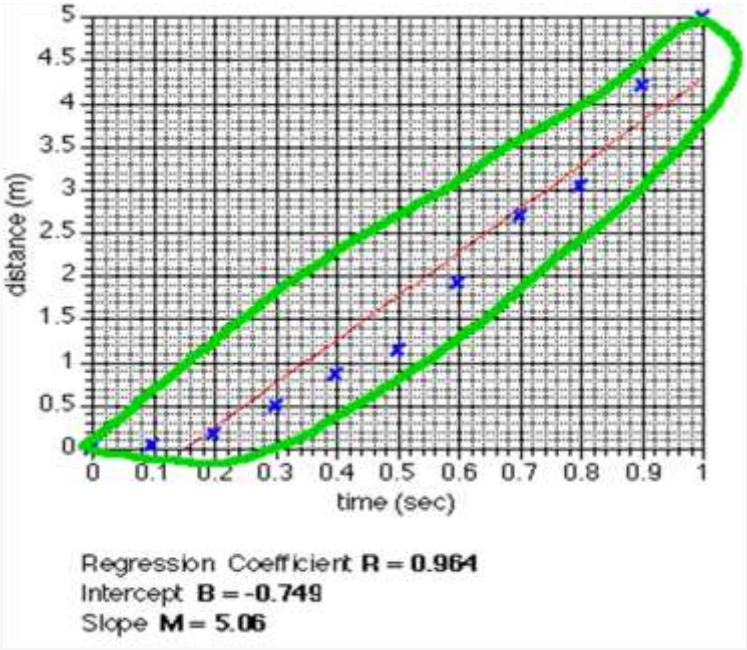


How to draw the "Best Fit Line"

The easiest way to draw the best fit line is to enter the data into the computer and let the software do the work. If you don't have the software or don't know how to use it you can still estimate the regression line.

Imagine that the points enclose an area, then cut that area in half. If you use a ruler to draw the line you can move it around until you find a place where approximately half the points are on each side of the line, as in the example below:

Example



PERFORM CALCULATIONS RELATING TO THE TIME VALUE OF MONEY

The **time value of money** is a fundamental idea in finance that money that one has now is worth more than money one will receive in the future. Because money can earn interest or be invested, it is worth more to an economic actor if it is available immediately. This concept applies to many contracts; for example, a trade in which payment is delayed will often require compensation for the time value of money. This concept may be thought of as a financial application of the saying, "A bird in the hand is worth two in the bush.

Time value of money is also to as **present discounted value**.

Example:

Everyone knows that money deposited in a savings account will earn interest. Because of this, the sooner it starts earning interest, the better. For example, assuming a 5% interest rate, a R100 investment today will be worth R105 in one year (R100 multiplied by 1.05). Conversely, R100 received one year from now is worth only R95.24 today (R100 divided by 1.05), assuming a 5% interest rate[4].

Even though there are many useful methods for calculating the time value of money, we will look at the following methods in this section:

- Present value (PV) of an annuity stream
- The Rule of 72

How to calculate the present value of an annuity stream

Say you want to live on R500 000 per year from your investments once you retire. Let's say you are going to retire at age 60 and expect to need the money for 25 years. We will also say that you expect to get a 5% return on your money. Now, how much money do you need at age 60 to be able to meet your goal?

Well, if you were to put all your money under your mattress where it got zero return, you would need R11 250 000 (R500 000 X 25 years = R11 250 000). You would stick R11 250 000 under your mattress and each year take out R500 000 to spend. At the end of 20 years, you would have nothing left.

However, if you are like most people, you probably want to get some sort of return on your money. To do this calculation, we have to use the following formula:

$$(1/i) – [1/(i \text{ X } (1 + i)^n)]$$

The "i" stands for expected interest rate, which is 5% (.05). The "n" stands for the number of periods, which is 25 years. The "X" is the multiplication sign. So, using real numbers, the equation would look like this:

$$(1/.05) – [1/(.05 \text{ X } (1 + .05)^{25})]$$

$$20 – [1/(.05 \text{ X } 3.3863549]$$

$$20 – [1/.1693177]$$

$$20 – 5.9060554$$

$$14.0939446$$

14.0939446 is our "factor." To get the amount of money we need at age 60 to fund this income stream, you multiply R500 000 by the factor (14.0939446). So, for this example, we need R7 046 972 in the bank at age 60 in order to fund an annual income of R500 000 for 25 years.

Remember: At the end of 25 years, the money will be gone- so if you plan on living till age 90, you will need to make a plan!

The Rule of 72

In finance, the **rule of 72**[5], the **rule of 70** and the **rule of 69** are methods for estimating an investment's doubling time. The number in the title is divided by the interest percentage per period to obtain the approximate number of periods (usually years) required for doubling. Although scientific calculators and spreadsheet programs have functions to find the accurate doubling time, the rules are useful for mental calculations and when only a basic calculator is available.

These rules apply to exponential growth and are therefore used for compound interest as opposed to simple interest calculations. They can also be used for decay to obtain a halving time. The choice of number is mostly a matter of preference: 69 is more accurate for continuous compounding, while 72 works well in common interest situations and is more easily divisible.

To estimate the number of periods required to double an original investment, divide the most convenient "rule-quantity" by the expected growth rate, expressed as a percentage.

- For instance, if you were to invest R100 with compounding interest at a rate of 9% per annum, the rule of 72 gives 72/9 = 8 years required for the investment to be worth R200; an exact calculation gives 8.0432 years.

Similarly, to determine the time it takes for the value of money to halve at a given rate, divide the rule quantity by that rate.

- To determine the time for money's buying power to halve, financiers simply divide the rule-quantity by the inflation rate. Thus at 3.5% inflation using the **rule of 70**, it should take approximately 70/3.5 = 20 years for the value of a unit of currency to halve.
- To estimate the impact of additional fees on financial policies (e.g., unit trust/ participatory interests fees and expenses), divide 72 by the fee. For example, if the policy charges a 3% fee over and above the cost of the underlying investment fund, then the total account value will be cut to 1/2 in 72 / 3 = 24 years, and then to just 1/4 the value in 48 years, compared to holding the exact same investment outside the time.
- The value 72 is a convenient choice of numerator, since it has many small divisors: 1, 2, 3, 4, 6, 8, 9, and 12. It provides a good approximation for annual compounding, and for compounding at typical rates (from 6% to 10%). The approximations are less accurate at higher interest rates.

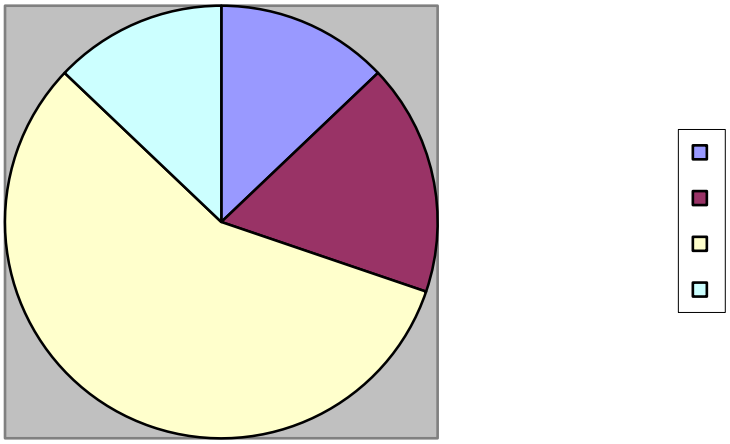
REPRESENT DATA COLLECTED AND CALCULATIONS IN A GRAPHICAL FORMAT

It is essential to take the data that you have collected, recorded and organised and represent it in a table, chart, plot or graph that can easily be interpreted.

The method used to represent the data depends on the nature of the data gathered. There are several ways of representing data. Let us look at a few of them.

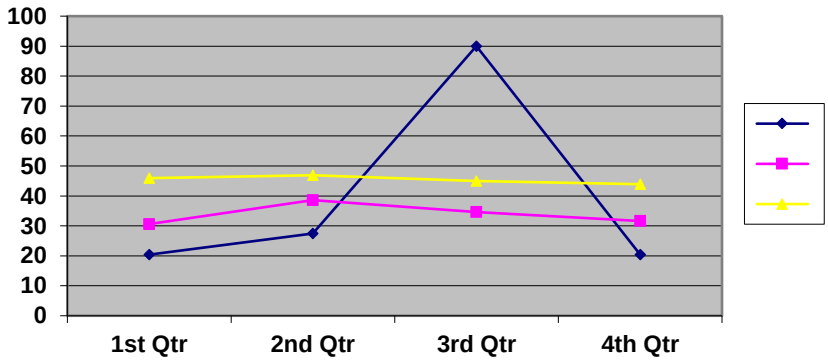
Pie charts

This type of chart depicts how an aggregate is divided into its principal components. The various items are proportional to the areas representing them in the circle, or to the angles of the various sectors. They can be converted into percentages by dividing the angles at the centre by 360 and multiplying by 100, i.e. if the angle is 45°, we can divide 45 by 360 X 100, which equals 12.5%. Alternatively, we can determine the angle by multiplying 360° with the percentage and dividing by 100:



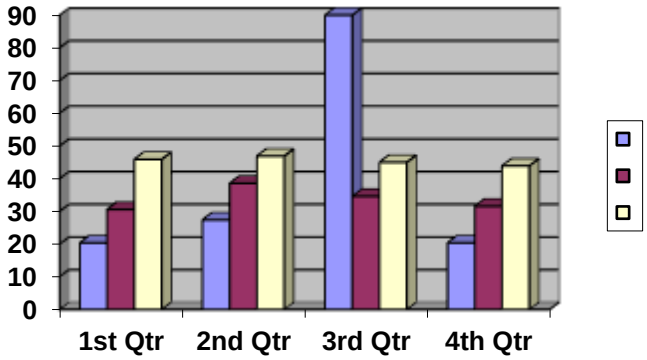
Line graphs

The most common type of chart in economic and commercial statistics is that of the time series, showing the progress of one or more quantities at successive times, usually at regular intervals.



Bar charts

In the simplest form of bar chart, several items are shown graphically by horizontal or vertical bars of uniform width, with lengths proportional to the values they represent:



To represent data using a bar chart:

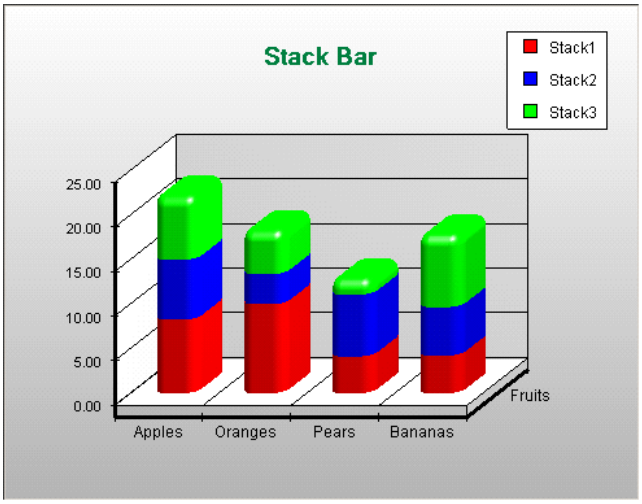
1. Determine which variable is dependent and which is independent. Place the independent variable on the *x*-axis and the dependent variable on the *y*-axis. The independent variable is often "time". The dependent variable may be something like "production output". Think about it: No-one has any control over the march of time. So time marches on whether we like it or not. The march of time is independent, or happens regardless of, any human activity. (The dependent variable is usually something that humans have accomplished or are trying to accomplish.)

2. Set the range of the data points gathered for the dependent variable along the *y*-axis.

3. Make sure that the categories for the *x*-axis and the measurements along the *y*-axis are evenly spaced. The vertical and horizontal axes must always be labelled properly, as in our example.

Stack bar charts

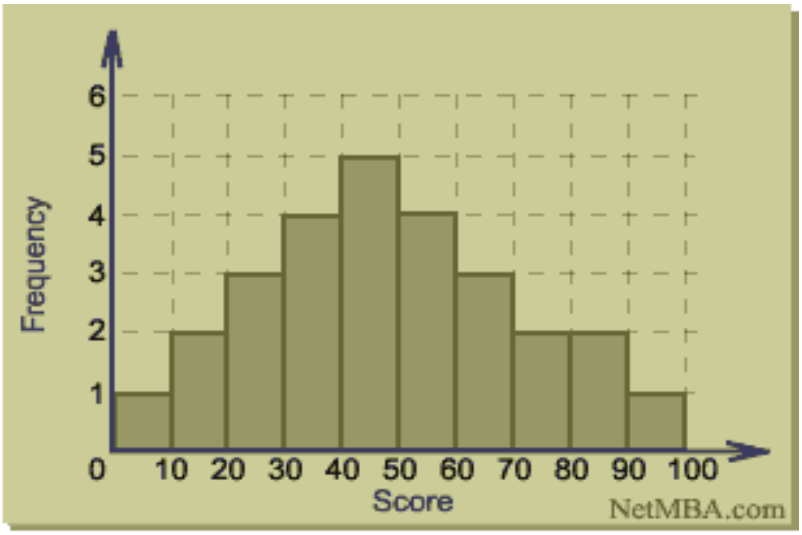
Another way to represent data is through stacking. In this way, a single bar on the chart can show data for more than one category of data. For example, a single bar can represent the amount of sales for CD-ROM drives in one year on top of a bar representing sales for other years. You can stack the bar charts vertically or horizontally.



Histograms

The difference between a bar chart and a histogram is that **a histogram is used exclusively to represent frequency**.

The graph below is an example of the way a histogram might be used to show the test results of a group of students.



The number of students who achieved between 40-50% for the exam is 5. Only 1 student achieved between 90 and 100%.

To represent data using a histogram:

1. First, make sure that you are trying to represent the **frequency** of a certain occurrence.

2. The independent variable will always be represented along the *x*-axis. In the case of a histogram this would always be a measure of **time** or **period**.

3. Along the *y*-axis would be the **frequency**, that is, the number of occurrences of a particular event. This is the dependent variable.

Note: What is the meaning of the term "independent variable"? What is the meaning of the term "dependent variable"?

No matter what you are trying to investigate, you will find that one thing depends on another. Let's think: What is the state of your physical fitness? That would depend on how you live. If you are too lazy to exercise, if you eat mostly junk foods, if you smoke, if you drink alcohol to excess, you will in all likelihood be very unfit indeed. In this simple example your lifestyle choices are the independent variable. Your state of physical fitness **depends on** your lifestyle choices, and is therefore the dependent variable.

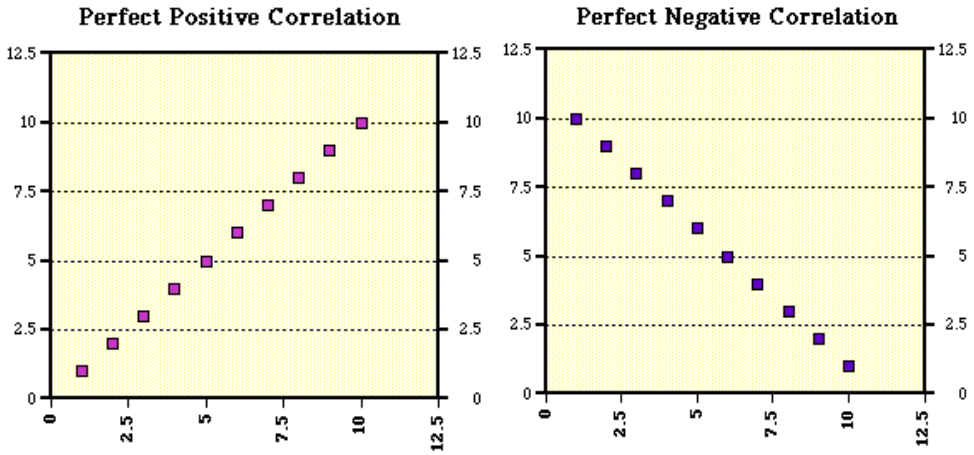
In mathematics, we often write equations like this: $y = 2x + 3$. We say that y is a function of x. That is, the value of y depends on the value we assign to x. We call x the independent variable, and y the dependent variable. The independent variable is always placed on the horizontal axis, and the dependent variable on the vertical axis.

Scatter diagram/plot

Scatter plots are similar to line graphs in that they use horizontal and vertical axes to plot data points. However, they have a very specific purpose. Scatter plots show how much one variable is affected by another. The relationship between two variables is called their **correlation**.

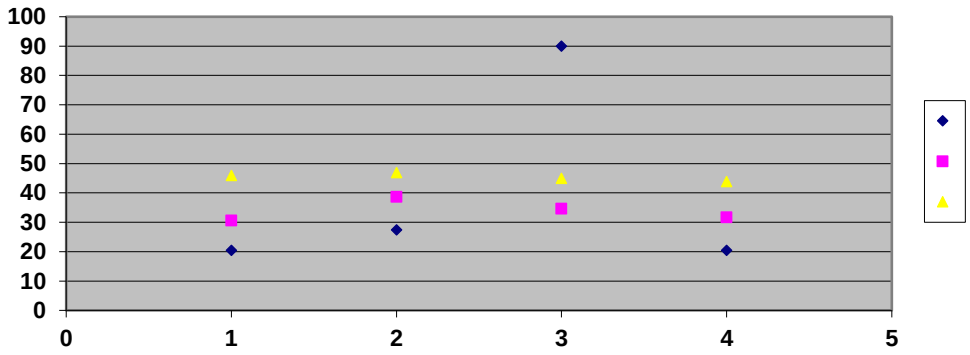
Scatter plots usually consist of a large body of data. The closer the data points come when plotted to making a straight line, the higher the correlation between the two variables, or the stronger the relationship.

If the data points make a straight line going from the origin out to high x- and y-values, then the variables are said to have a **positive correlation**. If the line goes from a high-value on the y-axis down to a high-value on the x-axis, the variables have a **negative correlation**.



An example of a situation where you might find a perfect positive correlation, as we have in the graph on the left, would be when you compare the total amount of money spent on tickets at the movie theatre with the number of people who go. This means that every time that "x" number of people go, "y" amount of money is spent on tickets without variation.

An example of a situation where you might find a perfect negative correlation, as in the graph on the right, would be if you were comparing the speed at which a car is going to the amount of time it takes to reach a destination. As the speed increases, the amount of time decreases.



Tips for Creating Effective Graphics

The key to creating effective data graphics is the combination of good graphic design and appreciation of statistics that Edward Tufte (in his seminal books The Visual Display of Quantitative Information and Envisioning Information) defined as graphical integrity.

Apply the following principles to ensure graphical integrity and graphical excellence:

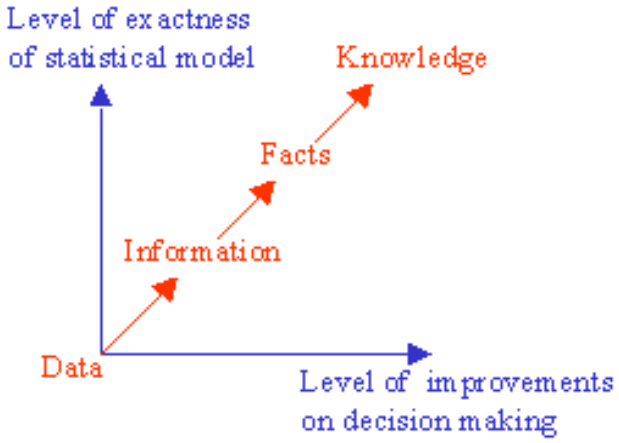
- It is essential to focus on the substance (contents) of the graph - not on the design, methodology or technology.
- It is essential to avoid distortion induced by the format of the graph.
- It is desirable to aim for what he termed high data density, whereby the graph is used to present - as no other method can - large amounts of data in a coherent manner.
- It is worthwhile constructing graphs that not only present data in a `static' from, but that encourage comparisons between variables, location, or time periods.
- It is desirable to allow the viewer to discover levels of detail within the graph.
- It is necessary to make the graph serve a single, clear purpose, such as data description, tabulation, exploration or decoration.
- It is important to integrate the graph with statistical and textual descriptions.
- Above all, it is vital that the graph should show the data, not the technical skills of its creator.

APPLY MATHEMATICAL ANALYSIS TO INDICATE ECONOMIC RELATIONSHIPS

The sequence from data to knowledge is: from Data to Information, from Information to Facts, and finally, from Facts to Knowledge. Data becomes information, when it becomes relevant to your decision making. Information becomes fact, when the data can support it. Facts are what the data reveals. However, the decisive instrumental (i.e., applied) knowledge is expressed together with some statistical degree of confidence.

Fact becomes knowledge, when it is used in the successful completion of a decision process.

The following figure illustrates the statistical thinking process based on data in constructing statistical models for decision making under uncertainties.



The above figure depicts the fact that as the exactness of a statistical model increases, the level of improvements in decision-making increases. That's why we need Business and Economic Statistics. Statistics arose from the need to place knowledge on a systematic evidence base. This required a study of the rules of computational probability, the development of measures of data properties and relationships, and so on.

To reason statistically - which is essential to be an informed citizen, employee, and consumer – we all need to learn about data analysis and related aspects of probability.

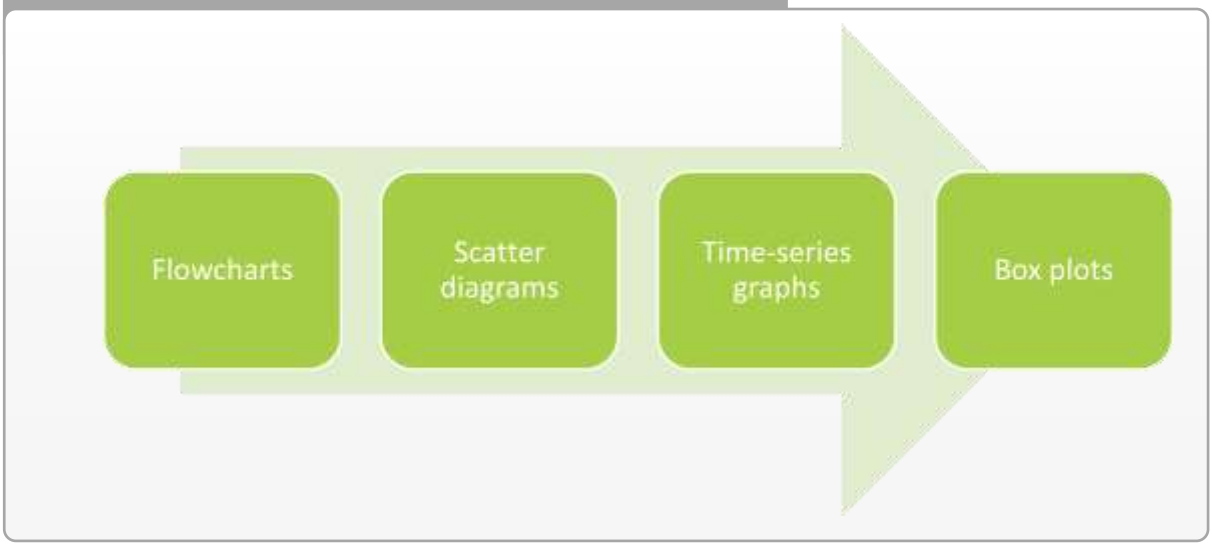
The amount of statistical information available to help make decisions in business, politics, research, and everyday life is staggering. Consumer surveys guide the development and marketing of products. Experiments evaluate the safety and efficacy of new medical treatments. Statistics sway public opinion on issues and represent - or misrepresent - the quality and effectiveness of commercial products. Through experiences with the collection and analysis of data, we learn how to interpret such information.

INDICATE ECONOMIC RELATIONSHIPS THROUGH GRAPHICAL REPRESENTATION

In economics, graphs and charts are used to simplify complex data.

Economists employ different types of graphs and charts, depending upon the range of data and multiplicity of variables. Some of these are:

Different types of graphs



Flowchart

Flowcharts are used most commonly in business, to represent the internal logical organisation of a system. However, they can be used in any situation where we wish to represent connected structures where there may be alternative pathways through the system. We can also indicate quantitative aspects of the flow of information or materials through the structure by annotating the diagram, or varying the line style or thickness to indicate quantity.

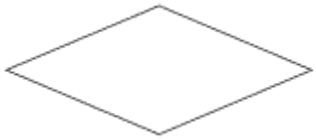
In economics, the flowchart helps to explain how different components of economics interact under particular market situations

Most flow charts are made up of three main types of symbol:

- Elongated circles, which signify the start or end of a process;

- Rectangles, which show instructions or actions; and

- Diamonds, which show decisions that must be made



Within each symbol, write down what the symbol represents. This could be the start or finish of the process, the action to be taken, or the decision to be made.

However, remember that there are many different flowchart symbols that can be used. Therefore, remember that an important use of flow charts is in communication: If you use obscure symbols that only part of your audience understands, there's a good chance that your communication will fail. Always keep things simple!

Symbols are connected one to the other by arrows, showing the flow of the process.

To draw the flow chart, brainstorm process tasks, and list them in the order they occur. Ask questions such as "What really happens next in the process?" and "Does a decision need to be made before the next step?" or "What approvals are required before moving on to the next task?"

Start the flow chart by drawing the elongated circle shape, and labelling it "Start".

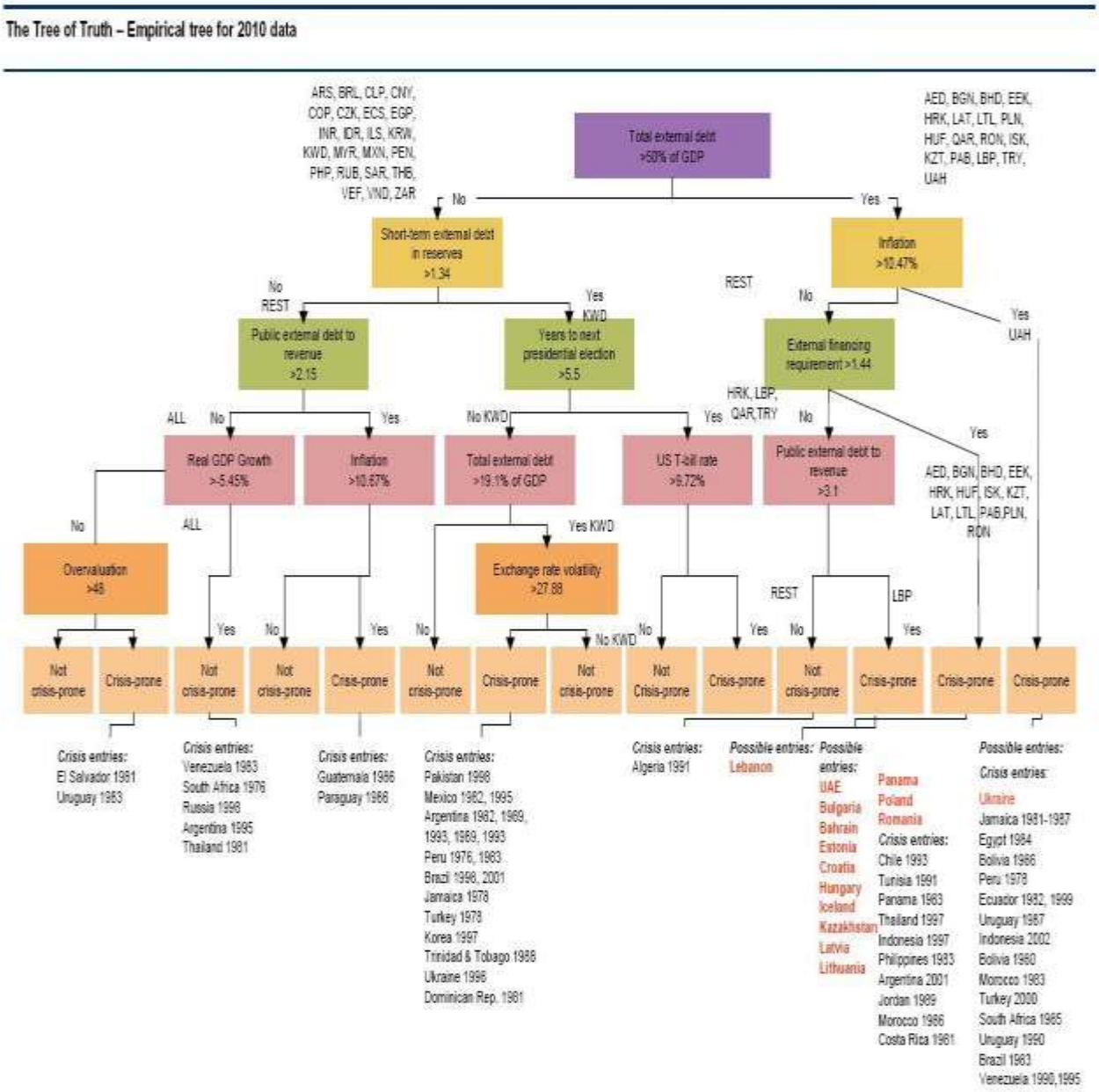
Then move to the first action or question, and draw a rectangle or diamond appropriately. Write the action or question down, and draw an arrow from the start symbol to this shape.

Work through your whole process, showing actions and decisions appropriately in the order they occur, and linking these together using arrows to show the flow of the process. Where a decision needs to be made, draw arrows leaving the decision diamond for each possible outcome, and label them with the outcome. And remember to show the end of the process using an elongated circle labelled "Finish".

Example: The `Tree of Truth'

According to the Royal Bank of Scotland, the flowchart below is aimed at selecting explanatory variables and critical threshold levels that best discriminate between sovereign debt crisis and non-sovereign debt crisis states.

In basic terms it's a flowchart, showing which countries in Central Eastern Europe, the Middle East and Africa, the bank thinks are potentially vulnerable to a sovereign debt crisis.

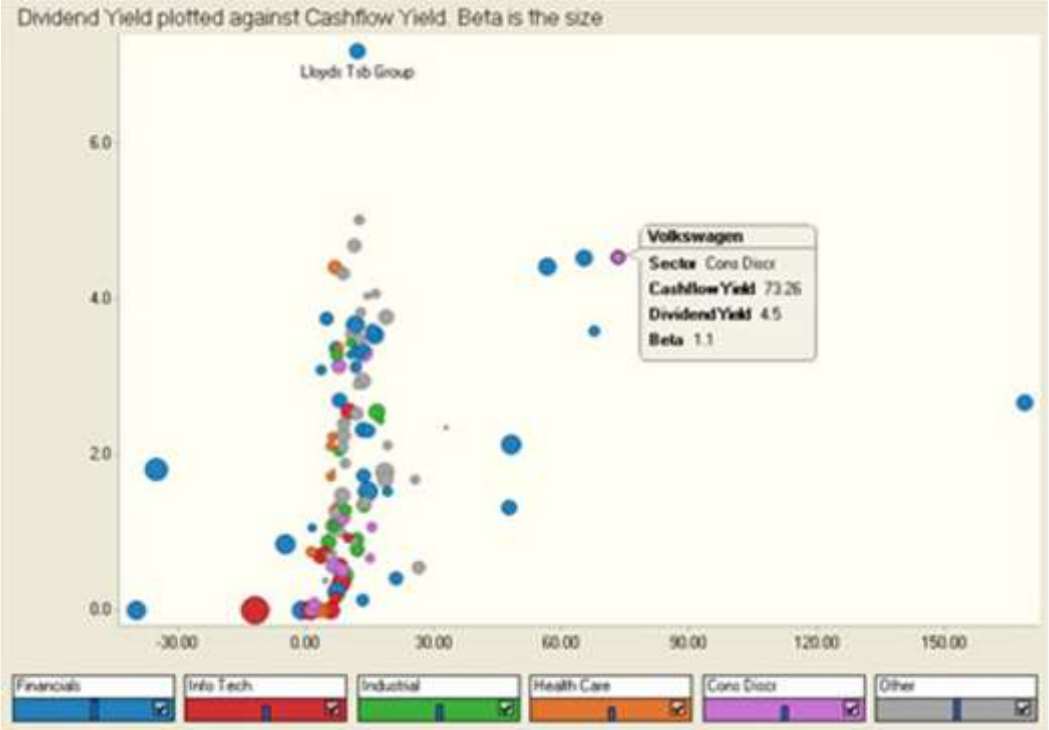


Scatter diagram

Scatter Plots are incredibly useful graphs for examining large data sets. Reports and standard table displays are hard and time-consuming to interpret, and aggregations of the data — which can make reports and tables easier to understand — can mask outliers, correlations and trends and make them difficult or impossible to see.

Scatter Plots are an excellent information visualisation to select when you are looking for positive and negative correlations, trends and outliers in large statistical databases. They are particularly useful in financial services applications.

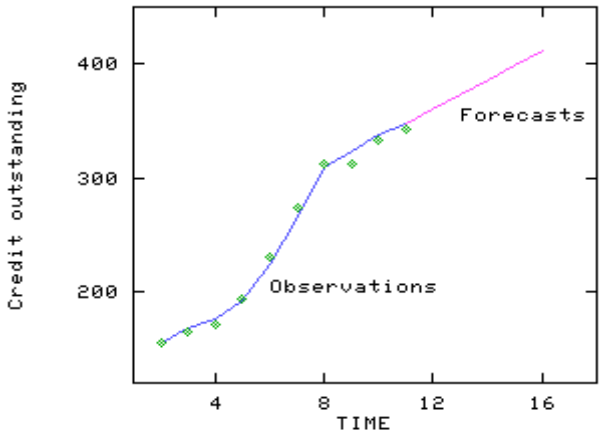
Scatter diagram



This Scatter Plot maps Dividend Yield on the Y axis and Cash flow Yield on the X axis. Colour is used to differentiate companies by sector. Each point represents a single company, and the size of each circle corresponds to the market cap for that company compared to all other companies in the dataset. This Scatter Plot makes it easy to see that Volkswagen is performing very well in terms of Cash flow and Dividends, and that Lloyds TSB is the leader by far in terms of Yield.

Time-series graphs

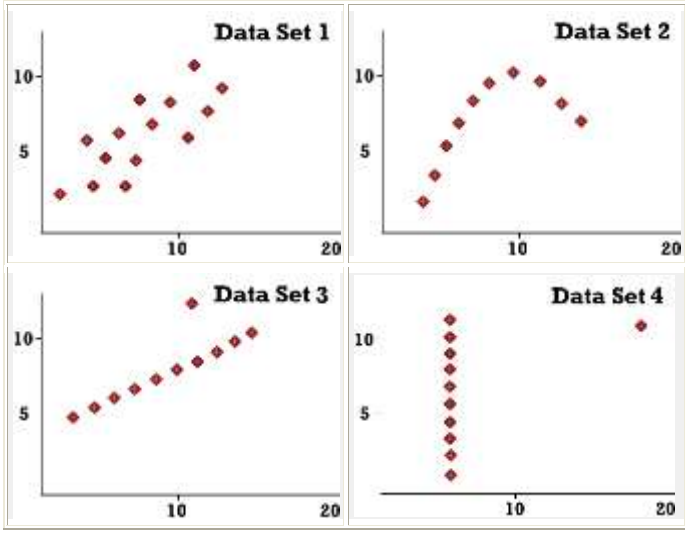
They are good at showing specific values of data, meaning that given one variable the other can easily be determined. Trends in data are also shown clearly, meaning that they visibly show how one variable is affected by the other as it increases or decreases. Time series graphs enable the viewer to make predictions about the results of data not yet recorded.



The most graphic way of seeing just how useful graphical data presentation can be is by trying to 'picture' the structure of any of the four data sets shown below purely by looking at the columns of figures:

DATA SET							
1		2		3		4	
X	***Y***	***X***	***Y***	***X***	***Y***	***X***	***Y***
10.0	8.04	10.0	9.14	10.0	7.46	8.0	6.58
8.0	6.95	8.0	8.14	8.0	6.77	8.0	5.76
13.0	7.58	13.0	8.74	13.0	12.74	8.0	7.71
9.0	8.81	9.0	8.77	9.0	7.11	8.0	8.84
11.0	8.33	11.0	9.26	11.0	7.81	8.0	8.47
14.0	9.96	14.0	8.10	14.0	8.84	8.0	7.04
6.0	7.24	6.0	6.13	6.0	6.08	8.0	5.25
4.0	4.26	4.0	3.10	4.0	5.39	19.0	12.50
12.0	10.84	12.0	9.13	12.0	8.15	8.0	5.56
7.0	4.82	7.0	7.26	7.0	6.42	8.0	7.91
5.0	5.68	5.0	4.74	5.0	5.73	8.0	6.89

It is only when we come to graph these data sets, as the series of scatter graphs, that we really appreciate how deceptive the numbers alone can be, and how valuable the graphical format can be.



7.2 ACCURATE GRAPHICAL REPRESENTATIONS AND NUMERICAL SUMMARIES

We have seen how to represent information graphically. In this section we will look at a simple method to represent and analyse numerical data, namely the **Stem and Leaf Plot**:

A stem-and-leaf plot is a display that organises data to show its shape and distribution. In a stem-and-leaf plot each data value is split into a "stem" and a "leaf". The "leaf" is usually the last digit of the number and the other digits to the left of the "leaf" form the "stem". The number 123 would be split as:

stem	12
leaf	3

Example:

Math test scores out of 50 points:

35, 36, 38, 40, 42, 42, 44, 45, 45, 47, 48, 49, 50, 50, 50

Separate each number into a stem and a leaf. Since these are two digit numbers, the tens digit is the stem and the units digit is the leaf.

The number 38 would be represented as

Stem	Leaf
3	8

Group the numbers with the same stems. List the stems in numerical order. (If your leaf values are not in increasing order, order them now.) Title the graph.

Math Test Scores (out of 50 pts)	
Stem	**Leaf**
3	5 6 8
4	0 2 2 4 5 5 7 8 9
5	0 0 0

Prepare an appropriate legend (key) for the graph.

Legend: 3 | 6 means 36

A stem-and-leaf plot shows the shape and distribution of data. It can be seen in the diagram above that the data clusters around the row with a stem of 4.

- The leaf is the digit in the place farthest to the right in the number, and the stem is the digit, or digits, in the number that remain when the leaf is dropped.
- To show a one-digit number (such as 9) using a stem-and-leaf plot, use a stem of 0 and a leaf of 9.
- To find the median in a stem-and-leaf plot, count off half the total number of leaves.

Example:

Information

The speeds of two types of bullet were measured to the nearest $m\,s^{-1}$ in an experiment as follows.

Speed of type A ($m\,s^{-1}$)

480 493 475 471 482 487 464 516 497 485
481 471 475 498 478 487 491 489 481 493

Speed of type B ($m\,s^{-1}$)

478 463 512 503 508 497 495 482 482 474
489 490 495 503 510 501 498 470 481 486

It is difficult to compare the speeds of the types of bullets from these lists.

A simple method of organising data is to use a **stem-and-leaf diagram**.
This can be drawn for a single set of data or, as in this case, back-to-back.
The data above would be recorded like this.

Type A		Type B
4	46	3
8 5 5 1 1	47	0 4 8
9 7 7 5 2 1 1 0	48	1 2 2 6 9
8 7 3 3 1	49	0 5 5 7 8
	50	1 3 3 8
6	51	0 2

Key

8 | 47 | | means 478 $m\,s^{-1}$
| 49 | 5 means 495 $m\,s^{-1}$

The stem-and-leaf diagram shows that type B bullets are generally faster.

7.3 MAKE PROJECTIONS ON THE BASIS OF MATHEMATICAL ANALYSIS

The solution to many statistical experiments involves being able to count the number of points in a sample space. Counting points can be hard, tedious, or both. Fortunately, there are ways to make the counting task easier. This section focuses on three rules of counting that can save both time and effort - event multiples, permutations, and combinations.

The first rule of counting deals with event multiples. An **event multiple** occurs when two or more independent events are grouped together. The first rule of counting helps us determine how many ways an event multiple can occur.

Rule 1.

Suppose we have k independent events. Event 1 can be performed in n1 ways; Event 2, in n_2 ways; and so on up to Event k (which can be performed in n_k ways). The number of ways that these events can be performed together is equal to $n_1n_2 \ldots n_k$ ways.

Examples

1. How many sample points are in the sample space when a coin is flipped 4 times?

   Each coin flip can have one of two outcomes - heads or tails. Therefore, the four coin flips can land in (2)(2)(2)(2) = 16 ways.

2. A business man has 4 dress shirts and 7 ties. How many different shirt/tie outfits can he create?

   For each outfit, he can choose one of four shirts and one of seven ties. Therefore, the business man can create (4)(7) = 28 different shirt/tie outfits.

Often, we want to count all of the possible ways that a single set of objects can be arranged.

3. Consider the letters X, Y, and Z. These letters can be arranged a number of different ways (XYZ, XZY, YXZ, etc.) Each of these arrangements is a permutation.

   In general, n objects can be arranged in n(n - 1)(n - 2) ... (3)(2)(1) ways. This product is represented by the symbol n!, which is called n factorial. (By convention, 0! = 1.)

A **permutation** is an arrangement of all or part of a set of objects, with regard to the order of the arrangement.

The number of permutations of n objects taken r at a time is denoted by ${}_nP_r$.

Rule 2.

The number of permutations of n objects taken r at a time is

${}_nP_r = n(n - 1)(n - 2) \ldots (n - r + 1) = n! / (n - r)!$

Examples

1. How many different ways can you arrange the letters X, Y, and Z?

   One way to solve this problem is to list all of the possible permutations of X, Y, and Z. They are:

   - XYZ, XZY, YXZ, YZX, ZXY, and ZYX.

   Thus, there are 6 possible permutations.

   Another approach is to use Rule 2. Rule 2 tells us that the number of permutations is n! / (n - r)!.

   - We have 3 distinct objects so n = 3.
   - And we want to arrange them in groups of 3, so r = 3.
   - Thus, the number of permutations is 3! / (3 - 3)! or 3! / 0!. This is equal to (3)(2)(1)/1 = 6.

2. In horse racing, a trifecta is a type of bet. To win a trifecta bet, you need to specify the horses that finish in the top three spots in the exact order in which they finish. If eight horses enter the race, how many different ways can they finish in the top three spots?

   Rule 2 tells us that the number of permutations is n! / (n - r)!.

   - We have 8 horses in the race. so n = 8.
   - And we want to arrange them in groups of 3, so r = 3.
   - Thus, the number of permutations is 8! / (8 - 3)! or 8! / 5!.
   - This is equal to (8)(7)(6) = 336 distinct trifecta outcomes. With 336 possible permutations, the trifecta is a difficult bet to win.

Sometimes, we want to count all of the possible ways that a single set of objects can be selected - without regard to the order in which they are selected.

A **combination** is a selection of all or part of a set of objects, without regard to the order in which they were selected.

The number of combinations of n objects taken r at a time is denoted by ${}_nC_r$.

Rule 3.

The number of Combinations of n objects taken r at a time is

${}_nC_r = n(n - 1)(n - 2) \ldots (n - r + 1)/r! = n! / r!(n - r)! = {}_nP_r / r!$

Examples

1. How many different ways can you select 2 letters from the set of letters: X, Y, and Z?

   One way to solve this problem is to list all of the possible selections of 2 letters from the set of X, Y, and Z.

   - They are: XY, XZ, and YZ. Thus, there are 3 possible combinations.

   Another approach is to use Rule 3. Rule 3 tells us that the number of combinations is n! / r!(n - r)!.

   - We have 3 distinct objects so n = 3.
   - And we want to arrange them in groups of 2, so r = 2.
   - Thus, the number of combinations is 3! / 2!(3 - 3)! or 3! /2!0!.
   - This is equal to (3)(2)(1)/(2)(1)(1) = 3.

2. Five-card stud is a poker game, in which a player is dealt 5 cards from an ordinary deck of 52 playing cards. How many distinct poker hands could be dealt?

   For this problem, it would be impractical to list all of the possible poker hands. However, the number of possible poker hands can be easily calculated using Rule 3.

   Rule 3 tells us that the number of combinations is n! / r!(n - r)!.

   - We have 52 cards in the deck so n = 52.
   - And we want to arrange them in groups of 5, so r = 5.
   - Thus, the number of permutations is 52! / (52 - 5)! or 52! / 5!47!.
   - This is equal to 2,598,960 distinct poker hands.

Probability of a Sample Point

The **probability** of a sample point is a measure of the likelihood that the sample point will occur.

By convention, statisticians have agreed on the following rules.

- The probability of any sample point can range from 0 to 1.
- The sum of probabilities of all sample points in a sample space is equal to 1.

Examples

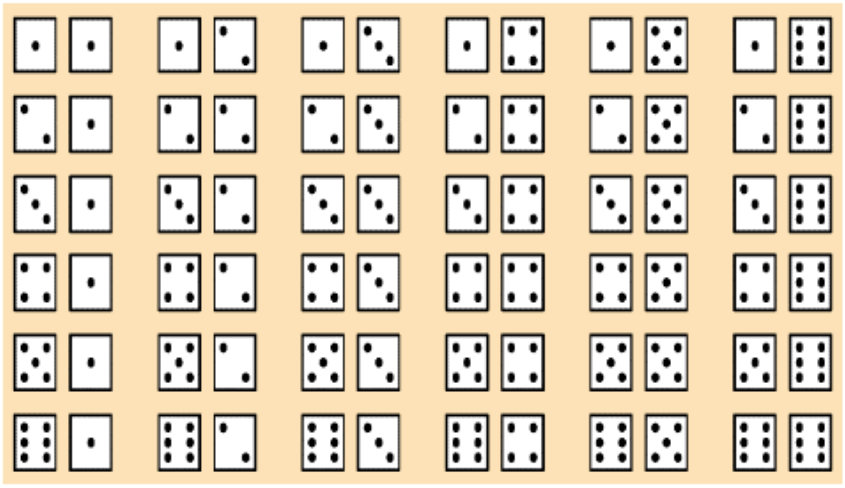
1. Suppose we conduct a simple statistical experiment. We flip a coin one time. The coin flip can have one of two outcomes - heads or tails. Together, these outcomes represent the sample space of our experiment. Individually, each outcome represents a sample point in the sample space. What is the probability of each sample point?

The sum of probabilities of all the sample points must equal 1. And the probability of getting a head is equal to the probability of getting a tail. Therefore, the probability of each sample point (heads or tails) must be equal to 1/2.

2. Let's repeat the experiment of the above example, with a die instead of a coin. If we toss a fair die, what is the probability of each sample point?

   For this experiment, the sample space consists of six sample points: {1, 2, 3, 4, 5, 6}. Each sample point has equal probability. And the sum of probabilities of all the sample points must equal 1. Therefore, the probability of each sample point must be equal to 1/6.

3. If we should use two die in an experiment, the following combinations would be probable (equally likely outcomes when rolling two dice):



Probability of an Event

The probability of an event is a measure of the likelihood that the event will occur. By convention, statisticians have agreed on the following rules.

- The probability of any event can range from 0 to 1.
- The probability of event A is the sum of the probabilities of all the sample points in event A.
- The probability of event A is denoted by P(A).

Thus, if event A were very unlikely to occur, then P(A) would be close to 0. And if event A were very likely to occur, then P(A) would be close to 1.

Examples

1. Suppose we draw a card from a deck of playing cards. What is the probability that we draw a spade?

   The sample space of this experiment consists of 52 cards, and the probability of each sample point is 1/52. Since there are 13 spades in the deck, the probability of drawing a spade is

   P(A) = (13)(1/52) = 1/4

2. Suppose a coin is flipped 3 times. What is the probability of getting two tails and one head?

   For this experiment, the sample space consists of 8 sample points.

S = {TTT, TTH, THT, THH, HTT, HTH, HHT, HHH}

Each sample point is equally likely to occur, so the probability of getting any particular sample point is 1/8. The event "getting two tails and one head" consists of the following subset of the sample space.

A = {TTH, THT, HTT}

The probability of Event A is the sum of the probabilities of the sample points in A. Therefore,

P(A) = 1/8 + 1/8 + 1/8 = 3/8

Rules of Probability

Often, we want to compute the probability of an event from the known probabilities of other events. This section covers some important rules that simplify those computations.

Before discussing the rules of probability, we state the following definitions:

- Two events are **mutually exclusive** if they have no sample points in common.
- The probability that Event A occurs, given that Event B has occurred, is called a **conditional probability**.
- The conditional probability of A, given B, is denoted by the symbol P(A|B).
- The probability that event A will not occur is denoted by P(A').
- Note:
  - The probability of a sample point ranges from 0 to 1.
  - The sum of probabilities of all the sample points in a sample space equals 1.

Rule of Subtraction	The probability that event A will occur is equal to 1 minus the probability that event A will not occur. $P(A) = 1 - P(A')$
Rule of Multiplication The rule of multiplication applies to the following situation. We have two events from the same sample space, and we want to know the probability that both events occur	If events A and B come from the same sample space, the probability that both A and B occur is equal to the probability the event A occurs times the probability that B occurs, given that A has occurred. $P(A \cap B) = P(A)\ P(B\|A)$

Examples

1. A bowl contains 6 red marbles and 4 black marbles. Two marbles are drawn without replacement from the bowl. What is the probability that both of the marbles are black?

   Let A = the event that the first marble is black; and let B = the event that the second marble is black. We know the following:

   In the beginning, there are 10 marbles in the urn, 4 of which are black. Therefore, P(A) = 4/10.

   After the first selection, there are 9 marbles in the urn, 3 of which are black. Therefore, P(B|A) = 3/9.

   Therefore, based on the rule of multiplication:

   $P(A \cap B) = P(A)\, P(B|A)$

   $P(A \cap B) = (4/10)*(3/9) = 12/90 = 2/15$

2. Suppose we repeat the experiment of the example above; but this time we select marbles with replacement. That is, we select one marble, note its colour, and then replace it in the bowl before making the second selection. When we select with replacement, what is the probability that both of the marbles are black?

   Let A = the event that the first marble is black; and let B = the event that the second marble is black. We know the following:

   In the beginning, there are 10 marbles in the urn, 4 of which are black. Therefore, P(A) = 4/10.

   After the first selection, we replace the selected marble; so there are still 10 marbles in the urn, 4 of which are black. Therefore, P(B|A) = 4/10.

   Therefore, based on the rule of multiplication:

   $P(A \cap B) = P(A)\, P(B|A)$

   $P(A \cap B) = (4/10)*(4/10) = 16/100 = 4/25$

Rule of Addition The rule of addition applies to the following situation. We have two events from the same sample space, and we want to know the probability that either event occurs	If events A and B come from the same sample space, the probability that event A and/or event B occur is equal to the probability that event A occurs plus the probability that event B occurs minus the probability that both events A and B occur. $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

Note: Invoking the fact that $P(A \cap B) = P(A)P(B \mid A)$, the Addition Rule can also be expressed as

$P(A \cup B) = P(A) + P(B) - P(A)P(B \mid A)$

Examples

1. A student goes to the library. The probability that she checks out
   (a) a work of fiction is 0.40,
   (b) a work of non-fiction is 0.30, and
   (c) both fiction and non-fiction is 0.20.
   What is the probability that the student checks out a work of fiction, non-fiction, or both?
   Let F = the event that the student checks out fiction; and let N = the event that the student checks out non-fiction. Then, based on the rule of addition:

$P(F \cup N) = P(F) + P(N) - P(F \cap N)$

$P(F \cup N) = 0.40 + 0.30 - 0.20 = 0.50$

2. A card is drawn randomly from a deck of ordinary playing cards. You win R10 if the card is a spade or an ace. What is the probability that you will win the game?

   Let S = the event that the card is a spade; and let A = the event that the card is an ace. We know the following:

   There are 52 cards in the deck.

   There are 13 spades, so $P(S) = 13/52$.

   There are 4 aces, so $P(A) = 4/52$.

   There is 1 ace that is also a spade, so $P(S \cap A) = 1/52$.

   Therefore, based on the rule of addition:

   $P(S \cup A) = P(S) + P(A) - P(S \cap A)$

   $P(S \cup A) = 13/52 + 4/52 - 1/52 = 16/52 = 4/13$

A probability model is a mathematical representation of a random phenomenon. It is defined by its sample space, events within the sample space, and probabilities associated with each event.

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APPENDIX A: RATIO AND TREND ANALYSIS REPORT

Report prepared for: ABC Wholesaler

Industry: Other Miscellaneous Durable Goods Merchant Wholesalers

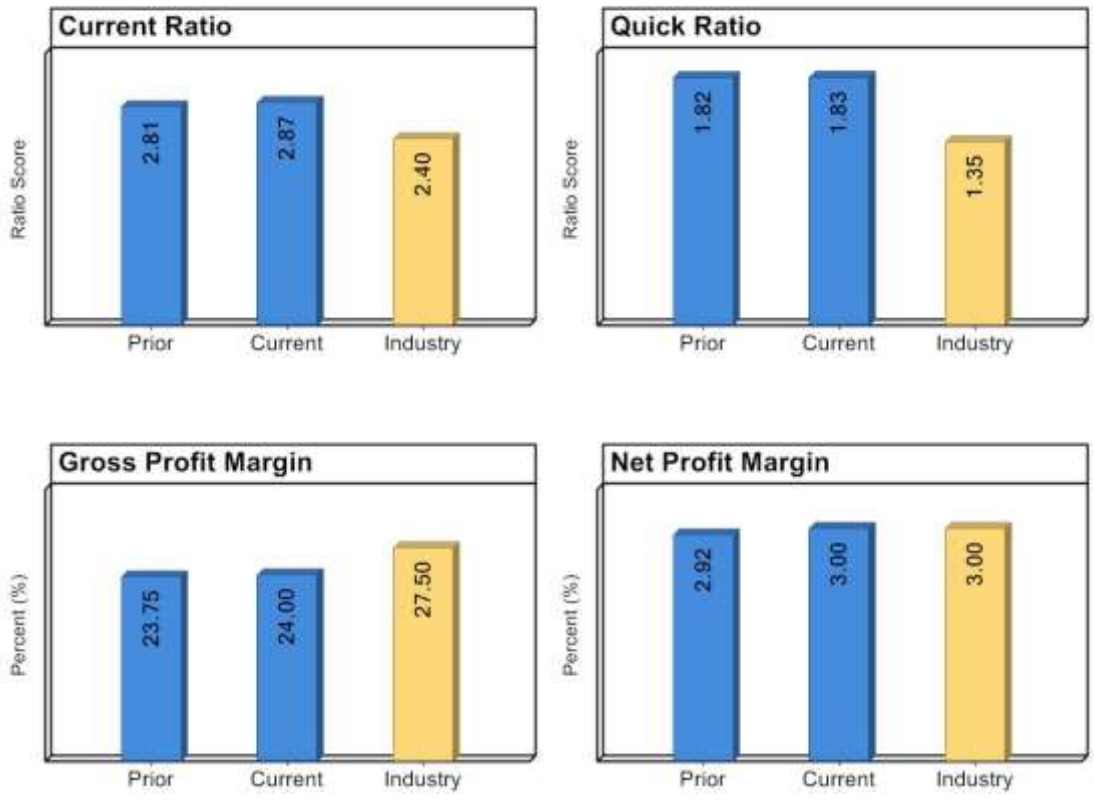
Periods: 12 months against the same 12 months from the previous year

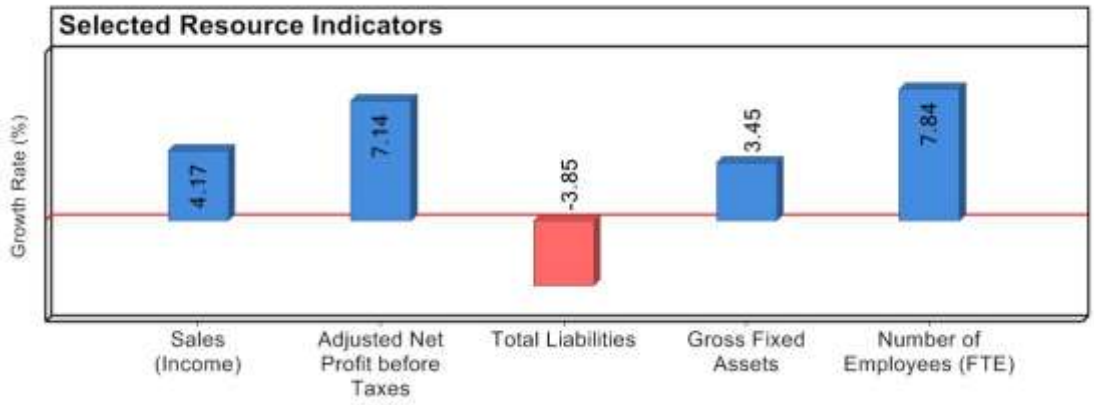
RAW DATA

	Prior Period	Current Period
Statement of Comprehensive Income (income statement) Data		
Sales (Income)	R24,000,000	R25,000,000
Cost of Sales (COGS)	R18,300,000	R19,000,000
Gross Profit	R5,700,000	R6,000,000
Gross Profit Margin	23.75%	24.00%
Net Profit before Taxes	R700,000	R750,000
Adjusted Net Profit before Taxes	R700,000	R750,000
Net Profit Margin	2.92%	3.00%
Statement of Financial Position (balance sheet) Data		
Cash (Bank Funds)	R375,000	R200,000
Accounts Receivable	R4,000,000	R4,000,000
Total Current Assets	R6,750,000	R6,600,000

Gross Fixed Assets	R725,000	R750,000
Total Assets	R11,850,000	R11,550,000
Total Current Liabilities	R2,400,000	R2,300,000
Total Liabilities	R2,600,000	R2,500,000
Number of Employees (FTE)	51	55

GRAPHS





LIQUIDITY

Generally, what is the company's ability to meet obligations as they come due?

Despite higher sales and profits this period, conditions have stayed similar to last period's results. It could be that there were Statement of Financial Position (balance sheet) transactions that usurped some extra resources (cash from profits and sales) from the company.

The company's liquidity position seems solid. There are many high quality liquid assets that can be used to pay current obligations. The graph area of the report depicts a strong "quick ratio," which measures the general ability to find cash quickly at this specific time. This analysis is based upon last period's data and the competition's data. Therefore, the company is doing well here, even compared to other similar companies.

On a final note, it should be noted that the overall liquidity position has stayed about the same since last period. In fact, the company's position is roughly the same using the several techniques employed to evaluate it.

Here are some of the ways the company **might** possibly improve its position: 1) Use trade credit. Trade credit is the financing the company receives from suppliers (accounts payable). Since there is typically no interest attached, trade credit really is "free." 2) Structure accounts receivable better. Try to receive payments at the rate at which the company performs services. Customers should basically "pay as they go." 3) Set up a "sweep" account at the bank so that the company can earn interest rate returns on any excess funds in the account. 4) Use electronic funds transfer (EFT) or credit cards as an option for receiving customer payments.

PROFITS & PROFIT MARGIN

Are profitability trends favorable in the company?

In this case, net profit margins stayed about the same from last period. **Because net margins are about average for the industry in which the company operates, the results in this area are fairly good.** Net profits in rands have also gone up as a specific result of higher sales this period. Clearly, it is good when the company is generating more sales and more net profits. These dynamics are good for the business and good for cash flow as well.

Although most trends are positive here, it might have been preferable to have seen improvements in net profit margins as well. This is because since fixed costs stay about the same as sales rise, companies generally expect net margins to improve as sales volume increases. This period, net profit margins did not improve significantly as managers increased sales volume, because the company spent more money on operating costs. Keep in mind that **the company's net profit margins are not excellent; they are only about average**. It might be best to move net margins up a little before investing heavily in operating costs. Strong net margins will even help improve cash flow over time.

Good profit managers make continuous and small adjustments to their companies to keep them moving forward. 1) Have managers put in good budgets for the business that will allow them to keep track of expenses and which ones are out of line? 2) Is the company adjusting the product and service mix to maximise profits? In other words, do managers know what the ideal product/service mix is?

SALES

Are sales growing and satisfactory?

As has been discussed in the last section, the fact that sales have increased is not the only way to "score" these results. Sales increases by themselves do not typically indicate that much. Therefore, it is important not to draw too many conclusions in this area -- the previous Profitability analysis is more important. However, what can be inferred here is that the company was able to drive in more sales with about the same level of fixed assets. Driving more sales through a flat level of assets indicates the company is using assets more effectively to produce sales. In other words, it means that the company has increased asset turns, which is positive.

BORROWING

Is the company borrowing profitably?

The company performed very well here. Net profitability improved with relatively little corresponding change in borrowing (debt), which is very good. There does not **seem** to be a correlation at this time between debt and profitability, since profitability improved on an even debt base. Yet, it might be interesting to determine if there were any prior period changes (increases or decreases) that might have helped profitability this period. If not, the company has improved Statement of Comprehensive Income (income statement) performance without adding significant debt, which is positive.

Over the short term (two years or less) it is generally preferable to borrow money when there will be a demonstrated return -- when the increases in borrowing will improve profitability. In this case, the company was able to improve profitability without borrowing money. This does not necessarily mean that managers should forego a good opportunity to expand. It does mean that they should be very careful in making these kinds of decisions, particularly at this time. Basically, the company was able to improve profitability without much of a change in total borrowings for this period, so there would have to be a fairly compelling reason in order for the company to decide to add debt to the books now.

ASSETS

Is the company using gross fixed assets effectively?

The company used relatively the same level of assets to improve profitability. This is a very positive situation. It means that additional resources such as assets were not required to leverage profitability during this period. It also indicates that more assets **may** not be needed to improve profitability for the immediate future. Additionally, if the company can continue to improve profitability, net profit margins and liquidity should improve over time. At that point, the company might still decide to buy more assets to support expansion, **but** managers should be careful if they decide to do this. It may not be advantageous to purchase more assets (which increase expenses) **if** profitability can continue to improve without them. A good return on investment analysis, as well as cash and profitability forecasts, can help determine the optimal strategy here.

EMPLOYEES

Is the company hiring effectively?

Overall results are fairly good here. The only component in this area that may be concerning is that net profitability improved a little more slowly than the growth in the employee base. This simply means that the company is adding employees (a cost) faster than it is adding net profitability (a benefit). Companies generally like to see profit levels improve more quickly than employee growth, since

employees are a form of expense. Employees should act as leverage like any other resource, levering higher multiples of profitability over time. If managers are planning to hire more people at this time, they should make sure to prepare some good income forecasts first.

"Spiritual force is stronger than material force; thoughts rule the world." -- Emerson

READER: Financial analysis is not a science; it is about interpretation and evaluation of financial events. Therefore, some judgment will always be part of our reports and analyses. Before making any financial decision, always consult an experienced and knowledgeable professional (accountant, banker, financial planner, attorney, etc.).

APPENDIX B

Example of Analysing Financial Data from Previous Accounting Periods

In order to set objectives for the upcoming accounting period, you must first study and analyse your organisation's current and past financial performances by using methods to determine where improvements need to and can be made. Financial statements represent a company's economic activities. To set sound objectives, you need to investigate these activities by using methods such as ratio analysis and trend analysis.

Some important ratios that can be used to obtain the information needed to make budgeting decisions are:

- **The current ratio -** The current ratio is used to evaluate solvency. The higher the current ratio, the more assurance creditors have that the entity can pay its bills on time. It is calculated by dividing current assets by current liabilities and is expressed as a decimal.

  Current ratio = current assets ÷ current liabilities

  This ratio indicates whether a company has enough short term assets to cover its short term debt. Anything below 1 indicates negative working capital and the organisation is therefore technically insolvent. Anything over 2 means that the company is not investing excess assets and may be tying up too much of their money in a form that is not earning them a return. Most believe that a ratio between 1.2 and 2.0 is sufficient.

  However, the current assets also include the organisation's stock. If the organisation has a high level of stock, it may mean one of two things:

  - The organisation predicts an increased market demand for its products and they are manufacturing stock to supply the anticipated demand.
  - The organisation has produced excessive stock that it is unable to sell.

- **Days sales outstanding -** Days sales outstanding is also known as Debtors' Turnover Ratio. Debtors are the businesses or people whom your organisation has provided goods and services to on credit terms. That is, your organisation allows its customers time to pay rather than paying in cash. An organisation extends credit but needs to control how much credit is extended, how often and for how long.

  Days sales outstanding = average debtors ÷ (credit sales ÷ 365) or

  Days sales outstanding = accounts receivable ÷ (credit sales ÷ 365)

  We can establish how well debtors are being controlled by looking at the debtor's turnover ratio over a period of time. We have to assume that all sales are credit sales unless we know which sales are for cash.

Example: ABC Company Days sales outstanding

ABC Company	**28 February 20X5** R000	**28 February 20X4** R000
Turnover	700,000	500,000
Debtors due within one year	165,000	90,000

Days sales outstanding for ABC Company		
28 February 20X5	(265,000 ÷ 700,000) ÷ 365	37.8 days
28 February 20X4	(150,000 ÷ 500,000) ÷ 365	30 days

In this example the ratio has worsened by going from 30 to 37.8 days over the period of a year which means that ABC Company's debtors are taking longer to pay their accounts.

- **Total assets turnover ratio -** The asset turnover ratio compares the organisations turnover (sales) with the assets that the business has used to generate that turnover. The formula for total asset turnover ratio is:

  Total assets turnover ratio = Turnover ÷ Total assets

  Example: ABC Company Total assets turnover ratio

ABC Company	**28 February 20X5** R000	**28 February 20X4** R000
Turnover	700,000	500,000
Total fixed assets	265,000	100,000
Total current assets	220,000	180,000

Total Asset Turnover Ratio for ABC Company		
28 February 20X5	700,000 ÷ (265,000 + 220,000)	= 1.4 times
28 February 20X4	500,000 ÷ (100,000 + 180,000)	= 1.8 times

The result for ABC Company is 1.4 times for 20X5. This means that turnover is 1.4 times total assets. In other words ABC Company was able to generate sales of R1.40 for every R1.00 of assets it owned

for the year ended 28 February 20X5. For the year ended 28 February 20X4, it was higher at 1.8 times. The Total Asset turnover ratio has worsened over the time period.

However it's not as bad as it appears. Turnover increased by 40% but fixed assets increased by 265% and current assets by 22%. Here a ratio is falling in value but the underlying changes are not necessarily cause for concern. ABC Company has made major investments in its assets that have yet to generate their expected level of sales. It can be expected that the ratio will improve in the next financial period. This needs to be monitored.

- **Debt-to-total-assets Ratio -** The debt-to-total-assets ratio indicates how many liabilities a company has per R1 of assets. The debt-to-total-assets ratio is calculated by dividing total liabilities by total assets:

  Debt-to-Total-Assets Ratio = Total Liabilities ÷ Total Assets.

  Example: ABC Company Debt-to-Total-Assets ratio

ABC Company	**28 February 20X5** R000	**28 February 20X4** R000
Total liabilities	120,000	50,000
Total fixed assets	265,000	100,000
Total current assets	220,000	180,000

Debt-to-total-assets Ratio for ABC Company		
28 February 20X5	120,000 ÷ (265,000 + 220,000)	= 0.25
28 February 20X4	50,000 ÷ (100,000 + 180,000)	= 0.18

For 28 February 20X5 ABC Company's debt-to-total-assets ratio is 0.25. In other words, for every R1 of assets, ABC Company has R0.25 of debt. Another way this figure can be interpreted is that 25 percent ABC Company's assets are funded by liabilities, or creditors.

The debt-to-total-assets ratio is important because it indicates a company's ability to absorb a reduction in assets without affecting its ability to pay creditors. Generally, creditors are more willing to loan funding to a company that has a low ratio; a company that is less-dependent on creditors for the funding of assets will be better able to pay creditors in the event of liquidation.

- **Times-interest-earned ratio -** Times-interest-earned ratio is also known as 'Interest cover'. This ratio tells us the safety margin that the organisation has in terms of being able to meet its interest obligations. A times-interest-earned ratio means that the business is easily able to meet its interest payments from profits. Similarly, a low times-interest-earned ratio means that the organisation is potentially in danger of not being able to meet its interest obligations.

  Times-interest-earned ratio = Net profit before interest ÷ Interest paid

Example: ABC Company Times-interest-earned ratio

ABC Company	**28 February 20X5** R000	**28 February 20X4** R000
Profit before interest and taxation	92,000	74,000
Net interest payable	5,000	5,000

Times-interest-earned ratio for ABC Company		
28 February 20X5	92,000 ÷ 5,000	= 18.4
28 February 20X4	74,000 ÷ 5,000	= 14.8

In both of these examples ABC Company's Times-interest-earned ratio is as it has the necessary profit to cover the interest payments that the business had incurred.

- **Profit margin on sales -** A good profit may look impressive but how can you tell if the level of profit the organisation is making is actually good or not? The ratio you use to assess the level of profit the organisation is making is called the Profit margin on sales**.** The formula is:

  Profit margin on sales = net profit ÷ sales (expressed as a percentage)

  Example: ABC Company Profit margin on sales

ABC Company	**28 February 20X5** R000	**28 February 20X4** R000
Profit before interest and taxation	92,000	74,000
Sales	700,000	500,000

Profit margin on sales for ABC Company		
28 February 20X5	92,000 ÷ 700,000	= 13.1%
28 February 20X4	74,000 ÷ 500,000	= 14.8%

Here the level of profit at ABC Company has gone up from 20X4 (R74,000) to 20X5 (R92,000), but the profit margin has not. This may mean that although ABC Company has sold more and made more profit, their costs must have gone up by a greater percentage than their sales revenue and so the percentage level of profit that is left is less. Better control of ABC Company costs is clearly needed.