
# APPENDIX C

**Compilers** Ms
M. Lötter
Ms C. le Roux
Mr J Moolman

**Coordinator Study guide Project**
Ms L. Esterhuyse

University of South Africa

Pretoria

**IMPORTANT INFORMATION:**

This appendix contains the second part of the module content.

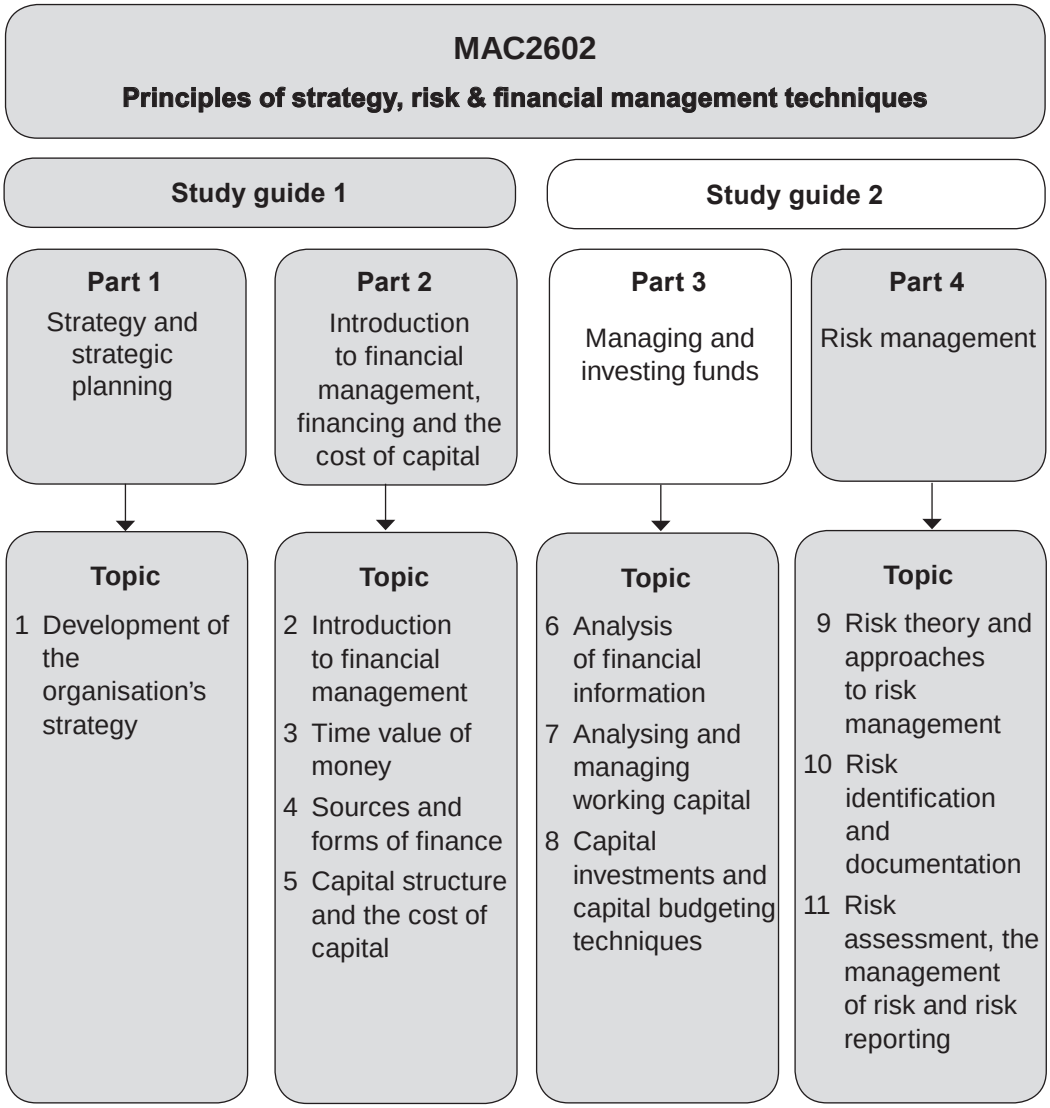
Printed and published by the
University of South Africa
Muckleneuk, Pretoria

MAC2602/2/2013–2019

98917625

# CONTENTS

# Managing and investing funds



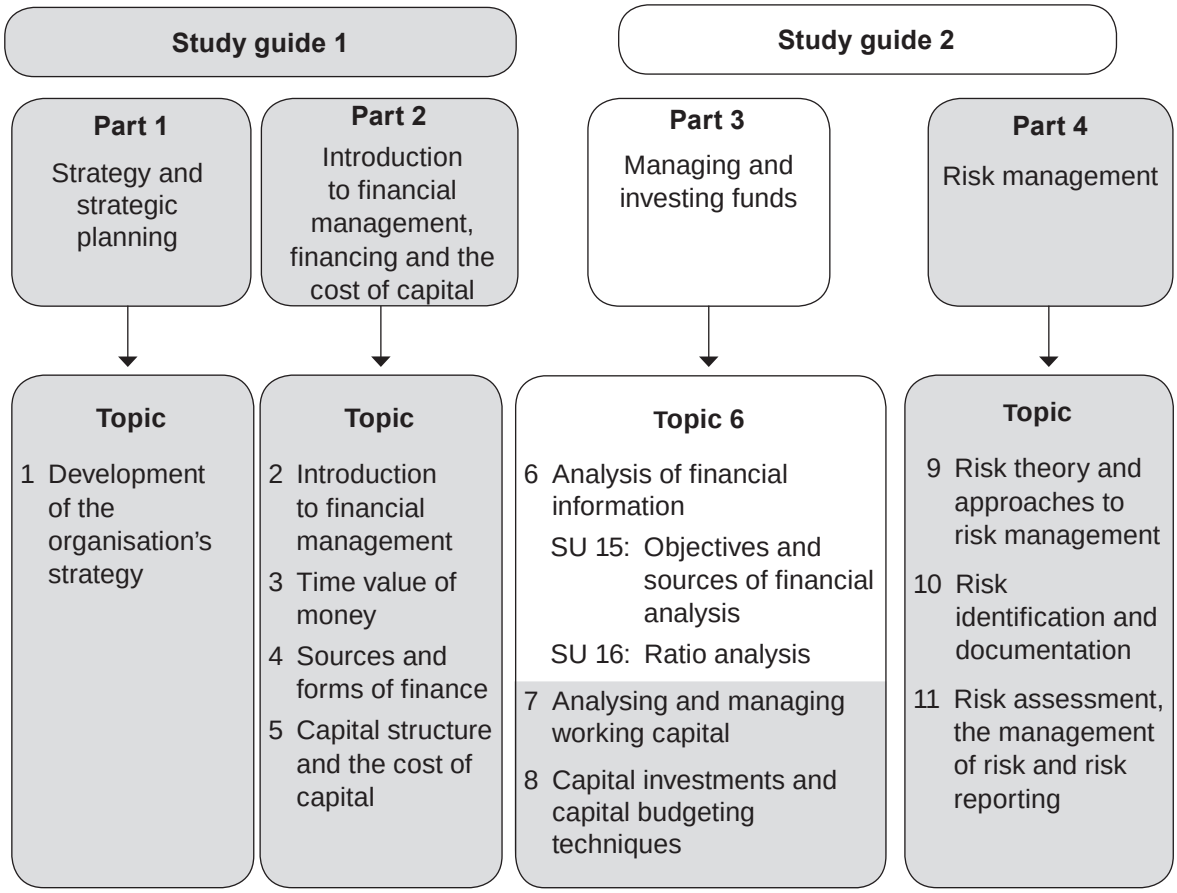
TOPIC 6

# Analysis of financial information

## LEARNING OUTCOMES

After studying this topic, you should be able to:

- define and identify the sources and limitations of financial information
- explain the objectives of financial analysis
- calculate, analyse and interpret growth rates and different ratios



## INTRODUCTION

In this part of the guide we are teaching you how an organisation can manage its funds. To assist in the effective management of these funds, it is necessary to have knowledge about the organisation and its industry. Deeper knowledge will be gained by analysing financial and other information about the organisation and its industry.

*Benjamin Franklin*, an American statesman, once said:

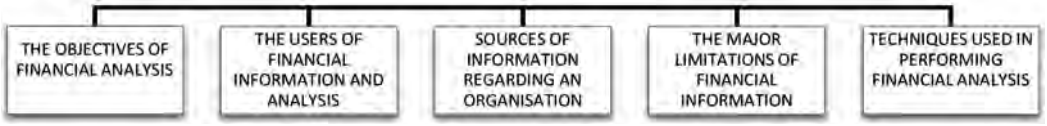
*"An investment in knowledge pays the best interest."*

When it comes to investments, nothing will pay off more than educating yourself. Do the necessary research, study and analyse before making any investment decisions, either in your personal capacity and/or as the manager of an organisation's funds.

STUDY UNIT 15

# Objectives and sources of financial analysis

**In this study unit**




## 1 Introduction

In this unit, we will define, as well as identify, the objectives, users, sources and limitations of financial information. We will also discuss the techniques used in performing financial analysis.

## 2 The objectives of financial analysis

Analysis implies that financial information has to be examined or broken down in order to be useful.

**ANALYSE**

To analyse is to examine in detail in order to discover meaning or to break down into smaller parts.

The three main objectives of financial *analysis* are:

1. an evaluation of an organisation's prospects for the future (to help external fund providers with investment decisions)
2. to evaluate the performance of an organisation's management as reflected in an analysis of their historical financial information in the annual financial statements
3. for internal decision-making by management regarding investment of funds, cash management, and so on

Financial analysis will therefore assist in managing long- and short-term funds as well as guide decisions regarding distributions to the owners of an organisation. The management of short-term funds will be discussed in topic 7 and long-term funds in topic 8.

## 3 The users of financial information and analysis

The purpose of financial *reporting* is to satisfy the information needs of the users of the financial information. The financial reports are used for several purposes, including the evaluation of the organisation's financial performance, its current financial position and its cash generation and utilisation. The users of the financial information are outlined below:

### a. Capital providers and financial analysts

Capital providers include current and potential new providers of share capital in the organisation and institutions which are or may lend money to the organisation. The equity holders are concerned about the prospects for growth and the lenders are more concerned about the organisation's cash flows and solvability (total assets exceeds total liabilities).

Investors analyse the financial information themselves in order to base their investment decisions on the outcome of such analysis, or make use of financial analysts to assist them. A financial analyst analyses financial information to forecast business, industry and economic conditions for use in making investment decisions. They then make recommendations about the investment value, whether to "buy" or "sell" or "hold" the shares or whether the debt is secure/safe ("hold").

### b. Creditors

Creditors provide products and services to an organisation on credit. They have to be paid for the products and services and they are therefore concerned about the organisation's cash flows and liquidity (ability to meet short-term obligations).

### c. Management

The organisations' own management includes the board of directors and managers of departments. The financial analysis can show their successes/strengths and failures/ weaknesses in running the business operations. They can use the analysis to correct mistakes and improve performance. The analysis assists them in managing the long- and short-term funds as well as decisions regarding the income distribution of the organisation.

### d. Other users

Other users include employees, auditors and the South African Revenue Service (SARS).

Employees are concerned about profits earned by the organisation and how this is distributed; the ability of the organisation to pay their salaries; annual salary increases; and payments made to managers. Employee unions analyse the information on behalf of their members and use it in negotiations with management.

Financial analysis and interpretation will enable auditors to be in a better position to express an opinion regarding the fairness of the figures in the financial statements. The analysis would also indicate if the organisation is solvent and liquid, which will have an effect on the presentation and disclosure of the financial statements.

SARS uses the financial information to verify the income taxation received from the organisations.

## 4 Sources of information regarding an organisation

Information regarding an organisation can be grouped into two main categories, namely financial information and strategic information. We will investigate both in more detail now.

## 4.1 Financial information

**FINANCIAL INFORMATION**

Financial information refers to the financial results, position and cash flows of an organisation's business operations in a specific period, stated in rand and cent terms.

The main source of **historical** financial information about an organisation is its **annual report.** With a listed company, the financial statements are part of an organisation's annual report which provides information to the public about the organisation's operations, objectives and other relevant information.

You would know from your Financial Accounting modules that the financial statements consist of a statement of profit or loss and other comprehensive income, a statement of financial position, a statement of cash flows, a statement of changes in equity and notes to the financial statements. The directors' report and auditors' report also form part of the financial statements. This is mailed to all registered shareholders and is also available from the organisation's website.

As previously mentioned, the annual report of an organisation is the main source of financial information and therefore the financial analysis will be based on the information therein. The annual report contains at least the mandatory annual financial statements, but usually also provides a lot of feedback from the operations of an organisation. The first section contains the ***voluntary*** information. This section normally gives descriptive information about the organisation's operating results, a summary of the performances and new developments that may impact future performances. There is normally a letter from the chief executive officer or chairman and the executive director of each of the business units, as well as the finance and human resource directors. The second section consists of the annual financial statements. This section contains the information ***prescribed*** by statute and GAAP. The detail will be discussed in your Financial Accounting modules.

Financial information about organisations is also published in **newspapers and financial journals** like Businessweek, et cetera. Organisations are also increasingly publishing voluntary financial information, for example, results presentations to analysts and other forward-looking financial information, on their **websites**.

### Activity 15.1

Access the following website of a company, Exxaro Ltd: www.exxaro.com. Exxaro is a South African-based mining group, listed on the JSE. Assume you are a potential investor. Can you identify the main source of financial information on the website? List briefly the types of financial information you could find there.

### Feedback on activity 15.1

If you enter the website of Exxaro Ltd., you will find the home page. You will notice a heading/tab called "Investors/Annual report archive" or "Publications". The annual report of the different years can be viewed there, which is the main source of the organisation's historical financial information.

Other information that you will also find at the page called “Investors” is:

- Notice of the general meetings
- Financial archive
- Share data
- Financial calendar
- Analyst and broker information
- Shareholders’ analysis

## 4.2 Strategic (non-financial) information

It is important to note that “information” should include not only the financial information, but other **strategic information** about an organisation and its industry as well.

The strategic information about an organisation tells us how the business of the organisation is managed and what its long-term goals are. Disclosing this information is part of good corporate governance, which is guided by the King III Report and Code. It is intended that the King III Report should apply to all organisations. Refer to study unit 5, section 5 on corporate governance and sustainability.

Strategic information may include the following:

- the type of industry
- type of products or services
- the future prospects of the organisation
- market share of an organisation
- if the organisation has a major competitor (now or in the future)
- whether or not the organisation has a significant customer, single supplier
- legal and regulatory environment

Conditions wherein the organisation operates can either have a positive or negative effect on the organisation. These possible effects are discussed in your strategy and risk management topics.

Potential investors, for example, will have to also take account of such strategic information as part of their evaluation, before deciding on whether an organisation is a good investment option or not.

Strategic (non-financial) information can be found …

- in the voluntary section of the annual report.
- on the organisation’s website (presentations to analysts, about us, etc).
- articles in financial journals and/or industry journals, such as SA Mining.

### Activity 15.2

Use the same website as in Activity 15.1: www.exxaro.com. Exxaro is a South African-based mining group, listed on JSE. Can you find and list strategic information which may affect the organisation?

**Feedback on activity 15.2**

If you enter the website of Exxaro Ltd., you will find the home page. You will notice a heading called "Publications". In the annual report, you can find the following strategic information:

- The type of industry – Exxaro is a mining company. [Home page]
- Type of products or services – "Exxaro is a diverse resources group with a portfolio of coal, mineral sands and base metals assets as well as a significant indirect interest in iron ore." [Home page]
- The future prospects of the organisation – The new projects are listed on the web page and from that we can see that the future prospects of Exxaro is strong and positive. [Year under review/Growth]
- If the organisation has a competitor (now or in the future) – This will not necessarily be published on the website. Information on this can be obtained from industry reports, management or minutes of the meetings of the board of directors.
- Does the organisation have a significant customer, single supplier? – This is part of the risk management of the company where the sustainability of the operations are discussed and rated. [Sustainability/Risk management]
- Legal and regulatory environment – This information can be found under the Governance section of the annual report. [Annual Report / Governance review]

## 5 The major limitations of financial information

a. The financial information is the responsibility of the directors as stated in the directors' report. It is reviewed by independent auditors who then state their opinion regarding the fairness of the financial performance, position and cash flows in the financial statements. The audit does not guarantee the total **accuracy**, but only give a fair level of assurance that the figures presented are in accordance with International Financial Reporting Standards (IFRS) in the case of a listed company. We can therefore never assume that the financial information is 100% accurate.

b. Another limitation of the financial statements is that they are, to an extent, subjective and reflective of the judgement of the accountants who prepared it. Although the IFRS helps to align the **accounting policies** of an organisation, there are still certain industry-specific transactions that may have an effect on the way the financial information is accounted for, or technical errors may occur.

c. In some instances, financial statements still reflect information on a historical cost basis, and thus do not include the effect of **inflation** or changes in, for example, an asset's **value**. The result is that true fair market values are often not reflected for non-financial instruments in the statement of financial position. For example, in South Africa, the inflation rate has been high for a number of years until recently, which may result in the carrying value of certain assets not being reflective of their fair market value.

d. Financial statements represent **past results** which will not necessarily predict what the future results will be. The annual report also has a tendency not to reflect all the failures and mistakes and can exaggerate achievements of management. Future market trends like: new competitors, smaller markets or substitute products, economic conditions like foreign exchange factors and future management are all factors not included in the historical financial information provided in the financial statements. However, information

about this might be presented in the operational reviews presented in the first part of a typical annual report, or in the *Investor Relations* pages on the website.

e. There is limited guidance on **forward-looking** information of an organisation. Organisations can be sued if they don't achieve specific targets. See the disclaimer on the website of Exxaro:

> Disclaimer of Exxaro:
>
> Warranties
>
> 1. Exxaro does not give any warranty or representation; express or implied, relating to information contained on this website or on any other website linked to this website or the accuracy of such information.
> 2. Exxaro does not warrant that this website or any website to which this website is linked or the content thereof is error free.
> 3. Exxaro does not give any warranty or representation, other than any warranty or representation that has been expressly set out in these terms and conditions.
>
> Forward-looking information
>
> This report includes certain information that is based on management's reasonable expectations and assumptions. These forward-looking statements include, but are not limited to, statements regarding estimates, intentions and beliefs, as well as anticipated future productions, reserves, costs and market conditions. While management has prepared this information using the best of their experience and judgement, in all good faith, there are risks and uncertainties involved which could cause results to differ from projections.

## 6 Techniques used in performing financial analysis

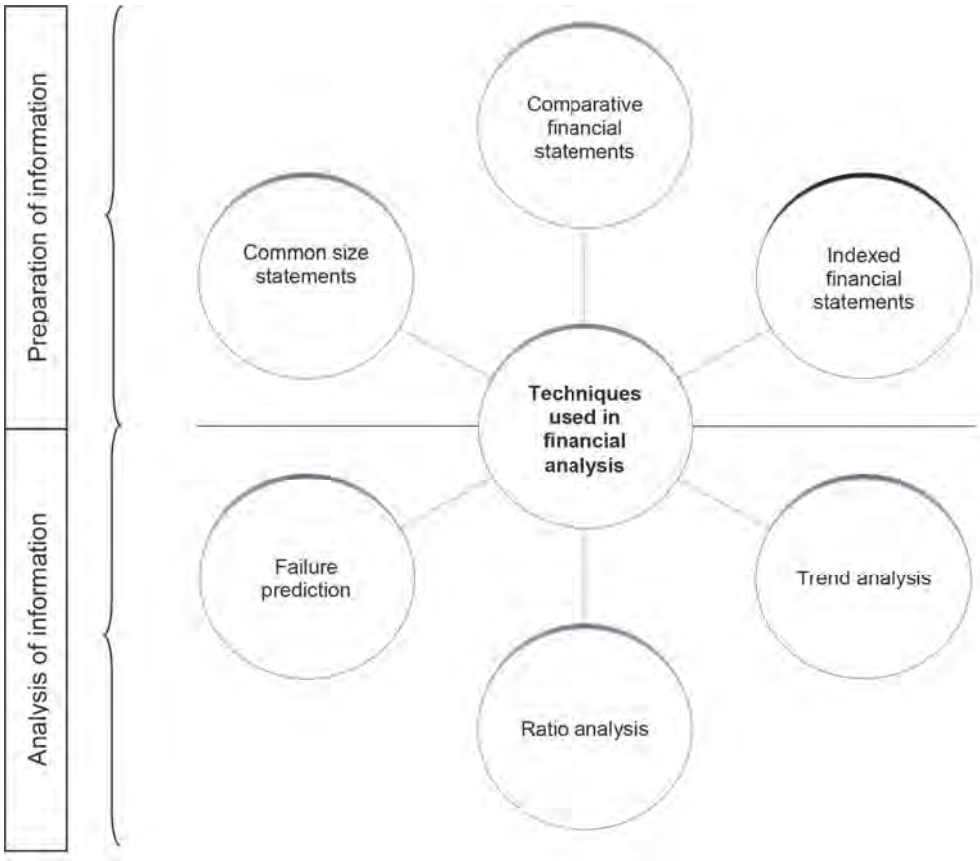
We have already explained that "to analyse" means to examine in detail in order to discover meaning or to break down into smaller parts in order to make information useful.

### NOTE

In this topic we will focus on the analysis of financial information. If strategic or non-financial information is provided in the question, you should use it to give **context to the financial analysis**. For example, turnover decreased by 25% because a new competitor entered the market or because of cheap imports.

Various techniques can be used for the analysis of financial information in order to arrive at a conclusion about the organisation. The information will always be **compared** with the previous years' results or industry/similar organisation averages. This **comparison** gives more meaning to the information.

Below is figure 15.1 that illustrates the different techniques in performing financial analysis on historical financial information.




**Source:** Author, 2012

FIGURE 15.1: Different techniques for performing financial analysis on historical financial information

In the case of the three techniques in the top part of figure 15.1, namely, **comparative financial statements, common size statements** and **indexed financial statements**, the financial statements have to be redrafted (redoing the financial statements in a different format) to prepare the information for analysis.

a. Comparative financial statements offer the statements in a table format for a required period of time, for example, five or ten years. The trend over the years can then be calculated and analysed.
b. Indexed financial statements are redrafted on an indexed basis in order to overcome some of the limitations of the comparative financial statements. The same table format is used, but the first year is shown as the base year (set equal to 100) and the subsequent years and figures are shown as percentages of that year. This gives the reader a good overview of the growth or decline from the base year to a certain date. This can also be presented in a graph.
c. Common size statements are redrafted to normalise financial statements whereby each item on the statements are stated as a percentage of the total of the specific section. For example, in the statement of financial position, current and non-current assets will be stated as a percentage of the total assets; in the statement of profit or loss and other comprehensive income, the figures will be stated as a percentage of revenue.

## Activity 15.3

You are given the following comparative statement of profit or loss and other comprehensive income of World Cup Ltd for five years:

| | 20x5 R'000 | 20x4 R'000 | 20x3 R'000 | 20x2 R'000 | 20x1 R'000 |
|---|---|---|---|---|---|
| **Revenue** | 3 640 | 2 552 | 1 506 | 2 054 | 1 569 |
| Cost of sales | (1 503) | (998) | (525) | (553) | (402) |
| Gross profit | 2 137 | 1 554 | 981 | 1 501 | 1 167 |
| Operating costs | (778) | (650) | (445) | (506) | (150) |
| Distribution costs | (258) | (203) | (145) | (123) | (53) |
| Administrative expenses | (15) | (13) | (11) | (14) | (9) |
| Other expenses | (3) | (36) | (32) | (22) | (26) |
| **Net operating profit /(loss)** | 1 083 | 652 | 348 | 836 | 929 |
| Interest and other income | 39 | 36 | 25 | 19 | 22 |
| **Earnings before interest and tax (EBIT)** | 1 122 | 688 | 373 | 855 | 951 |
| Interest expense | (106) | (102) | (54) | (86) | (93) |
| Profit before tax | 1 016 | 586 | 319 | 769 | 858 |
| Income tax expense | (284) | (164) | (89) | (215) | (240) |
| **Net profit** | 732 | 422 | 230 | 554 | 618 |

**REQUIRED**

Redraft the comparative statement of profit or loss and other comprehensive income of World Cup Ltd by using the following techniques:

a. indexed statements

b. common size statements

## Feedback on activity 15.3

### a. Indexed statements

| | 20x5 % | 20x4 % | 20x3 % | 20x2 % | 20x1 % |
|---|---|---|---|---|---|
| **Revenue** | 232 | 163 | 96 | 131 | 100 |
| Cost of sales | 374 | 248 | 131 | 138 | 100 |
| Gross profit | 183 | 133 | 84 | 129 | 100 |
| Operating costs | 519 | 433 | 297 | 337 | 100 |
| Distribution costs | 487 | 383 | 274 | 232 | 100 |
| Administrative expenses | 167 | 144 | 122 | 156 | 100 |
| Other expenses | 12 | 138 | 123 | 85 | 100 |
| **Net operating profit /(loss)** | 117 | 70 | 37 | 90 | 100 |
| Interest and other income | 177 | 164 | 114 | 86 | 100 |
| **Earnings before interest and tax** | 118 | 72 | 39 | 90 | 100 |
| Interest expense | 114 | 110 | 58 | 92 | 100 |
| Profit before tax | 118 | 68 | 37 | 90 | 100 |
| Income tax expense | 118 | 68 | 37 | 90 | 100 |
| **Net profit** | 118 | 68 | 37 | 90 | 100 |

### b. Common size statements

| | 20x5 % | 20x4 % | 20x3 % | 20x2 % | 20x1 % |
|---|---|---|---|---|---|
| **Revenue** | 100,0 | 100,0 | 100,0 | 100,0 | 100,0 |
| Cost of sales | 41,3 | 39,1 | 34,9 | 26,9 | 25,6 |
| Gross profit | 58,7 | 60,9 | 65,1 | 73,1 | 74,4 |
| Operating costs | 21,4 | 25,5 | 29,5 | 24,6 | 9,6 |
| Distribution costs | 7,1 | 8,0 | 9,6 | 6,0 | 3,4 |
| Administrative expenses | 0,4 | 0,5 | 0,7 | 0,7 | 0,6 |
| Other expenses | 0,1 | 1,4 | 2,1 | 1,1 | 1,7 |
| **Net operating profit /(loss)** | 29,8 | 25,5 | 23,1 | 40,7 | 59,2 |
| Interest and other income | 1,1 | 1,4 | 1,7 | 0,9 | 1,4 |
| **Earnings before interest and tax** | 30,8 | 27,0 | 24,8 | 41,6 | 60,6 |
| Interest expense | 2,9 | 4,0 | 3,6 | 4,2 | 5,9 |
| Profit before tax | 27,9 | 23,0 | 21,2 | 37,4 | 54,7 |
| Income tax expense | 7,8 | 6,4 | 5,9 | 10,5 | 15,3 |
| **Net profit** | 20,1 | 16,5 | 15,3 | 27,0 | 39,4 |

### NOTE

Can you see from the common size statements that the gross profit % declined from 74,4% (20x1) to 58,7% (20x5) and the net operating profit % almost halved from 59,2% (20x1) to 29,8% (20x5)? This is confirmed by viewing the indexed statements: cost of sales, operating costs and distribution costs reflect an unusually high increase from the base year (20x1).

Indicated in the bottom left part of figure 15.1 is **failure prediction**, which is a technique, used to predict the possibility of failure of an organisation – in advance. This will assist management to take precautionary steps to prevent such a failure.

Indicated in the bottom right part of figure 15.1 is **trend analysis**, which is a technique that is used to determine the trends in financial results of an organisation. This technique is used after other techniques, for example, the comparative financial statements, common size statements or indexed financial statements have been applied. The trend of the figures in these statements is determined in order to identify whether the organisation is heading in the right direction or not.

There will be more detailed discussions on these two techniques in your later MAC modules.

Indicated in the bottom part of figure 15.1 is **ratio analysis**, which is a very important technique as it is the most informative one. It gives essential information to the analysts about almost all the aspects of an organisation. We will discuss ratio analysis in more detail in the next study unit.

## 7 Summary

In this study unit, we have discussed the objectives of financial analysis. The users of financial information and analysis were listed and we have indicated how they will use the financial analysis to their benefit. We have also discussed the main source of financial information which is the annual report. We have also listed and discussed the major limitations of financial information. We presented a broad overview of the different techniques to be used in financial analysis.

The technique that we will be focusing on is ratio analysis which will be discussed in detail in the next study unit.

### Self-assessment activity

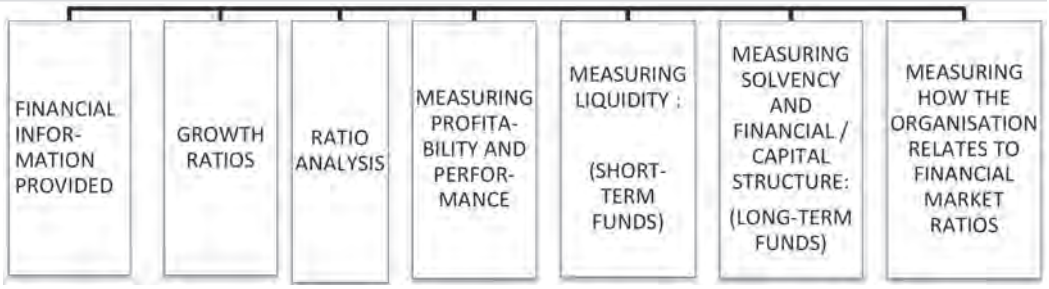
After having worked through the study unit, you should be able to answer the following questions:

a. What are the purposes or objectives of financial analysis?
b. Define financial information.
c. What is the main source of financial information?
d. What are the limitations of financial information provided by the organisation?
e. Name the users of financial analysis and how they will use the information for their benefit.
f. Name the different techniques that can be applied in financial analysis.
g. Describe briefly how each technique is used in performing financial analysis.

STUDY UNIT 16

# Ratio analysis

**In this study unit**




## 1 Introduction

In the previous study unit, we discussed the objectives and sources of financial information and analysis. In this study unit, we will be focusing on the calculation, analysis and interpretation of growth percentages and ratios.

We will illustrate calculations of growth percentages as well as different ratios. These calculations, in turn, will be analysed and interpreted in order to increase our understanding of, amongst other things, the organisations operations and how to manage the long- and short-term funds of the organisation.

## 2 Financial information provided

We will now illustrate how to perform calculations, analysis and interpretation of some key ratios. The statement of profit or loss and other comprehensive income and statement of financial position of Anco Limited, presented below, will be used as the source of information throughout this study unit.

**Anco Limited (or Anco Ltd)**

Statement of profit or loss and other comprehensive income for the period ended 31 December 20x2

| | 20x2<br>R'000 | 20x1<br>R'000 |
|---|---|---|
| Revenue | 6 633 | 5 960 |
| Cost of sales | (3 655) | (3 125) |
| Gross profit | 2 978 | 2 835 |
| Operating costs | (1 506) | (1 206) |
| Distribution costs | (650) | (539) |
| Administrative expenses | (205) | (246) |
| Other expenses | (156) | (78) |
| Net operating profit /(loss) | 461 | 766 |
| Interest and other income | 55 | 36 |
| Earnings before interest and tax (EBIT) | 516 | 802 |
| Interest expense | (335) | (265) |
| Profit before tax | 181 | 537 |
| Income tax expense | (54) | (161) |
| Net profit [#] | 127 | 376 |

[#] *Without minority interest, this is also equal to earnings attributable to shareholders in this case study.*

Statement of financial position as at 31 December 20x2

| | 20x2<br>R'000 | 20x1<br>R'000 |
|---|---|---|
| **ASSETS** | | |
| **Non-current assets** | | |
| Property, plant and equipment | 7 254 | 6 652 |
| Other investments | 655 | 569 |
| Total non-current assets | 7 909 | 7 221 |
| **Current assets** | | |
| Inventories | 290 | 303 |
| Trade and other receivables | 250 | 222 |
| Cash and cash equivalents | 354 | 156 |
| Total current assets | 894 | 681 |
| TOTAL ASSETS | 8 803 | 7 902 |
| **EQUITY AND LIABILITIES** | | |
| **Capital and reserves** | | |
| Share capital | 1 000 | 1 000 |
| Retained earnings | 1 646 | 1 519 |
| Total equity | 2 646 | 2 519 |
| **Non-current liabilities** | | |
| Interest-bearing borrowings | 5 220 | 4 770 |
| Deferred tax | 332 | 299 |
| Total non-current liabilities | 5 552 | 5 069 |
| **Current liabilities** | | |
| Trade and other payables | 365 | 245 |
| Current tax payable | 89 | 48 |
| Current provisions | 151 | 21 |
| Total current liabilities | 605 | 314 |
| TOTAL EQUITY AND LIABILITIES | 8 803 | 7 902 |

The following additional information applies:

- Anco Ltd has 5 million authorised shares. They have issued 1 000 000 shares.
- Assume that 100% of ordinary shares were recently valued at R3 million (20x1: R2,8 million) and that the market value of all liabilities equals the carrying value for both years.
- The market value of each share after the release of these audited annual financial statements was 300 cents[a] (20x1: 280 cents[a])
- The dividend per share is 6 cents[a] (20x1: 5 cents[a])
- The opening balance of inventory for 20x1 was R79 000.

- The opening balance of capital and reserves for 20x1 was R2 350 000 and for total assets it was R7 530 000.
- The amount of sales on credit is 60% of revenue for both years.
- Actual purchases made by Anco Limited on credit were R3 642 000 (20x2) and R3 349 000 (20x1).
- Value added tax (VAT) is calculated at a rate of 14%.

[a] Note that in the normal practice of the financial markets, share prices and figures such as dividend per share are expressed in cents, not rands.

**NOTE**

For the simplification of calculations below, the thousands in the figures were not shown.

## 3 Growth ratios

**GROWTH RATE**

Growth rate simply refers to the percentage that a line item in an organisation's financial information has increased or decreased from one period/year to another.

The growth rate provides an indication of the success of the organisation's operations over a number of periods or years. The method of calculating the growth rate is, for this example, as follows:

**Key formula: GROWTH RATE**

$$\frac{\text{Year 20x2} - \text{Year 20x1}}{\text{Year 20x1}} \times 100$$

**NOTE**

1. The annual growth rate is calculated relative to the earlier period/year (in this case the year 20x1, which is used as the denominator – to be written below the line in the calculation).
2. Growth rates can also be used to index figures by keeping the denominator constant and equal to the base year for all the years covered in the table. You had practice doing that with the indexed statements.

When there is an increase or decrease in the growth rate, further comparison and investigation should be done in order for the result to be sensible. It can also be read in conjunction with other ratios analysed, which may help clarify the results, for example, borrowings increased, leading to positive growth in the interest expense.

Growth rates can be calculated on figures in the statement of profit or loss and other comprehensive income as well as the statement of financial position and statement of cash flows.

## Activity 16.1

Calculate the growth rate for Anco Ltd for the year ended 31 December 20x2 in the following line items:

a. revenue
b. cost of sales
c. operating costs
d. interest expense
e. profit for the year
f. property, plant and equipment
g. inventory

## Feedback on activity 16.1

Growth rate calculations:

**a. Revenue**

$$\frac{\text{Year 20x2} - \text{Year 20x1}}{\text{Year 20x1}} \times 100 = \frac{673}{5\,960} \times 100$$

$$= 11{,}29\% \text{ growth (increase)}$$

Revenue has increased with 11,29% from Year 20x1 to Year 20x2.

**b. Cost of sales**

$$\frac{\text{Year 20x2} - \text{Year 20x1}}{\text{Year 20x1}} \times 100 = \frac{530}{3\,125} \times 100$$

$$= 16{,}96\% \text{ growth (increase)}$$

Cost of sales has increased with 16,96% from Year 20x1 to Year 20x2.

**c. Operating costs**

$$\frac{\text{Year 20x2} - \text{Year 20x1}}{\text{Year 20x1}} \times 100 = \frac{300}{1\,206} \times 100$$

$$= 24{,}88\% \text{ growth (increase)}$$

Operating costs has increased with 24,88% from Year 20x1 to Year 20x2.

**d. Interest expense**

$$\frac{\text{Year 20x2} - \text{Year 20x1}}{\text{Year 20x1}} \times 100 = \frac{70}{265} \times 100$$

$$= 26{,}42\% \text{ growth (increase)}$$

Interest expense has increased with 26,42% from Year 20x1 to Year 20x2.

**e. Profit for the year (net profit)**

$$\frac{\text{Year 20x2} - \text{Year 20x1}}{\text{Year 20x1}} \times 100 = \frac{(249)}{376} \times 100$$

$$= 66{,}22\% \text{ decline (decrease)}$$

Basic interpretation:

Profit for the year decreased by 66,22% from Year 20x1 to Year 20x2. Although revenue increased, the expenses increased by a higher percentage, resulting in the decline in the profit.

**f. Property, plant and equipment**

$$\frac{\text{Year 20x2} - \text{Year 20x1}}{\text{Year 20x1}} \times 100 = \frac{602}{6\ 652} \times 100$$

$$= 9{,}05\% \text{ growth (increase)}$$

Property, plant and equipment have increased with 9,05% from Year 20x1 to Year 20x2.

**g. Inventory**

$$\frac{\text{Year 20x2} - \text{Year 20x1}}{\text{Year 20x1}} \times 100 = \frac{(13)}{303} \times 100$$

$$= -4{,}29\% \text{ decline (decrease)}$$

Inventory has decreased with 4,29% from Year 20x1 to Year 20x2.

**NOTE**

When answering growth and ratio analysis questions where you have to comment and interpret the answer, you will NOT earn marks for merely stating, for example, cost of sales increased by 11%. You should bring ratios in context with one another and with the background information provided in the question.

## 4 Ratio analysis

Ratio analysis is a financial analysis technique and designed to assist in the evaluation of an organisation's financial results and the starting point for successful financial management.

**RATIO ANALYSIS**

Ratio analysis is a method whereby further calculations are performed on a set of financial statements and is intended to create more meaningful information. Ratio analysis can be made even more useful when we compare the calculated ratios to the same ratios calculated for previous years or to industry norms and other ratios of the same set.

We have grouped the ratios in the following four classifications:

1. **Profitability and performance**

   Profit is an important measure of an organisation's success. Within a certain time-horizon an organisation has to be profitable to both survive and to ensure continued support and funding from equity and debt providers. Profitability ratios only measure the organisation's success in generating profits. To enable us to make informed decisions and judgements, we need to also relate the profits to other financial information, for example, inflation or the exchange rate. Performance ratios and calculations also indicate if sufficient returns were generated.

2. **Liquidity**

   Liquidity ratios measure the organisation's ability to meet short-term financial obligations. Lenders and suppliers who provide products and services on credit are concerned about these ratios. It also provides an indication of the efficiency in which an organisation's current assets are managed.

3. **Solvency and financial/capital structure**

   Solvency and financial/capital structure ratios measure the organisation's financial health. Here we can ask for example: Is the organisation able to pay its debts, or is it in financial distress? Are the organisation's assets sufficient to cover its liabilities? Is the balance between debt and equity in an organisation's capital structure proper given its specific business environment and industry? Too much debt will increase the organisation's cost of funding.

4. **Financial market**

   The aforementioned categories of ratios largely relate to the internal management of an organisation and are more under the control of management. In contrast, the financial market is not controllable by management and is normally of specific interest to investors. The ratios and calculations that fall under this category can also be used by management to assist them in making dividend decisions, which will be discussed in your later MAC modules. It is also used in calculating the cost of different classes of funding, and used in valuations. You will learn about this in your third-year MAC module, MAC3702.

The answers to your ratio calculations can be classified as:

a. **percentages** (normally where calculating margins, growth, or changes in figures);
b. **cover ratios** (normally expressed as the "number of times", for example, "revenue covers (exceeds) total assets 2 times"), or
c. **proportional ratios** (normally where something is expressed relative to something else, for example debt to equity or "the asset turnover equals 2:1" *(but, importantly, the latter figure represents the "1" – we therefore do not use 1:0,5 for example)*).

Further notice that the formulae below represent **general** formulae and that, in some cases, alternative and additional formulae are available. We recommend that you follow the formulae in this guide, but also recommend that you always show the formula used in your calculation, where appropriate.

### Activity 16.2 (Enrichment activity)

Access Aspen Holdings' website at www.aspenpharma.com and open the 2011 Annual Report. Page to the "Ten Year Review" and the "Definitions and Formulas".

**Feedback on activity 16.2**

Did you notice the slight variations from the general ratio definitions?

Figure 16.1 show the important margins and ratios that belong to the categories of profitability, liquidity, solvency and financial market.

| Profitability and performance | Liquidity | Solvency and financial/capital structure | Financial market |
|---|---|---|---|
| • Gross profit margin<br>• Operating profit margin<br>• Net profit margin<br>• Return of equity (ROE)<br>• Return on assets (ROA)<br>• Asset turnover | • Current ratio<br>• Liquid asset ratio (or acid test or quick ratio)<br>• Receivable days (debtors' collection period)<br>• Payable days (creditors' payment period)<br>• Inventory days<br>• Inventory turnover ratio (times)<br>• Cash conversion cycle – days<br>• Cash ratio | • Interest cover ratio<br>• Debt to equity ratio<br>• Debt ratio (or gearing)<br>• Total assets to total debt ratio<br>• Financial leverage ROE:ROA | • Earnings per share<br>• Dividend payout ratio<br>• Dividend cover ratio<br>• Price earnings ratio<br>• Earnings yield<br>• Dividend yield |

**Source:** Author, 2012

FIGURE 16.1: Categories and common ratios

# 5 Measuring profitability and performance

## 5.1 Profit margins

There are three types of profit margins namely, the gross profit, operating profit and the net profit margin.

**Key formula: GROSS PROFIT MARGIN**

$$\frac{\text{Gross profit}}{\text{Revenue}} \times 100$$

Where **Gross profit** = Revenue – Cost of sales

The gross profit margin is calculated by stating gross profit as a percentage of revenue for the period. The gross profit margin shows the proportion of sales that is available to cover other expenses and to earn a profit, after accounting for cost of goods sold. For certain stable industries, this percentage will normally be fairly constant from one year to the next (stable industries may create stable conditions, justifying stable mark-ups).

Changes in these percentages should be traced back to factors that have an effect on gross profit, for example, trade discounts, mark-ups, purchasing details (like bulk discounts or theft), inventory levels, inventory valuation policies, and changes in the scale of operations.

Changes in mark-up percentages may affect revenue and the gross profit of the organisation. An increase in the mark-up will increase the profit earned on each item sold, due to the higher selling price of each item, but the higher prices may discourage customers, which may then result in lower total sales and lower total net profit. You will learn more about setting of selling prices in MAC2601 and later modules.

The gross profit (GP) margin is calculated for Anco Ltd:

| | | **20x2** | | **20x1** |
|---|---|---|---|---|
| $\frac{\text{Gross profit}}{\text{Revenue}} \times 100$ | = | $\frac{2\ 978}{6\ 633} \times 100$ | = | $\frac{2\ 835}{5\ 960} \times 100$ |
| | = | 44,90% | = | 47,57% |

- The gross profit margin has decreased from 47,57% in 20x1 to 44,90% in 20x2.
- The change in gross profit margin is relatively small (depending on industry) indicating that mark-up has not changed significantly.
- This reduction is slightly disconcerting, however, as it took place in spite of a likely increase in the scale of operations of the organisation. (We can assume that the scale of operations increased as the revenue grew by 11,29% during this time – this growth percentage probably exceeds the inflation rate during the same period; if revenue growth equals the inflation rate over a period then there is effectively no real growth.) When the scale of operations increase, we might expect savings due to efficiencies of scale (fixed costs spread over more products). This would result in improved gross profits. See cost-volume-profit analysis in MAC2601.
- A lower gross profit margin might be the result of a number of factors, including cost of sales inflated (eg where inventory is obsolete or unpopular) and old or stolen inventory.

**Key formula: OPERATING PROFIT MARGIN**

$$\frac{\text{Operating profit}}{\text{Revenue}} \times 100$$

Where **operating profit** = profit after accounting for operating expenditure, but before finance cost, tax and investment income. The latter items are excluded as it does not form part of the operating activities of an organisation.

The operating profit margin is the operating profit expressed as a percentage of revenue. Changes in this percentage can be ascribed to the change in the gross profit margin or the changes in the operating costs, for example, administrative, distribution and other operating expenses.

The operating profit margin is calculated for Anco Ltd:

| | | **20x2** | | **20x1** |
|---|---|---|---|---|
| $\frac{\text{Operating profit}}{\text{Revenue}} \times 100$ | = | $\frac{461}{6\ 633} \times 100$ | = | $\frac{766}{5\ 960} \times 100$ |
| | = | 6,95% | = | 12,85% |

- The operating profit margin has decreased from 12,85% in 20x1 to 6,95% in 20x2.
- This is attributable to the decrease in the GP margin and the increase in the overall operating costs, in particular, operating cost, distribution cost and other expenses. There was a slight saving in administrative expenses that had a small positive effect.
- As a management accountant, you would analyse the growth rates of these expenses in detail.

**Key formula: NET PROFIT MARGIN**

$$\frac{\text{Net profit}}{\text{Revenue}} \times 100$$

Where **net profit** = profit after accounting for finance cost, tax and investment income, or the final "bottom line".

The net profit margin expresses the relationship between net profit and revenue and gives an indication of the overall profitability of an organisation. It also gives insight into management's overall performance.

The net profit (NP) margin is calculated for Anco Ltd:

| | | **20x2** | | **20x1** |
|---|---|---|---|---|
| $\frac{\text{Net profit}}{\text{Revenue}} \times 100$ | = | $\frac{127}{6\,633} \times 100$ | = | $\frac{376}{5\,960} \times 100$ |
| | = | 1,91% | = | 6,31% |

- The net profit margin has decreased from 6,31% in 20x1 to 1,91% in 20x2.
- This is attributable to the decrease in GP margin, and the increase in overall operating costs and interest expense.
- The slight increase in interest and other income had a small positive effect.

## 5.2 Performance ratios

There are three types of performance ratios namely, return on equity, return on assets and asset turnover.

**Return on equity (ROE)** is a measure of the performance realised by management for the equity holders (shareholders) and expresses net profit as a percentage of equity. In this module, we will only be focusing on ordinary shareholders. The effect of minority interests will be covered in MAC3702.

**Key formula: RETURN ON EQUITY (ROE)**

$$\frac{\text{Net profit}}{\text{Equity}} \times 100$$

### NOTE

ROE measures the organisation's ability to earn a return on the owners'/shareholders' capital. In order to calculate a meaningful return, we seek a relationship between the figure

used as the numerator (above the line) and the figure on which the return is calculated – the denominator (used below the line). Firstly, you should realise that equity holders receive their reward last; after all other expenses have been paid, including the interest paid to the providers of debt capital. It is therefore appropriate to use net profit as the numerator in this calculation (above the line) as it represents the remaining amount, after all other expenses have been paid; and furthermore, net profit is normally available for distribution as a dividend to the holders of equity. (The exact proportion paid out as a dividend and other considerations are discussed in your later MAC modules.)

The ROE is calculated for Anco Ltd:

| | | **20x2** | | **20x1** |
|---|---|---|---|---|
| $\frac{\text{Net profit}}{\text{Equity}} \times 100$ | = | $\frac{127}{1\,646} \times 100$ | = | $\frac{376}{2\,519} \times 100$ |
| | = | 4,80% | = | 14,93% |

- The ROE has decreased from 14,93% in 20x1 to 4,80% in 20x2.
- The reason for the decrease is to be found in the significant decrease in the net profit and a slight increase in the carrying value of equity.

To overcome movements in equity in the year, this return is sometimes also calculated based on opening balances of capital and reserves or on the average of the opening and closing balances.

Based on the opening balance basis, the ROE is now calculated as follows:

| | | **20x2** | | **20x1** |
|---|---|---|---|---|
| $\frac{\text{Net profit}}{\text{Equity}} \times 100$ | = | $\frac{127}{2\,519} \times 100$ | = | $\frac{376}{2\,350^{①}} \times 100$ |
| | = | 5,04% | = | 16,00% |

① See additional information provided.

Based on the average basis, the ROE is now calculated as follows:

| | | **20x2** | | **20x1** |
|---|---|---|---|---|
| $\frac{\text{Net profit}}{\text{Equity}} \times 100$ | = | $\frac{127}{2\,583^{①}} \times 100$ | = | $\frac{376}{2\,435^{②}} \times 100$ |
| | = | 4,92% | = | 15,44% |

① (2 646 + 2 519) ÷ 2 = 2 583
② (2 519 + 2 350) ÷ 2 = 2 435

- The ROE based on the averages are normally more accurate, as it assumes that the movements in equity were spread during the year.

- The ROE calculation based on the market value of Anco Ltd:

| | | 20x2 | | 20x1 |
|---|---|---|---|---|
| $\frac{\text{Net profit}}{\text{Equity}} \times 100$ | = | $\frac{127}{3\,000} \times 100$ | = | $\frac{376}{2\,800} \times 100$ |
| | = | 4,22% | = | 13,43% |

- Based on the market value of the equity, the ROE has decreased from 13,43% in 20x1 to 4,22% in 20x2.
- The ROE based on market values are less than based on book values.
- The market values give a better indication of the true ROE.

**Return on total assets (ROA)** is a measure of the performance generated on all the assets employed in the business and expresses EBIT as a percentage of the total assets employed.

**Key formula: RETURN ON TOTAL ASSETS (ROA)**

$$\frac{\text{EBIT}}{\text{Total assets}} \times 100$$

## NOTE

In calculating this return, we once again seek a relationship between the figure used as the numerator (above the line) and the figure on which the return is calculated – the denominator (used below the line). The appropriate return generated on total assets, to be used as the numerator (above the line), is EBIT as this figure includes the operating profit, and interest and other income earned by the total assets. Recall that total assets consist of non-current assets (property, plant and equipment) and current assets (inventories, trade and other receivables, other investments as well as cash and cash equivalents).

Capital-intensive businesses, such as airlines and companies involved in heavy industry, will normally display a low ROA as a great investment in assets is required in order for these businesses to generate a return. Against this, organisations requiring a low investment in assets, such as service organisations, generally display a higher ROA. **For this reason, ROA is normally only comparable between organisations in similar industries.**

The ROA is calculated for Anco Ltd:

| | | 20x2 | | 20x1 |
|---|---|---|---|---|
| $\frac{\text{EBIT}}{\text{Total assets}} \times 100$ | = | $\frac{516}{8\,803} \times 100$ | = | $\frac{802}{7\,902} \times 100$ |
| | = | 5,86% | = | 10,15% |

- The ROA has decreased from 10,15% in 20x1 to 5,86% in 20x2.
- The reason for the decrease is that the EBIT decreased and total assets increased.

- This implies that the organisation bought new assets, but generated an overall lower return on the new total assets.
- This poor performance may be caused by a lack of skills in managing the new assets or the timing of the investment, for example, if invested close to the year-end, it would not have had time yet to deliver a return.

To overcome movements in assets during the year, this return is sometimes also calculated based on opening balances of total assets or on the average of the opening and closing balances.

Based on the opening balance basis, the ROA is now calculated as follows:

| | | **20x2** | | **20x1** |
|---|---|---|---|---|
| $\frac{\text{EBIT}}{\text{Total assets}} \times 100$ | = | $\frac{516}{7\,902} \times 100$ | = | $\frac{802}{7\,530^{①}} \times 100$ |
| | = | 6,53% | = | 10,65% |

① See additional information provided.

Based on the average basis, the ROA is now calculated as follows:

| | | **20x2** | | **20x1** |
|---|---|---|---|---|
| $\frac{\text{EBIT}}{\text{Total assets}} \times 100$ | = | $\frac{516}{8\,353^{①}} \times 100$ | = | $\frac{802}{7\,716^{②}} \times 100$ |
| | = | 6,18% | = | 10,39% |

① (8 803 + 7 902) ; 2 = 8 353
② (7 902 + 7 530) ; 2 = 7 716

- The ROA based on the averages are normally more accurate, as it assumes that the movements in assets were spread during the year.

The ROA calculation based on the market value of Anco Ltd:

| | | **20x2** | | **20x1** |
|---|---|---|---|---|
| $\frac{\text{EBIT}}{\text{Total assets}} \times 100$ | = | $\frac{516}{9\,157^{①}} \times 100$ | = | $\frac{802}{8\,183^{②}} \times 100$ |
| | = | 5,64% | = | 9,80% |

① 3 000 + 5 552 + 605 = 9 157
② 2 800 + 5 069 + 314 = 8 183

- Based on the market value of the equity, the ROA has decreased from 9,80% in 20x1 to 5,64% in 20x2.
- The ROA based on market values are less than the return based on carrying values.
- The market values give a better indication of the true ROA.

## NOTE

As total assets = total equity and liabilities, we can also use the "other side" of the statement of financial position to calculate the market value of total assets. We just substitute the accounting carrying value of equity with the market value of equity.

Return on operating assets and other assets can also be calculated by using a return attributable to the specific asset as the numerator (above the line) and the value of the specific asset as the denominator (below the line). This will be dealt with on third-year level.

### DU PONT RATIO

Du Pont ratio is a method that breaks down the return on total asset ratio (ROA) into two components – a profit margin and an asset turnover rate.

The return on total asset ratio (ROA) broken down into the two components (Du Pont ratio) is done by merely incorporating revenue as both a numerator and denominator, as follows:

**Key formula: DU PONT RATIO**

$$\frac{\text{EBIT}}{\text{Revenue}} \times \frac{\text{Revenue}}{\text{Assets}} = \frac{\text{EBIT}}{\text{Assets}}$$

**Asset turnover** is normally expressed as a simple ratio (number of times) and not as a percentage. It shows how much revenue is generated per rand invested in total assets. An organisation that generates more revenue with a given number of assets is more efficient in this regard (this is also industry dependent).

## NOTE

The impact of depreciation: Non-current assets that are old and have a low book value will generate a higher asset turnover than an organisation with newer assets, even if they are in the same industry.

**Key formula: ASSET TURNOVER**

$$\frac{\text{Revenue}}{\text{Total assets}} \times 100$$

The asset turnover is calculated for Anco Ltd:

| | | **20x2** | | **20x1** |
|---|---|---|---|---|
| $\frac{\text{Revenue}}{\text{Total assets}}$ | = | $\frac{6\ 633}{8\ 803}$ | = | $\frac{5\ 960}{7\ 902}$ |
| | = | 0,75 times | = | 0,75 times |

- The asset turnover remained constant at 0,75 times for both 20x1 and 20x2.

- This implies that the organisation is generating the same revenue given the total asset investment.
- This can also be compared with industry averages. If this ratio is below industry averages, ways and means should be sought to make more efficient use of assets: Revenue should be increased, or unproductive assets should be sold, or a combination of these two.

The different **profit margins** were illustrated in the beginning of section 5. The profit margin that we use in the Du Pont ratio, is the earnings before interest and tax (EBIT) divided by revenue.

**Key formula: EBIT PROFIT MARGIN**

$$\frac{\text{EBIT}}{\text{Revenue}} \times 100$$

The EBIT profit margin is calculated for Anco Ltd:

| | | **20x2** | | **20x1** |
|---|---|---|---|---|
| $\frac{\text{EBIT}}{\text{Revenue}} \times 100$ | = | $\frac{516}{6\,633}$ | = | $\frac{802}{5\,960}$ |
| | = | 7,78% | = | 13,46% |

- The EBIT profit margin decreased from 13,46% in 20x1 to 7,78% in 20x2.
- This is attributable to the decrease in the GP margin and the increase in the overall operating costs, in particular, operating cost, distribution cost and other expenses. There was a slight saving in administrative expenses that had a small positive effect.

Therefore: ROA =

$$\frac{\text{EBIT}}{\text{Revenue}} \times \frac{\text{Revenue}}{\text{Assets}} = \frac{\text{EBIT}}{\text{Assets}}$$

| | **20x2** | | **20x1** |
|---|---|---|---|
| = | 0,75 x 7,78% | = | 0,75 x 13,46% |
| = | 5,84% | = | 10,10% |

- The ROA has decreased from 10,10% in 20x1 to 5,84% in 20x2.
- Compare this with the first ROA calculation above. Can you see the answer is the same? *(The rounding to 2 decimals creates a small difference!)*

## 6 Measuring liquidity – short-term funds

A business organisation's liquidity is very important to its operations. These ratios indicate the ability of the organisation to generate and conserve cash from its working capital. (Working capital refers to the current assets and current liabilities, which is directly related to the operating activities of an organisation. It will be discussed in detail in topic 7.) We discuss these ratios separately below, each under a separate heading.

## 6.1 Current ratio

This is the primary measure of an organisation's liquidity. This ratio is best viewed within the context of a particular industry. However, for most types of businesses, current assets should be more than current liabilities to ensure liquidity, which means that the ratio should exceed 1, but a ratio that is too high can indicate one of the following conditions: Current assets might be overstated (valued too high), current assets are not converted into cash fast enough, or too much money is tied up in non-productive current assets. For many organisations, the current ratio remains close to 2:1, but this can differ significantly per industry. For example, due to its particular trade environment, food retailers and wholesalers often have a current ratio below 1:1, which is the result of buying most/all of its inventory (normally its largest current asset) on credit, but selling most goods on a cash-basis. Notice that this ratio is stated as a number, not as a percentage.

**Key formula: CURRENT RATIO**

Current assets:Current liabilities

The current ratio is calculated for Anco Ltd:

| | | **20x2** | | **20x1** |
|---|---|---|---|---|
| Current assets:Current liabilities | = | 894:605 | = | 681:314 |
| | = | 1,48:1 | = | 2,17:1 |

- The current ratio has decreased from 2,17:1 in 20x1 to 1,48:1 in 20x2.
- The decrease to 1,48 implies that R1 of current liabilities are covered by only R1,48 of current assets.
- To properly evaluate this change, additional knowledge of the industry in which Anco Ltd operates should be sought. The current ratio of Anco Ltd should then be compared to the average of the industry, or rather, to organisations representing "best practice" for the industry.

## 6.2 Liquid asset ratio (or acid test or quick ratio)

This ratio is more conservative than the current ratio and recognises the fact that inventory may take longer to convert into cash than other current assets, such as accounts receivable. For many businesses the liquid asset ratio remains close to 1:1, but this can differ significantly per industry.

**Key formula: LIQUID ASSET RATIO**

Current assets *less* inventory:Current liabilities

The liquid asset ratio is calculated for Anco Ltd:

| | | **20x2** | | **20x1** |
|---|---|---|---|---|
| Current assets *less* inventory:Current liabilities | = | 604:605 | = | 378:314 |
| | = | 1,00:1 | = | 1,20:1 |

- The liquid asset ratio has decreased from 1,20:1 in 20x1 to 1,00:1 in 20x2.

- Although there is a decrease, it still shows that the organisation can meet its current liabilities without much difficulty.
- To properly evaluate this change, additional knowledge of the industry in which Anco Ltd operates should again be sought.

## 6.3 Inventory days

This calculation measures the days of sales in inventory and indicates the period an inventory item will lie in stock from its purchase (in the case of a reseller) or production (in the case of a manufacturer) up to date of sale. As revenue increase, we expect the inventory levels to increase as well, to ensure that the organisation does not run out of stock (when the organisation is out of stock, it will lose customers and sales). In such a case, however, the inventory days should still remain fairly constant. An increase in the inventory days may mean that the organisation does not properly manage inventory levels; a decrease in inventory days implies lower inventory holding costs to the organisation, but may have a negative effect where this results in an out-of-stock scenario.

**Key formula: INVENTORY DAYS**

$$\frac{\text{Inventory}}{\text{Cost of sales}} \times 365 \text{ (or x 12 if months are used)}$$

The inventory days is calculated for Anco Ltd:

| | | **20x2** | | **20x1** |
|---|---|---|---|---|
| $\frac{\text{Inventory}}{\text{Cost of sales}} \times 365$ | = | $\frac{290}{3\,655} \times 365$ | = | $\frac{303}{3\,125} \times 365$ |
| | = | 29 days | = | 35 days |

- The inventory days decreased from 35 days in 20x1 to 29 days in 20x2.
- This decrease implies that inventory has been managed better, especially considering that revenue has increased with 11%.
- The organisation should ensure, however, that it does have sufficient inventory so as not to reach an out-of-stock situation.

**NOTE**

Sometimes the working capital days are calculated based on 360 days (30 days per month). Please read the question carefully to see what number you should use.

## 6.4 Inventory turnover ratio

The inventory turnover ratio is a measure of the number of times inventory is sold or used in a year. This calculation is the inverse of the inventory days. A low turnover is not good, as the value of inventory tend to decline as they are in the warehouse for longer periods and inventory holding costs are higher. Organisations that are selling fresh products have a very high turnover.

**Key formula: INVENTORY TURNOVER RATIO (RATE)**

$$\frac{\text{Cost of sales}}{\text{Inventory}}$$

The inventory turnover rate is calculated for Anco Ltd:

| | | 20x2 | | 20x1 |
|---|---|---|---|---|
| $\frac{\text{Cost of sales}}{\text{Inventory}}$ | = | $\frac{3\ 655}{290}$ | = | $\frac{3\ 125}{303}$ |
| | = | 12,60 times | = | 10,31 times |

- The inventory turnover rate increased from 10,31 times in 20x1 to 12,60 times in 20x2.
- The increase is normally an indication of good inventory management. It also could lead to saving in costs like inventory holding costs.

If average inventory is used, the calculation will be as follows:

**Key formula: INVENTORY TURNOVER RATIO (RATE) – FOR AVERAGE INVENTORY**

$$\frac{\text{Cost of sales}}{\text{Average inventory}}$$

The inventory turnover rate is calculated for Anco Ltd:

| | | 20x2 | | 20x1 |
|---|---|---|---|---|
| $\frac{\text{Cost of sales}}{\text{Average inventory}}$ | = | $\frac{3\ 655}{297^{①}}$ | = | $\frac{3\ 125}{191^{②}}$ |
| | = | 12,33 times | = | 16,36 times |

① (290 + 303) ÷ 2 = 297
② (303 + 79) ÷ 2 = 191

- The inventory turnover rate decreased from 16,36 times in 20x1 to 12,33 times in 20x2.
- The big difference in the turnover rate in 20x1 is due to the low opening balance of inventory in the beginning of 20x1.
- The decrease in the turnover rate could indicate that the organisation's inventory levels are too high.
- As cost of sales occur over the entire year, it is better to use an average inventory measure.

## 6.5 Receivable days (debtors' collection period)

This calculation measures the number of days it takes for credit sales to be converted into cash, or for the average debtor to pay his debt. For most organisations, debtors should pay within a month or two of the sale (once again this will normally display a trend within an industry) so average receivable days should not exceed 30 days or 60 days, with too much, respectively. Notice that the longer the organisation takes to collect the cash, the more difficult it becomes. Debtors exceeding the allowed payment terms represent a greater

risk of becoming "bad debt" or irrecoverable. As the trade receivables amount includes VAT, the credit sales should also be calculated inclusive of VAT.

**NOTE**

If information on different sales categories are given, remember to split the export sales from the local sales, as there is no VAT on export sales.

**Key formula: RECEIVABLE DAYS (DEBTORS' COLLECTION PERIOD)**

$$\frac{\text{Receivables (trade and other debtors)}}{\text{Credit sales}} \times 365 \text{ (or x 12 if months are used)}$$

The receivable days is calculated for Anco Ltd:

| | | **20x2** | | **20x1** |
|---|---|---|---|---|
| $\frac{\text{Receivables}}{\text{Credit sales}} \times 365$ | = | $\frac{250}{4\ 537^{①}} \times 365$ | = | $\frac{222}{4\ 077^{②}} \times 365$ |
| | = | 20 days | = | 20 days |

① 6 633 x 60% x 1,14 = 4 537
② 5 960 x 60% x 1,14 = 4 077

- The receivable days stayed constant on 20 days for both 20x1 and 20x2.
- This answer is best compared to that of the industry, but is nonetheless positive as sales have increased by 11% (see paragraph 0) and the collection period has not changed.

Normally, an increase in revenue can result in an increase in debtors, but we expect the ratio to stay the same, for example, 15 ÷ 150 x 365 = 36,5 days and if both increase, the number of days stay the same: 16 ÷ 160 x 365 = 36,5 days. If the ratio gets worse, it means that the organisation has increased the revenue by allowing "easy" debt. Although profits may increase, it can become risky as the organisation may run into cash flow problems, or debtors may not pay.

## 6.6 Payable days (creditors' payment period)

This calculation measures the number of days it takes for the organisation to pay its creditors. For most organisations, a period between 30 and 60 days are considered to be normal. Current payables are a form of finance that is mostly free, dependant on timely payment discounts (if not taken then there is an "opportunity costs" to this) and other late payment costs (such as interest on overdue accounts charged by the creditor). The efficient management of payable days will depend on a number of factors, including industry norms and credit terms. As the trade payables amount includes VAT, the credit purchases should also be calculated inclusive of VAT.

**Key formula: PAYABLE DAYS (CREDITORS' PAYMENT PERIOD)**

$$\frac{\text{Payables (trade and other creditors)}}{\text{Credit purchases}} \times 365 \text{ (or x 12 if months are used)}$$

The payable days is calculated for Anco Ltd:

| | | 20x2 | | 20x1 |
|---|---|---|---|---|
| $\frac{\text{Payables}}{\text{Credit purchases}} \times 365$ | = | $\frac{365}{4\ 152^{①}} \times 365$ | = | $\frac{245}{3\ 818^{②}} \times 365$ |
| | = | 32 days | = | 23 days |

① 3 642 x 1,14 = 4 152
② 3 349 x 1,14 = 3 818

- The payable days has increased from 23 days in 20x1 to 32 days in 20x2.
- The 23 day period in 20x1 is almost the same as the 20 receivable days in 20x1, which is not a good indication for cash flow management.
- The increase to 32 days in this scenario can be interpreted as positive as it is greater than the corresponding receivable days, thereby financing the receivables and a portion of inventory, but is dependent on a number of factors, including its effect on supplier relationships. It should also be compared to the norm for the industry.

## 6.7 Cash conversion cycle (days)

The cash conversion cycle indicates the number of days it takes for cash to flow through the operating activities, from initial purchases on credit, until it is eventually converted into a cash inflow. The cycle is determined by taking the receivable days, adding the inventory days and subtracting the payable days. If the number of days in the cycle decreases, it indicates an improvement in the cash flow from operating activities.

The cash conversion cycle days is calculated for Anco Ltd:

| | 20x2 | 20x1 |
|---|---|---|
| Period of credit taken by customers (Receivable days) | 20 | 20 |
| *Plus:* Number of days of inventory (Inventory days) | 29 | 35 |
| | 49 | 55 |
| *Less:* Period of credit granted by suppliers (Payable days) | (32) | (23) |
| Total cash conversion cycle | 17 days | 32 days |

- The cash conversion cycle days has decreased from 32 days in 20x1 to 17 days in 20x2.
- This implies that the organisation has improved its cash flow from operating activities.

### NOTE

In topic 7 on working capital management you will learn more about techniques to manage the cash conversion cycle and its components to remain within industry norms and funding available to the organisation.

## 6.8 Cash ratio

The cash ratio is not commonly used, but can be used to determine the organisation's immediate ability to pay its short-term obligations. The higher the ratio, the more liquid the organisation, but too high a ratio can also mean "*unproductive cash*" that is not generating a sufficient return (eg a return that could have been generated if it was invested in assets and investments).

**Key formula: CASH RATIO**

$$\frac{\text{Cash}}{\text{Current liabilities}}$$

**NOTE**

Unproductive cash: Bank balances with positive balances earn much lower interest than when it's invested in the money market or fixed term investments. Ultimately, funds should not lie in cash, but be invested in operating assets that generate higher returns.

The cash ratio is calculated for Anco Ltd:

| | | **20x2** | | **20x1** |
|---|---|---|---|---|
| $\frac{\text{Cash}}{\text{Current liabilities}}$ | = | $\frac{354}{605}$ | = | $\frac{156}{314}$ |
| | = | 0,59 times | = | 0,50 times |

- The cash ratio has increased from 0,50 times in 20x1 to 0,59 times in 20x2, but has not changed much.
- As the resulting ratios are below 1, it implies that cash cannot cover short-term obligations in either year.
- This will be of concern only if there is a possibility of trade and other payables suspending credit (consider increased accounts payable days/creditors' payment period, with a possible strain on relationships), or debt providers cancelling the loan agreement (consider the terms and conditions in the loan agreement).

# 7 Measuring solvency and financial/capital structure – long-term funds

These ratios tell more about the organisation's ability to repay its long-term debts, which include the repayment of the capital and also the payment of interest. It provides information about the risk that shareholders and debt providers are taking. These ratios are sensitive to the industry. We discuss these ratios separately below – each under a separate heading.

## 7.1 Interest cover ratio

This ratio measures the number of times the operating profit will cover the interest expense. The more times earnings before interest and tax (EBIT) cover the interest, the safer it is to borrow additional funds.

**Key formula: INTEREST COVER RATIO**

$$\frac{\text{EBIT}}{\text{Interest expense}}$$

The interest cover ratio is calculated for Anco Ltd:

| | | 20x2 | | 20x1 |
|---|---|---|---|---|
| $\frac{\text{EBIT}}{\text{Interest expense}}$ | = | $\frac{516}{335}$ | = | $\frac{802}{265}$ |
| | = | 1,54 times | = | 3,03 times |

- The interest cover ratio has decreased from 3,03 times in 20x1 to 1,54 times in 20x2.
- As the coverage is declining, it indicates that the organisation probably cannot afford to significantly increase interest-bearing debt in its capital structure.

## 7.2 Debt to equity ratio (or leverage ratio)

The debt to equity ratio is an important ratio as it measures the level of financial risk (as discussed in the part on risk management of this study guide). Debt financing creates an obligation that has to be settled, for example, through capital and interest payments that has to be paid whether the organisation can afford it or not, thereby creating financial risk.

The debt to equity ratio measures the relationship between an organisation's debt financing (financing with an obligation to settle, as mentioned) and equity financing (financing without an obligation to settle, eg dividends may be paid but isn't compulsory).

For the purposes of calculating this ratio, debt financing commonly comprises only long-term interest-bearing debt (including its current portion, which is normally payable within the next 12 months); equity comprises the organisation's assets less liabilities belonging to shareholders, or simply put, the total shareholders' interest. When determining the debt-portion of this ratio, non-interest bearing debt and current liabilities (other than the current portion of long-term debt, if any) are usually excluded, as we are concerned here with the portion of debt representing long-term capital financing.

**Key formula: DEBT TO EQUITY RATIO**

Long-term interest bearing debt (including its current portion):Equity

The debt to equity ratio is calculated for Anco Ltd:

| | | 20x2 | | 20x1 |
|---|---|---|---|---|
| Long-term debt[#] (including its current portion):Equity | = | 5 220 + 0[①]:2 646 | = | 4 770 + 0[①]:2 519 |
| | = | 1,97:1 | = | 1,89:1 |

[#]Long-term debt is long-term interest bearing debt.
[①] In this case there is no current portion of long-term debt.

- The debt to equity ratio has increased from 1,89:1 in 20x1 to 1,97:1 in 20x2.
- Both ratios indicate that the organisation has high gearing, as the long-term debt portion is nearly twice as much as the equity portion.
- Notice that this calculation used carrying values, which often understates the value of equity. (We therefore prefer that this ratio be calculated based on market values, as detailed below.)

The debt to equity calculation based on the market value of Anco Ltd:

| | | 20x2 | | 20x1 |
|---|---|---|---|---|
| Long-term debt[#] (including its current portion):Equity | = | 5 220 + 0[①]:3 000 | = | 4 770 + 0[①]:2 800 |
| | = | 1,74:1 | = | 1,70:1 |

[#] Long-term debt is long-term interest bearing debt.
[①] In this case there is no current portion of long-term debt.

- Based on the market values, the debt to equity ratio has increased from 1,70:1 in 20x1 to 1,74:1 in 20x2.
- The debt to equity ratio based on market values is still relatively high, but less than the ratio based on carrying values as equity is not understated in this case.
- The market values give a better indication of the true debt to equity ratio.

## 7.3 Debt ratio (or gearing ratio)

This ratio measures the percentage of total funds provided by holders of debt, including all forms of debt. It tells us how much of the organisation's assets are financed by total debt. A high debt ratio is risky to investors, debt providers and other creditors as it points to higher financing risk.

**Key formula: DEBT RATIO**

$$\frac{\text{Total debt}}{\text{Total assets}} \times 100$$

The debt ratio is calculated for Anco Ltd:

| | | 20x2 | | 20x1 |
|---|---|---|---|---|
| $\frac{\text{Total debt}}{\text{Total assets}} \times 100$ | = | $\frac{6\ 157^{①}}{8\ 803} \times 100$ | = | $\frac{5\ 383^{②}}{7\ 902} \times 100$ |
| | = | 69,94% | = | 68,12% |

[①] 5 552 + 605 = 6 157
[②] 5 069 + 314 = 5 383

- The debt ratio has increased slightly from 68,12% in 20x1 to 69,94% in 20x2.
- Both these percentages are considered high in most industries, the norm being about 50%. Note that this is also industry dependant.

The debt ratio calculation based on the market value of Anco Ltd:

| | | 20x2 | | 20x1 |
|---|---|---|---|---|
| $\frac{\text{Total debt}}{\text{Total assets}} \times 100$ | = | $\frac{6\ 157^{①}}{9\ 157^{③}} \times 100$ | = | $\frac{5\ 383^{②}}{8\ 183^{④}} \times 100$ |
| | = | 67,24% | = | 65,78% |

[①] 5 552 + 605 = 6 157 and
[②] 5 069 + 314 = 5 383

Total assets = Total debt + total equity, therefore:

[③] 6 157 + 3 000 = 9 157 and
[④] 5 383 + 2 800 = 8 183

The debt ratio has increased from 65,78% in 20x1 to 67,24% in 20x2. The debt ratio based on market values is slightly less than based on carrying values as equity is not understated in this case. The market values give a better indication of the true debt ratio.

## 7.4 Total assets to total debt

This ratio indicates the number of times debt is covered by assets. The same figures are used as in the debt ratio above, just in the inverse. In this case, the higher the ratio, the lower the risk is for investors and creditors.

**Key formula: TOTAL ASSETS TO TOTAL DEBT**

$$\frac{\text{Total assets}}{\text{Total debt}}$$

The total assets to total debt ratio is calculated for Anco Ltd:

| | | **20x2** | | **20x1** |
|---|---|---|---|---|
| $\frac{\text{Total assets}}{\text{Total debt}}$ | = | $\frac{8\ 803}{6\ 157}$ | = | $\frac{7\ 902}{5\ 383}$ |
| | = | 1,43 times | = | 1,47 times |

- The ratio has decreased from 1,47 times in 20x1 to 1,43 times in 20x2.
- Both these ratios are considered too low in most industries (a similar unfavourable result as for the debt ratio above).

The total assets to total debt calculation based on the market value of Anco Ltd:

| | | **20x2** | | **20x1** |
|---|---|---|---|---|
| $\frac{\text{Total assets}}{\text{Total debt}}$ | = | $\frac{9\ 157}{6\ 157}$ | = | $\frac{8\ 183}{5\ 383}$ |
| | = | 1,49 times | = | 1,52 times |

- The ratio has decreased from 1,52 times in 20x1 to 1,49 times in 20x2.
- The total assets to total debt ratio based on market values is higher than that based on carrying values (book values).
- The market values give a better indication of the total assets to total debt ratio.

## 7.5 Financial leverage effect

This ratio refers to the degree the organisation is utilising (leveraging) debt when they acquire additional assets in order to increase the returns to equity holders. This ratio should be evaluated in conjunction with the capital expenditure for the period and changes in the gearing ratio. The ratio should be greater than one, indicating that returns to equity holders (ROE) has benefited from debt financing of assets. It can also indicate that a high amount of borrowed funds are used in high risk investments in order to maximise the returns for equity holders.

**Key formula: FINANCIAL LEVERAGE EFFECT**

Return on equity (ROE):Return on assets (ROA)

The financial leverage is calculated for Anco Ltd:

| | | 20x2 | | 20x1 |
|---|---|---|---|---|
| Return on equity (ROE)*: Return on assets (ROA)* | = | 4,80:5,86 | = | 14,93:10,15 |
| | = | 0,82:1 | = | 1,47:1 |
| and Gearing ratio (debt ratio) | = | 69,94% | = | 68,12% |

(*See profitability ratios)

- The financial leverage has decreased from 1,47:1 in 20x1 to 0,82:1 in 20x2.
- The gearing (debt) ratio only increased slightly. This means that new capital expenditure was funded in the same debt to equity ratio as before.
- The gearing (debt) ratio is already quite high, limiting the extent to which further debt financing can be obtained.
- In the absence of increased gearing (debt ratio), we would expect the same returns as before.
- However, as discussed before, both the ROE and ROA declined due to lower profits.

The leverage effect is:

| | | 20x2 | | 20x1 |
|---|---|---|---|---|
| ROE* | = | 4,80% | = | 14,93% |
| Less: ROA* | = | 5,86% | = | 10,15% |
| | = | (1,06)% | = | 4,78% |

(*See profitability ratios)

- The financial leverage effect has decreased from 4,78% in 20x1 to –1,06% in 20x2.
- The decrease in the financial leverage effect is an indication of the inefficient use of borrowed funds.
- The ROE is an indication of the return the shareholders receive on their investment.
- The negative return in 20x2 is shows that the organisation did not use the borrowed or own funds effectively.

# 8 Measuring how the organisation relates to financial market ratios

When measuring how the organisation is judged or valued by the financial market, several ratios and other calculations can assist in the process. Here we highlight only a few.

## 8.1 Earnings per share

Earnings per share (EPS) are an organisation's net profit (after minority interest) divided by the number of ordinary shares issued. EPS will be used later in calculating the price/earnings ratio.

**Key formula: EARNINGS PER SHARE**

$$\frac{\text{Earnings (or net profit)}}{\text{Number of shares issued}}$$

EPS represents historical financial information and is therefore also subject to the limitations in financial information as discussed in study unit 15, section 5. Notice further that EPS can be manipulated to an extent by making changes in accounting policies.

## NOTE

The finer calculations involving diluted earnings, normalised earnings, headline earnings, et cetera, will be covered in later FAC and MAC modules.

The earnings per share are calculated for Anco Ltd:

| | | 20x2 | | 20x1 |
|---|---|---|---|---|
| $\frac{\text{Earnings (or net profit)}}{\text{Number of shares issued}}$ | = | $\frac{127}{1\,000}$ | = | $\frac{376}{1\,000}$ |
| | = | R0,127 | = | R0,376 |
| | = | 12,7 cents[a] | = | 37,6 cents[a] |

[a] Notice that in the financial markets, earnings per share are normally expressed in cents, not rands.

- The earnings per share have decreased from 37,6 cents in 20x1 to 12,7 cents in 20x2.
- This decrease is mainly attributable to the decrease in GP margin, and the increase in overall operating costs and interest expense.
- The slight increase in interest and other income had a small positive effect.

## 8.2 Dividend pay-out ratio

This ratio indicates the proportion of earnings per share paid out to the shareholders in the form of a dividend. A low dividend pay-out ratio can indicate that the organisation is in a growth phase and is retaining money to invest in profitable projects (which might eventually increase the share price and or allow for the payment of greater future dividends). Warren Buffet, the well-known investor and CEO of Berkshire Hathaway Inc, a US conglomerate, famously follows a general policy of not paying any dividends to investors in this conglomerate, instead choosing to reinvest funds in order to generate capital growth. An individual company might, however, have a high dividend pay-out ratio where its investors prefer high current pay-outs rather than capital growth, or where the organisation represents a mature organisation in a stable phase of its life-cycle (no expansions are envisioned). Furthermore, dividend pay-out ratios are sometimes comparable between business organisations within the same industry.

**Key formula: DIVIDEND PAY-OUT RATIO**

$$\frac{\text{Dividend per share (DPS)}}{\text{Earnings per share (EPS)}}$$

The dividend pay-out ratio is calculated for Anco Ltd:

| | | **20x2** | | **20x1** |
|---|---|---|---|---|
| $\frac{\text{Dividend per share (DPS)}}{\text{Earnings per share (EPS)}}$ | = | $\frac{6}{12,7}$ | = | $\frac{5}{37,6}$ |
| | = | 47,24% | = | 13,30% |

- The dividend pay-out ratio has increased from 13,30% in 20x1 to 47,24% in 20x2.
- The ratio increased as a greater proportion of the earnings per share was paid out to shareholders in 20x2 in the form of a dividend.
- The dividend itself increased from 5 cents to 6 cents.

**NOTE**

Organisations usually try to keep their dividends constant or to increase it slightly if they feel confident that they can maintain the new level in the future. In times of decreasing earnings, the pay-out ratio would therefore increase "artificially". You will learn more about distributions to equity holders in your later MAC modules.

Organisations that have a low dividend pay-out ratio, say below 60% of earnings, will have more money to invest back into the organisation and grow the share price.

## 8.3 Dividend cover ratio

Dividend cover measures an organisation's ability to pay its dividend payments to the shareholders. A healthy, growing company will have a high coverage ratio, which indicates that it has little difficulty in paying its dividends, and is retaining earnings (cash) to fund expansion projects. The dividend cover is the inverse of dividend pay-out ratio, which was calculated above. Normally, a ratio of 2 or higher is considered that the organisation can well afford the dividend, and anything below 1,5 is risky. When the ratio is below 1, the organisation is using its retained earnings from a previous year to pay this year's dividend.

**Key formula: DIVIDEND COVER RATIO**

$$\frac{\text{Earnings per share (EPS)}}{\text{Dividend per share (DPS)}}$$

The dividend cover ratio is calculated for Anco Ltd:

| | | **20x2** | | **20x1** |
|---|---|---|---|---|
| $\frac{\text{Earnings per share (EPS)}}{\text{Dividend per share (DPS)}}$ | = | $\frac{12,7}{6}$ | = | $\frac{37,6}{5}$ |
| | = | 2,12 times | = | 7,52 times |

- The dividend cover ratio has decreased from 7,52 times in 20x1 to 2,12 times in 20x2.
- The ratio decreased as there are less EPS in 20x2 to cover the higher dividend per share.
- As the ratio in 20x2 is higher than 2, it shows that the organisation can still well afford the dividend payment.

## 8.4 Price/earnings ratio

The price/earnings (P/E) ratio, also known as a P/E-multiple, expresses the relationship between the market price of an organisation's shares and its earnings per share (both variables have to be available). The P/E ratio can be considered as "the number of years' earnings that are represented by the current share price" (SAICA, 2009:4).

**Key formula: PRICE/EARNINGS RATIO**

$$\frac{\text{Share price}}{\text{Earning per share (EPS)}}$$

Generally, the market price of the shares of an unlisted (private) organisation is not easily available. A P/E ratio is therefore normally only calculated for listed organisations, which have published share market prices (based on regular buy and sell transactions on a securities exchange), or for private organisations where there was a recent share transaction or where the value of the private shareholding was recently quantified by a specialist appraiser. In fact, appraisers often make use of a market-comparable approach to value a private shareholding, using a method that utilises the P/E multiple of a similar listed organisation as a point of departure in the valuation.

### NOTE

You will learn more about valuations and the different market indicators used in your third-year MAC modules.

The price/earnings ratio is calculated for Anco Ltd:

| | | **20x2** | | **20x1** |
|---|---|---|---|---|
| Share price | = | 300,0 | = | 280,0 |
| Earning per share (EPS) | | 12,7 | | 37,6 |
| | = | 23,62 | = | 7,45 |

- The price/earnings ratio has increased from 7,45 in 20x1 to 23,62 in 20x2.
- Although the earnings per share decreased in 20x2, the share price still increased slightly, even after release of the downturn in the EPS, and this resulted in a higher P/E ratio. In other words, roughly a year ago the market priced a share at 7,45 times the 20x1 EPS, but currently it prices a share at 23,62 times the 20x2 EPS.
- A higher P/E ratio in this case, is a sign of optimism in the future, relative to the poor EPS on which it is based. This implies that the market expects the EPS to improve significantly in the future which will bring the P/E ratio back to previous levels, or slightly higher.
- P/E ratios can be placed in a better context by comparing them to the P/E ratios of similar (normally listed) organisations, calculated at the same date.

## 8.5 Earnings yield

The earnings yield is the inverse of the price/earnings (P/E) ratio.

**Key term: EARNINGS YIELD**

The earnings yield on an organisation's share is an estimate of the expected return from the organisation's share. The future earnings is expressed as a percentage of the value of the share. The earnings yield can also be determined by finding a comparable earnings yield from a similar share and adjust it for growth and risk.

**Key formula: EARNINGS YIELD**

$$\frac{\text{Earnings per share (EPS)}}{\text{Share price}}$$

The earnings yield is calculated for Anco Ltd:

| | | 20x2 | | 20x1 |
|---|---|---|---|---|
| $\frac{\text{Earnings per share (EPS)}}{\text{Share price}}$ | = | $\frac{12,7}{300,0}$ | = | $\frac{37,6}{280,0}$ |
| | = | 4,23% | = | 13,43% |

- The earnings yield has decreased from 13,43% in 20x1 to 4,23% in 20x2.
- The earnings per share decreased in 20x2 AND the share price still increased slightly. This combination resulted in a lower earnings yield.
- A lower earnings yield is a sign of optimism in the future, relative to the EPS on which it is based. This implies that the market expects the EPS to improve significantly in the future.
- Earnings yields can be placed in a better context by comparing them to the earnings yields of similar (normally listed) organisations, calculated at the same date.

## 8.6 Dividend yield

The dividend yield measures the return from distributions that the shareholders will earn from their investments in relation to the share price. The higher the dividend (distribution) is, the higher the return will be.

**DIVIDEND YIELD**

The dividend yield on an organisation's share is the organisation's total annual dividend payments divided by its price per share. The dividend yield can also be determined by finding a comparable dividend yield from a similar share and adjust it for growth and risk.

**Key formula: DIVIDEND YIELD**

$$\frac{\text{Dividend per share (DPS)}}{\text{Share price}}$$

The dividend yield is calculated for Anco Ltd:

| | | 20x2 | | 20x1 |
|---|---|---|---|---|
| $\frac{\text{Dividend per share (DPS)}}{\text{Share price}}$ | = | $\frac{6,0}{300,0}$ | = | $\frac{5,0}{280,0}$ |
| | = | 2,00% | = | 1,79% |

- The dividend yield has increased from 1,79% in 20x1 to 2,00% in 20x2.
- Although the dividend per share increased in 20x2, the share price also increased slightly. This still resulted in a slightly higher dividend yield.
- A higher dividend yield is a sign of a higher return to the shareholders, but does not necessarily indicate whether the organisation is profitable or not.
- Dividend yields can be placed in a better context by comparing them to the dividend yields of similar (normally listed) organisations, calculated at the same date.

**NOTE**

Remember: where appropriate, always show your calculations and attempt to show as much insight as possible in your discussions. For discussions, a good understanding of the interactions between figures, calculations and ratios is required. For a test or exam, always analyse exactly what is required. Make sure you understand which calculations and ratios belong to each of the four categories. The number of marks should offer your further guidance on the extent of the calculations and discussions to be presented.

## 9 Summary

In this study unit, we have examined how to calculate growth rates and ratios. An income statement and balance sheet were provided to base the calculations on. The ratios were classified into four categories namely, profitability and performance, liquidity, solvability and financial/capital structure, and financial market. Different ratio formulas were given, calculations were performed and the results were analysed and interpreted. These techniques assist us in making decisions in managing the funds of the organisation or with respect to our investment decisions.

In the next topics we will examine how these ratios assist us in managing working capital and income distribution in the organisation.

### Self-assessment activity

After having worked through the study unit, you should be able to answer the following questions:

a. Why are growth ratios important?

b. Name and describe the four classifications that ratio analysis consists of.

c. List the ratios in each classification and describe how the ratio will assist you in financial analysis of an organisation.

**QUESTION 1**

Calculate the following ratios for years 20x2 and 20x1 by using the selected information below. Discuss your findings and offer **detailed reasons** for the change in the ratios from the one year to the next.

a. gross profit margin
b. operating profit margin
c. return on total assets
d. current ratio
e. debt to equity ratio

| | 20x2 R'000 | 20x1 R'000 |
|---|---|---|
| Revenue | 777 | 663 |
| Net operating profit /(loss) | 93 | 48 |
| Gross profit | 312 | 298 |
| Operating costs | (101) | (150) |

| | 20x2 R'000 | 20x1 R'000 |
|---|---|---|
| Total assets | 969 | 879 |
| Interest-bearing borrowings | 572 | 555 |
| Total current assets | 94 | 89 |
| Total equity | 330 | 265 |
| Total current liabilities | 67 | 59 |

The current portion of interest-bearing borrowings included in current liabilities is R34 000 (20x2) and R33 000 (20x1).

*(We deliberately **do not** reflect these items in the order in which they would appear in the annual financial statements.)*

## Solution to self-assessment activity

**QUESTION 1**

*For the simplification of calculations below, the thousands in the figures were not shown.*

**a. Gross profit margin**

| | | 20x2 | | 20x1 |
|---|---|---|---|---|
| $\frac{\text{Gross profit}}{\text{Revenue}} \times 100$ | = | $\frac{312}{777} \times 100$ | = | $\frac{298}{663} \times 100$ |
| | = | 40,15% | = | 44,95% |

Discussion and detailed reasons:

The gross profit margin decreased from 44,95% in 20x1 to 40,15% in 20x2, which could be due to a number of factors, including a reduction in GP margins, old or obsolete inventory written off. We can predict that the scale of operations increased as the revenue grew by 17,20% during this time – this growth percentage probably exceeding the inflation rate during the same period; if revenue growth equals the inflation rate over a period then there is effectively no real growth. When the scale of operations increase, we might expect savings due to efficiencies in scale (fixed costs spread over more products). This would result in IMPROVED gross profits. We can therefore eliminate REDUCTION in the GP% as a reason.

**b. Operating profit margin**

| | | **20x2** | | **20x1** |
|---|---|---|---|---|
| $\frac{\text{Operating profit}}{\text{Revenue}} \times 100$ | = | $\frac{93}{777} \times 100$ | = | $\frac{48}{663} \times 100$ |
| | = | 11,97% | = | 7,24% |

Discussion and detailed reasons:

The operating profit margin increased from 7,24% in 20x1 to 11,97% in 20x2 due to the large saving in operating cost, which decreased significantly, even though revenue increased for this year. This saving was large enough to also compensate for the lower gross profit margin earned in 20x2, which reduced from 44,95% in 20x1 to 40,15% in 20x2.

## NOTE

In order to discuss possible reasons for a change in a margin between years, we have to refer to relative changes in the variables that were used to calculate it (relative to revenue for each year, in this case). This is the reason why we discuss changes in gross profit margin (this is already relative to revenue and gross profit is incorporated into operating profit) and change in operating costs relative to revenue (operating cost is the last cost incorporated in order to calculate operating profit).

**c. Return on total assets**

| | | **20x2** | | **20x1** |
|---|---|---|---|---|
| $\frac{\text{EBIT}}{\text{Total assets}} \times 100$ | = | $\frac{93^a}{969} \times 100$ | = | $\frac{48^a}{879} \times 100$ |
| | = | 9,60% | = | 5,46% |

[a] Operating profit equals EBIT in this case, as no other income was supplied.

Discussion and detailed reasons:

The ROA has increased from 5,46% in 20x1 to 9,60% in 20x2 due to the large increase in operating profit (which equals EBIT in this case) relative to the smaller increase in total assets. The organisation therefore generated a greater return on total assets (including new assets acquired) in 20x2, relative to 20x1. This increase implies good skills in managing the existing and new assets in 20x2. Further reasons should be sought for this improvement,

such as the type of new assets acquired, changes in market conditions, changes in management or competitors, and so on.

**d. Current ratio**

| | | 20x2 | | 20x1 |
|---|---|---|---|---|
| Current assets:Current liabilities | = | 94:67 | = | 89:59 |
| | = | 1,40:1 | = | 1,51:1 |

Discussion and detailed reasons:

The current ratio has decreased from 1,51:1 in 20x1 to 1,40:1 in 20x2. In order to evaluate whether this represents an improvement or not, detailed knowledge of the organisation and its industry will be required. Nonetheless, it could be interpreted as positive as it points to improved working capital management (less cash invested in debtors and inventory). On the other hand, a lower current ratio could be a warning of future cash flow problems (eg if debtors do not pay on time in future, or if inventory is not sold fast enough, the current assets will not convert to cash quickly enough to enable the organisation to pay the current liabilities, when due).

**e. Debt to equity ratio**

| | | 20x2 | | 20x1 |
|---|---|---|---|---|
| Long-term debt[#] (including its current portion):Equity | = | 606[①]:330 | = | 588[②]:265 |
| | = | 1,84:1 | = | 2,22:1 |

[#] Long-term debt is long-term interest bearing debt
[①] 572 + 34 = 606
[②] 555 + 33 = 588

The debt to equity ratio has decreased from 2,22:1 in 20x1 to 1,84:1 in 20x2. The decrease in the ratio shows that the level of debt capital increased by a smaller amount relative to the increase in equity for 20x2. The organisation therefore reduced its level of debt in 20x2, but it still represents a high level. This is at least a positive sign for investors, as the lighter gearing indicates a reduction in the risk of the organisation not being able to repay its debt.

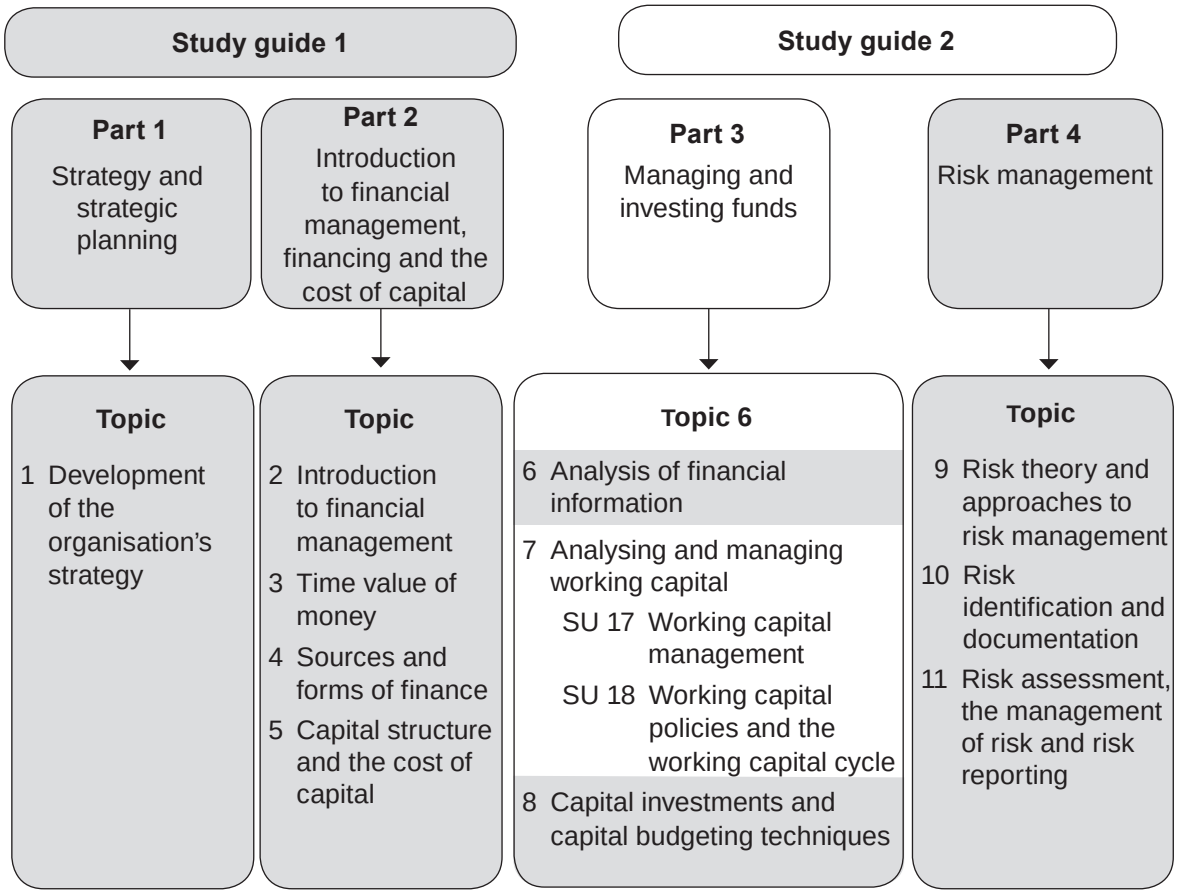
TOPIC 7

# Analysing and managing working capital

## LEARNING OUTCOMES

After studying this topic, you should be able to:

- define and explain working capital, net working capital and working capital management
- discuss strategies on how to monitor and manage each component of working capital
- calculate the effective cost of discount forfeited
- prepare basic cash flow forecasts
- define the concepts of working capital policy and working capital cycle
- calculate the weighted cost of different financing policies
- calculate the cash conversion cycle days



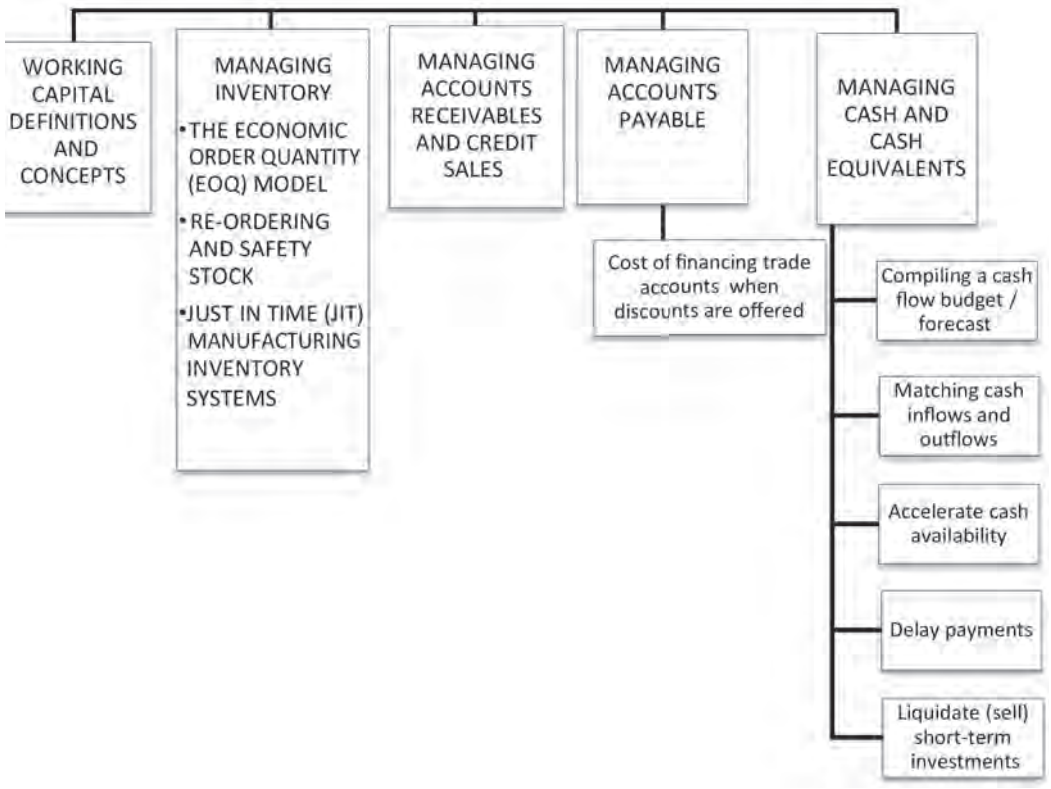
## INTRODUCTION

Management of the working capital of the organisation is one of the most important functions of the financial manager. This determines how much cash is available to sustain the day-to-day activities of the organisation. Managing the working capital requires close cooperation with other managers in the organisation, that is, the purchasing manager, stores manager, accounts receivable manager and the accounts payable manager. The financial manager should also maintain a good relationship with his/her bank manager.

STUDY UNIT 17

# Working capital management

**In this study unit**




## 1 Introduction

A profitable organisation has to decide on whether to retain its profits for reinvestment (including investment in capital projects (topic 8) and working capital (this topic) or to distribute the profits as dividends. This decision is partially based on the outcomes of the financial analysis discussed in topic 6.

In this study unit, we will explore the various concepts regarding working capital. We will discuss strategies to monitor and manage the different categories of working capital. We highlight the purpose and importance of the optimum level of working capital.

**NOTE**

The concepts discussed in this study unit links closely to ratios covered in topic 6. Make sure that you understand the ratios discussed in topic 6 before progressing to this topic.

## 2 Working capital definitions and concepts

### NET WORKING CAPITAL

Net working capital refers to the current assets less current liabilities, which is directly related to the operating activities of an organisation.

The term *gross working capital* (or sometimes only called *working capital*) refers to the current assets. The term *net working capital* is the excess of current assets over current liabilities. This is computed by subtracting the current liabilities from the current assets. You will know from your Financial Accounting modules that current assets include:

- inventory
- trade receivables
- cash and cash equivalents

Current liabilities include:

- trade payables
- taxation due to the South African Revenue Services (SARS)
- the short-term portion of long-term loans

∴ Net Working Capital = Current Assets – Current Liabilities

The level of the net working capital has important implications for the rest of the business. We will briefly highlight each.

1. The net working capital figure is an important indication of the **short-term solvency** of an organisation. The higher the level by which the current assets cover the current liabilities, the more solvent the organisation is in the short term (it then has a higher ability to meet its short-term liabilities).
2. Net working capital can also be linked to the concept of **liquidity.** (Recall that liquidity represents the length of time until assets can be converted into cash, or the funds available for immediate investment.) Normally, the higher the level by which the current assets cover the current liabilities, the less liquid the organisation would be as more cash is then tied up in the net working capital balance. (The measurement of liquidity was highlighted earlier, in study unit 16, section 6.)
3. Net working capital can further be linked to the concept of **profitability**, in which case lower net working capital levels can often be linked to lower profitability. For example, if an organisation lowers its net working capital levels in order to improve liquidity, it might have to limit the amount of credit sales, which, in turn, could lower the interest from current or prospective customers, and thus the level of revenue and profit that might otherwise have been earned. (The measurement of profitability and performance was highlighted earlier, in study unit 16, section 5.)

### WORKING CAPITAL MANAGEMENT

Working capital management refers to the **controlling** of balances included in the current assets and current liabilities, the way the related **functions** within the organisation are performed and the way working capital is **financed.**

As described, the efficient analysis and management of working capital are important in the management of an organisation's short-term solvency, liquidity and profitability. In fact, the objective of working capital management is often to balance the level of net working

capital between operational requirements (often calling for higher levels) and cash flow requirements (often necessitating lower levels).

Next, we will discuss basic strategies in the management of each component of net working capital.

## 3 Managing inventory

**INVENTORY**

Inventory of a reseller is represented by purchased goods (held to be sold), and of a manufacturer by the completed products (held to be sold), work-in-process products (intended for sale) and raw material inventory (held for use in production). Both types of organisations can also have stores of consumable items.

Managing the organisation's inventory is important as it ensures that the level of inventory is adequate to sustain the operations, whilst the inventory costs are kept at a minimum.

The adequate inventory level will differ from organisation to organisation, as it depends on the type and complexity of the business. Although the management of inventory is not the direct responsibility of the financial manager, he/she should still provide advice to make sure that it is managed cost effectively.

**NOTE**

The scientific management of inventory levels is a very advanced field. This forms part of what is called "supply chain management". People qualify as specialists in this area by completing specific qualifications in this field. In MAC2601 and MAC3701 you will only be provided a very rudimentary education in this area. The financial manager therefore acts in an advisory capacity where the organisation is large enough to employ supply chain specialists!

The management of inventory involves having a delicate balance between the benefits of holding inventory, and the costs of holding and ordering too much inventory.

Having inventory on hand at all times will:

- reduce "out of stock" situations – the risk of inventory required for production or by a customer not being on hand. This situation leads to loss of income.
- prevent disruptions in the manufacturing operations, which are normally costly.
- require less detailed planning (production scheduling) as there are always enough inventories.
- retain customers (all else being equal) and prevent them from going to another supplier.

On the other hand, keeping (too much) inventory incurs:

- holding cost
- ordering cost
- physical stores/infrastructure required to maintain the inventories in good condition
- systems to manage/control it
- greater risk of obsolescence

**HOLDING COSTS**

Holding costs are the costs of holding inventory and includes storage costs (eg renting warehouse space and security), insurance costs (for protection against losses), cost of obsolescence (inventory ageing or deteriorating whilst in storage) and opportunity cost (funds invested in inventory could have earned a return elsewhere at a certain rate, eg earning the weighted average cost of capital).

**ORDERING COSTS**

Ordering costs are the costs associated with placing an order, receiving the deliveries and the associated payment.

Inventory management refers to the methods the organisation uses to control its inventory. An organisation can buy or develop a system to help them with the managing process (refer to your Accounting Information (AIN) modules for the discussion on types of accounting systems and databases). Some of the methods and models are discussed briefly below.

## 3.1 The economic order quantity (EOQ) model

The EOQ model uses certain assumptions to determine the optimum order quantity that will minimise the total relevant inventory holding cost and ordering cost. The focus of this model is on *incremental* (additional) holding and ordering cost associated with the inventory; the model ignores the costs that are not relevant (ie those that will not change) within a short-term time horizon, such as the acquisition cost of inventory and fixed costs that will not change within this time.

For today's economy, where inventory holding costs are very high and the risk of obsolescence is high (fast changing world, global competition), the EOQ model normally indicates that total inventory costs are minimised by ordering smaller quantities, more frequently.

## 3.2 Re-ordering and safety stock

An order for inventory has to be placed in advance in order for the inventory to be delivered to the organisation at the time when it is needed. The time elapsed from placing an order until inventory is delivered is called "lead time". When the organisation knows with certainty the quantity of inventory that is required during a period, the quantity to be ordered can be calculated exactly by taking the lead time into account.

However, an organisation is normally uncertain about the exact level of demand and is therefore often required to keep additional safety stocks to prevent "out-of-stock" situations. Safety stock therefore represents emergency inventory that is held and used when normal inventory is depleted. There are holding costs attached to these safety stock items, which should be weighed up against lost revenues when a sale can't be made or when production stands still.

## 3.3 Just in Time (JIT) – manufacturing inventory systems

Several western companies emulated Japanese firms by implementing JIT manufacturing systems during the 1980s and 90s. (Japanese firms were highly successful then, even though their current performance seems to be less inspiring.) JIT systems pursue excellence in all phases of manufacturing and, if suitable to the business environment and properly implemented, it can reduce costs, time and inventory-holding.

Inventory holding cost are reduced specifically as a JIT system requires that suppliers deliver the exact quantity and type of inventory "just in time" to be used in the manufacturing process. However, a JIT system is often difficult to successfully introduce in practice, as it requires a total re-engineering of business practices, including the requirement of very good relationships between the organisation and its suppliers. As a result, the system can normally work only for large and powerful organisations where the suppliers are located nearby and will do their best to keep the organisation's support.

## NOTE

The three methods/models used to manage and control the costing of inventory will be explained in more detail and applied in MAC2601, MAC3701 and MAC4861/2.

The results of the inventory management actions are measured in the inventory days (refer to topic 6).

**INVENTORY DAYS**

Length of time that inventory remains unsold (in the case of goods for sale) or remains unused (in the case of raw materials).

**Key formula: INVENTORY DAYS**

- Purchased inventory: Inventory value ÷ cost of goods sold x 365 (or 360) days
- Manufactured inventory: Inventory value ÷ cost of goods sold x 365 (or 360) days
- Raw material inventory: Inventory value ÷ raw material expense included in cost of goods sold x 365 (or 360) days

### Activity 17.1

Assume you are the financial manager of Decorplan CC, an organisation that sells blinds for windows. How do you think the next two aspects would impact on the management of Decorplan's inventory?

- type and complexity of the blinds
- type of customers

### Feedback on activity 17.1

- Type and complexity of the inventory

  Will the blinds be custom-made in specific measurements and on requests or manufactured in standard sizes?
- Type of customers

  Will the customers be large groups, for example, Builders City or only private clients?

Level of inventory

The adequate level of inventory can be determined if the above questions are considered.

- If blinds are custom-made, the level of inventory will be lower (it will not fit other windows) than when it is manufactured in standard sizes.
- If the type of customers is large groups, the level of inventory will be higher than private client type of customers as their premises are larger (more windows).

**NOTE**

In your AIN2601 module you will learn how to generate reports from Pastel that will indicate which inventory are slow moving and is at risk for obsolescence. You will also learn about the classes of inventory; re-order levels for each inventory code, et cetera. The inventory classed as slow moving would be subjected to provision for obsolescence.

## 4 Managing accounts receivable and credit sales

**ACCOUNTS RECEIVABLE (TRADE DEBTORS)**

Accounts receivable refers to the amount outstanding in respect of previous credit sales that customers/debtors have to pay in the near future.

Normally an organisation would prefer to sell its products and services for cash, but by granting credit to customers, revenue and profits may increase and the organisation will stay competitive.

**NOTE**

You may have experienced this yourself as a customer. Depending on your finances, you might prefer to shop at a retailer that allows you to open an interest-free account instead of paying cash. In your later MAC modules you will learn how to weigh up the costs of each option.

A large balance of trade accounts receivable, relative to revenue, implies that the organisation grants credit to customers easily and is willing to wait relatively longer to be paid. The downside to this is that there is a cost involved, since it is similar to an interest-free loan given to customers. There is also a risk involved in that the amount owed by the customers will not be collected and it will become bad debt.

Managing the level of credit sales is important as it also has an effect on the profitability of the organisation. The effective managing of credit sales (and the resulting accounts receivable) requires a balance between an increase in revenue and profits, an increase in holding cost of accounts receivable (the effective cost of offering this “interest-free loan”) and an increase in bad debts. Accounts receivable are managed by having a credit policy and enforcing it.

The **credit policy** is the main instrument used to influence the balance of accounts receivable. It affects the revenue, selling prices, types of inventory and marketing methods. The credit policy focuses on the following four areas:

### 1. Creditworthiness

This refers to the financial strength of customers and their ability to repay debt. When applying for credit, you will be asked to identify yourself and to provide proof of residence and income. The company providing the credit will probably also do a credit check with the credit bureaus (such as Experian or TransUnion) to see if your payment history is in order. You have probably opened accounts with clothing stores or cell phone providers yourself. The same process applies to organisations.

A more lenient credit policy, with lax creditworthiness requirements, might lead to increased revenue (more customers will be able to buy on credit), but also to higher bad debts (the customers might not be able to pay their accounts).

### 2. Credit period

This refers to the length of time customers are given to pay their outstanding balance. If properly enforced, a shorter credit period will lower the balance of accounts receivable. This is not the same indicator as the actual debtors' (receivable) days outstanding! See discussion later on.

### 3. Discounts

This refers to discounts given to customers for early payments (before the credit period expires). The credit policy indicates the discount percentage as well as the period in which the payment must be made in order to qualify for the discount. A larger discount will reduce the amount of the accounts receivable outstanding, as customers will be motivated to pay earlier, but it reduces the profitability as the discount awarded is expensed!

### 4. Collection policy

This refers to the methods the organisation uses to collect overdue accounts receivable. A more aggressive collection policy will result in a lower balance of trade accounts receivable as payments are actively "chased", but if the policy is too aggressive, it may damage the relationship between the organisation and the customer, which might reduce future sales.

Customers that stay in default are usually reported to the credit bureaus (such as Experian and TransUnion) which keep a database of individuals' and organisations' payment records. Having a bad credit record will affect the ability of the debtor to obtain credit in the future.

## NOTE

The credit period and the discount collectively form the "credit terms". Credit terms are often described using specific terminology, for example, a credit policy of 2/10 net 60, implies that a 2% discount is offered to customers paying within 10 days, but that the debt has to be paid on/before 60 days from the date of sale.

Refer to section 5, Accounts payable, for the discussion on what the effective cost of the discount offered is.

The balance of the accounts receivable (in the debtors' ledger and the statement of financial position) is determined by the volume of credit sales, and the payments received in respect thereof. The net result is measured in the receivable days measure and the debtors' ageing schedule (report).

**RECEIVABLE DAYS**

Receivable days (or the debtor collection period) is a measurement of the number of days it takes the average debtor to pay for the goods/services bought on credit.

**Key formula: RECEIVABLE DAYS**

Outstanding (unpaid) accounts receivable ÷ credit sales x 365 (or 360) days

**AGEING SCHEDULE (FOR DEBTORS)**

An ageing schedule for debtors (or debtors' age analysis report) is a classification of accounts receivable within bands of different outstanding periods, normally including, current debt, up to and including 30 days, up to and including 60 days, up to and including 90 days, and greater than 90 days.

This **ageing schedule** reflects the accounts receivable balance, segregated into bands according to the age of each invoice. The ageing schedule will also indicate whether the organisation's credit policy is adequately enforced or not (debtors in the bands greater than the credit period should be a minimum!).

This ageing schedule can be compiled from the organisation's accounts receivable (debtors') ledger. There are also computer systems available that makes it easy to determine the age of each debtor's invoice. These systems can then also generate an ageing schedule for debtors.

**NOTE**

In your AIN2601 module you will learn how to view the debtors' age analysis report in Pastel. The overdue amounts are also used to determine your provision for doubtful debts.

The balance outstanding of accounts receivable and the receivable days should be monitored closely, to reduce the possibility of bad debts. Shareholders (or owners), investors and banks are also interested in this balance as it will have an impact on their investment. Calculating the receivable days (as discussed in study unit 16, section 6) and analysing the organisation's ageing schedule, assists the financial manager in managing the balance.

When the receivable days start to increase relative to prior periods, or the ageing schedule shows that the percentage of past-due accounts is increasing, the organisation often needs to tighten its credit policy.

**Activity 17.2**

The ageing schedule of two garden centres, Sunshine and Moonlight, are supplied as at the end of March 20x1. Both organisations have approximately the same (rand) balance for accounts receivable.

| Days out-standing | Sunshine | | Moonlight | |
|---|---|---|---|---|
| | Balance of the account | Percentage of total balance | Balance of the account | Percentage of total balance |
| 0–10 | 859 960 | 61% | 509 632 | 35% |
| 11–30 | 559 677 | 39% | 426 301 | 29% |
| 31–60 | | | 255 690 | 18% |
| 60 + | | | 262 906 | 18% |
| | 1 419 637 | 100% | 1 454 529 | 100% |

The credit terms offered to the customers of Sunshine are: 2,5/10 net 30 (if payment is made within 10 days, the customer will receive a discount of 2,5%; or else the total amount is due within 30 days).

The credit terms offered to the customers of Moonlight are: 2/10 net 30.

**REQUIRED**

Analyse the two ageing schedules and discuss possible issues by referring to the credit policy.

---

## Feedback on activity 17.2

**Analysis of the ageing schedules:**

The ageing schedule of Sunshine indicates that all its customers pay within the allowed credit period which is 30 days. A total of 61% makes use of the 2,5% discount by paying within 10 days and 39% pays within 30 days and does not receive any discount.

The ageing schedule of Moonlight indicates that several of its customers are not complying with its credit terms. A large proportion of the accounts receivable balance, equalling 36% (18%+18%), is more than 30 days old. This is the case in spite of Moonlight's credit terms that require full payment within 30 days.

**Discussion of the issues by referring to the credit policy:**

**1. Creditworthiness**

Based on an analysis of the ageing schedule, it seems that Sunshine might have stricter assessment procedures of the creditworthiness of customers. Moonlight, on the other hand, seems to be more lenient in granting credit to customers. This may have increased their revenue, but could also result in higher bad debts.

**2. Credit period**

The credit period granted to trade debtors of both organisations is the same.

**3. Discounts**

The customers of Sunshine are more eager to make use of the 2,5% discount on early payments. It seems that the smaller discount of 2% offered by Moonlight to their customers was not sufficient to motivate them to pay earlier.

**4. Collection policy**

Based on an analysis of the ageing schedule, it seems that Sunshine might have stricter debt collecting procedures as all the customers of Sunshine are paying within the required period of 30 days as was stipulated in the credit policy. Moonlight might have to use a more aggressive collection policy, but be wary not to damage relationships with their customers.

## 5 Managing accounts payable

**TRADE ACCOUNTS PAYABLE (TRADE CREDITORS)**

Trade accounts payable refers to the amount of purchases on credit that has to be paid to the suppliers/creditors in the near future. Total accounts payable may also include other accounts payable, which do not relate directly to the main operations (trading activities) of the organisation.

We have already explained the term *net working capital* in section 2 when we discussed working capital. In the previous sections, we have addressed the management of accounts receivable and inventory. We will now look at the managing of current liabilities and we will focus on the management of trade accounts payable, since it normally forms the biggest part of current liabilities.

Trade accounts payable is a type of financing that arises naturally from normal operations. It emanates from credit given by an organisation's suppliers and is often the largest source of short-term credit, especially for small organisations.

The **advantages** are that it is usually offered and relatively easy to obtain, assuming a good credit record. It is largely interest-free if payments occur in line with the credit terms (but not always cost-free as we will explain below).

The cost **disadvantages** can be high however, since failing to pay accounts payable on due dates could lead to poor relationships with suppliers or suppliers may refuse to extend further credit to the organisation. Interest and recovery fees are usually charged when payment terms is exceeded. The impact on the organisation's credit rating (by the credit bureaus) is also very negative for future transactions on credit.

Proper management of the accounts payable process is necessary, because the decisions regarding payments to suppliers may have significant effects on the cost of financing and therefore have an impact on the organisation's profit. As part of this process, the credit terms of the suppliers' credit policy should be taken into account when payments are planned.

**ACCOUNTS PAYABLE (CREDITORS) DAYS**

Payable days (or the creditor payment period) is the measurement of the average number of days the organisation takes to pay for the goods/services received on credit from its suppliers.

**Key formula: PAYABLE DAYS**

Outstanding (unpaid) accounts payable ÷ credit purchases x 365 (or 360) days.

**NOTE**

When you are analysing a statement of financial position and the amount of credit purchases were not given, a rough alternative is to use the cost of sales figure.

**AGEING SCHEDULE FOR CREDITORS**

An ageing schedule for creditors (or creditors' age analysis report) is a classification of accounts payable within bands of different outstanding periods, normally including current debt, up to and including 30 days, up to and including 60 days, up to and including 90 days, and greater than 90 days.

This ageing schedule reflects the accounts payable balance, segregated into bands according to the age of each invoice due/unpaid. The ageing schedule will also indicate which payments are long overdue, in dispute and/or accruing interest.

This ageing schedule can be compiled from the organisation's accounts payable (creditors') ledger. There are also computer systems available that makes it easy to determine the age of each suppliers' invoice. These systems can then also generate an ageing schedule for creditors.

**NOTE**

In your AIN2601 module you will learn how to view the creditors' age analysis report in Pastel as well as amounts due for payment. The overdue amounts are the ones at risk.

## 5.1 The cost of financing trade accounts when discounts are offered

The implied monetary cost of finance, through the use of trade accounts payable, lies in the settlement discount forfeited if payment is postponed (at this point in your studies, ignore the interest charged on overdue accounts).

This is illustrated by the following example:

The credit terms allowed by a supplier is 2/10 net 30 (indicating that if payment is made within 10 days after invoice date, the customer will receive a settlement discount of 2%; otherwise, the total amount is due within 30 days after invoice date). As the amount paid could be less by using the discount (paying on day 10), there is an implied cost (opportunity cost) involved if the payment is postponed (to day 30) and the discount is forfeited.

Another way to look at it is that the discount is invested ("left" with the supplier or "paid back" to the supplier) in order to make use of the credit from day 11 to day 30! This is then the cost of the financing.

For this example, assume further that the value of the invoice is R200 and that the organisation will be forfeiting the discount if they decide not to pay within 10 days. The discount amount lost would equal: 2% x R200 = R4

or alternatively:

The organisation would pay the full R200 if settled at 30 days, but only the following amount if settled within 10 days: R200 x [(100 – 2) ÷ 100] = R200 x [98 ÷ 100] = R196.

Therefore, R200 – R196 = R4 is the discount lost, or alternatively, the implied finance charge for postponing payment by 20 days (30 days less 10 days). (We will describe later how to convert this to a percentage.)

Due to the nature of credit terms in general, managing the accounts payable involves two distinct periods:

**1. Period of free credit**

This refers to the credit received and utilised **during** the period that discount is available (in our example: day 1 to 10).

**2. Period of costly credit**

This refers to the credit used **after** the period of free credit and which has costs involved based on unused discounts (in our example: day 11 to 30). The cost of not taking discounts can be significant and, furthermore, the risk of being classified as a "late payer" can also lead to more strict credit terms.

The decision whether to make use of trade discounts or to use the full credit period, should be part of the organisation's short-term financing decisions. Postponing payments to creditors may be costly, but should be compared to the cost of other short-term financing sources (usually the bank overdraft).

The following equation can be used to calculate the implied nominal percentage cost, on an annual basis, of not taking discounts:

**Key formula: IMPLIED *NOMINAL* ANNUAL PERCENTAGE COST OF ACCOUNT PAYABLE (CREDIT)**

$$r_{NOM} = \frac{\text{Discount\%}}{100 - \text{discount\%}} \times \frac{365 \text{ days}}{\text{Days credit outstanding} - \text{discount period}}$$

If we apply this formula to the example earlier in this section, then we could calculate the implied annual percentage cost of the financing of postponing payment to 30 days:

$$r_{NOM} = \frac{2}{(100 - 2)} \times \frac{365 \text{ days}}{(30 - 10)}$$

$$r_{NOM} = \frac{2}{98} \times \frac{365 \text{ days}}{20}$$

$$= 0{,}3724$$

$$= 37{,}24\%$$

**or alternatively**

$$r_{NOM} = \frac{R4}{(R200 - R4)} \times \frac{365 \text{ days}}{(30 - 10)}$$

$$r_{NOM} = \frac{R4}{R196} \times \frac{365 \text{ days}}{20}$$

$$= 0{,}3724$$

$$= 37{,}24\%$$

## NOTE

Notice that this is a very high annual rate. Continuously forfeiting discounts by postponing payments can thus be an expensive form of finance.

The nominal annual cost equation does not take the effect of compounding into account. The following familiar equation (refer to topic 3 – time value of money) is used to calculate the effective annual rate:

**Key formula: EFFECTIVE ANNUAL PERCENTAGE COST OF ACCOUNT PAYABLE (CREDIT)**

Effective annual rate (EAR) $= (1 + \text{periodic rate})^n - 1$

Where:

The periodic rate = discount % ÷ (100% – discount %)

n = the number of interest periods per year

If we now apply this formula to the example earlier in this section, then we could calculate the implied effective annual cost percentage of postponing payment to 30 days:

n = 365 ÷ 20

= 18,25 interest periods in a year

Thus:

EAR $= [1 + \text{periodic rate}]^n - 1$

$= [1 + (\frac{2\%}{100\% - 2\%})]^{365/20} - 1$

$= [1 + (\frac{2}{98})]^{18,25} - 1$

$= [1,0204]^{18,25} - 1$

$= 1,4459 - 1$

$= 0,4459$

$= 44,59\%$

## NOTE

Notice that the implied effective annual rate is even higher than the nominal cost due to the effect of compounding.

**Rule: WHEN TO TAKE UP DISCOUNT OFFERED**

The effective cost of discount forgone should be weighed against the organisation's regular cost of short-term funding (usually the overdraft rate). If the overdraft rate is lower, the discount should be taken. When the overdraft rate is higher, it is not cost-effective to take the discount (you will be paying more than you are saving in the discount received)!

**NOTE**

The same calculations should be done when an organisation is considering whether to OFFER discounts to its clients. In this case, the effective cost of discount should be less than the cost of financing from short-term sources!

## Activity 17.3

Arwin CC purchases an average of R300 000 of inventory from its supplier on an annual basis. The credit terms of the supplier is 2/10 net 45 and is strictly enforced. The cost of other short-term financing options (such as the bank overdraft) has an effective annual rate of 13%.

**REQUIRED**

a. Determine the true total monetary cost of the inventory to Arwin if all purchases are paid within the discount period.
b. Calculate the nominal annual cost of credit if Arwin follows the policy of paying for the purchases on the latest date allowed.
c. Advise Arwin on the best short-term financing option.

[Use four decimal places and round **only** the final answer to two decimal places.]

## Feedback on activity 17.3

a. The true (net cash) price of the inventory is:

$$R300\,000 \times \frac{98^*}{100} = R294\,000$$

*(100 – 2 ÷ 100)

**NOTE**

This net amount is only used for decision-making purposes! Remember that in terms of IAS2 settlement discount cannot be netted off the purchase price for purposes of valuing inventory!

b. The nominal annual cost of credit if discount is not taken:

$$r_{NOM} = \frac{\text{Discount\%}}{100 - \text{discount\%}} \times \frac{365 \text{ days}}{\text{Days credit outstanding} - \text{discount period}}$$

$$r_{NOM} = \frac{2}{(100 - 2)} \times \frac{365 \text{ days}}{(45 - 10)}$$

$$r_{NOM} = \frac{2}{98} \times \frac{365 \text{ days}}{35}$$

$$= 0{,}2128$$

$$= 21{,}28\%$$

c. In order to determine which form of short-term financing is the best option, we have to compare like-to-like: An effective annual rate was provided for other short-term financing. We therefore have to calculate the same rate for the implied cost of not taking the settlement discount on trade accounts.

The effective annual rate rate of utilising the full credit period, instead of taking the settlement discount, can be calculated as follows:

$$EAR = [1 + \text{periodic rate}]^{n} - 1$$

$$= [1 + (\frac{2\%}{100\% - 2\%})]^{365/(45-10)} - 1$$

$$= [1 + (\frac{2}{98})]^{10,4286} - 1$$

$$= [1,0204]^{10,4286} - 1$$

$$= 1,2345 - 1$$

$$= 0,2345$$

$$= 23,45\%$$

Arwin can borrow from other short-term financing options at an effective annual rate of 13%. This is far less than the rate of credit (applicable to day 11 to 45) if discount is not taken. Therefore, Arwin should preferably make use of alternative short-term financing options first (if sufficient total funds are available) and rather pay the supplier on the 10th day following the invoice date, in order to receive the discount.

## 6 Managing cash and cash equivalents

The net result of all the management actions to optimise the inventory levels, accounts receivable and accounts payable, is reflected in the cash or overdraft balance! We will now investigate how this aspect of current assets should be managed.

**CASH AND CASH EQUIVALENTS**

Cash is the money the organisation has on hand (eg petty cash, undeposited payments received) as well as the money in the bank (eg cheque accounts or short-term deposits).

Cash and cash equivalents are needed in every organisation for the operations to run smoothly. It is used, for example, to pay salaries and other expenses, buy assets or pay liabilities. Cash generally earns a lower rate of return than financial instruments, short-term investments or non-current capital assets. It is therefore important to properly manage the levels of cash held.

Too high levels of cash will reduce the profitability of the organisation due to the low return that is earned thereon. Too low levels of cash on the other hand will increase the risk that the organisation will not have enough funds when it is needed, or that it will have to borrow cash at higher interest rates (eg use a bank overdraft). There are four possible reasons for holding enough cash:

1. **Transactions** – routine transactions are paid in cash or via a bank transfer. These are transactions that are done on a regular basis and include payments to suppliers, employees, taxation, et cetera.
2. **Precautionary** balances – there can be unpredictable or unforeseen transactions and therefore the organisation would need additional cash in reserve. Examples

of these transactions are delayed payments by debtors, payments of the excess to an insurance claim in case of an accident or fire, or legal costs. A greater level of uncertainty in a cash forecast model warrants a higher level of precautionary cash balances. This is the equivalent of safety stock.

3. **Opportunities** – Unexpected opportunities may arise, for instance, investment opportunities, unexpected changes in exchange rates, and so on. The organisation will need sufficient cash to take advantage of that opportunity, otherwise it will be lost.
4. **Obligations** – A bank, for example, may require that their customers (the organisation) maintain a minimum amount of cash in their account.

It is easier to manage an organisation with sufficient cash resources (less planning is required) and it also indicates that the organisation is more liquid. An organisation may experience financial distress if there is not enough cash.

The disadvantage of too much cash, as we mentioned before, is that cash earns little interest and therefore a low return on investment. The objective is to have the minimum of cash on hand, but to have enough cash to run operations effectively. The question that arises is: How much cash is enough?

We will now look at different techniques that can assist with cash management.

## 6.1 Compiling a cash flow budget/forecast

A cash budget or forecast is the best known cash management technique. A cash budget can be compiled daily, weekly, monthly or for any required period. It indicates whether a cash surplus or shortfall can be expected in the specified period. Management uses the cash budget to plan for the period ahead, estimate short-term cash requirements and use it to evaluate subsequent performance.

**NOTE**

Preparing detailed cash budgets based on sales, production and payment terms will be discussed in more detail in MAC2601.

## 6.2 Matching cash inflows and outflows

By performing cash flow forecasting, the timing of cash payments and requirements can be planned to match with the cash receipts. This “matching” will entail that when you receive cash from debtors, you will then pay the outstanding creditors and other expenses. **Matching cash flows** provide cash when it is needed and thus enable the organisation to lessen the cash balances that has to be kept in reserve.

## 6.3 Accelerate cash availability

There are different payment methods used by debtors, each taking longer or shorter to reflect as cash in the supplier’s bank account.

1. **Cheque payments** were popular years ago, but very few organisations still accepts cheques today. Cheque payments necessitated a lengthy administrative process resulting in a long delay before it is reflected as cash in the bank.

2. Another payment method, which is much faster and effective, is the **electronic funds transfer (EFT)** method. If the customer uses the same bank as the organisation, the transfer will reflect the same day or if it is a different bank, the transfer will reflect within two to three days.
3. The **direct debit** method is another efficient payment method where funds are automatically deducted from the customers' account and added to the organisation's account. A direct debit is only suitable to certain businesses, but has the added advantage of a reduction in debtor reconciliations (as there will be fewer problems with payment references and in allocating amounts).
4. **Credit cards** are another method of payment in the retail industries. The payment is reflected in the organisations account within two days, but the drawback is that credit card fees are expensive. However, many customers prefer to pay by credit card, so the organisation has to weigh-up the benefit of increased sales versus increased financing fees.

Accelerating the cash availability means that you "move" your customers (by promotions and incentives) to the payment method that reflects as cash soonest.

## 6.4 Delay payments

If the organisation currently settles early in order to take up discount offered, it can decide to rather delay payments to the normal credit period. However, bear in mind that this involves the effective cost of forfeiting the discount. In extreme cash flow shortages, the organisation can approach its suppliers with a request for extension. This might entail further interest charges. The long-term relationship with the suppliers should not be damaged.

## 6.5 Liquidate (sell) short-term investments

An organisation can also hold short-term investments in addition to the cash balances. These short-term investments include money market financial instruments such as commercial paper (unsecured promissory notes) issued by banking and non-banking institutions like SABMiller and Sappi with exceptional credit ratings, treasury bills (issued by the government) and negotiable certificates of deposit (issued by authorised deposit-taking institutions).

These are liquid financial instruments (it is traded on the money markets) and it can be sold within a day or on very short notice. This is very important as an organisation normally needs the cash immediately for emergencies or other opportunities. Money market financial instruments usually earn a superior return to the interest paid on normal bank accounts (if any).

### Activity 17.4

The management of Flashco Limited is concerned about their cash flows for the next three months. Flashco have invested R15 million in a short-term financial instrument that will expire (repaid) only at the end of March (expected interest R260 000). Their cash balance at the beginning of the January is R9 million. The expected OPERATING cash flows over the next three months are as follows:

| | **January** | **February** | **March** |
|---|---|---|---|
| | **R'000** | **R'000** | **R'000** |
| Expected cash inflows per month | 55 988 | 44 890 | 74 552 |
| Expected cash outflows per month | 54 890 | 71 255 | 69 556 |

You may assume that cash flows will occur at the end of every month, with inflows occurring right before the outflows.

**REQUIRED**

a. Compile a simplified cash flow budget for the months ending January, February and March.

b. Advise the management of Flashco on possible corrective actions that may be required.

---

## Feedback on activity 17.4

a. Simplified cash flow budget for the three-month period:

| | **January** | **February** | **March** |
|---|---|---|---|
| | **R'000** | **R'000** | **R'000** |
| Expected cash inflows (given) | 55 988 | 44 890 | 74 552 |
| Expected cash outflows (given) | (54 890) | (71 255) | (69 556) |
| Expected net cash inflow/(outflow) for the month | 1 098 | (26 365) | 4 996 |
| *Plus* Opening cash balance – positive/(negative) | 9 000 | 10 098 | (16 267) |
| *Plus* Inflow from short-term financial instrument | | | 15 260 |
| **Closing cash balance – positive/ (negative)** | **10 098** | **(16 267)** | **3 989** |

b. Advice:

The calculated cash balance of Flashco Limited had a negative balance of R16,2 m at the end of February. Flashco would either have to apply for a bridging loan or an overdraft facility at the bank (at least equal to this amount) from the end of February to the end of March, or request that the short-term investment be terminated earlier, if possible (but they must consider possible penalties).

Because of the uncertainty involved in the cash flows and budgeting process, we would advise them to apply for more finance than indicated by the calculation above, for example R20 million, to support the negative balance at the end of February.

All efforts should be made to encourage debtors to pay early (end February and not in March) and suppliers should be approached for a delay in payment from the end of February to March.

Since there is a positive cash balance at the end of January, the financial manager of Flashco should consider investing the excess cash in short-term investments. This will likely earn a higher return than the current bank account.

---

**NOTE**

Notice the importance of the assumption that cash flows would occur at the *end* of every month, with inflows occurring right before the outflows. If not the case, cash flows could occur *during* the month, which would necessitate a similar cash flow budget prepared on a daily basis (or even before every payment is made).

## 7 Short-term financing

**Rule: MATCHING MATURITIES**

The maturity of the assets (current or non-current) should be matched with the maturity of the financing (current or non-current). Matching maturities further implies that the financing term (and related cash outflows) should match the duration of the asset that is supported (and its related cash inflow benefits).

A basic principle of effective financing is that short-terms assets (current assets) should *mostly* be financed by short-term financing instruments (current liabilities). In study unit 18, section 2.2, we will discuss this in more depth.

Where an organisation uses short-term instruments to finance non-current assets that offer benefits over a longer timeframe, there may be a mismatch between cash outflows (to repay interest and capital in the short-term) whilst the cash inflows (from the assets) arise over a longer period. This may create financial distress.

**SHORT TERM**

Short term refers to a period of one year or less.

As mentioned earlier, accounts payable is a spontaneous form of short-term financing that arises from normal operations, but this is not always adequate to finance all the current assets. As a result, additional sources of finance are often required and these could further be classified as either short-term or long-term finance. When considering short-term financing, certain inherent advantages and disadvantages have to be considered.

**Advantages** of short-term financing are:

- It can generally be **obtained much faster** than long-term financing – lenders of long-term financing will require a more detailed investigation of the organisation's financial status.
- As the term is of a **short period**, it can be obtained for periodic needs and the organisation does not have to commit for long periods.
- It may **not** be necessary to offer **collateral** for short-term financing.
- **Interest rates** on short-term financing may be **lower** than interest rates on long-term financing. (Here we should compare short and long-term financing on a like-for-like basis – both options with collateral, or without as the risk also impacts on the cost of debt.)

**Disadvantages** of short-term financing are:

- The **interest expense may fluctuate** more on the short term.
- Short-term finance might in some cases be **cancelled with little or short notice**, which could create financial distress where an organisation cannot arrange for alternative finance at short notice. (Notice that this is especially relevant in today's day and age, where banks are stricter in offering finance than in the past.)

Forms of short-term financing (excluding accounts payable) include bank overdrafts and short-term bank loans. Bank overdrafts and bank loans are provided by most commercial banks. Large companies with excellent credit ratings may also sell commercial paper (promissory notes) in the money market to raise financing for periods of 1–270 days. The interest rates offered (paid to the holders) on these notes are often cheaper than that obtained from the organisation's bank.

## 8 Summary

In this study unit we have explained working capital management and how to manage each component of working capital. In managing inventory, the advantages and disadvantages of holding inventory were discussed as well as methods to assist in managing inventory. In managing accounts receivable, the credit policy has been discussed and the ageing schedule identified as a way to monitor the balance. In managing accounts payable as a type of short-term financing, we explained that there is a cost involved if early settlement discounts are not taken. As part of "cash management", the reasons for holding cash and cash management techniques were explained. Lastly, the advantages and disadvantages of short-term financing were pointed out.

In the next study unit, we will continue with the topic of working capital by discussing working capital policies and working capital cycle.

### Self-assessment activity

After having worked through the study unit, you should be able to answer the following questions:

a. Why is the management of inventory important?
b. Why is the management of accounts receivable important?
c. Explain the periods associated with "free credit" and "costly credit" when referring to trade accounts payable.
d. Why is cash management important?
e. Name the different cash management techniques.
f. Give the main reasons for holding cash.
g. What are the advantages and disadvantages of short-term financing?

**QUESTION 1**

The following are selected items from Green Industries Ltd's trial balance at 31 December 20x1.

| | |
|---|---|
| Accounts receivable | R 265 110 |
| Accounts payable | R 656 000 |
| Cash | R 120 500 |
| Accruals | R90 650 |
| Property, plant and equipment | R 980 000 |
| Long-term debt | R3 500 900 |
| Inventory | R 550 000 |
| Investments | R1 400 400 |

*(We deliberately **do not** reflect these items in the order in which they would appear in the annual financial statements.)*

**REQUIRED**

a. Calculate the gross working capital.

b. Calculate the net working capital.

**QUESTION 2**

Go-to-Basic Corporation buys its inventory from any of four suppliers. The suppliers all offer basically the same quality and their prices are competiitve. Their credit terms, however, vary noticeably as follows:

| **Supplier** | **Credit terms** |
|---|---|
| EverGreen | 1/5, net 20 |
| LetsSave | 2,5/10, net 35 |
| SimplicityCorp | 0,5/10, net 20 |
| Universe&I | 2/5, net 30 |
| Live-from-Earth | 3/5, net 45 |

**REQUIRED**

a. Calculate the implied **nominal** annual interest rate associated with each policy. Use a 365-day year and round your final answer to two decimal places.

b. If Go-to-Basic buys inventory from the SimplicityCorp supplier, advise them of the best financing option if they pay an **effective** annual rate of 12% for other working capital financing?

## Solution to self-assessment activity

**QUESTION 1**

a. Gross working capital

| | |
|---|---|
| Accounts receivable | R 265 110 |
| Cash | R 120 500 |
| Inventory | R 550 000 |
| **Gross working capital** | **R 935 610** |

b. Net working capital

| | |
|---|---|
| Current assets (Gross working capital) | R 935 610 |
| *Less:* Current liabilities: | R 746 650 |
| Accounts payable | R 656 000 |
| Accruals | R 90 650 |
| **Net working capital** | **R 188 960** |

**QUESTION 2**

a. Nominal interest rate

EverGreen

$$r_{NOM} = \frac{\text{Discount\%}}{100 - \text{discount\%}} \times \frac{365 \text{ days}}{\text{Days credit outstanding} - \text{discount period}}$$

$$= \frac{1}{99} \times \frac{365}{(20 - 5)}$$

$$= 0{,}2458$$

$$= 24{,}58\%$$

LetsSave

$$r_{NOM} = \frac{\text{Discount\%}}{100 - \text{discount\%}} \times \frac{365 \text{ days}}{\text{Days credit outstanding} - \text{discount period}}$$

$$= \frac{2{,}5}{97{,}5} \times \frac{365}{(35 - 10)}$$

$$= 0{,}3744$$

$$= 37{,}44\%$$

SymplicityCorp

$$r_{NOM} = \frac{\text{Discount\%}}{100 - \text{discount\%}} \times \frac{365 \text{ days}}{\text{Days credit outstanding} - \text{discount period}}$$

$$= \frac{0{,}5}{99{,}5} \times \frac{365}{(20 - 10)}$$

$$= 0{,}1834$$

$$= 18{,}34\%$$

Universe&I

$$r_{NOM} = \frac{\text{Discount\%}}{100 - \text{discount\%}} \times \frac{365 \text{ days}}{\text{Days credit outstanding} - \text{discount period}}$$

$$= \frac{2}{98} \times \frac{365}{(30 - 5)}$$

$$= 0{,}2980$$

$$= 29{,}80\%$$

Live-from-Earth

$$r_{NOM} = \frac{\text{Discount\%}}{100 - \text{discount\%}} \times \frac{365 \text{ days}}{\text{Days credit outstanding} - \text{discount period}}$$

$$= \frac{3}{97} \times \frac{365}{(45 - 5)}$$

$$= 0{,}2822$$

$$= 28{,}22\%$$

b. Effective annual rate rate

EAR = $(1 + \text{periodic rate})^n - 1$

Effective annual rate of discount not taken, thus of postponing payment.

EAR = $(1 + \text{periodic rate})^n - 1$

$= (1 + 0{,}5/99{,}5^*)^{[365/(20 - 10)]} - 1$

$= (1{,}0050)^{36{,}5} - 1$

$= 20{,}08\%$

(*Use the periodic rate of the option/supplier with the lowest nominal rate. In this case SimplicityCorp = 18,34%)

Go-to-Basic can obtain short term funding through other instruments (options) at an effective annual rate of 12%.

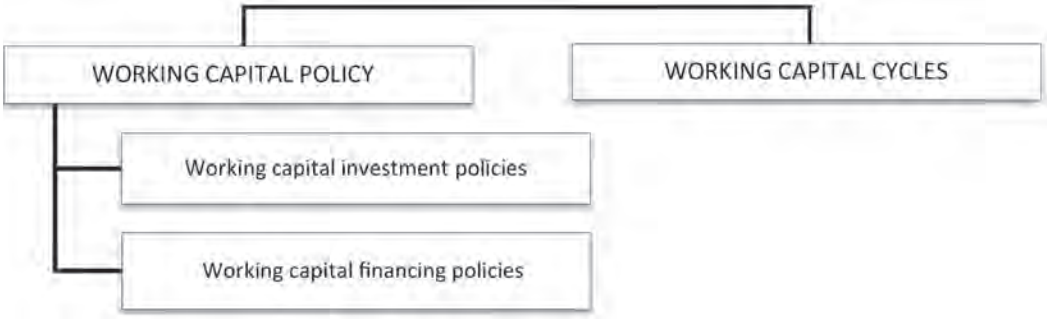
The effective cost of postponing the payment from the 10th to the 20th day (taking 10 days extra credit) after invoice, is 20,08%, while the other funding is available at 12% should they wish to pay on the 10th day. The 12% is less than the rate of credit, if discount is not taken.

Therefore, they should preferably make use of alternative short-term financing instruments (options) first (if sufficient total funds are available) and rather pay the supplier on the 10th day following the invoice date, in order to receive the discount.

STUDY UNIT 18

# Working capital policies and the working capital cycle

**In this study unit**




## 1 Introduction

In the previous study unit, we have explained why the management of working capital is important as well as the factors that affect the level of working capital and cash balances. In this study unit, we will be focusing on working capital policies, which include investment and financing policies. The working capital cycle will also be explained and illustrated.

## 2 Working capital policy

**WORKING CAPITAL POLICY**

The working capital policy of an organisation stipulates the appropriate amount for the net working capital balance and for each of its components (*investment policy*), and, in addition, how the net working capital balance should be financed (*financing policy*).

We already explained that working capital is an important and necessary component for most organisations in conducting their operations. The holding of working capital is however costly as it is money that could have been invested in other return-generating assets. This policy should strike an appropriate balance between the level of cash and inventories on hand, the level of accounts receivable, and the level of accounts payable.

The following matters have an effect on an organisation's working capital policy:

1. the total amount of working capital required
2. financing of working capital by short- or long-term funds
3. the nature and source of short-term financing used
4. the management of each component of working capital

The working capital investment policy of an organisation will be addressed next. Thereafter, we will address the question of how the investment in working capital should be financed by discussing the working capital financing policy of an organisation.

## 2.1 Working capital investment policies

An organisation must determine what the optimum level of investment in working capital should be. Every organisation needs a minimum level of investment in working capital in order to support its basic operations. The organisation could be at risk if the investment in working capital is lower than this minimum requirement. These risks were discussed in the previous study unit in sections 2 and 3.

When a low level of net working capital is kept compared to total assets, it is described as an **aggressive investment policy**. In contrast, when the investment in working capital of an organisation is high when compared to all the assets of the organisation, the risk is much lower. However, as with investments in general, lower risk usually warrants a lower expected return on that investment. Since working capital does not actively generate income, the return of the organisation will be lower and therefore also the profitability of the organisation. As a result, where the investment in working capital of an organisation is high compared to all assets, it is called a **conservative investment policy**.

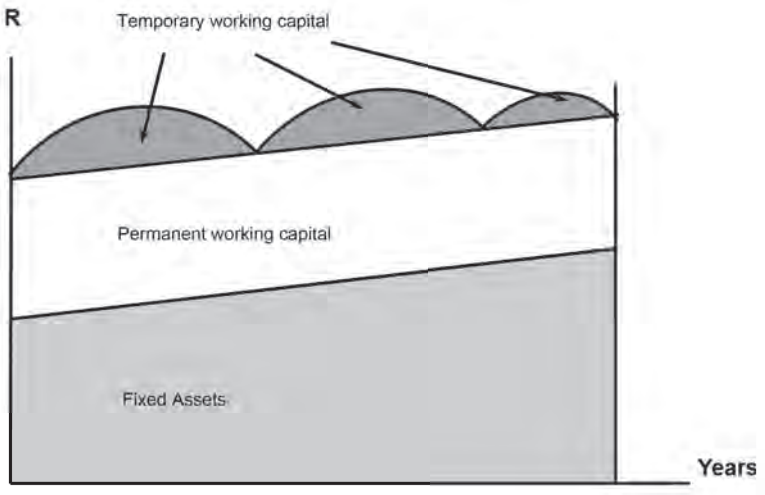
In general, for most businesses the net working capital varies directly with sales. (Where more products are sold, more inventories will generally have to be kept on hand, more debtors will owe the organisation money from sales on credit, etc).

When an organisation's business is seasonal (ie in agriculture, or beer sales that is correlated to the weather or seasons), the sales will vary throughout the year, and so will its working capital needs. Seasonal business is the reason for the distinction between permanent and temporary working capital.

**PERMANENT and TEMPORARY WORKING CAPITAL**

- Permanent working capital supports a constant **minimum** level of sales.
- Temporary working capital supports **seasonal peaks** in the organisation's operations.

See Figure 18.1 below for a graphical presentation of these two concepts.




**Source:** Kriek, Beekman & Els (adapted), 2008

FIGURE 18.1: Permanent and temporary working capital

## 2.2 Working capital financing policies

After the organisation has determined the optimum level of investment in working capital, the next step is to decide on how to finance the amount of working capital that is required. The extreme opposite options are predominantly long-term funding (conservative policy) and predominantly short-term funding (aggressive policy). The moderate policy is somewhere between the two extremes.

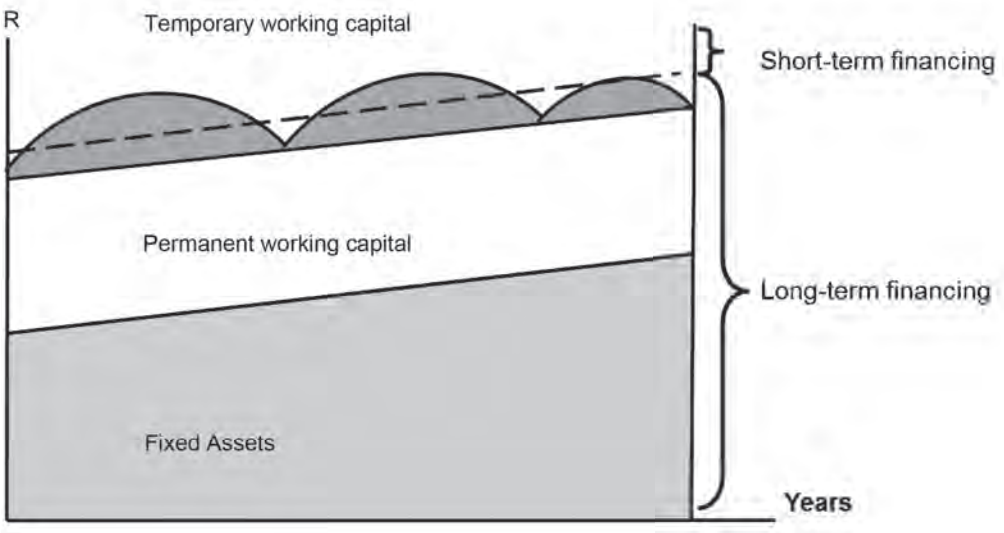
The current ratio (as explained in study unit 16, section 6) can give an indication of which policy the organisation is following. This ratio indicates the ability of the organisation to pay its current liabilities with its current assets. The higher the ratio, the more conservative the working capital policy would be. We will now look at the three different working capital financing policy options, as well as the advantages and disadvantages of each.

### 1. Conservative financing policy

In the case of the conservative policy, the organisation makes use of more long-term financing. Short-term financing is only used to support the peaks of the temporary working capital. When temporary working capital is low, the total funding will mainly consist of long-term funds; excess money will be invested in short-term deposits or financial instruments.

The **advantages** of a conservative financing policy are that the risk of not being able to fund the ups and downs in working capital is low, as the repayment of the long-term funds is not due soon.

The **disadvantage** is that the interest rates on long-term funds are generally higher than those of short-term funding. This is one of the reasons why this policy is more expensive and this then has a negative effect on the profitability of an organisation.




**Source:** Kriek, Beekman & Els (adapted), 2008

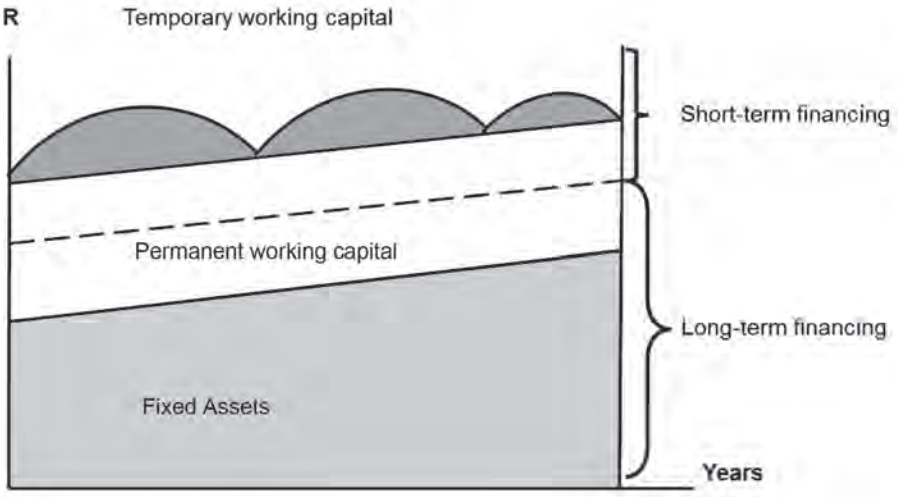
FIGURE 18.2: The conservative financing policy

### 2. Aggressive financing policy

In the case of the aggressive policy, the organisation makes use of more short-term financing. Here short-term financing is supporting the entire temporary and some of the permanent working capital.

The **advantage** is that the profitability of the organisation should increase. The reduction of costs is possible because short-term funds are generally cheaper than long-term funds.

The **disadvantage** is a greater level of financing risk, as the risk of the organisation not being unable to repay the funding when it is due, is higher.

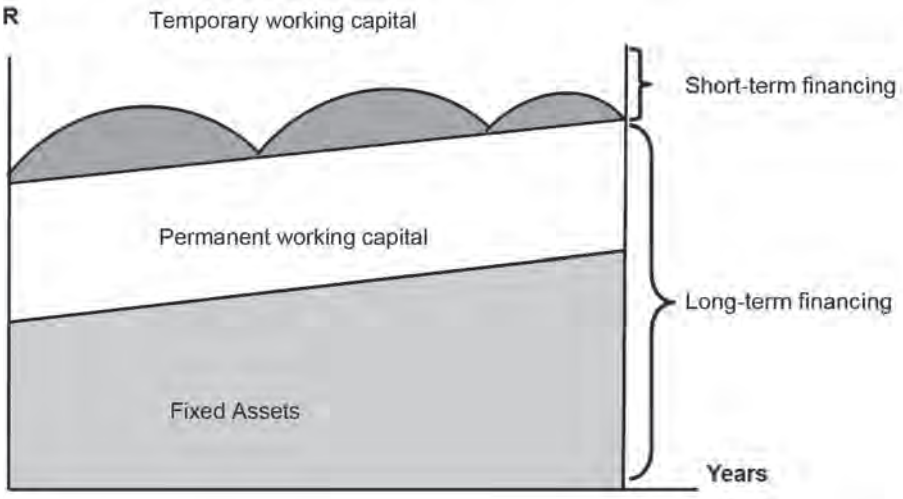



**Source:** Kriek, Beekman & Els (adapted), 2008

FIGURE 18.3: The aggressive financing policy

### 3. Moderate financing policy

This policy lies between the two extreme policies above. Long-term financing is used to finance fixed assets and permanent working capital and short-term financing is used to finance the temporary working capital. Here the matching maturities concept, that matches the maturity of the assets with the maturity of the financing, is applicable.




**Source:** Kriek, Beekman & Els (adapted), 2008

FIGURE 18.4: The moderate financing policy

## Activity 18.1

Winter-Heat Limited manufactures and sells electric heaters. Most of the manufacturing is done in the five months from October to February in order to have the heaters ready to sell in the autumn and winter months. The company holds permanent net working capital of R1 200 000 all year, with total net working capital increasing to R6 000 000 during these five months. Secured long-term financing has an interest rate of 12% and secured short-term financing is available at 10%. Winter-Heat Limited is considering two financing options:

Aggressive – Finance half of permanent working capital with long-term funds and the remaining permanent and temporary working capital with short-term funds.

Conservative – Finance the entire permanent and half of the temporary working capital with long-term funds and the remaining temporary working capital with short-term funds.

**REQUIRED**

a. Calculate the cost of each option.

b. Motivate why the financial manager may choose the expensive policy.

[You may ignore the effect of compounding in your answer. Round **only** the final answer to the nearest rand.]

## Feedback on activity 18.1

a. The following calculations should be done in order to calculate the cost of each option:

| **Aggressive financing policy** | **R** | | **R** |
|---|---|---|---|
| Half of permanent for full year | (1 200 000 ÷ 2) = 600 000 | x 12% | 72 000 |
| Half of permanent for full year | 600 000 | x 10% | 60 000 |
| Temporary for 5 months | (6 000 000 – 1 200 000) = 4 800 000 | x 10% x (5 ÷ 12) | 200 000 |
| Total | | | 332 000 |

| **Conservative financing policy** | **R** | | **R** |
|---|---|---|---|
| Permanent for full year | 1 200 000 | x 12% | 144 000 |
| Half temporary for 5 months | (4 800 000 ÷ 2) = 2 400 000 | x 12% x (5 ÷ 12) | 120 000 |
| Half temporary for 5 months | 2 400 000 | x 10% x (5 ÷ 12) | 100 000 |
| Total | | | 364 000 |

### NOTE

The temporary working capital is only required from October to February (5 months).

b. The financial manager may choose the conservative option, even if it represents the more expensive one, because the financing risk is lower for the organisation. Short-term financing may be unavailable for small companies like Winter-Heat and, where available, may be recalled at short notice, which may create financial distress.

**NOTE**

Both options provided in the question represent secured debt (where collateral has to be offered). This would therefore not create a benefit for either option.

## 3 Working capital cycles

Certain cycles can be associated with the use of working capital in an organisation's operations. These cycles are: inventory is purchased from suppliers on credit; inventory is then sold to customers on credit; the next step is the collection of accounts receivable; and finally, payment is made to accounts payable. The cycles are segregated into two distinct areas: the *operating cycle* and *cash conversion cycle*.

**OPERATING CYCLE**

The operating cycle focuses on an organisation's **internal** (thus excluding accounts payable) cycle's impact on cash flow. It represents the length of time from committing cash for purchases of inventory to the inflow of cash from the sale of inventory on credit.

**Key formula: OPERATING CYCLE**

Operating cycle = inventory days + accounts receivable days

**CASH CONVERSION CYCLE**

The cash conversion cycle focuses directly on the cash flow associated with the overall cash flow from operations (including accounts payable). It represents the length of time between when an organisation makes payments to its creditors (outflow of cash) and when an organisation receives payments from its customers (inflow of cash). As the cash conversion cycle includes the cash flow benefit afforded by accounts payable, this cycle is shorter than the operating cycle.

**Key formula: CASH CONVERSION CYCLE**

Cash conversion cycle = inventory days + accounts receivable days – accounts payable days

Number of days inventory (Inventory days)
+
Period of credit taken by customers (Receivable days)
–
Period of credit granted by suppliers (Payable days)
=
Total cash conversion cycle

**Source:** Author, 2012

FIGURE 18.5: The calculation of the cash conversion cycle

The cash conversion cycle consists of the following:

1. Inventory turnover (conversion) time (= inventory days)

   In a manufacturing organisation, it is the time that is required to convert raw materials into finished goods and then to sell the inventory.

2. Receivables collection time (= receivable days)

   The time required to collect the receivables after the credit sale.

3. Payables deferral time (= payable days)

   The time it takes from purchasing the inventory or raw materials to the payment thereof.

4. Cash conversion time (= cash conversion cycle – days)

   The net of the length of the above times (inventory, receivables and payables) and equals the time from cash expenditure to the receipts from sales.

The cash conversion cycle is an important cycle as it contributes to our understanding of how the organisation's operations are running on an on-going basis. Managing the cash conversion cycle is important as longer cycles consume more financial resources.

The cash conversion cycle can be shortened in a number of ways, including:

- reducing inventory levels by implementing inventory management systems
- delaying payments to suppliers or obtaining more finance
- recovering outstanding accounts sooner by making the credit terms more strict or by improving on the collection process

Each of these methods, in turn, has associated advantages and disadvantages. (These were discussed earlier in the previous study unit, sections 3, and 5.) The calculation of the cash conversion-cycle days was explained as part of ratio-analysis, in study unit 16, section 6.

## Activity 18.2

RoofJacks is a manufacturer of roof trusses and a range of roofing materials. The company wants to improve on their cash conversion cycle to eliminate the need for additional funds to finance their working capital. An extract from the company's financial statements of the most recent financial year is offered below.

The total amount of credit purchases relating to inventory for the year were R254 521. Total sales revenue (all on credit) was R390 000. Cost of sales amounted to R245 112 for the year.

Balances at year-end:

| | R |
|---|---|
| Inventories | 88 965 |
| Trade receivables | 74 556 |
| Trade payables | 36 559 |

**REQUIRED**

a. Calculate the cash conversion-cycle days for the most recent financial year.
b. Suggest how RoofJacks can shorten their cash conversion cycle.

You may assume that year-end balances were reflective of average balances for the year. Round **only** the final answer to the nearest rand. Use 365 days per year.

### Feedback on activity 18.2

a. The cash conversion cycle days:

$$\frac{\text{Receivables}}{\text{Credit sales}} \times 365 = \frac{74\,556}{390\,000} \times 365$$

$$= 70 \text{ days}$$

$$\frac{\text{Payables}}{\text{Credit purchases}} \times 365 = \frac{36\,559}{254\,521} \times 365$$

$$= 52 \text{ days}$$

$$\frac{\text{Inventory}}{\text{Cost of sales}} \times 365 = \frac{88\,965}{245\,112} \times 365$$

$$= 132 \text{ days}$$

| Cash conversion cycle | Days |
|---|---|
| Number of days of inventory (Inventory days) | 132 |
| *Plus:* Period of credit taken by customers (Receivable days) | 70 |
| | 202 |
| *Less:* Period of credit granted by suppliers (Payable days) | (52) |
| Total cash conversion cycle | 150 |

b. How to shorten the cash conversion cycle days:

Refer to section 3.

## 4 Summary

In this study unit, we have defined working capital policy and listed the factors that may have an effect on the policy. The working capital investment policy was explained as well as the different working capital financing policies. We defined operating cycle and illustrated the calculation of the cash conversion cycle.

### Self-assessment activity

After having worked through the study unit, you should be able to answer the following questions:

a. Define working capital policy.
b. Explain the difference between permanent and temporary working capital.
c. Name and describe the different working capital financing policies.
d. Define the operating cycle.
e. Define the cash conversion cycle.
f. Explain how the cash conversion cycle days are calculated.

**QUESTION 1**

New Harvest Limited has an inventory turnover rate of ten times, an accounts collection period (receivable days) of 45 days and turns over its payables (payable days) once in two months.

**REQUIRED**

a. Calculate the length of the operating cycle.
b. Calculate the length of the cash conversion cycle.

(Use a 360-day year.)

**QUESTION 2**

Ladybird Limited is in a seasonal business as their high income period is in the summer time. They require a permanent base of net working capital of R10 million throughout the year, but that requirement temporaralily increases to R20 million during the 6-month summer period each year. Ladybird Limited has two financing policy options for net working capital:

1. Finance all net working capital needs with short-term debt at 12,5%.
2. Finance permanent net working capital with equity at a cost of 18% and temporary net working capital with a short-term loan at 12%.

**REQUIRED**

a. Calculate the cost of each financing policy option.
b. Which option will you classify as the aggressive working capital policy? Why?
c. Which option will you choose and why?

## Solution to self-assessment activity

**QUESTION 1**

a. Operating cycle

Inventory turnover rate (number of times inventory is sold or used in a year – refer to topic 6) converted into days are:

360-day year / 10 times = 36 days

| | |
|---|---|
| Inventory days | 36 |
| *Plus:* Receivable days | 45 |
| **Operating cycle** | **81 days** |

b. Cash conversion cycle

| | |
|---|---|
| Inventory days | 36 |
| *Plus:* Receivable days | 45 |
| *Less:* Payable days | 60 |
| **Cash conversion cycle** | **21 days** |

**QUESTION 2**

a. The following calculations should be done in order to calculate the cost of each option:

| **Financing policy: Option 1** | **R** | | | **R** |
|---|---|---|---|---|
| Permanent for full year | | 10 000 000 | x 12,5% | 1 250 000 |
| Temporary for 6 months | (20 000 000 – 10 000 000) = 10 000 000 | | x 12,5% x (6 ÷ 12) | 625 000 |
| Total | | | | 1 875 000 |
| *Alternatively:* | **R** | | | **R** |
| Balance of working capital for 6 months | | 10 000 000 | x 12,5% x (6 ÷ 12) | 625 000 |
| Balance of working capital for 6 months | | 20 000 000 | x 12,5% x (6 ÷ 12) | 1 250 000 |
| Total | | | | 1 875 000 |

| **Financing policy: Option 2** | **R** | | | **R** |
|---|---|---|---|---|
| Permanent for full year | | 10 000 000 | x 18% | 1 800 000 |
| Temporary for 6 months | (20 000 000 – 10 000 000) = 10 000 000 | | x 12% x (6 ÷ 12) | 600 000 |
| Total | | | | 2 400 000 |

b. The first financing policy is the aggressive policy, because the organisation makes use of more short-term financing. The short-term financing is supporting the entire temporary and all of the permanent working capital. Short-term financing is more volatile.

c. The financial manager may choose the conservative option, which is the second option, even if it represents the more expensive one, as the financing risk is lower for the organisation.

## References and additional reading

Kriek, JH, Beekman, E & Els, G. 2008. *Fundamentals of finance.* 4th edition. Durban: LexisNexis.

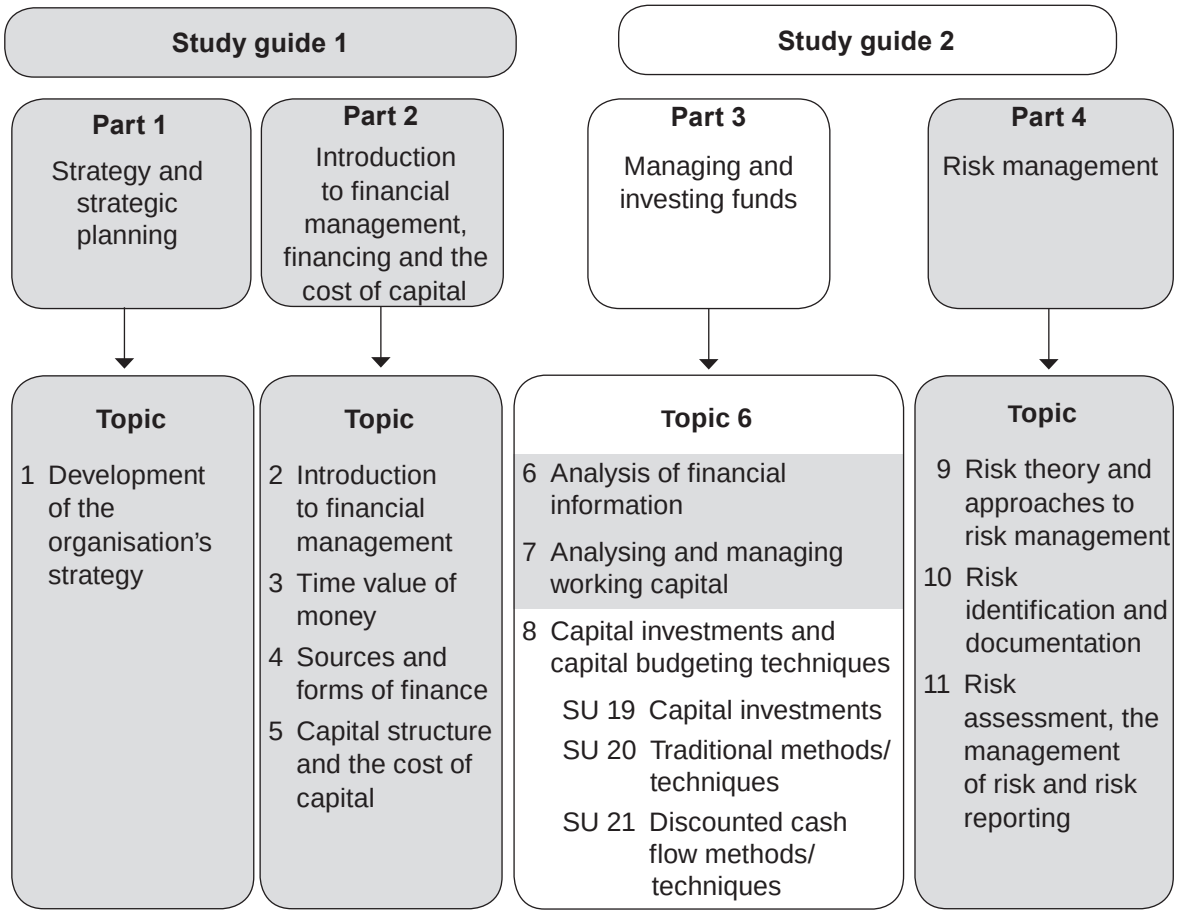
TOPIC 8

# Capital investments and capital budgeting techniques

## LEARNING OUTCOMES

After studying this topic, you should be able to:

- discuss the purpose and importance of capital investment decisions
- classify projects into types of expenditure and types of projects
- determine relevant cash flows for the capital budget of a project
- list and define traditional capital budgeting techniques
- list and define discounted cash flow capital budgeting techniques
- apply the capital budgeting techniques in the evaluation of different capital projects, asset acquisitions and investment decisions



## INTRODUCTION

In topic 7, we dealt with managing the investment in working capital (current or short-term assets) and sources of financing available for this investment type. In this topic, we will explain how an organisation can invest in long-term (non-current) assets such as property, plant and equipment by looking at capital budgeting, investment appraisals and valuation methods.

We have already dealt with the basics of financing long-term assets in topic 4 – sources and forms of finance and topic 5 – capital structure and the cost of capital.

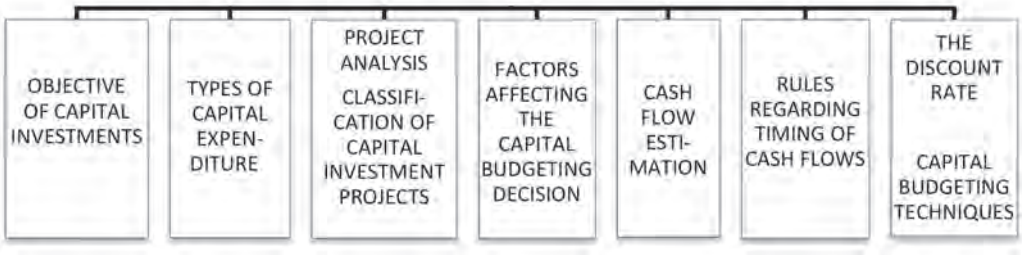
### NOTE

This topic relies strongly on your knowledge of topic 3 – time value of money and topic 5 – capital structure and the cost of capital. If you get stuck, please refer back to these topics!

STUDY UNIT 19

# Capital investments

**In this study unit**




## 1 Introduction

In this study unit, we provide an overview of capital investments whilst distinguishing between different types of investments. We also discuss the project analysis process and different classifications of capital projects.

## 2 Objective of capital investments

As a shareholder or owner of an organisation, you would have an expectation to earn a return on your investment, whether it is in the form of dividends/distributions or capital gain. Therefore, the role of management is to use the funds in the organisation to increase the value for the shareholder/owner, whilst still taking cognisance of the interest of other stakeholders, that is, creating long-term sustainable wealth as discussed in topics 1 and 2. The management should also manage the risks which face the organisation (you will learn more about that in the next part on risk management).

You will know from your Financial Accounting modules that the organisation's **cash outflows** are either classified as **expenses or as assets**. Investments in assets can be divided into two further categories, namely **short-term (current) assets** and **long-term (non-current) assets**. Investment in working capital was covered in topic 7. Funds that are invested in assets, large projects and capital market instruments (refer to topic 4) are long-term assets. Examples include machinery that needs to be replaced, start-up cost for a new business or long-term projects. This topic deals with long-term capital investments.

When making capital investment decisions, management's objective is therefore to select assets and projects that will **increase the long-term sustainable value of the organisation**. Management has to invest the funds sensibly. Capital budgeting decisions are the most important investment decisions made by the management of an organisation. Capital investments create value if they are worth more than what they cost. Most of the time, capital investments produce most of an organisation's income in future years.

**CAPITAL INVESTMENTS / EXPENDITURE (also called CAPEX)**

Long-term assets (eg non-current) such as property, plant and equipment acquired individually or as part of large projects that generate returns (cash inflows) over a number of years.

**NOTE**

The definition also includes investments in financial instruments (ie shares, debentures) issued by other organisations where the intention is a long-term investment and not speculation. Large companies usually own shares in their subsidiaries and associate companies instead of holding all the long-term assets directly in their own legal organisation (ie instead of buying another plant in their own name, they buy shares in another company that owns such a plant).

In this topic, we will focus on non-financial (tangible) long-term assets. You will learn more about the advanced issues surrounding the acquisition of shares in another organisation in MAC3702 and MAC4861/2. The basic evaluation process though is largely the same.

Although we use the term "capital *expenditure*" in our MAC modules, it does not mean it is expensed to the statement of profit or loss and other comprehensive income in terms of International Financial Reporting Standards (IFRS) – it still remains a long-term asset!

**SUSTAINABLE CAPITAL BUDGETING**

Sustainable capital budgeting involves planning and evaluation of how funds are spent on capital investments that will ultimately add to the organisation's value while taking cognisance of the social, environmental and governance impact of the decision.

Capital budgeting is an organisation's formal process for the acquisition and investment of capital. It involves an organisation's decision to invest its current funds for addition, modification and replacement of long-term assets.

The capital budgeting decision is an important one for any organisation, in the sense that it determines the nature of the organisation's operations and products over the long term. Before the organisation commits its scarce and valuable capital resources to capital investments (fixed productive projects/assets), it needs to be assured of the **profitability** as well as an **acceptable return** on the funds invested therein. Therefore, capital budgeting provides methods by which capital investments are evaluated.

The evaluation forms the basis of deciding whether a specific capital asset/project makes sense for a particular organisation at a specific time and whether it is in line with long-term strategic goals.

## 3 Types of capital expenditure

The capital expenditure process starts with an organisation's strategic plan, which states the strategy for the next three to five years. Strategic objectives are then converted into business plans that give details of quantifiable targets for each business unit (refer to topic 1).

The **capital budget** forms part of the business plans (you will learn more about the details surrounding the budgeting process in your MAC2601 module) and outline the reasons and budgeted amount required for capital expenditure.

Types of capital expenditures are as follows:

- **Major repair or upgrade**

After some time, plant and equipment must undergo major repairs, be rebuilt or updated with new technology. This usually restores the asset to its previous condition and output capacity. These decisions do not require a detailed analysis and are made during the course of the business operations. (Note that the taxation treatment of this expenditure is different than that for replacement and expansion!)

- **Replacement**

The replacement of assets is done when it's irreparable, worn out or damaged. These decisions involve the replacement of the asset with a similar or updated one. These decisions will require a detailed analysis and also approval from the organisation's board of directors. Project cash flows can be forecasted with a greater degree of accuracy, based on existing sales and manufacturing conditions.

- **Expansion**

The expansion of a business unit involves producing new products, entering into a new market or increasing capacity. These decisions will require a detailed analysis and also approval from the organisation's board of directors. Project cash flow estimates are subject to greater uncertainty regarding eventual success of the new products or new markets.

## Activity 19.1

You are given the following examples of capital expenditure:

a. A manufacturing company decides to increase the output of existing products. This involves the purchase of new equipment to produce more products and extension of their distribution system.
b. A delivery company has a fleet of delivery vehicles. They decide to renovate the vehicles and their engines rather than to purchase new ones.
c. An organisation has a machine that has become obsolete and has to decide whether to replace the machine with a similar one or to purchase a different machine that would require a change in the production process. The new machine may provide cost savings with respect to labour or material usage and/or may improve product quality.

**REQUIRED**

Identify the correct type of capital expenditure for each example.

## Feedback on activity 19.1

Refer to section 3.

a. This type of capital expenditure is an expansion as it involves increases of capacity and the company's distribution system.
b. This type of capital expenditure is a major repair or upgrade as the repairs will restore the vehicles to its previous condition and output capacity instead of purchasing new ones.
c. This type of capital expenditure is a replacement as it will replace an old machine. Although it has other benefits as well (if a different machine is

purchased), it still is not an expansion, as the output (capacity) was not improved!

## 4 Project analysis

**PROJECT ANALYSIS**

Project analysis is the detailed examination of all the technical specifications (operational), marketing (sales units, market, etc) and financial aspects (costs and revenues) and/or problems of a project before funds are allocated and work on it is started.

The project analysis process involves the following steps:

| PROJECT ANALYSIS PROCESS |
|---|
| Proposal generation |
| Project evaluation |
| Project selection |
| Implementation, monitoring and post-implementation audit |

### 1. Proposal generation

The first step is the generation of a capital investment proposal. This entails the gathering of information, both financial and non-financial.

Examples of the proposals for capital investment may include some of the following:

- proposals to add a new product to the product line (to be sold in existing or new markets)
- proposals to expand the production capacity in existing product lines (to be sold in existing or new markets)
- proposals to reduce the costs of the output of the existing products without changing the scale of operation
- proposals to upgrade the production facilities to meet new environmental regulations regarding gas emissions, effluents, and so on

### 2. Project evaluation

The proposal is then received by management and compared to other proposals. Management has to ensure that all cash inflows from a project will be sufficient to cover the initial cash outflow that will take place. An estimation of benefits and costs are measured in terms of cash flows which are mainly dependant on future uncertainties.

The risk associated with each project should be analysed carefully and sufficient provision must be made for covering the different types of risks.

Environmental, social and governance impacts should also be evaluated properly.

### 3. Project selection

*Capital investment criteria* should be compiled by management (the board) to judge the attractiveness of the project. These selection criteria should be consistent with the

organisation's objective of increasing sustainable long-term wealth. The criteria should include financial and non-financial parameters.

The screening and selection procedures for approving the investment proposal will be different from organisation to organisation. The board (or top management) approves selected projects and it is usually awarded a "vote number" and minuted as such.

Once the proposal for capital expenditure is approved (vote number obtained), it is the duty of the financial manager to investigate the different alternatives available for acquiring the funds, in line with the target capital structure of the organisation (refer to topic 5).

**NOTE**

There is a difference between the approval of the project (getting the vote number) and getting approval in each financial year to spend the money (in line with the overall approval granted)! The board sits at different intervals in the year. The budget is submitted for approval to the board at a specific sitting (before the start of the new financial year).

**4. Implementation, monitoring and post-implementation audit of the project.**

The financial manager has to prepare a capital budget (detailing how and where the funds will be spent) and various reports in order to get authorisation from the organisation's board of directors as the money is actually spent.

Systematic procedures should be developed to review the performance of the capital investments during their lifetime and after completion in the case of capital projects. It is important to identify any significant deviations from the initial proposal and quantify these as soon as possible.

The follow up and comparison of actual performance with the original estimates (part of the post-implementation audit) does not only ensure better forecasting, but should also improve the capital investment appraisal process in future and assist management not to repeat the same mistakes there might have been made.

## 5 Classification of capital investment projects

Potential capital projects can be grouped into the following classifications:

| PROJECT CLASSIFICATION |
|---|
| Independent projects (projects with unrelated cash flows) |
| Mutually exclusive projects (competing alternatives) |
| Contingent projects (acceptance depends on acceptance of another project |
| Divisible and indivisible projects |

**1. Independent projects (projects with unrelated cash flows)**

Independent projects **do not compete** with one another in terms of functionality. Their cash flows are also independent from one another.

For example, a financial manager is reviewing a company's capital investment proposals. One proposal is to acquire a new machine for its existing product line and another proposal is to purchase mining rights. Both these projects can be accepted if they meet the criteria because they have different functions.

**2. Mutually exclusive projects (competing alternatives)**

Mutually exclusive projects are projects that **do compete** with one another. These are projects for which acceptance of one prevents acceptance of the other. The different projects are alternatives for one another, and one has to be selected.

Consider a company that has to replace a machine. There are two types of machines that can do the job. These two projects (machines) compete with each other because they have the same function. Only one project can be chosen. Choosing one project automatically eliminates the other from further consideration.

**3. Contingent projects (projects, of which the acceptance depends on the acceptance of another project)**

With contingent projects, the acceptance of the one project is contingent on the acceptance of another. If there are different (sub) projects required to complete a larger project, it is called contingent projects. These different projects are treated as a single investment for the purpose of evaluation. In this module, we will not deal with contingent projects.

**4. Divisible and indivisible projects**

When a project can be broken down into smaller parts that can be executed on their own, it is a divisible project. A project that cannot be broken down in subparts is indivisible and has to be undertaken in its entirety.

For example, divisible projects are common in the construction industry where developments take place in "phases". The organisation can decide to complete Phase I now and start on Phase II in two years' time (or never, if conditions become unfavourable!)

An indivisible project is, for example, where an organisation wants to erect a new bottling facility in a new area to service a different market. The whole project has to be completed as no smaller part of the plant can operate on its own.

## NOTE

An organisation usually has only a limited amount of long-term funding available. Therefore, all projects under consideration cannot be accepted. The type of project plays an important role in allocating the available money!

### Activity 19.2

You are given the following examples of capital investment projects:

a. A gas company wants to build a new power plant which involves different projects. Firstly, a power plant will have to be built. Then, in order to comply with environmental standards, they also need to invest in suitable pollution control equipment.

b. An automobile company decided to manufacture sedans in South Africa. It considered three possible manufacturing sites (or capital projects) namely KwaZulu-Natal, Northern Cape and Gauteng. Management has decided

and selected Gauteng as a manufacturing site after their detailed capital budgeting calculations.

c. A property developer wants to develop a vacant area into a new shopping centre. Phase I includes the anchor retailers (such as Woolworths and Edgars) while Phase II involves four restaurants and a stationery shop.

d. The management of a manufacturing company has three projects in mind: (1) build a new parking area at its head office; (2) acquire a small truck; and (3) add manufacturing capacity to one of its workshops.

**REQUIRED**

Identify the correct classification for each project.

---

**Feedback on activity 19.2**

Refer to section 5.

a. These are contingent projects. The acceptance of the power plant is contingent on the acceptance of the pollution control equipment. We can also say that the pollution control investment is a compulsory contingent project. This is also an example of in indivisible project. It is no use to build the plant, if the pollution control equipment is not installed too, as the plant will not get authorisation to start production.

b. These are mutually exclusive projects. Once management has decided and selected Gauteng as a manufacturing site, the other two possible locations for the investment are no longer considered.

c. These are divisible projects. The developer can decide to only go ahead with Phase I.

d. These are independent projects. Since the cash flows for each project are unrelated, accepting or rejecting one of the projects will have no effect on the others.

---

## 6 Factors affecting the capital budgeting decision

Because the amount of funds available at any given time for new capital investments is limited, management needs to use capital budgeting techniques to determine which assets or projects will earn the highest return over an applicable period of time.

Apart from the returns of the individual projects under consideration, some of the factors listed below also influence the capital allocation decision:

- availability of funds
- current and target capital structure of the organisation
- legal factors
- lending policies of financial institutions
- immediate need for the project
- future earnings

Some of the risks and uncertainties in capital budgeting decisions include:

- expected economic life of the asset or project
- environmental, social and governance impact of the project(s)
- the duration of the construction and ramp-up phase (getting the equipment ready to produce at specified capacity)
- recoupment value of the assets and working capital (if any) at the end of the project
- overall capacity of the asset or project (output units)
- selling price of the product
- future demand for the product
- reaction from competitors – affecting the projected sales volumes
- South African Revenue Services' (SARS) allowances for capital expenditure
- production cost
- successfully implementing new technology or new production techniques
- inflation rates for different input costs
- exchange rates, especially with imported plant and equipment and where the output of the project is exported
- tax rate

## 7 Cash flow estimation

Almost all the techniques (discussed in the next two study units) used in capital budgeting appraisal is based on cash flows. Cash inflows and outflows are assessed in order to determine whether the returns generated by the capital investment meet a sufficient target benchmark, which is often the weighted average cost of capital (discussed in section 9).

The cash flow information needed to perform the capital budgeting appraisal or evaluation is mostly obtainable within the organisation. It often starts with sales representatives and marketing managers who are in the market place talking to potential and current customers. Cost accountants and production engineers determine the cost of producing a product and any capital expenditure necessary to manufacture it. Where the project involves optimising production processes, the production managers will provide the details surrounding savings, increased output levels, and so forth.

When preparing a proposal, it is important for the financial manager to only include cash flows that are relevant to the capital investment decision.

A few of the cash flow concepts will be discussed next.

### 1. Relevant cash flows

Relevant cash flows are inflows and outflows that arise in the future as a result of the investment decision being approved. Its inclusion or exclusion from the capital budgeting calculation can affect the overall investment decision. For example, if the project is not accepted, the machine will not be bought and no costs will be incurred. Relevant cash flows will therefore **be included** in the capital budgeting calculation.

Examples of relevant cash flows are:

- the acquisition cost of a machine (outflow of funds)
- proceeds from sale of any project assets at the end of its useful life (estimated residual value)

- the initial investment in working capital for the project, such as the **additional** inventories to support the new operation, or **increases** in accounts receivable due to new customers taken on
- the cash sales attributed to the new machine and the payments in respect of variable costs associated with the sales
- salaries of the **additional** employees that needs to be hired specifically for the new operation
- rent to be paid for **additional** space for the new machine

**Non-cash flow** items are not included in the capital budgeting calculation. An example of a non-cash flow item is depreciation and amortisations. Depreciation is an accounting entry and not a flow of funds and therefore it must not be treated as a cash flow. However, it has an effect on the income tax liability and must be taken into account when the cash flow pertaining to the income tax liability is to be calculated (more on that later). Another example is bad debts written off. The credit sale that gave rise to the debtor is only an accounting entry; no cash has yet flowed.

**Non-relevant cash flows** include, for example, the rent of a factory if an organisation wants to add a new product to the existing product lines. The new product will be manufactured in the existing factory, so the rent of the factory is not relevant. If the project to manufacture the new product is rejected, the rent still needs to be paid, because current products will still be manufactured in the factory.

## NOTE

The same principle applies as that in Relevant Costing covered in MAC2601. We only include ***incremental cash in or outflows***. Existing cash flows or cash flows already committed before the investment decision is irrelevant. For example, if an additional machine can be accommodated on the factory floor, we will not include a pro rata portion of the factory rental to the project (even though the rental is paid in cash) as there is no increase in the total amount of rental paid as a result of the investment decision. However, should additional premises need to be rented, that rental will be included as additional cash fixed cost of the project!

### 2. Working capital

Net working capital invested normally consists of additional inventories that are required to support a new business operation or plant, and which will also have an effect on accounts payable (inventories bought on credit), accounts receivable (increase in credit sales) and cash. The amount invested is reflected as an outflow at the beginning of the investment period.

The investment in net working capital is returned/realised at the end of the investment period as the working capital is no longer required and the cash that was tied up in it is now made available. For example, the last inventory has been sold, the debtors have all paid and the creditors have been settled. It reflects as a net cash inflow at the end of the investment period.

Should there be an annual change in the level of the working capital related to the project, the net movement would reflect as either an outflow (increase in working capital balance) or inflow (reduction in working capital balance).

For example, let us assume the working capital required over the life of the project is as follows:

| | 0<br>R | 1<br>R | 2<br>R | 3<br>R | 4<br>R |
|---|---|---|---|---|---|
| Working capital | 50 000 | 55 000 | 56 000 | 49 000 | 0 |

This can be reflected in the capital budget cash flows in two ways:

a. Net movements

| | | | | | |
|---|---|---|---|---|---|
| Annual net cash movement | (50 000) | (5 000) | (1 000) | 5 000 | 49 000 |

b. Annual balances

| | | | | | |
|---|---|---|---|---|---|
| Working capital opening balance | 0 | 50 000 | 55 000 | 56 000 | 49 000 |
| Working capital closing balance | (50 000) | (55 000) | (56 000) | (49 000) | 0 |

### 3. Sunk costs

Sunk costs are costs that have already been committed or that have already taken place in the past and will not be considered in the capital budgeting calculation. Sunk costs cannot be changed or reversed by the acceptance or rejection of the project.

Examples of sunk costs include:

- costs of research and development relating to the project which has already taken place
- patent fees for protection of intellectual property rights (new products/techniques developed)
- costs of feasibility studies
- market research costs (if extensive market research has proved a demand for a new product and the product is then being manufactured, the market research cost is sunk costs and will be irrelevant to the capital budgeting decision)

### 4. Wear and tear allowances for taxation calculation

For accounting purposes, assets are depreciated by writing off a depreciation charge over the productive life of the asset. SARS too allows a capital allowance on assets purchased. In many cases this allowance (called wear and tear) occurs at a **higher rate** (to encourage organisations to invest in productive capacity and create employment) than that which is used to depreciate the asset for accounting purposes. It bears **no correlation to the life** of the asset. This results in the taxable income being different to the accounting profit before tax.

For example, an asset with a cost of R600 000 may have a useful life of six years. For accounting purposes, we will charge depreciation at R100 000 per annum and deduct that from the profits of the business. SARS may allow a wear and tear allowance of 20% per year, which means that R120 000 is allowed as a deduction in the calculation of taxable income. If we assume the organisation has other net cash profits before tax of R1 000 000, the impact is as follows:

**Statement of profit or loss and other comprehensive income**

| | R |
|---|---|
| Other net cash profits | 1 000 000 |
| Depreciation | (100 000) |
| Profit before tax in statement of profit or loss | 900 000 |
| Normal tax (see below) | (246 400) |
| Profit after tax | 653 600 |

**NOTE**

Do you notice that when we add back the accounting depreciation, we are back to the other net cash profits?

**The calculation of taxable income will be as follows:**

| | |
|---|---|
| Profit before tax | 900 000 |
| Add back depreciation | 100 000 |
| Other net cash profits | 1 000 000 |
| Deduct wear and tear | (120 000) |
| Taxable income | 880 000 |

Normal tax at 28% 246 400

**Cash flow for capital budgeting:**

| | R |
|---|---|
| Profit before tax | 900 000 |
| Add back: Non-cash depreciation | 100 000 |
| Net cash from operations | 1 000 000 |
| Less: Taxation paid | (246 400) |
| Net cash flow for the period | 753 600 |

**NOTE**

Depreciation does not feature in cash flows as it is a non-cash item. It is added back to profit. We include the tax payment as an outflow.

When the wear and tear allowance is different to the accounting depreciation, the asset will also have a tax value which is different from the accounting book value. For the example above, it looks as follows:

| Year | 0<br>R | 1<br>R | 2<br>R | 3<br>R | 4<br>R | 5<br>R | 6<br>R |
|---|---|---|---|---|---|---|---|
| Original cost price | 600 000 | | | | | | |
| Book value end of year | | 500 000 | 400 000 | 300 000 | 200 000 | 100 000 | 0 |
| Tax value end of year | | 480 000 | 360 000 | 240 000 | 120 000 | 0 | |

Another aspect that should be considered is where the asset is disposed of. When the proceeds are more than the tax value, a recoupment of previous wear and tear allowances occurs. This is added to the taxable income. For example, let us assume the asset was sold at the end of year four for R150 000.

For accounting purposes, the loss is R(50 000) (= R150 000 – R200 000).

For taxation purposes, the recoupment is R30 000 (= R150 000 – R120 000), which is added to the taxable income. If we once again assume the organisation has other net cash profits before tax of R1 000 000, the impact is as follows:

| | **Year 4** |
|---|---|
| | **R** |
| Other net cash profits | 1 000 000 |
| Depreciation | (100 000) |
| Loss on sale of asset | (50 000) |
| Profit before tax in statement of profit or loss | 850 000 |
| Normal tax (see below) | (254 800) |
| Profit after tax | 595 200 |

**The calculation of taxable income will be as follows:**

| | |
|---|---|
| Profit before tax | 850 000 |
| Add back: Depreciation | 100 000 |
| Loss on sale | 50 000 |
| Other net cash profits | 1 000 000 |
| Deduct wear and tear | (120 000) |
| Recoupment of wear and tear | 30 000 |
| Taxable income | 910 000 |

Normal tax at 28% R254 800

### 5. Normal income tax

This also is a relevant cash flow, as it has to be paid according to the Income Tax Act based on the taxable income generated by the project (after taking account of wear and tear allowances). The relevant cash flows (returns available to owners/fund providers) are always net of tax. A detailed tax calculation (see previous point) is usually a part of determining the after tax cash flows relating to the project.

## NOTE

You will learn more about how taxable income is determined in your Taxation modules. For purposes of MAC2602, we will limit it to very basic calculations.

### 6. Opportunity costs

Opportunity costs are net cash inflows that could have been generated from an alternative investment or transaction and is therefore a lost (forfeited) return. The lost return can be

viewed as a cost that arises from a lost opportunity and will be included in your capital budgeting calculation.

An example is if a new project is implemented which requires the use of an existing machine. The decision leads to the machine not being available to earn income for its existing application any longer. The net cash income lost is a relevant cost to the capital budgeting decision of the new project. The implication is that the new project must recoup at least this lost income and more!

### 7. Financing costs

Financing costs (interest etc) is **NEVER** taken into account in the capital budgeting exercise.

Even though the interest on debt financing represents a cash outflow, the weighted average cost of capital (used as the discount rate), based on the target capital structure, includes the required return of all providers of capital (after tax) and will ensure that providers of debt (and equity) will receive their return.

In topic 5 we have stressed that we use the target capital structure (or the actual, when the target structure is unknown), because the source of funding for the next expansion of the organisation is driven by the objective of moving towards to the target structure, irrespective of how the funds are invested!

**NOTE**

In the next two study units, you will get the opportunity to see how all the different aspects discussed above is treated in the capital budget!

## 8 Rules regarding timing of cash flows

In the discounted cash flow techniques, we take into account both the **timing** of cash flows as well as the streams of cash flows **over the full life time** of the project.

A capital budget is usually prepared in a spread sheet like the example below:

| **Example** | NPV | Period 0 | Period 1 | Period 2 | Period 3 |
|---|---|---|---|---|---|
| | R | R | R | R | R |
| Capital outlay (cash outflow) | | (90 000) | – | – | – |
| Realisable value (inflow) | | – | – | – | 5 000 |
| Working capital | | (20 000) | – | – | 15 000 |
| Net cash inflow from operations | | – | 80 000 | 50 000 | 35 000 |
| Normal tax payments | | – | (15 000) | (6 000) | (3 000) |
| Net cash inflow/(outflow) | | (110 000) | 65 000 | 44 000 | 52 000 |
| PV factor of R1 at 10% p.a. | | 1,000 | $1\div(1+0{,}1)^1$ | $1\div(1+0{,}1)^2$ | $1\div(1+0{,}1)^3$ |
| OR per Table A | | 1,000 | 0,909 | 0,826 | 0,751 |
| Present value | 24 481 | (110 000) | 59 085 | 36 344 | 39 052 |

The following guidelines will assist you in populating the spread sheet:

**Rule: TIMING OF CASH FLOWS**

- The initial cost of the investment or capital outlay always occurs in year 0 and is an outflow (negative amount), which can be seen as the beginning of year 1. The present value of R1 now (year 0), is R1 regardless of the size of the discount rate.
- Cash flows (in and out) that occurs *during* any period is said to occur at the end of that period/year. So, if a relevant cost occurs during the first year, it will be included in year 1, which is the *end of year 1*.
- Cash flows that occur at the *beginning* of a period/year are taken to have occurred at the end of the previous period/year. So, if a relevant cost occurs at the beginning of the second year, it will be included in year 1, which is the *end of year 1*.
- Any *sale of assets* or *recoupment* of working capital at the end of the project is reflected as an inflow at the end of the last year.

**Activity 19.3**

The business that you work for, Refti Limited, owns a piece of land that have cost them R500 000 five years ago. The land can be used for a new building or it can be sold for R650 000.

**REQUIRED**

Identify the relevant costs when they decide to build a building on the piece of land instead of selling the land.

**Feedback on activity 19.3**

The R500 000 are sunk costs, as the money was paid in the past. The cost is irreversible and cannot affect your capital budgeting decision regarding the erection of the new building. It is therefore an irrelevant cost.

The R650 000 is an opportunity cost as it is a lost opportunity when they decide not to sell the land, but to build a building on it. It is therefore a relevant cost and to be included in the capital budgeting calculation for the building.

## 9 The discount rate

In the previous section, we identified the cash flows that are relevant to the capital investment decision. In topic 3, we have learned that money has a time value. Some of the methods that will be discussed in the next sections and study units are based on the time value of money. The correct decisions can only be made if all cash flows are measured at the same point in time. Therefore, all cash flows must be discounted back to today's value (called the net present value (NPV) of the project).

The discount rate used is the *weighted average cost of capital* (WACC), which was discussed in topic 5. The cost of capital is the rate of return that a capital investment must earn to be accepted by management. The providers of the capital need the project to deliver at least this minimum return on the investment.

**NOTE**

This rate is sometimes adjusted for risk if the risk of the project differs from that of the organisation in general (on which the WACC was based). You will learn more about this in later MAC modules.

## 10 Capital budgeting techniques

Capital budgeting techniques help the management of an organisation to analyse the business opportunities in order to decide on the best capital investments. Various techniques have been developed to determine whether an investment opportunity meets the organisation's requirements for a "satisfactory return". These methods/techniques are classified as follows:

**Traditional methods/techniques (also called conventional methods)**

They are based on highly simplified and at times, unrealistic assumptions. They fail to take into account the effect of risk factors or the time value of money.

The following traditional methods/techniques will be discussed and illustrated in study unit 20:

1. payback period
2. accounting rate of return (ARR)

**Discounted cash flow methods/techniques (also called profitability methods)**

They are more realistic as they take the time value of money into consideration when the return on an investment is calculated through the application of discounted cash flow methods.

The following discounted cash flow methods/techniques will be discussed and illustrated in study unit 21:

1. net present value (NPV)
2. internal rate of return (IRR)
3. profitability index (PI)

## 11 Summary

In this study unit, we discussed the meaning and function of capital investments and capital budgets. We discussed types of capital expenditure and the stages in the execution and completion of a project. We also explained the different classifications of capital investment projects. The importance of capital budgeting, factors influencing the decision and the risks and uncertainties involved in these decisions were highlighted. We briefly discussed sources of information and explained relevant cash flows and the discount rate. We also listed the different capital budgeting techniques.

In the next study unit, we will illustrate the traditional methods used in capital budgeting.

## Self-assessment activity

After having worked through the study unit, you should be able to answer the following questions:

a. Define capital investments.
b. Define capital budgeting.
c. What is the objective of capital investments?
d. Name and describe the different types of capital expenditure.
e. Discuss the project analysis process.
f. Discuss the classifications of capital investment projects.
g. List some of the factors influencing the capital budgeting decision.
h. List some of the risks and uncertainties in capital budgeting decisions.
i. Define relevant cash flows, sunk cost and opportunity cost.
j. Which rate can be used as the discount rate?
k. Name the conventional methods/techniques.
l. Name the profitability methods/techniques.

**QUESTION 1 – Eskom**

You are given the following examples of capital expenditure of Eskom:

a. During the 1980s, Eskom realised that they supplied an excess electricity. The supply was much more than the demand. They then decided to *mothball* three power stations, of which Camden power station was one. In 2006, Eskom realised that there was going to be a 15% shortfall in meeting the demand and they decided to start up the Camden power station again to ensure that the supply is sufficient. However, the control systems used (a major part of the plant) in the Camden power station was installed before 1980 and was too old and worn-out. It had to be replaced.

   **Mothball**: If an organisation mothballs a factory, building or plant, it closes it or does not use it for a long time, but may open it or use it again in future. Minimal maintenance is done to prevent damage and to ensure a smooth start-up when it is required again.

b. Eskom is currently producing 40 gigawatts of electricity to satisfy the country's electricity needs. Their predictions show that the electricity demand in 2015 will be 43 gigawatts. They decided to build the Madupi power station that will produce 3,6 gigawatts.

c. During the nine warmer months of a year, Eskom does the necessary major repairs and maintenance on their generators to make sure that they will be able to generate sufficient power during the three winter months when the demand is very high.

**REQUIRED**

Identify the correct types of capital expenditure for each example.

**QUESTION 2 – Gunsite company**

The Gunsite company manufactures a line of hunting rifles. Management is considering a new business opportunity to produce a new product. New legislation by the government requires that six months from now, all current and future rifle owners must store their rifles in a rifle safe certified by the South African Bureau of Standards (SABS). The new product line entails the manufacture and supply of SABS approved rifle safes.

The opportunity has been investigated carefully and the following information is estimated:

| | | |
|---|---|---|
| Cost of new production machinery and equipment including transport and setup costs | | R500 000 |
| Expense of appointing and training new employees | | R225 000 |
| Pre-start-up advertising and other miscellaneous expenses | | R 60 000 |
| Additional selling expenses per year after start-up | | R180 000 |
| Unit sales prediction: | | |
| Year 1 | 650 | |
| Year 2 | 1 590 | |
| Year 3 | 1 320 | |
| Year 4 | 1 400 | |
| Unit selling price | | R2 700 |
| Unit cash cost to manufacture (50% of revenue) | | R1 350 |

Last year, in anticipation of this new opportunity, Gunsite bought the rights to a new safe design which has SABS approval, for R85 000.

Gunsite's production facilities are currently being utilised to capacity, so a new workshop has to be found for the incremental production. The company owns a plot near the present facility on which a new building can be constructed for R700 000. The land was purchased ten years ago for R300 000 and now has an estimated market value of R1 010 000.

If Gunsite produces rifle safes, it expects to increase some of its current sales of rifles, as there will be more feet in the shop. An addition of ten percent of the rifle sales are expected to come from this new business each year and will contribute an additional cash profit of R70 000 per year.

Gunsite's general overhead includes salary payments, repairs and maintenance. Small one-time increments in business don't affect overhead spending, but a major continuing increase in volume would require additional support. Management estimates that additional cash spending in overhead areas will amount to about 3% of the new project's revenue.

Incremental inventories are estimated at R220 000 at start-up and for the first year. After that, the working capital requirement will decrease to R80 000 and remain at that level for the duration of the project.

The useful life of the machinery and equipment is six years and wear and tear for taxation purposes is deductible at 20% per annum based on the cost of the asset by using the straight line method.

The company's current tax rate is 28%.

**REQUIRED**

a. Calculate the total initial cash outlay (period 0) relating to the new product line of rifle safes.
b. Estimate the cash flows of the new product line of rifle safes for the first four years.
   [Round your figures to the nearest rand.]

**QUESTION 1 – Eskom**

a. This type of capital expenditure is replacement as the control system was worn out and had to be replaced.

b. This type of capital expenditure is an expansion as they will be building a new power station to increase capacity of power supply.

c. This type of capital expenditure is a major repair as equipment needs to be maintained and repaired. One can even argue that some of the expenditure is normal maintenance, but we need more information on the details.

**QUESTION 2 – Gunsite company**

a. The initial outlay (period 0) for the new product line of rifle safes.

| **Assets necessary to get started** | **R** |
|---|---|
| Machinery and equipment | 500 000 |
| New building construction | 700 000 |
| Initial working capital (inventory) | 220 000 |
| Total of assets | 1 420 000 |

| **Operating costs necessary to get started** | **R** |
|---|---|
| Appointing and training of new employees | 225 000 |
| Advertising and miscellaneous | 60 000 |
| Net operating costs ① | 285 000 |

**NOTE**

The expenses are paid upfront in period 0, but remember that the tax deduction of these expenses takes place at the end of year 1. You should include it as a deduction in the calculation of the taxable income of year 1.

| **Opportunity cost of the land** | **R** |
|---|---|
| Market value – current selling price | 1 010 000 |

The historical cost of the land (R300 000) is a sunk cost and is excluded!

**NOTE**

We will ignore the capital gains tax on the potential sale as it falls outside the scope for MAC2602.

The total initial outlay for the new product line is as follows:

| **Total initial outlay** | **R** |
|---|---|
| Assets necessary to get started | 1 420 000 |
| Operating costs necessary to get started | 285 000 |
| Opportunity cost of the land | 1 010 000 |
| **Total for year 0** | **2 715 000** |

b. The cash flow estimation for the first four years of the new product line – the rifle safes

| | Years | | | |
|---|---|---|---|---|
| | 1 | 2 | 3 | 4 |
| **Units** | 650 | 1 590 | 1 320 | 1 400 |
| | R | R | R | R |
| Turnover (units x R2 700) | 1 755 000 | 4 293 000 | 3 564 000 | 3 780 000 |
| Cash gross profit (units x R1 350) | 877 500 | 2 146 500 | 1 782 000 | 1 890 000 |
| Increase in current rifle sales | 70 000 | 70 000 | 70 000 | 70 000 |
| Selling expenses | (180 000) | (180 000) | (180 000) | (180 000) |
| Depreciation (non-cash flow) | – | – | – | – |
| General overhead (3% x turnover) | (52 650) | (128 790) | (106 920) | (113 400) |
| Net cash income before tax | 714 850 | 1 907 710 | 1 565 080 | 1 666 600 |
| Taxation paid ② | (92 358) | (506 159) | (410 222) | (438 648) |
| Working capital (R220 000 – R80 000) | 140 000 | – | – | – |
| Net cash flow | 762 492 | 1 400 551 | 1 154 858 | 1 227 952 |

| ②**Taxation calculation:** | Years | | | |
|---|---|---|---|---|
| | 1 | 2 | 3 | 4 |
| | R | R | R | R |
| Net cash income before tax | 714 850 | 1 907 710 | 1 565 080 | 1 666 600 |
| Start-up operating costs (from a. ①) | (285 000) | – | – | – |
| Wear and tear (R500 000 x 20%) | (100 000) | (100 000) | (100 000) | (100 000) |
| Total taxable income | 329 850 | 1 807 710 | 1 465 080 | 1 566 600 |
| Taxation at 28% | (92 358) | (506 159) | (410 222) | (438 648) |

## NOTE

The R85 000 that was spent on the new SABS approved design, is not taken into account in the relevant cash flow estimation. It is a **sunk cost**, as the cost occurred in the past and is irrelevant whether the new rifle safe opportunity was accepted or not. Only future

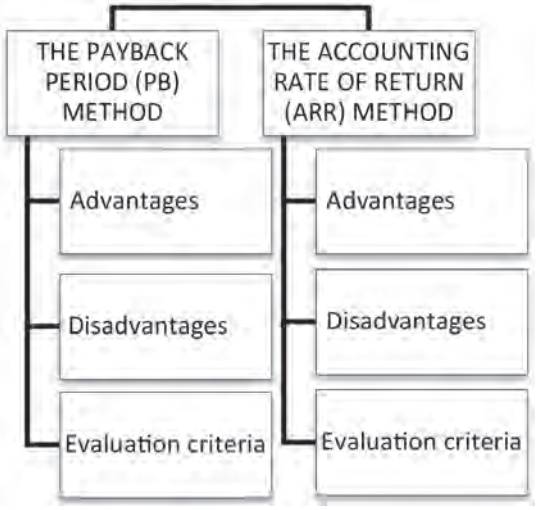
cash flows that depend on the decision to go ahead should be included in the cash flow estimation.

Also note that there are no **financing costs** deducted as it is included in WACC when the NPV and IRR techniques are applied.

STUDY UNIT 20

# Traditional methods/techniques

**In this study unit**




## 1 Introduction

In the previous study unit, we discussed the importance of capital budgeting. Two different capital budgeting techniques namely traditional and discounted cash flow were identified. This study unit provides an illustration of the underlying principles involved in the evaluation of capital assets/projects by virtue of examples that cover the traditional methods/techniques for evaluating capital investments. These include the payback period- and the accounting rate of return methods.

## 2 The payback period (PB) method

**PAYBACK PERIOD**

The period of time required to recoup the total capital amount invested through the cash generation from the project.

In other words, it calculates the time it takes the **cash inflows** from a capital project to equal the **cash outflows, that is, to break even**.

A long payback period means capital is tied up for a long time, which increases business risk (the longer the time horizon, the greater the uncertainty regarding cash flows and the business environment). Organisations use this method to set a maximum payback time, above which investments are no longer acceptable. The calculated payback period of a project is therefore compared with the target period that is set by management.

This method is based on simplicity and is very popular in practice. It is a very crude measure though, and should be used in conjunction with other methods.

**Key formula: PAYBACK PERIOD**

$$PB = \text{Years } \textbf{before} \text{ break-even year} + \frac{\text{Remaining cost to recover}}{\text{Cash flow during the break-even year}}$$

Where:

| | | |
|---|---|---|
| Years before break-even year | = | number of years that the cumulative cash outlay is still negative |
| Remaining cost to cover | = | capital outlay (investment) less cash recovered in years before the break-even year or cumulative negative cash outlay at the start of the break-even year |
| Cash flow during the break-even year | = | cash flow during the year in which break-even takes place |
| Cash flows | = | operational cash flows AFTER tax |

| **Example:** | | **Periodic cash flow** | **Cumulative (unrecovered cash outlay) or excess cash inflow** | |
|---|---|---|---|---|
| Outlay (investment) | = | R(10) m | R(10) m | |
| After tax cash inflow year 1 | = | R2 m | R(8) m | |
| After tax cash inflow year 2 | = | R3 m | R(5) m | Last year that cumulative outlay is still negative |
| After tax cash inflow year 3 | = | R6 m | R1 | Break-even occurs somewhere in this year |
| After tax cash inflow year 4 | = | R2 m | R3 | |

$$PB = \text{Years } \textbf{before} \text{ cost recovery} + \frac{\text{Remaining cost to recover}}{\text{Cash flow during the year}}$$

$= 2 + (5 \div 6)$

$= 2{,}8333$ years

## 2.1 Advantages

- The method involves a simple calculation.
- Acceptance or rejection of the project can be made easily.
- It is biased towards short-term projects and liquidity and favours investments that free up cash for other uses more quickly.
- It is a good method for evaluating high risk projects. The longer it takes to recover the initial investment, the higher the risk of the project. It thereby potentially eliminates the uncertainty of later years' cash flows.

## 2.2 Disadvantages

- The method does not recognise the importance of time value of money.
- It does not recognise patterns of cash flows.
- It does not take risk explicitly into account.
- It ignores cash flows after the payback period (break-even). It therefore ignores the need to make profits from a project.
- The target payback period is subjectively set by management.

## 2.3 Evaluation criteria

The acceptance or rejection of the project is based on the cash flow generation of a project. After your calculation of the payback period, you can evaluate the project as follows:

- If the payback period is shorter than the target payback period (as set by management), the project should be considered for funding.
- If the payback period is longer than the target payback period (as set by management), the project should be rejected.
- If projects are mutually exclusive, the project with the shortest payback period should be considered for funding, but the target payback period should still be taken into consideration.

Based on the disadvantages listed above, it is therefore recommended that this method be used in conjunction with other methods before final decisions are made.

### Activity 20.1

A business has to choose between two machines, Sip and Huk:

- Sip has a cost of R100 000 and will give a net cash flow saving in operating cost after tax of R25 000 per annum for five (5) years.
- Huk has a cost of R110 000 and will give a net cash flow saving in operating cost after tax of R26 000 per annum for five (5) years.
- Depreciation amounts to R20 000 for Sip and R22 000 for Huk per annum, but it has not been included in determining the cost saving as it does not constitute cash flow.

**REQUIRED**

a. Calculate the payback periods for both Sip and Huk.
b. Which machine should be chosen if we use this method in isolation? Why?
c. If management has set a target payback period of four (4) years, which machine should be rejected?

### Feedback on activity 20.1

a. The payback periods for both Sip and Huk:

$$\text{PB} = \text{Years } \textbf{before} \text{ break-even year} + \frac{\text{Remaining cost to recover}}{\text{Cash flow during the break-even year}}$$

$$\text{Sip: Payback period} = \frac{\text{R100 000}}{\text{R25 000}}$$

$$= 4 \text{ years}$$

$$\text{PB} = \text{Years } \textbf{before} \text{ break-even year} + \frac{\text{Remaining cost to recover}}{\text{Cash flow during the break-even year}}$$

$$\text{Huk: Payback period} = \frac{\text{R110 000}}{\text{R26 000}}$$

$$= 4{,}23 \text{ years}$$

**NOTE**

This is an alternative method to calculate the payback period where we have **equal cash inflows per year**! The annual cash inflows are treated as an annuity. We therefore do not need to calculate the cumulative unrecovered cash outlay for each year.

Proof for Huk:

| | | R'000 | Cumulative (unrecovered cash outlay) or excess cash inflow | |
|---|---|---|---|---|
| Outlay (investment) | = | R110 | R(110) | |
| Cash inflow year 1 | = | R26 | R(84) | |
| Cash inflow year 2 | = | R26 | R(58) | |
| Cash inflow year 3 | = | R26 | R(32) | |
| Cash inflow year 4 | = | R26 | R(6) | Last year that cumulative outlay is still negative |
| Cash inflow year 5 | = | R26 | R20 | Break-even occurs somewhere in this year |

$$PB = \text{Years before cost recovery} + \frac{\text{Remaining cost to recover}}{\text{Cash flow during the year}}$$

$$= 4 + \frac{6}{26}$$

= 4,2308 years

b. The payback period of Sip and Huk should be compared. The payback period of Sip is shorter than that of Huk. Therefore, machine Sip should be chosen.

c. Machine Huk should be rejected as its payback period is longer than the target of four (4) years.

## 3 The accounting rate of return (ARR) method

**ACCOUNTING RATE OF RETURN (ARR)**

This is based on an investment's (project's) **average net PROFIT after tax** (not cash flow), divided by its **average book value**. It is also called the average rate of return on investment/capital (ROI or ROC) method.

The accounting rate of return method calculates the average rate of return generated by the investment over its useful life (life span). If this return exceeds a target rate of return (set by management), the investment project should be undertaken.

**Key formula: ACCOUNTING RATE OF RETURN (ARR)**

$$ARR = \frac{\text{Average net profit after taxation}}{\text{Average investment}} \times \frac{100}{1}$$

Where:

Average net profit after taxation = the average annual profit after taxation for the whole period (life of the project/asset)

Average investment = the average of the original investment cost (outlay) and any residual value at the end of its useful life (usually Rnil). (*This is equal to the cost of the investment ÷ 2 if depreciation is levied on the straight-line basis!)*

**Example:**

Outlay (investment) = R10 m Depreciated straight-line over 4 years, no residual value

| | | | **Annual profit (loss) after depreciation charged** |
|---|---|---|---|
| After tax cash inflow year 1 | = | R2 m | R(0,5) m |
| After tax cash inflow year 2 | = | R3 m | R0,5 m |
| After tax cash inflow year 3 | = | R6 m | R3,5 |
| After tax cash inflow year 4 | = | R2 m | R(0,5) |
| Total over 4 years | = | | R3 m |
| Average over 4 years | = | | R0,75 m |
| Average investment (R10 m ÷ 2) | | | R5 m |

$$\text{ARR} = \frac{\text{Average net profit after taxation}}{\text{Average investment}} \times \frac{100}{1}$$

$$= \frac{\text{R0,75}}{\text{R5 m}} \times \frac{100}{1}$$

$$= 15\%$$

## NOTE

The average investment can also be calculated as the average of the book values over the life of the asset:

Outlay (investment) = R10 m Depreciated over 4 years, no residual value

| | **Book value** | | **Average book value** | | |
|---|---|---|---|---|---|
| End of year 1 | = | R7,5 m | R8,75 m | = | (10 + 7,5) ÷ 2 |
| End of year 2 | = | R5 m | R6,25 m | = | (7,5 + 5) ÷ 2 |
| End of year 3 | = | R2,5 m | R3,75 m | = | (5 + 2,5) ÷ 2 |
| End of year 4 | = | R0 m | R1,25 m | = | (2,5 + 0) ÷ 2 |
| Total over 4 years | = | | R20 m | | |
| | | | ÷ 4 | | |
| Average book value over 4 years | | | = R5 m or | = | R10 m ÷ 2 |

Where assets are **not depreciated on the straight-line basis**, OR the **residual value is significant**, you should rather determine the average investment based on the **average book values** and not on the investment divided by two! The reason is that there is not a gradual decline (to Rnil) in the book value over the useful life.

## 3.1 Advantages

- It is very simple to understand and use.
- It provides a better means of comparison of projects than the payback period method, because it takes into account the saving over the entire economic life of the project.
- It can readily be calculated by using the accounting data.
- A rate is always easy to interpret.

## 3.2 Disadvantages

- It ignores cash flows.
- It ignores time value of money.
- It ignores risk.
- It ignores the fact that the profits earned can be reinvested.
- It does not consider the length of life of the projects.
- The target rate of return is set subjectively by management.

**NOTE**

Where managers' performance are measured based on return on investment (ROI), the timing of the profits (how much is generated in which year) can have an impact on whether a project that should be accepted, based on the average ARR, is accepted or not. You will learn more about this in MAC3701 in Performance Management.

## 3.3 Evaluation criteria

After your calculation of the ARR, you can evaluate the project as follows:

- If the ARR of the project exceeds the target rate (as set by management), the project should be considered for funding.
- If the ARR of the project is lower than the target rate (as set by management), the project should be rejected.
- If projects are mutually exclusive, the project with the highest ARR should be considered for funding, but the target rate should still be taken into consideration.

Based on the disadvantages listed above, it is therefore recommended that this method be used in conjunction with other methods before final decisions are made.

### Activity 20.2

Use the same information as in activity 20.1 before.

**REQUIRED**

a. Calculate the ARR for both Sip and Huk.
b. Which machine should be chosen? Why?
c. If management has set a target rate of 10%, which machine should be rejected?

**Feedback on activity 20.2**

a. The ARR for both Sip and Huk:

$$\text{Sip: ARR} = \frac{\text{Average net profit after taxation}}{\text{Average book value}} \times \frac{100}{1}$$

$$= \frac{(\text{R25 000} - \text{R20 000})}{(\text{R100 000} + 0) \div 2} \times \frac{100}{1}$$

$$= \frac{\text{R5 000}^{(1)}}{\text{R50 000}^{(2)}} \times \frac{100}{1}$$

$$= 10\%$$

$$\text{Huk: ARR} = \frac{\text{Average net profit after taxation}}{\text{Average book value}} \times \frac{100}{1}$$

$$= \frac{(\text{R26 000} - \text{R22 000})}{(\text{R110 000} + 0) \div 2} \times \frac{100}{1}$$

$$= \frac{\text{R4 000}}{\text{R50 000}^{(2)}} \times \frac{100}{1}$$

$$= 7{,}27\%$$

(1) The average annual profit is brought about by the net saving in after tax cost, which is calculated at R5 000 per annum for machine Sip and R4 000 per annum for machine Huk (the cash flow figures provided in activity 20.1 were before depreciation, but already after taxation).

(2) As depreciation is calculated on the straight-line basis, we can use the short-cut and divide the investment amount by two.

b. The ARR of Sip and Huk should be compared. The ARR of Sip is higher than that of Huk. Therefore, machine Sip should be chosen (in the absence of other methods).

c. Machine Huk should be rejected as its ARR is lower than the target rate of 10%.

## 4 Summary

In this study unit, we discussed traditional techniques used in capital budgeting. Advantages, disadvantages and evaluation criteria of the payback period method and the accounting rate of return method were explained. We illustrated these techniques in the calculations of different activities.

In the next study unit, we shall proceed with the illustration of discounted cash flow techniques used in capital budgeting.

## Self-assessment activity

After having worked through this study unit, you should be able to **discuss** the following:

a. the advantages, disadvantages and evaluation criteria of the payback period method
b. the advantages, disadvantages and evaluation criteria of the ARR method

The next question will assess your skills in calculating the payback period and the use of the ARR method.

**QUESTION 1**

A project requires a cash outlay of R200 000 and generates cash flow savings in operating cost after tax of R80 000, R70 000, R40 000 and R30 000 during the next four years. Depreciation of R50 000 per year has not been deducted from the operating cash flow after tax figures as it is a non-cash item.

**REQUIRED**

a. What is the project's payback period?
b. What is the accounting rate of return (ARR) for the project?

## Feedback on self-assessment activity

**QUESTION 1**

a. The project's payback period:

Payback period = 1 year : R200 000 – R80 000 = R120 000
= 2 years: R120 000 – R70 000 = R50 000
= 3 years: R50 000 – R40 000 = R10 000
= 3 years and (R10 000 ÷ R30 000) x 12 months
= 3 years and 4 months

b. The accounting rate of return (ARR) for the project:

$$ARR = \frac{\text{Average net profit after taxation}}{\text{Average book value}} \times \frac{100}{1}$$

$$= \frac{(R55\,000 - R50\,000)}{(R200\,000 - 0) \div 2} \times \frac{100}{1}$$

$$= \frac{R5\,000^{(1)}}{R100\,000} \times \frac{100}{1}$$

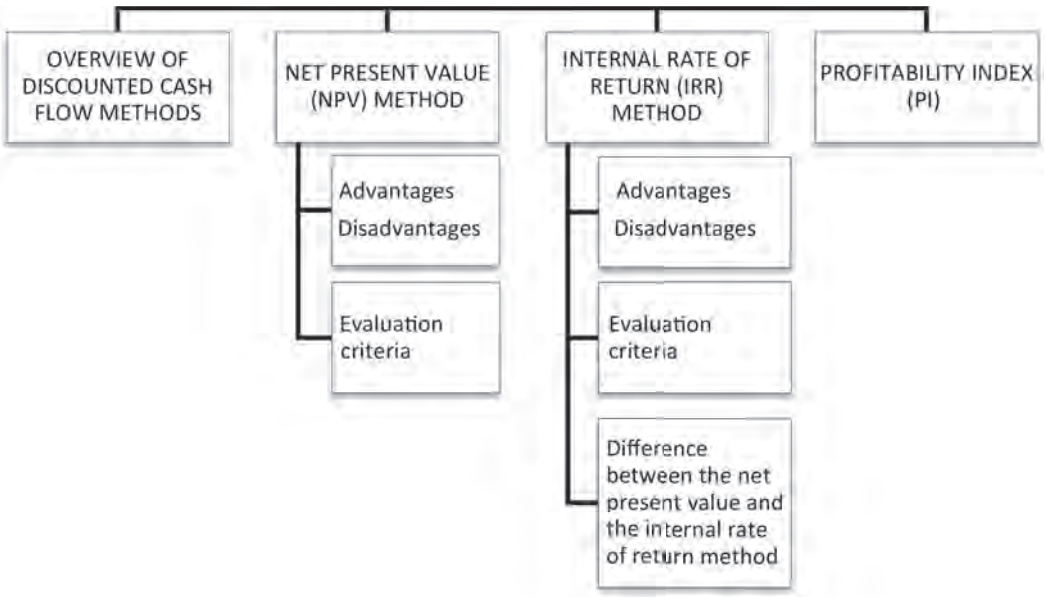
$$= 5\%$$

(1) Average operating cash flow after tax for 4 years
= (R80 000 + R70 000 + R40 000 + R30 000) ÷ 4
= R55 000

STUDY UNIT 21

# Discounted cash flow methods/techniques

**In this study unit**




## 1 Introduction

In the previous study unit, traditional techniques used in capital budgeting were discussed and illustrated. This study unit provides a further illustration of the underlying principles involved in the evaluation of capital assets/projects by virtue of examples that cover the discounted cash flow methods/techniques for evaluating capital investments. These include the net present value, internal rate of return and profitability index methods/techniques.

## 2 Overview of discounted cash flow methods

These methods factor in the **timing** of cash flows and it considers cash flows after the payback period (ie **all the cash flows over the life** of the investment or project) and are an improvement on the traditional methods such as payback period and accounting rate of return.

The presence of time as a factor in investment decision-making is fundamental because the real value of money fluctuates over a period of time. A total of R40 000 received today has more value than R40 000 received in five year's time (refer to topic 3). In evaluating investment projects, it is therefore important to consider the timing of returns on investment.

We will now discuss each of the three methods in more detail.

## 3 Net present value (NPV) method

**NET PRESENT VALUE**

Net result of future periodic net after tax cash flows discounted to present value, using an appropriate rate, and the present value of the capital invested in the project.

The net present value method is a discounted cash flow (DCF) method because it takes cash flows and time value of money into account. It is considered as the best method of evaluating capital investment proposals and it is widely used in practice.

**Key formula: NET PRESENT VALUE**

$$NPV=\left[\sum_{t=1}^{n}\frac{C_t}{(1+k)^t}\right]-I$$

Where:

n = number of periods (life of the project)

t = specific period

k = discount rate (= WACC ± risk adjustment, if any)

$C_t$ = net cash flow for period t

I = initial capital investment at period 0 (note, this is not a figure "1", but "I" for "Investment")

The NPV method involves the following steps which are represented in the formula above:

1. Determine and calculate the net cash flows PER PERIOD for the entire life of the investment/project/asset. This is $C_t$ in the formula.
2. Discounting each of the net cash flows by an appropriate discount factor (refer to study unit 19, section 9 and topic 5 – capital structure and cost of capital). This is the denominator $(1 + k)^t$ in the above formula.
3. Add together the discounted cash flows for each period (the present values) 1 to t. This is the $\sum$ in the formula.
4. The net value (NPV) is derived by subtracting the amount invested at point 0 (this is the I in the formula) from the total present values of all the project generated cash flows, calculated in step 3.

In applying this method, an acceptable discount factor (or required rate of return), normally based on the weighted average cost of capital (WACC) (refer to topic 5), is calculated. It is this percentage at which the cash flows are discounted to obtain a net present value. The NPV's of each project will be used for measurement against the accept or reject criteria.

### 3.1 Advantages

- This method recognises the time value of money.
- It considers the cash inflow of the entire project.
- The discount rate can be adjusted to take account of the riskiness of the investment/project.
- It assumes that surplus cash inflows can be reinvested at the WACC.

### 3.2 Disadvantages

- The concept of WACC is difficult to understand.

- The calculation of the WACC is complex and subject to interpretation.
- The risk premium/discount that is added to the WACC can be manipulated by management.
- The result of the discounted cash flows is a rand amount, rather than a rate (%), which makes it more difficult to interpret.

## 3.3 Evaluation criteria

Determine **what** has to be decided on. This could be, inter alia:

- whether a single project is to be undertaken or not (compare cash cost with cash advantages)
- a choice between alternative projects (compare equivalent periodic cash advantages with each other)
- to decide whether capital must be invested to obtain a saving in operating costs (compare the cash costs before investment with cash costs after investment)

The cash flows pertaining to each project must be included in a time schedule or time statement and a net cash flow per period must be determined. The NPV can be calculated using the formula for present value, the factor tables or a financial calculator. (These methods were discussed and explained in topic 3 – time value of money.)

After your calculation of the NPV, you can evaluate the project as follows:

- If the NPV is **positive (exceeds 0)**, the project may be accepted.
- Should the NPV be **negative (lower than 0)**, the project must be rejected.
- A NPV of **nil**, where the present values of the cash inflows and cash outflows are equal, means that the project may still be accepted and the internal rate of return (IRR) has been achieved.
- If the projects are mutually exclusive, the project with the highest positive (exceeds 0) NPV may be accepted.

We will now demonstrate the application of this method with the next two activities.

### Activity 21.1 – Projects Yum, Tum and Pun

An organisation should choose between three projects namely Yum, Tum and Pun. The cost of each of these projects are R100 000 and they are mutually exclusive. Assume a required rate of return on capital of 14%.

The net cash inflow from operations after tax for each project is as follows:

| | Project | | |
|---|---|---|---|
| Year | Yum | Tum | Pun |
| | R | R | R |
| 1 | 50 000 | 60 000 | 20 000 |
| 2 | 50 000 | 50 000 | 40 000 |
| 3 | 25 000 | 40 000 | 80 000 |

**REQUIRED**

a. Evaluate the above three projects by calculating their NPV as follows:

   i. Project Yum by using the factors from the tables and combining years with the same cash flows.

   ii. Project Tum by using the factors from the tables and a financial calculator.

   iii. Project Pun by using the factors from the tables and Microsoft Excel.

b. Conclude on what project should be accepted.

## Feedback on activity 21.1

**a. i. Project Yum by using the factors from the tables and NOT combining years:**

| | Years | | | |
|---|---|---|---|---|
| | 0 | 1 | 2 | 3 |
| | R | R | R | R |
| Capital outlay (cash outflow) | (100 000) | – | – | – |
| Net cash inflow from operations | – | 50 000 | 50 000 | 25 000 |
| Net cash inflow/(outflow) | (100 000) | 50 000 | 50 000 | 25 000 |
| PV factor of R1 at 14% p.a. (Table A) | 1,000 | 0,877 | 0,769 | 0,675 |
| Present values | (100 000) | 43 850 | 38 450 | 16 875 |
| NPV | | (825) | | |

**Combining of years**

Where the cash flows of more than one year are identical, they may be combined in one column to save time and space. These cash flows are treated as an **annuity** (refer to topic 3 – time value of money). The PV factor that is used then is from Table B which is a present value (PV) of cash flow per annum. By using Table B, the cash flow is projected for multiple years, as illustrated below.

**Project Yum (years of identical cash flow COMBINED)**

| | Years | | |
|---|---|---|---|
| | 0 | 1 – 2 | 3 |
| | R | R | R |
| Capital outlay (cash outflow) | (100 000) | – | – |
| Net cash inflow from operations | – | 50 000 | 25 000 |
| Net cash inflow/(outflow) | (100 000) | 50 000 | 25 000 |
| PV factor of R1 at 14% p.a. (Table A) | 1,000 | 1,646① | 0,675 |
| Present values | (100 000) | 82 300 | 16 875 |
| NPV | | (825) | |

**NOTE**

Please note that the cash flow **for one year is indicated in the column, and not the cash flow per year multiplied by the number of years.**

**Calculation:**

① **Factor**

| | |
|---|---|
| Year 1: Table A at 14%, year 1 | 0,877 |
| Year 2: Table A at 14%, year 2 | 0,769 |
| Years 1 to 2 | 1,646 |

OR

Year 1 – 2: Table B at 14%, 2 years = 1,647

The difference is due to rounding and can be ignored.

**a. ii. Project Tum by using the factors from the tables and a financial calculator:**

| | Years | | | |
|---|---|---|---|---|
| | 0 | 1 | 2 | 3 |
| | R | R | R | R |
| Capital outlay (cash outflow) | (100 000) | – | – | – |
| Net cash inflow from operations | – | 60 000 | 50 000 | 40 000 |
| Net cash inflow/(outflow) | (100 000) | 60 000 | 50 000 | 40 000 |
| PV factor of R1 at 14% p.a. (Table A) | 1,000 | 0,877 | 0,769 | 0,675 |
| Present values | (100 000) | 52 620 | 38 450 | 27 000 |
| NPV | | 18 070 | | |

**Financial calculator**

In order to use your financial calculator, read the manual, as each calculator has its own specific way of working. The following steps have been demonstrated for a Sharp and HP financial calculator:

| SHARP EL-738 | | Hp10BII | |
|---|---|---|---|
| Key in: | Display will read: | Key in: | Display will read: |
| **Clear all registers first:** | | 2ndF C ALL | 1 P_Yr then 0.0000 |
| CFi 2ndF CA | 0.0000 | 3rdF C MEM 0 | c FLo clr then 0.0000 |
| | | 2ndF 1 I/YR | 1.0000 |
| **Enter data sets:** | | | |
| +/– 100 000 ENT | DATA SET:CF 0.0000 | 100000+/– $CF_j$ | CFLO/CF-100,000.0000 |
| 60 000 ENT | DATA SET:CF 1.0000 | 60000 $CF_j$ | CFLO/CF 60,000.0000 |
| 50 000 ENT | DATA SET:CF 2.0000 | 50000 $CF_j$ | CFLO/CF 50,000.0000 |
| 40 000 ENT | DATA SET:CF 3.0000 | 40000 $CF_i$ | CFLO/CF 40,000.0000 |
| **Clear cash flow registers:** | | | |
| ON/C | 0.0000 | | |
| 2ndF CASH | RATE (I/Y) = | | |
| 2ndF CA | RATE (I/Y) = 0.0000 | | |
| **Enter rate:** | | | |
| (I/Y) 14 ENT | RATE (I/Y)= 14.0000 | 14 I/YR | 14.0000 |
| **Use arrows to get to NPV and press COMP** | NET_PV = 0.0000<br>18'103.8160 | 2ndF NPV | 18 103.8160 |

Thus, the net present value is R18 104 (rounded to the nearest rand) according to the financial calculator and is R18 070 according to the method using the factors from the tables. The difference of R34 is due to the fact that the factors in the tables are rounded off.

**a. iii. Project Pun by using the factors from the tables and Microsoft Excel:**

| | Years | | | |
|---|---|---|---|---|
| | 0 | 1 | 2 | 3 |
| | R | R | R | R |
| Capital outlay (cash outflow) | (100 000) | – | – | – |
| Net cash inflow from operations | – | 20 000 | 40 000 | 80 000 |
| Net cash inflow/(outflow) | (100 000) | 20 000 | 40 000 | 80 000 |
| PV factor of R1 at 14% p.a. (Table A) | 1,000 | 0,877 | 0,769 | 0,675 |
| Present values | (100 000) | 17 540 | 30 760 | 54 000 |
| NPV | | 2 300 | | |

**Using Microsoft Excel:**

Net present value problems can also be solved by using a spread sheet program. The spread sheet is designed to keep track of all the cash flows and the periods in which they occur. The following spread sheet setup shows how to calculate the NPV for project Pun.

| | A | B | C | D | E |
|---|---|---|---|---|---|
| 1 | | | | | |
| 2 | | Net Present Value Calculations | | | |
| 3 | | | | | |
| 4 | | Year | | Cash flows in Rand | |
| 5 | | 0 | | (100 000) | |
| 6 | | 1 | | 20 000 | |
| 7 | | 2 | | 40 000 | |
| 8 | | 3 | | 80 000 | |
| 9 | | | | | |
| 10 | | WACC | | 0.14 | |
| 11 | | | | | |
| 12 | | **NPV** | | **2 320** | |
| 13 | | | | | |
| 14 | | Formula used: | | =NPV(D10,D6:D8)+D5 | |
| 15 | | | | and rounded to the | |
| 16 | | | | nearest Rand | |
| 17 | | | | | |

**NOTE**

Notice that the preset NPV formula (***in Excel, not your financial calculator***) only determines the net present values of the cash flows in all other years, excluding period 0! Therefore, you should only enter the cash flows in years 1 to 3, along with the discount rate. You then add/deduct the cash flow in year 0 to the total of the NPV formula calculation to arrive at the NPV for the investment.

*Remember to keep track of signs. Cash outflows are negative and cash inflows are positive.*

Thus, the net present value is R2 320 according to Microsoft Excel and is R2 300 according to the method using the factors from the tables. The difference of R20 is due to the fact that the factors in the tables are rounded off.

**b. Conclusion**

An overview of the three projects, bearing in mind the project cost of R100 000 each, reflects that project **Yum** has a negative net present value (cash inflow). It does not meet the 14% return which is required and will not provide for the return of the capital invested and the required interest thereon.

Project **Tum** has a positive net present value of R18 070, which indicates that its return substantially exceeds the required 14% per annum. In the next section, we will revisit how to calculate the internal rate of return (which you encountered in topic 5 – capital structure and cost of capital).

Project **Pun** with a positive net present value of R2 300, indicates that its internal rate of return is also in excess of 14% per annum.

Project Yum cannot be recommended, whilst projects Tum and Pun are both acceptable, with Tum being preferred as it has the highest NPV.

Where the amounts to be invested differ, the most profitable project is that for which the ratio of income to investment is the highest. You will learn how to calculate this in the section on the profitability index.

Where sufficient funds are available for investment in both projects and they are divisible projects, the maximum amount should be invested in Tum and the balance in project Pun.

## NOTE

Qualitative issues as discussed in topics 1 and 2 should also be considered when making the final investment decision. These issues include the consideration of other stakeholders as well as non-financial aspects such as environmental, social and governance in order to ensure the long-term sustainability of the organisation. It is no longer acceptable to make decisions based on financial impact alone.

## Self-assessment activity

Abrey Ltd is considering the replacement of its machine Adro, which is currently in use, with a new machine, Bedro.

The following information regarding the two machines is available:

| | Machine | |
|---|---|---|
| | **Adro** | **Bedro** |
| | **R** | **R** |
| Cost price | 49 000 | 56 000 |
| Book value – Current | 28 000 | – |
| Tax value – Current | 12 250 | – |
| Market value – Current | 10 000 | – |
| Useful life: | | |
| – Original | 7 years | 4 years |
| – Remaining | 4 years | – |
| Estimated costs: | | |
| – Direct material (per unit) | 100 cents | 100 cents |
| – Annual fixed costs (including depreciation) | R25 000 | R52 000 |
| – Annual variable conversion costs (based on annual production) | R25 000 | R36 000 |
| Annual production: | | |
| – Maximum production (units) | 25 000 | 45 000 |
| – Maximum sales (units) | 40 000 | 40 000 |
| – Selling price (per unit) | 500 cents | 500 cents |
| Annual wear and tear allowance for taxation purposes (R49 000 ÷ 4) (R56 000 ÷ 4) | R12 250 | R14 000 |
| Annual depreciation (R49 000 ÷ 7) (R56 000 ÷ 4) | R 7 000 | R14 000 |

**Additional information:**

1. The annual production for Bedro will be limited to the maximum number of units that can be sold annually, whilst the production for Adro, should it be retained, will be limited to the maximum annual production.
2. The rate of taxation is 28% and VAT can be ignored.
3. Management requires a return of 12% on capital projects.
4. Assume that all cash flows, except initial capital outlays which occur at the beginning of the year, occur at the end of the year concerned.

**REQUIRED**

Determine whether machine Adro should be replaced by machine Bedro. Execute your calculations to the nearest rand, and round off all your factors to three decimal places.

## Feedback on self-assessment activity – Abrey Limited

**Option 1 – Retain existing Adro**

| | Years | | |
|---|---|---|---|
| | 0 | 1 | 2–4 |
| | **R** | **R** | **R** |
| Opportunity cost – current market value forfeited | (10 000) | – | – |
| Sales (25 000 x R5) | – | 125 000 | 125 000 |
| Material costs (25 000 x R1) | – | (25 000) | (25 000) |
| Fixed costs (R25 000 – R7 000) | – | (18 000) | (18 000) |
| Variable costs | – | (25 000) | (25 000) |
| Taxation② | – | (13 160) | (15 960) |
| Net cash inflow/(outflow) | (10 000) | 43 840 | 41 040 |
| Factor at 12%③ | 1,000 | 0,893 | 2,144③ |
| Present values | (10 000) | 39 149 | 87 990 |
| Net present value | R117 139 | | |

## NOTE

In years where the cash flows FOR ALL LINE ITEMS ARE CONSTANT/IDENTICAL, we treat the net cash flows as an annuity in order to save time! See calculation ③.

As Adro is an older machine, its output is limited to 25 000 units, even though the market can take 40 000 units. Remember to always base your calculations on the lowest number of units that can physically be manufactured or that which can be sold!

**Calculations:**

① **Tax disadvantage as a result of not selling Adro at the beginning of year 4 (= year 1 of the capital budget)**

| | R |
|---|---|
| Current market value (proceeds) | 10 000 |
| Current tax value (end of year 3) | 12 250 |
| Scrapping allowance forfeited | 2 250 |

## NOTE

The present market value of Adro together with the forfeiture of the tax saving which would have resulted from the scrapping allowance is the "cost"/price of retaining the Adro machine. This is the cash flow which is forfeited by retaining the machine, in other words, an opportunity cost. The tax effect is still considered as a year-end cash flow and is taken into account in year 1.

The question indicated that there are four years left. Therefore, the book and tax values provided for machine Adro is at the end of year 3. The potential sale could have taken place at the beginning of year 4. We therefore calculate the opportunity cost based on the values and proceeds as at the end of year 3.

② **Taxation**

| | Years | |
|---|---|---|
| | 1 | 2–4 |
| | **R** | **R** |
| Sales | 125 000 | 125 000 |
| Material costs | (25 000) | (25 000) |
| Fixed costs | (18 000) | (18 000) |
| Variable costs | (25 000) | (25 000) |
| Wear and tear[4] | (12 250) | – |
| Scrapping allowance forfeited | 2 250 | – |
| Taxable amount | 47 000 | 57 000 |
| Taxation at 28% | (13 160) | (15 960) |

③ **Factor – Years 2–4**

| | | |
|---|---|---|
| Years 1–4: | Table B at 12%, year 4 | 3,037 |
| Minus: Year 1: | Table A at 12%, year 1 | (0,893) |
| = Years 2–4 | | 2,144 |

**OR**

| | |
|---|---|
| Per Table A (Year 2) | 0,797 |
| (Year 3) | 0,712 |
| (Year 4) | 0,636 |
| | 2,145 |

The difference is due to the factors being rounded off in the tables.

④ Note that the tax value of Adro is R12 250 at the time of the decision (= end of year 3). The annual wear and tear allowance is given as R12 250, therefore the wear and tear allowance may only be claimed for one remaining year (the fourth year), where after the asset would have been written off fully for tax purposes. NO wear and tear allowance can therefore be claimed in years 5–7 in the life of the asset (or years 2–4 for the capital budget)!

**Option 2: Acquire new Bedro**

| | Years | |
|---|---|---|
| | 0 | 1–4 |
| | **R** | **R** |
| Cost price | (56 000) | – |
| Sales (40 000 x R5) | – | 200 000 |
| Material costs (40 000 x R1) | – | (40 000) |
| Fixed costs (R52 000 – R14 000) | – | (38 000) |
| Variable costs | – | (36 000) |
| Taxation ⑤ | – | (20 160) |
| Net cash inflow/(outflow) | (56 000) | 65 840 |
| Factor at 12% (Table B) | 1,000 | 3,037 |
| Present values | (56 000) | 199 956 |
| Net present value | R143 956 | |

## NOTE

As Bedro is a new machine, its potential output of 45 000 units is higher than the 40 000 units that the market can take. Remember to always base your calculations on the lowest number of units that can physically be manufactured or that which can be sold!

**Calculations:**

⑤ **Taxation**

| | Years 1–4 |
|---|---|
| | **R** |
| Sales | 200 000 |
| Material costs | (40 000) |
| Fixed costs | (38 000) |
| Variable costs | (36 000) |
| Wear and tear | (14 000) |
| Taxable income | 72 000 |
| Taxation at 28% | (20 160) |

**NOTE**

The market value of Adro and the tax effect thereon cannot be treated as a cash inflow for Bedro. The new machine (Bedro) must be considered in isolation as the two options are mutually exclusive projects: either we keep the existing machine, or we buy a new machine. Bedro should achieve a positive NPV on its own, without including cash flows from Adro.

**Recommendation:**

Adro should be replaced with Bedro as it renders a higher positive net present value.

**NOTE**

Qualitative issues as discussed in topics 1 and 2 should also be considered when making the final investment decision. These issues include the consideration of other stakeholders as well as non-financial aspects such as environmental, social and governance in order to ensure the long-term sustainability of the organisation. It is no longer acceptable to make decisions based on financial impact alone.

You will have more opportunities to assess your skills with NPV calculations at the end of this study unit!

## 4 Internal rate of return (IRR) method

The internal rate of return method is also a discounted cash flow (DCF) method and requires that the actual rate of return of the project be calculated.

**INTERNAL RATE OF RETURN (IRR)**

The rate at which cash flows must be discounted so that the present value of the cash inflows equals the present value of the initial cash outflow. That is the rate at which the NPV will be equal to Rnil.

It is called the internal rate, because it depends mainly on the outlay and proceeds associated with the projects and not on any rate determined outside the investment.

**Key formula: INTERNAL RATE OF RETURN (IRR)**

$$0=\left[\sum_{t=1}^{n}\frac{C_t}{(1+r)^t}\right]-I$$

Where:

r = internal rate of return

n = number of periods (life of the project)

t = specific period

$C_t$ = net cash flow for period t

I = capital investment at period 0

**NOTE**

Note that this is based on the NPV formula. There are two differences:

1. We have pre-set the NPV to Rnil.
2. The "k" is replaced with "r" as we do not know what return will generate a NPV of Rnil. When you are instructed NOT to use a financial calculator, you will "find" the "r" by means of interpolation. Refer back to topic 3 if you are not sure how interpolation works.

## 4.1 Advantages

- This method recognises the time value of money.
- It considers the cash inflow of the entire project.
- The IRR attempts to find the maximum rate of interest at which funds invested in the project could be repaid out of the cash inflows arising from the project.
- The result of the discounted cash flows is a rate (%), which makes it easier to interpret.
- It is very popular in the business world.

## 4.2 Disadvantages

- It assumes that surplus cash inflows can be reinvested at the IRR, which is an unrealistic rate for future reinvestments.
- It may give results that are inconsistent with the NPV method, especially in the case of mutually exclusive projects.
- It can generate more than one IRR for the same project when there are inconsistent cash flows, that is net inflows followed by net losses again.

## 4.3 Evaluation criteria

The internal rate of return is the true interest rate earned on an investment over the course of its useful life (eg the discounted rate of return). Management may once again set a minimum IRR which should be exceeded. This is referred to as the hurdle rate. The hurdle rate can be set equal to the WACC plus/minus any adjustment for project specific risk.

- If the IRR exceeds the required (acceptable) rate of return or the WACC, the project may be accepted.
- Should the IRR be lower than the required (acceptable) rate of return or the WACC, the project must be rejected.
- If the projects are mutually exclusive, the project with the highest IRR and exceeding the required (acceptable) rate of return or the WACC, may be accepted.

## 4.4 Difference between the net present value and the internal rate of return method

These two methods use the same process (discounted cash flows), but sometimes result in widely different rankings, especially when the useful lives and the discounting rates of the projects differ considerably. The difference between the two methods can be summarised as follows:

i. Net present value method: This method assumes re-investment of the net cash flows at the *acceptable rate of return or the WACC*. It calculates the NPV, given the discount rate.

ii. Internal rate of return method: This method assumes re-investment of the net cash flows at the *internal rate of return*. It assumes that NPV is nil and calculates the discount rate that makes NPV nil.

**NOTE**

Unless the internal rate of return method is specifically requested, the net present value method should be used in the examination.

We will now demonstrate how to calculate the IRR in the next activity.

## Activity 21.2 – Projects Yum, Tum and Pun

Refer to the information in activity 21.1.

**REQUIRED**

a. Evaluate the above three projects by calculating their IRR's as follows:

   i. Project Yum by using a financial calculator.

   ii. Project Tum by interpolating between 25% and 26%.

   iii. Project Pun by interpolating between 15% and 16% and using Microsoft Excel.

b. Which project shoud be accepted? Explain how you reached your conclusion.

## Feedback on activity 21.2

**a i. The IRR of Project Yum by using a financial calculator:**

**Financial calculator**

In order to use your financial calculator, read the manual, as each calculator has its own specific way of working. The following has been done with a Sharp and HP financial calculator:

| SHARP EL-738 | | Hp10BII | |
|---|---|---|---|
| Key in: | Display will read: | Key in: | Display will read: |
| **Clear all registers first:** | | 2ndF C ALL | 1 P_YR then 0.0000 |
| CFi 2ndF CA | 0.0000 | 3rdF C MEM 0 | C FLo clr then 0.0000 |
| | | 2ndF 1 I/YR | |
| **Enter data sets:** | | | |
| +/- 100 000 ENT | DATA SET:CF 0.0000 | 100000+/- $CF_j$ | CFLO/CF-100,000.0000 |
| 50 000 ENT | DATA SET:CF 1.0000 | 50000 $CF_j$ | CFLO/CF 50,000.0000 |
| 50 000 ENT | DATA SET:CF 2.0000 | 50000 $CF_j$ | CFLO/CF 50,000.0000 |
| 25 000 ENT | DATA SET:CF 3.0000 | 25000 $CF_i$ | CFLO/CF 25,000.0000 |
| **Clear cash flow registers:** | | | |
| ON/C | 0.0000 | | |
| 2ndF CASH | RATE (I/Y) = | | |
| 2ndF CA | RATE (I/Y) = 0.0000 | | |
| and | | | |
| **press COMP to get the IRR** | RATE (I/Y) = 13.4765 | 2ndF IRR/YR | 13.4765 |

As regards the internal rate of return, it is clear that project Yum, with a negative NPV, will have an internal rate of return which is below 14%. The calculated IRR is 13,48% (rounded to two decimal places).

### NOTE

Let us see if a discount rate of 13,48% will indeed return a R Nil NPV.

| | Years | | | |
|---|---|---|---|---|
| | 0 | 1 | 2 | 3 |
| | **R** | **R** | **R** | **R** |
| Capital outlay (cash outflow) | (100 000) | – | – | – |
| Net cash inflow from operations | – | 50 000 | 50 000 | 25 000 |
| Net cash inflow/ (outflow) | (100 000) | 50 000 | 50 000 | 25 000 |
| PV factor of R1 at 13,48% p.a. | 1,000<br>1,000 | $1 \div (1+0{,}1348)^1$<br>0,881 | $1 \div (1+0{,}1348)^2$<br>0,777 | $1 \div (1+0{,}1348)^3$<br>0,684 |
| Present values | (100 000) | 44 050 | 38 850 | 17 100 |

NPV **Nil**

The objective is then to calculate the effective interest rate for projects Tum and Pun, that is, where the net present value of inflows = initial capital outlay:

**a ii. The IRR of Project Tum by interpolating between 25% and 26%**

Project Tum

| | Years | | | |
|---|---|---|---|---|
| | 0 | 1 | 2 | 3 |
| | **R** | **R** | **R** | **R** |
| Net cash in-/(outflow) | (100 000) | 60 000 | 50 000 | 40 000 |
| Present value factor of R1 at **25%** p.a. | 1,000 | 0,800 | 0,640 | 0,512 |
| Present values | (100 000) | 48 000 | 32 000 | 20 480 |
| NPV | 480 | | | |
| Present value factor of R1 at **26%** p.a. | 1,000 | 0,794 | 0,630 | 0,500 |
| Present values | (100 000) | 47 640 | 31 500 | 20 000 |

NPV (860)

**Interpolation**

$$25\% + \left[\frac{(R480 - R0)}{[R480 - (-R860)]} \times 1\%\right]$$

$$= 25\% + \left[\frac{R480}{R1\,340} \times 1\%\right]$$

$$= 25\% + [0{,}358 \times 1\%]$$

∴ Effective rate (IRR) = 25,36%

**a. iii. The IRR of Project Pun by interpolating between 15% and 16% and using Microsoft Excel**

Project Pun

| | Years | | | |
|---|---|---|---|---|
| | 0 | 1 | 2 | 3 |
| | **R** | **R** | **R** | **R** |
| Net cash in-/(outflow) | (100 000) | 20 000 | 40 000 | 80 000 |
| Present value factor of R1 at **15%** p.a. | 1,000 | 0,870 | 0,756 | 0,658 |
| Present values | (100 000) | 17 400 | 30 240 | 52 640 |
| NPV | 280 | | | |
| Present value factor of R1 at **16%** p.a. | 1,000 | 0,862 | 0,743 | 0,641 |
| Present values | (100 000) | 17 240 | 29 720 | 51 280 |

NPV (1 760)

**Interpolation**

$$15\% + \left[\frac{(R280 - R0)}{[R280 - (-R1\ 760)]} \times 1\%\right]$$

$$= 15\% + \left[\frac{R280}{R2\ 040} \times 1\%\right]$$

$$= 15\% + [0{,}137 \times 1\%]$$

$\therefore$ Effective rate (IRR) = 15,14%

**Using Microsoft Excel:**

Calculating the IRR can be a long process. Knowing all the cash flows and an approximate return, will allow you to use a spread sheet formula from Microsoft Excel and get an answer right away. The spread sheet below shows the setup for calculating the IRR for project Pun

| | A | B | C | D | E |
|---|---|---|---|---|---|
| 1 | | | | | |
| 2 | | Internal Rate of Return Calculations | | | |
| 3 | | | | | |
| 4 | | Year | | Cash flows in Rand | |
| 5 | | 0 | | (100 000) | |
| 6 | | 1 | | 20 000 | |
| 7 | | 2 | | 40 000 | |
| 8 | | 3 | | 80 000 | |
| 9 | | | | | |
| 10 | | WACC | | 0.14 | |
| 11 | | | | | |
| 12 | | **IRR** | | **15.12%** | |
| 13 | | | | | |
| 14 | | Formula used: | | =IRR(D5:D8,D10) | |
| 15 | | | | and rounded to two | |
| 16 | | | | decimal places | |
| 17 | | | | | |

## NOTE

Notice that, unlike the NPV formula ***(in Excel)***, the IRR formula accounts for all cash flows in ONE step, including the initial cash flow in year 0. There is no need to add the initial investment later to the formula. Also, you will need an estimated rate to calculate the IRR, for example, the WACC which will be given to you in the activities and questions. If the WACC is not given, Excel uses 10% as default from which to extrapolate!

*Remember to keep track of signs. Cash outflows are negative and cash inflows are positive.*

Thus, the IRR is 15,12% according to Microsoft Excel and is 15,14% according to the interpolation method. The difference of 0,02% is due to rounding.

**b. Conclusion**

An overview of the three projects, bearing in mind the project cost of R100 000, shows that project **Yum** has an IRR of 13,48%. It does not meet the 14% return which is required and will not provide for the return of the capital invested and the required interest thereon.

Project **Tum** has an IRR of 25,36%, which shows that its return substantially exceeds the required 14% per annum.

Project **Pun** with an IRR of 15,14%, indicates that it exceeds the 14% return which is required.

Project Yum cannot be recommended, whilst projects Tum and Pun are both acceptable, with Tum (with the highest IRR) being preferred.

In this case, the IRR method ranked the projects in the same order as the NPV method!

Where the amounts to be invested differ, the most profitable project is that of which the ratio of income to investment is the greatest. We will cover this in the next section.

Where sufficient funds are available for investment in both projects, the maximum amount should be invested in Tum and the balance in project Pun, assuming it is divisible.

**NOTE**

Qualitative issues as discussed in topics 1 and 2 should also be considered when making the final investment decision. These issues include the consideration of other stakeholders as well as non-financial aspects such as environmental, social and governance in order to ensure the long-term sustainability of the organisation. It is no longer acceptable to make decisions based on financial impact alone.

You will have more opportunities to assess your skills with IRR calculations at the end of this study unit!

## 5 Profitability index (PI)

The profitability index, or PI, method compares the present value of future cash inflows with the initial investment on a relative basis.

**PROFITABILITY INDEX**

The PI is the ratio of the present value of cash flows (PVCF) to the initial investment of the project. PI is also known as a benefit/cash ratio.

**Key formula: PROFITABILITY INDEX**

$$PI = \frac{PVCF}{\text{Initial investment}}$$

In this method, a project with a PI greater than 1 is accepted, but a project is rejected when its PI is less than 1. Note that the PI method is closely related to the NPV approach. In fact, if the net present value of a project is positive, the PI will be greater than 1. On the other hand, if the net present value is negative, the project will have a PI of less than 1.

The same conclusion is reached whether the net present value or the PI is used. In other words, if the present value of cash flows exceeds the initial investment, there is a positive net present value and a PI greater than 1, indicating that the project is acceptable.

This method is **useful to rank projects where the initial investment differs**, but the NPVs are all positive and close to each other.

## Activity 21.3

Refer to the information in activity 21.1

**REQUIRED**

Evaluate the three projects by calculating their profitability index (PI). You may use the information calculated in activity 21.2

## Feedback on activity 21.3

a. i. The PI of Project Yum:

$$PI = \frac{99\ 175}{100\ 000} = 0{,}99175$$

a. ii. The PI of Project Tum:

$$PI = \frac{118\ 070}{100\ 000} = 1{,}1807$$

a. iii. The PI of Project Pun:

$$PI = \frac{102\ 300}{100\ 000} = 1{,}0230$$

b. Conclusion

Accept project if PI > 1

Reject if PI < 1

According to the PI, Project Yum is rejected as being < 1. Project Tum's and Pun's PI's are greater than 1 and both can be accepted. As these are mutually exclusive projects, preference should be given to Project Tum with the highest PI.

**NOTE**

The cash flows in the numerator (above the line) of the fraction are the total project cash flows excluding the investment's amount! In other words, it is NOT the NPV amount, but total of net cash flows from year 1 to the end of the project!

## 6 Summary

In this study unit, we focused on discounted cash flow techniques for capital budgeting. We discussed the advantages, disadvantages and evaluation criteria of the net present value, internal rate of return, and profitability index methods. We illustrated these techniques in different approaches.

This study unit concludes the part dealing with capital investments. In the next part we will look into risk management.

### Self-assessment activity

After having worked through this study unit, you should be able to answer the following questions:

a. List the advantages, disadvantages and evaluation criteria of the NPV method.
b. List the advantages, disadvantages and evaluation criteria of the IRR method.
c. Briefly describe the differences between the NPV and IRR method.
d. Define the PI method.

The next questions will assess your skills in using discounted cash flow techniques.

**QUESTION 1 – Nkonki Limited**

Nkonki Limited operates a large fleet of delivery vehicles in order to make deliveries to its customers. A cost-benefit analysis has previously indicated that the maximum period to retain a vehicle, based on the assumption that the average vehicle would cover 30 000 kilometres a year, is five years. The asset register indicated that four vehicles are due for replacement. The accountant gathered the following information:

- The cost price of a new delivery vehicle is R360 000.
- Depreciation is calculated by taking the realisable value into account.
- It has a residual (realisable) value of R10 000 at the end of year five.
- It is estimated that the operating costs per vehicle (including depreciation) will be R170 000 for the first year and R190 000 per annum for years two to five.

Sibiya Transport, which satisfactorily serves a number of other firms in the area, has offered a similar service to the company at R220 000 per delivery vehicle, per year.

The company's required rate of return is calculated to be 15% per annum.

**REQUIRED**

Apply the net present value method and make a recommendation on whether Nkonki Limited should purchase and operate the four delivery vehicles themselves or accept Sibiya Transport's offer.

Ignore taxation and assume that management and administration costs will be the same for both alternatives. Calculate and indicate the discounting factors that you used.

**QUESTION 2 – Lex Power Limited**

The company, a manufacturer of power tools, is considering buying a new machine. They have gathered information on two possible options – machine Zin or machine Wic.

1. The following information regarding the machines is available:

| | Machine | |
|---|---|---|
| | Zin | Wic |
| | **R** | **R** |
| Cost price | 100 000 | 80 000 |
| Working capital required | 10 000 | 8 000 |
| Net operating income before tax | 25 000 | 21 100 |
| Realisable value at end of useful life | 20 000 | 18 000 |
| Useful life | 5 years | 5 years |

2. Taxation:
   - Wear and tear allowances are calculated on the straight-line method at 25% per annum, on the cost of the asset.
   - Normal income tax rate – 28%.
3. In determining net operating income, depreciation has already been taken into account. Depreciation is calculated by taking the realisable value into account.
4. Management requires a 23% after-taxation return on all capital investments.

**REQUIRED**

Determine, using the internal rate of return method, whether machine Zin or machine Wic should be purchased, by interpolating between 22% and 24%.

Assume that all cash flows occur at the end of each year, except the initial capital outlays, which occur at the beginning of year 1.

[Calculations must be rounded off to the nearest rand.]

**QUESTION 3 – Cyco Limited**

The company uses a certain machine, TS.40, in a manufacturing process. The supplier of the TS.40 has demonstrated an improved model, TS.50, to management. Management consequently approached the management accountant for an opinion in this regard.

The following information is available:

| | Machine | |
|---|---|---|
| | TS.40 | TS.50 |
| | **R** | **R** |
| Cost | 400 000 | 700 000 |
| Realisable value – end of useful life | 80 000 | 100 000 |
| – current | 200 000 | – |
| Annual net cash inflow before taxation | 95 000 | 150 000 |
| Useful life – total | 5 years | 6 years |
| – remaining | 3 years | – |

**Additional information:**

1. Wear and tear for taxation purposes is deductible at 20% per annum based on the cost of the asset by using the straight-line method.
2. The present rate of taxation 28%.
3. The company requires a 15% rate of return on investments.

**REQUIRED**

Advise management whether TS.40 should be replaced by TS.50, by using the net present value method.

[Execute your calculations to the nearest rand and round all your factors to three decimal places.]

## Feedback on self-assessment activity

**QUESTION 1 – Nkonki Limited**

**Option – Own vehicles**

| | Years | | | |
|---|---|---|---|---|
| | 0 | 1 | 2–4 | 5 |
| | **R** | **R** | **R** | **R** |
| Cost price | (360 000) | – | – | – |
| Operating costs | – | (170 000) | (190 000) | (190 000) |
| Add back – depreciation① | – | 70 000 | 70 000 | 70 000 |
| Residual (realisable) value | | – | – | 10 000 |
| Net cash outflows | (360 000) | (100 000) | (120 000) | (110 000) |
| Factor at 15% | 1,000 | $1 \div (1+0{,}15)^1$ | ② | $1 \div (1+0{,}15)^5$ |
| | 1,000 | 0,870 | 1,986 | 0,497 |
| Present values | (360 000) | (87 000) | (238 320) | (54 670) |

NPV for one vehicle (R739 990)

**Option – Sibiya Transport service**

NPV = R220 000 per annum for 5 years at 15% p.a.
= (R220 000) x 3,353③
= (R737 660)

① **Depreciation**

Value to be depreciated = original cost price less realisable value
= R360 000 – R10 000
= R350 000

Depreciation over life = R350 000 ÷ 5 years
= R70 000 per year

## NOTE

Discounted cash flow techniques only work with estimated cash flows. You therefore have to ADD BACK NON-CASH FLOW items!

② Annuity for years 2 to 4

$= [1 \div (1+ 0{,}15)^{2}] + [1 \div (1+ 0{,}15)^{3}] + [1 \div (1+ 0{,}15)^{4}]$
= 0,756 + 0,658 + 0,572
= 1,986

③ Annuity for 5 years

$= [1 \div (1+ 0{,}15)^{1}] + [②] + [1 \div (1+ 0{,}15)^{5}]$
= 0,870 + 1,986 + 0,497
= 3,353

## NOTE

Even if the time value of money (TMV) tables or factors are not given to you in a question or as an addendum to the paper, you should still be able to work out the factors mathematically based on your knowledge of topic 3 – time value of money!

Remember to **group years with EXACTLY the same cash flows and to use an annuity factor**. It saves time in that you don't have to write out the figures in three columns (in this scenario). You should then use an annuity as it is the same cash flow for x-number of periods!

**Recommendation:**

Based on the financial analysis alone, the company should accept the offer of Sibiya Transport as their offer presents a LOWER negative net present value.

## NOTE

In this scenario, we were comparing the net COSTS of two options that were mutually exclusive. You should remember to select the option with the lowest cost! When you

are comparing options for projects with cash inflows, you should select the option with the highest NPV.

Qualitative issues as discussed in topics 1 and 2 should also be considered when making the final investment decision. These issues include the consideration of other stakeholders as well as non-financial aspects such as environmental, social and governance in order to ensure the long-term sustainability of the organisation. It is no longer acceptable to make decisions based on financial impact alone.

**QUESTION 2 – Lex Power Limited**

**Capital budget – Machine Zin**

| | Years | | |
|---|---|---|---|
| | 0 | 1–4 | 5 |
| | **R** | **R** | **R** |
| Cost price | (100 000) | – | – |
| Working capital* | (10 000) | – | 10 000 |
| Net operating income | – | 25 000 | 25 000 |
| Add back: Non-cash items | | | |
| – depreciation (R100 000 – R20 000) ÷ 5 | – | 16 000 | 16 000 |
| Realisable value | – | – | 20 000 |
| Taxation ① | – | (4 480) | (17 080) |
| **Net cash in-/(outflow)** | (110 000) | 36 520 | 53 920 |
| Factor at 22% (Table B, 4 years) ; (Table A, 5 years) | 1,000 | 2,494 | 0,370 |
| Present values | (110 000) | 91 081 | 19 950 |
| Net present value | R1 031 | | |
| Factor at 24% (Table B, 4 years) ; (Table A, 5 years) | 1,000 | 2,404 | 0,341 |
| Present values | (110 000) | 87 794 | 18 387 |
| Net present value | (R3 819) | | |

**Interpolation**

$$22\% + \left[\frac{(R1\,031 - R0)}{[R1\,031 - (-R3\,819)]} \times 2\%\right]$$

$$= 22\% + \left[\frac{R1\,031}{R4\,850} \times 2\%\right]$$

∴ Effective rate (IRR)

$$= 22\% + [0{,}2126 \times 2\%]$$

$$= \underline{\underline{22{,}43\%}}$$

**NOTE**

The interval between 22% and 24% is 2%. The interpolation fraction is therefore based on 2%!

* Working capital is an amount invested once at the beginning of the investment period (outflow) and realised at the end of the investment period (inflow), as the working capital is no longer required and the cash that was tied up in it is made available.

**Calculations:**

① Taxation

| | Years | |
|---|---|---|
| | 1–4 | 5 |
| | **R** | **R** |
| Net cash income (R25 000 + R16 000) | 41 000 | 41 000 |
| Wear and tear (R100 000 x 25%) | (25 000) | – |
| Wear and tear recouped ② | – | 20 000 |
| Taxable amount | 16 000 | 61 000 |
| Taxation at 28% | (4 480) | (17 080) |

② Wear and tear recouped

| | **R** |
|---|---|
| Cost | 100 000 |
| Less :Wear and tear (R100 000 x 25% x 4) | (100 000) |
| Tax value at end of useful life | NIL |
| Realisable value | 20 000 |
| Wear and tear recouped | 20 000 |

| **Capital budget – Machine Wic** | Years | | |
|---|---|---|---|
| | 0 | 1–4 | 5 |
| | **R** | **R** | **R** |
| Cost price | (80 000) | – | – |
| Working capital* | (8 000) | – | 8 000 |
| Net operating income | – | 21 100 | 21 100 |
| Add back: Non-cash items | | | |
| – depreciation (R80 000 – R18 000) ÷ 5 | – | 12 400 | 12 400 |
| Realisable value | – | – | 18 000 |
| Taxation ① | – | (3 780) | (14 420) |
| Net cash inflow/(outflow) | (88 000) | 29 720 | 45 080 |

| | Years | | |
|---|---|---|---|
| | 0 | 1–4 | 5 |
| Factor at 22% (Table B, 4 years); (Table A, 5 years) | 1,000 | 2,494 | 0,370 |
| Present values | (88 000) | 74 122 | 16 680 |
| Net present value | R2 802 | | |
| Factor at 24% (Table B, 4 years); (Table A, 5 years) | 1,000 | 2,404 | 0,341 |
| Present values | (88 000) | 71 447 | 15 372 |
| Net present value | (R1 181) | | |

**Interpolation**

$$22\% + \left[\frac{(R2\,802 - R0)}{[R2\,802 - (-R1\,181)]} \times 2\%\right]$$

$$= 22\% + \left[\frac{R2\,802}{R3\,983} \times 2\%\right]$$

$$= 22\% + [0{,}7035 \times 2\%]$$

∴ Effective rate (IRR) = 23,41%

**Calculations:**

③ Taxation

| | Years | |
|---|---|---|
| | 1–4 | 5 |
| | **R** | **R** |
| Net cash income (R21 100 + R12 400) | 33 500 | 33 500 |
| Wear and tear (R80 000 x 25%) | (20 000) | – |
| Wear and tear recouped ④ | – | 18 000 |
| Taxable amount | 13 500 | 51 500 |
| Taxation at 28% | (3 780) | (14 420) |

④ Wear and tear recouped

| | **R** |
|---|---|
| Cost | 80 000 |
| Less: Wear and tear (R80 000 x 25% x 4) | (80 000) |
| Tax value at end of useful life | NIL |
| Realisable value | 18 000 |
| Wear and tear recouped | 18 000 |

**Conclusion:**

The company should buy machine Wic, as it renders a higher internal rate of return and the IRR of 23,41% is also higher than the 23% after-taxation return that management requires on all capital investments.

## NOTE

Qualitative issues as discussed in topics 1 and 2 should also be considered when making the final investment decision. These issues include the consideration of other stakeholders as well as non-financial aspects such as environmental, social and governance in order to ensure the long-term sustainability of the organisation. It is no longer acceptable to make decisions based on financial impact alone.

**QUESTION 3 – Cyco Limited**

| **Capital budget – TS.40** | Years | | | |
|---|---|---|---|---|
| | 0 | 1 | 2 | 3 |
| | **R** | **R** | **R** | **R** |
| Realisable value – proceeds forfeited | (200 000) | – | – | – |
| Net cash inflow from operations | – | 95 000 | 95 000 | 95 000 |
| Proceeds on realisation | – | – | – | 80 000 |
| Taxation ② | – | (15 400) | (4 200) | (26 600) |
| Net cash inflow/(outflow) | (200 000) | 79 600 | 90 800 | 148 400 |
| Factor | 1,000 | $1 \div (1+0{,}15)^1$ | $1 \div (1+0{,}15)^2$ | $1 \div (1+0{,}15)^3$ |
| Factor at 15% (Table A) | | 0,870 | 0,756 | 0,658 |
| Present values | (200 000) | 69 252 | 68 645 | 97 647 |
| Net present value | 35 544 | | | |

**Calculations:**

① Scrapping allowance forfeited – TS.40

| | **R** |
|---|---|
| Cost | 400 000 |
| Less: Wear and tear to date [(R400 000 x 20%) x (5 – 3) years] | (160 000) |
| Tax value at date of decision | 240 000 |
| Current realisable value | 200 000 |
| Realisation allowance forfeited at date of decision | 40 000 |

**NOTE**

The machine has a total useful life of 5 and a remaining useful life of 3 years. We therefore know that it has been used productively for 2 years at the time that this decision is being taken, during which period wear and tear would have been written off, for 2 years.

② Taxation

| | Years | | |
|---|---|---|---|
| | 1 | 2 | 3 |
| | **R** | **R** | **R** |
| Net cash inflow from operations | 95 000 | 95 000 | 95 000 |
| Wear and tear (R400 000 x 20%) | (80 000) | (80 000) | (80 000) |
| Scrapping allowance forfeited ① | 40 000 | – | – |
| Wear and tear recouped ③ | – | – | 80 000 |
| Taxable amount | 55 000 | 15 000 | 95 000 |
| Taxation at 28% | (15 400) | (4 200) | (26 600) |

③ Wear and tear recouped

| | **R** |
|---|---|
| Cost | 400 000 |
| Less: Wear and tear (R400 000 x 20% x 5) | (400 000) |
| Tax value at end of useful life | NIL |
| Realisable value | 80 000 |
| Wear and tear recouped | 80 000 |

**Capital budget – TS.50**

| | Years | | |
|---|---|---|---|
| | 0 | 1–5 | 6 |
| | **R** | **R** | **R** |
| Cost | (700 000) | – | – |
| Net cash inflow from operations | – | 150 000 | 150 000 |
| Proceeds on realisation | – | – | 100 000 |
| Taxation ④ | – | (2 800) | (70 000) |
| Net cash inflow/(outflow) | (700 000) | 147 200 | 180 000 |
| Factor at 15% (Table B); (Table A) | 1,000 | 3,352 | 0,432 |
| Present values | (700 000) | 493 414 | 77 760 |
| Net present value | (128 826) | | |

**Calculations:**

④ Taxation

| | Year | |
|---|---|---|
| | 1–5 | 6 |
| | **R** | **R** |
| Net cash inflow from operations | 150 000 | 150 000 |
| Wear and tear (R700 000 x 20%) | (140 000) | – |
| Wear and tear recouped ⑤ | – | 100 000 |
| Taxable amount | 10 000 | 250 000 |
| Taxation at 28% | (2 800) | (70 000) |

⑤ Wear and tear recouped

| | **R** |
|---|---|
| Cost | 700 000 |
| Less: Wear and tear (R700 000 x 20% x 5) | (700 000) |
| Tax value at end of useful life | NIL |
| Realisable value | 100 000 |
| Wear and tear recouped | 100 000 |

**Recommendation:**

Machine TS.40 renders the positive required rate of return, while TS.50 does not render the required rate of return. Thus TS.40 should be retained and not be replaced by TS.50.

## NOTE

Where the periods of the two projects are different, the equivalent annual income method has to be used. This method will be dealt with in your third-year module, MAC3702. In this activity, machine TS.40 had a positive NPV and TS.50 had a negative NPV and therefore the recommendation could be done without performing the equivalent annual income method.

Qualitative issues as discussed in topics 1 and 2 should also be considered when making the final investment decision. These issues include the consideration of other stakeholders as well as non-financial aspects such as environmental, social and governance in order to ensure the long-term sustainability of the organisation. It is no longer acceptable to make decisions based on financial impact alone.

**QUESTION 4 – Alpha Limited**

The budget committee of the company is faced with a choice between two machines, A and B, which differ in their production characteristics and capabilities.

The following information regarding the two machines is available:

| | Machine | |
|---|---|---|
| | **A** | **B** |
| | **R** | **R** |
| Cost price | 1 000 000 | 1 500 000 |
| Residual (realisable) value at end of useful life | 110 000 | 160 000 |
| Annual income after depreciation and income tax | 152 000 | 183 000 |
| Required working capital | 180 000 | 220 000 |
| Expected useful life | 10 years | 10 years |

**Additional information:**

1. The company can invest all its funds at a rate of 12% per annum, which is also regarded as an acceptable return on the investment in either of the above machines.
2. The accounting policy of the company is to provide for depreciation on the straight-line method, over the useful lives of the machines after taking the residual (realisable) value into account.
3. The South African Revenue Services allows wear and tear allowances on the same basis as that determined for depreciation.

**REQUIRED**

a. Apply the following methods to evaluate the two mutually exclusive options available to Alpha Ltd and comment on the results of each:
   i. net present value (NPV), indicating the factors you used
   ii. internal rate of return (IRR), using 12% and 18% to interpolate
   iii. profitability index (PI)
   iv. payback period (PB)
   v. accounting rate of return (ARR)

b. Make a final recommendation based on your calculations and deliberations in a.

**QUESTION 4 – Alpha Limited**

**a. i. Net present value method**

| | Machine | | | | | |
|---|---|---|---|---|---|---|
| | A | | | B | | |
| | Years | | | Years | | |
| | 0 | 1–9③ | 10 | 0 | 1–9③ | 10 |
| | **R** | **R** | **R** | **R** | **R** | **R** |
| Cost price | (1 000 000) | – | – | (1 500 000) | – | – |
| Working capital ④ | (180 000) | – | 180 000 | (220 000) | – | 220 000 |
| Annual cash flow from operations ① | – | 241 000 | 241 000 | – | 317 000 | 317 000 |
| Realisable value | – | – | 110 000 | – | – | 160 000 |
| Present values | (1 180 000) | 241 000 | 531 000 | (1 720 000) | 317 000 | 697 000 |
| Factor at 12% ② | 1,000 | 5,328 | 0,322 | 1,000 | 5,328 | 0,322 |
| | (1 180 000) | 1 284 048 | 170 982 | (1 720 000) | 1 688 976 | 224 434 |
| Net present value | R275 030 | | | 193 410 | | |

**Calculations:**

① Annual cash flow from operations, after taxation

| | Machine | |
|---|---|---|
| | A | B |
| | **R** | **R** |
| Profit after depreciation and tax | 152 000 | 183 000 |
| Add back: Non-cash items – Depreciation | | |
| $\frac{\text{R1 000 000 – R110 000}}{10}$ | 89 000 | – |
| $\frac{\text{R1 500 000 – R160 000}}{10}$ | – | 134 000 |
| Annual cash flow from operations, after taxation | 241 000 | 317 000 |

② PV factors

Years 1–9: Table B at 12% = 5,328

Year 10: Table A at 12% = 0,322

Or

| | |
|---|---|
| $1 \div (1 + 0{,}12)^1$ | 0,893 |
| $1 \div (1 + 0{,}12)^2$ | 0,797 |
| $1 \div (1 + 0{,}12)^3$ | 0,712 |
| $1 \div (1 + 0{,}12)^4$ | 0,636 |
| $1 \div (1 + 0{,}12)^5$ | 0,567 |
| $1 \div (1 + 0{,}12)^6$ | 0,507 |
| $1 \div (1 + 0{,}12)^7$ | 0,452 |
| $1 \div (1 + 0{,}12)^8$ | 0,404 |
| $1 \div (1 + 0{,}12)^9$ | 0,361 |
| Annuity | 5,329# |
| $1 \div (1 + 0{,}12)^{10}$ | 0,322 |

# Small rounding difference may occur.

## NOTE

Tip: when using your pocket calculator:

Enter 1 ÷ 1.12 = to get factor for year 1, then add to memory.

Press = again to get factor for year 2, then add to memory.

Press = again and add to memory each time until you reach year 9, then add to memory.

Press = again to get factor for year 10, write down – DO NOT ADD TO MEMORY.

Press memory recall to get the cumulative factor for the 9-year annuity!

③ Combining of years

In deciding which years may be combined, you must be guided by the information in the specific question. Often the first and last year differ from the rest, but sometimes all the years differ and would have to be kept apart (column for each year).

④ Working capital

Working capital is an amount invested once at the beginning of the investment period (outflow) and realised at the end of the investment period (inflow), as the working capital is no longer required and the cash that was tied up in it is now made available. It is not an annual outflow, unless the working capital levels differ in each year (then the net increase or decrease is reflected as an (outflow) or inflow respectively.

### a. ii. Internal rate of return (IRR)

| | Machine | | | | | |
|---|---|---|---|---|---|---|
| | A | | | B | | |
| | Years | | | Years | | |
| | 0 | 1–9 | 10 | 0 | 1–9 | 10 |
| Cash flow from a. | (1 180 000) | 241 000 | 531 000 | (1 720 000) | 317 000 | 697 000 |
| Factor at 18% ① | 1,000 | 4,303 | 0,191 | 1,000 | 4,303 | 0,191 |
| Present values | (1 180 000) | 1 037 023 | 101 421 | (1 720 000) | 1 364 051 | 133 127 |
| Net present value | R(41 556) | | | R(222 822) | | |

① Factors at 18%

| | |
|---|---|
| $1 \div (1 + 0{,}18)^1$ | 0,847 |
| $1 \div (1 + 0{,}18)^2$ | 0,718 |
| $1 \div (1 + 0{,}18)^3$ | 0,609 |
| $1 \div (1 + 0{,}18)^4$ | 0,516 |
| $1 \div (1 + 0{,}18)^5$ | 0,437 |
| $1 \div (1 + 0{,}18)^6$ | 0,370 |
| $1 \div (1 + 0{,}18)^7$ | 0,314 |
| $1 \div (1 + 0{,}18)^8$ | 0,266 |
| $1 \div (1 + 0{,}18)^9$ | 0,225 |
| Annuity | 4,302# |
| $1 \div (1 + 0{,}18)^{10}$ | 0,191 |

# Small rounding differences may occur between already rounded annual factors and when one uses the factor from the tables or calculate it without rounding.

| | **Machine A** | **Machine B** |
|---|---|---|
| **Interpolation** | $12\% + \left[\frac{(R275\,030 - R0)}{[R275\,030 - (-R41\,556)]} \times 6\%\right]$ | $12\% + \left[\frac{(R193\,410 - R0)}{[R193\,410 - (-R222\,822)]} \times 6\%\right]$ |
| | $= 12\% + \left[\frac{R275\,030}{R316\,586} \times 6\%\right]$ | $= 12\% + \left[\frac{R193\,410}{R416\,232} \times 6\%\right]$ |
| ∴ Effective rate | = 12% + [0,8687 x 6%] | = 12% + [0,4647 x 6%] |
| (IRR) | = 17,2122% | = 14,7882% |

## NOTE

The interval between 12% and 18% is 6%. The interpolation fraction is therefore based on 6%!

Due to the fact that we used factors individually rounded to 3 decimals for the NPV calculations at 12% and 18%, our answer might be slightly different than when you use your financial calculator or Excel. Excel generate an IRR of 17,0666% for machine A and 14,498% for machine B.

### a. iii. Profitability index

The PI of Machine A

$$PI = \frac{(275\,030 + 1\,180\,000)}{1\,180\,000} = 1{,}2331$$

The PI of Machine B

$$PI = \frac{(193\,410 + 1\,720\,000)}{1\,720\,000} = 1{,}1124$$

According to the PI, both of the above machines should be accepted, as both have a PI greater than 1. Machine A is the highest. This correlates with the NPV calculation which also indicated that Machine A should be selected.

**a. iv. Payback period method**

| | Machine | |
|---|---|---|
| | **A** | **B** |
| Cash outflow | R1 180 000 | R1 720 000 |
| Annual cash inflow (from a. above) | R241 000 | R317 000 |
| | R1 180 000 | R1 720 000 |
| | R241 000 | R317 000 |
| Payback period | = 4,9 years | = 5,4 years |

## NOTE

We can use the annuity method of calculating the payback period as the cash flows in years one to nine is identical and the break-even occurs BEFORE year ten, which have a different annual cash flow! Remember that the last year of the capital budget usually has a different cash flow (as a result of residual values etc) and if the break-even occurs in the last year, you have to use the pro rate method to calculate the portion of the year, that is the remainder of cash outflow to be covered divided by the cash flow in last year. Where each year's cash flow varies, you have to use the tabular and pro rate method.

The payback period method indicates that once again, Machine A is preferred as the payback period is the shorter of the two options.

**a. v. Accounting rate of return**

As the assets' residual value at the end of the period is greater than 10% of the original cost, it cannot be considered to be immaterial. We will therefore have to calculate the average investment as follows:

| | **Machine A** | **Machine B** |
|---|---|---|
| | **R** | **R** |
| Original investment | 1 000 000 | 1 500 000 |
| Less: residual value | 110 000 | 160 000 |
| Depreciable value | 890 000 | 1 340 000 |
| Average value (÷ 2) | 445 000 | 670 000 |
| Add: residual value | 110 000 | 160 000 |
| Average investment value (1) | 555 000 | 830 000 |
| Annual profit after tax (2) | 152 000 | 183 000 |
| Return (2) ÷ (1) | 27,39% | 22,05% |

Machine A generates a higher ARR than Machine B, despite the fact that Machine B has a higher annual profit (B's asset base is also that much higher).

**NOTE**

The assumption in the calculation of the asset base is that the residual value is outstanding for the entire life of the project. We therefore do not apply an average to it.

The ARR is based on the investment in non-current assets only. We therefore ignore the working capital investment.

**b. Recommendation**

All the methods indicate that machine A should be purchased and in the absence of any other qualitative issues that favour machine B, we recommend that machine A is acquired.

**NOTE**

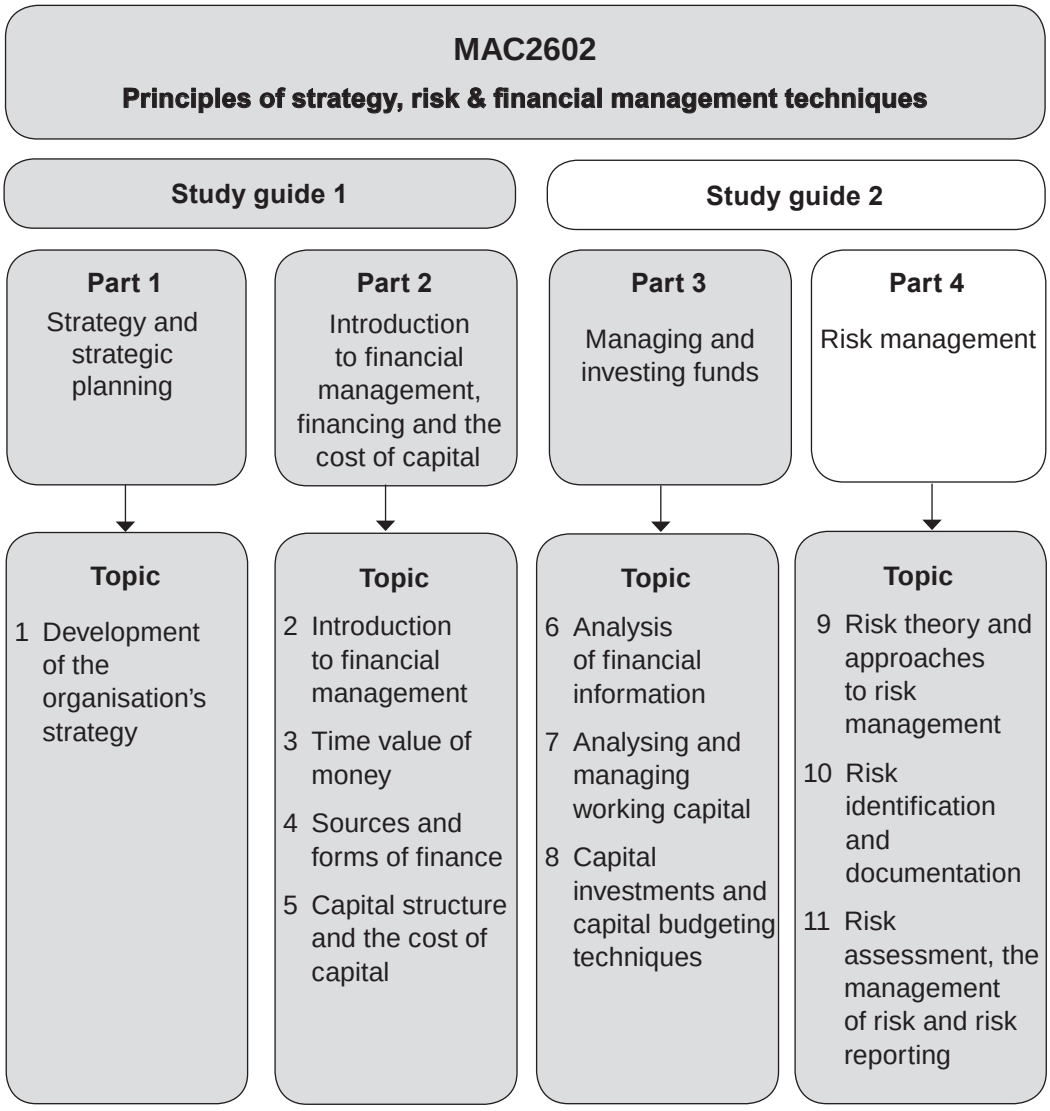
Qualitative issues as discussed in topics 1 and 2 should also be considered when making the final investment decision. These issues include the consideration of other stakeholders as well as non-financial aspects such as environmental, social and governance in order to ensure the long-term sustainability of the organisation. It is no longer acceptable to make decisions based on financial impact alone.

# Risk management

## PURPOSE

Risk management is concerned with identifying, assessing and managing threats/risks resulting from pursuing the organisation's strategies *(SAICA, 2010, Detailed Guideline for Academic Programmes)*.

The purpose of this part is to define risk and to explain risk management. This includes risk identification, risk assessment, managing the risk and risk reporting.



**NOTE**

We touched on risks and stakeholder management in topic 1 – development of the organisations' strategy and topic 2 – introduction to financial management, earlier in this module. You will also find this background useful when you encounter the internal control and governance modules in Auditing. The knowledge and skills you acquire in this part of MAC2602 will further find practical applications in the advanced financing, capital structure, working capital management and capital investment topics covered later in MAC3702 as well as in MAC3701 (decision-making).

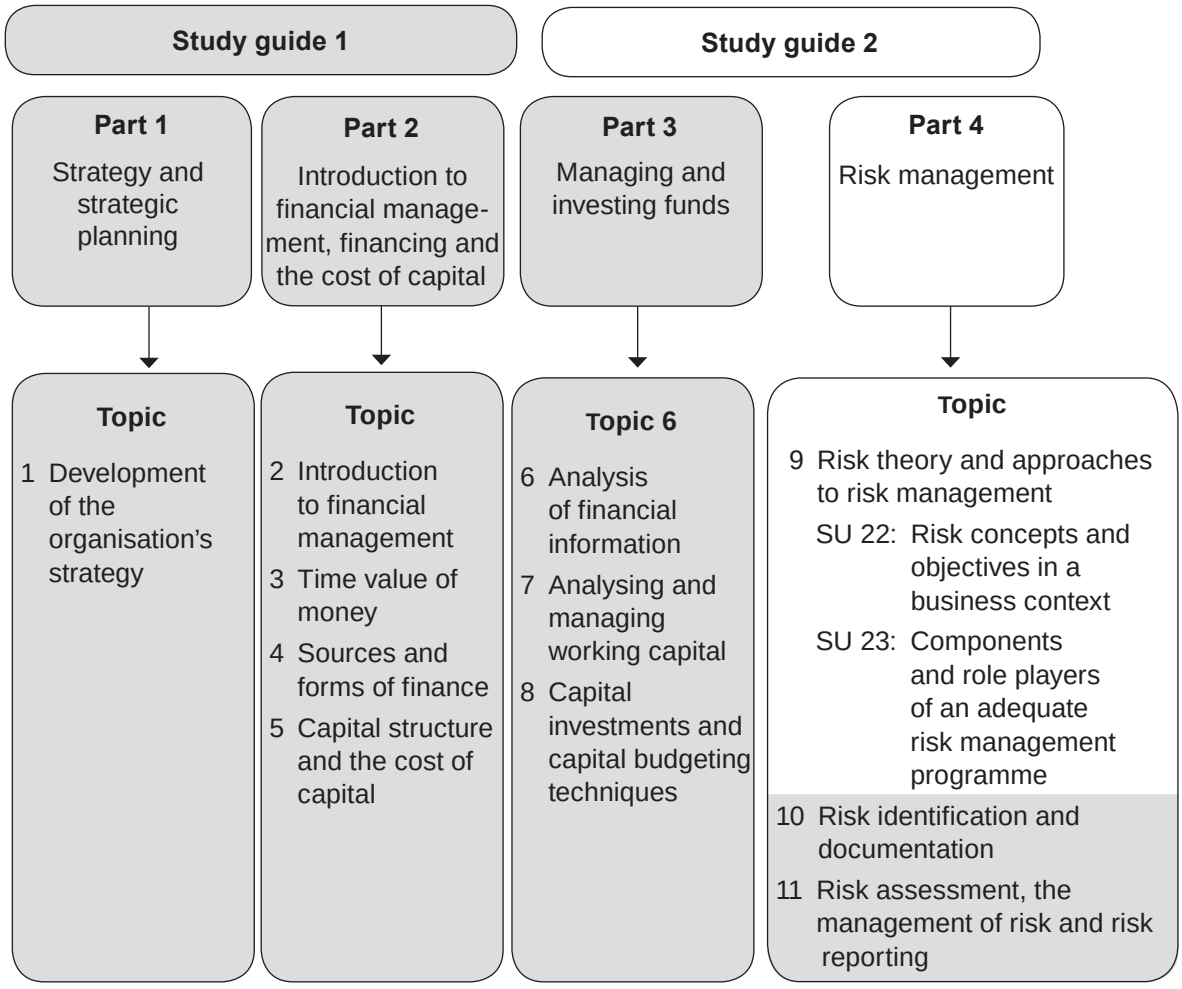
TOPIC 9

# Risk theory and approaches to risk management

## LEARNING OUTCOMES

After studying this topic, you should be able to:

- define risk in a business context
- identify the objective of risk management
- explain what the components are of an adequate risk management programme



## INTRODUCTION

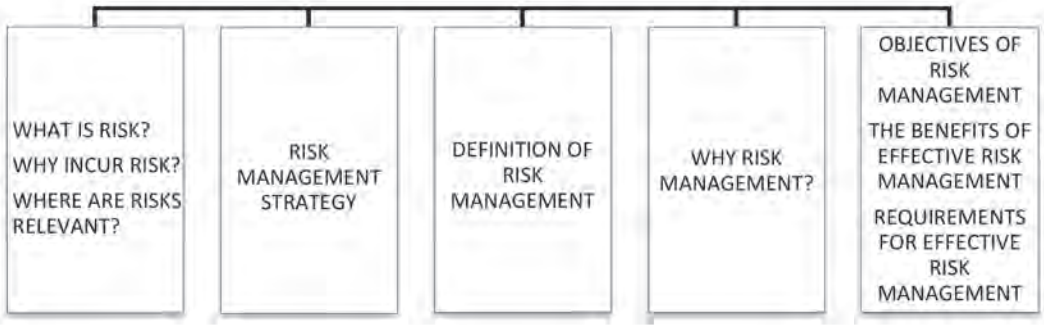
The main purpose of this topic is to introduce you to the concepts of risk and risk management. You will also learn about the objective of risk management and the components of an adequate risk management programme.

This topic includes a fair amount of theory best understood by applying it to your own life or in a business environment.

STUDY UNIT 22

# Risk concepts and objectives in a business context

**In this study unit**




## 1 Introduction

In this study unit, we will define risk in a business context and introduce you to risk management and its objective.

## 2 What is risk?

**RISK**

The typical dictionary definition of risk is a chance or possibility of danger, loss, injury or other adverse consequences.

Risk is associated with something happening with a negative future outcome.

The Chartered Institute of Management Accountants (CIMA) (2011:10) defines business risk facing an organisation as risks that affect the achievement of the organisation's overall objectives that should be reflected in its strategic aims.

## Activity 22.1

You also face risks in your own life. An example is that your car could be stolen.

a. Identify some risks in the picture below:

**Source:** © 1998 – 2012 Signnetwork.com

FIGURE 22.1: Bart Simpson

b. Name three other risks in your own life.

## Feedback on activity 22.1

a. Risks from the picture could include:

- Bart is riding a skateboard and may fall off and injure himself.
- Bart may be hit by a car and be seriously injured.
- Bart is not wearing a helmet, which is required by legislation. This contravention could result in a fine.

b. Risks in your own life could include:

- traffic congestion on the road to the exam centre on the day of your exam, which could result in you being late; or
- that your car or other belongings are stolen.

### NOTE

Drury (2011) notes in Management and Cost Accounting that **risk** is inherent in a situation and exist where there are several possible outcomes but there is relevant past experience to predict the possible outcome.

**Uncertainty** exists where there are several possible outcomes, but there is little previous statistical evidence to predict the possible outcomes. Uncertainty can possibly be reduced by gaining more information.

This distinction is not essential and we shall use the terms interchangeably.

Business leaders are often confronted by uncertainties and risk in decision-making. The inability to predict the precise outcome of a decision, that is the inability to predict the sales volumes of a new product – normally due to a lack of information – creates risk.

## 3 Why incur risk?


**Source:** CIMA (2011:11)

FIGURE 22.2: Why incur risk?

- Taking risks allows the organisation to be more competitive and to generate higher returns. For example, you could launch a new technologically advanced product even though there is uncertainty whether customers will buy the new product.
- Benefits could be financial in the form of higher returns or reduced cost.
- Benefits could be intangible, for example, gaining more valuable client information to be used for future products.

Risk taking could result in losses, but in business, the potential rewards of risk taking usually become greater when the chance of loss becomes greater.

### Activity 22.2

With enough capital, you could start a company that manufactures solar-powered vehicles or you could place your money in the bank and earn interest on the investment.

Illustrate the concept of risk versus reward when evaluating the risks associated with each option.

### Feedback on activity 22.2

The risks for a company that manufactures solar-powered vehicles are significant, as the vehicles may be unroadworthy if it does not comply with government standards and related regulations. Customers may be sceptical and question the vehicles' performance and endurance, and the organisation could fail. Alternatively, the vehicles could be far less expensive to operate, with cleaner emissions, which could receive government's support and be a huge success with large returns.

In comparison, the risk/chance that the money in the bank could be lost is very low, but the potential return on the investment is also lower.

### Activity 22.3

Quickclean (Pty) Ltd, a facilities management company that provides cleaning and security services, has a number of business objectives including the following: "Grow the brand in a socially and economically effective way to obtain a significant market share in the Limpopo province."

The management of the organisation has recently learnt that provincial government tenders in Limpopo are mainly awarded to organisations with a very high (level 1 or 2) broad-based black economic empowerment (BBBEE) rating. Quickclean (Pty) Ltd is BBBEE compliant, but only has a level four (4) rating, which is not deemed high enough. The very high BBBEE requirement is the main reason why very few facility management organisations operating in Limpopo submit tenders to the provincial government.

**REQUIRED**

Explain what you think the risk is for Quickclean (Pty) Ltd. Also, explain why there could be an opportunity for Quickclean (Pty) Ltd.

### Feedback on activity 22.3

Quickclean (Pty) Ltd will not be successful in its tender applications to do work for the provincial government in Limpopo with its current BBBEE rating. This reduces the organisation's ability to get work and the risk is that the organisation may not achieve its objectives and fail to realise a profit to ensure the continued success/sustainability of the business.

Very few facility management companies currently operating in Limpopo are BBBEE compliant so there is an opportunity for Quickclean (Pty) Ltd to get very lucrative government contracts if it increases its BBBEE rating.

## 4 Where are risks relevant?

We have already noted that risks are relevant in everybody's day-to-day lives.

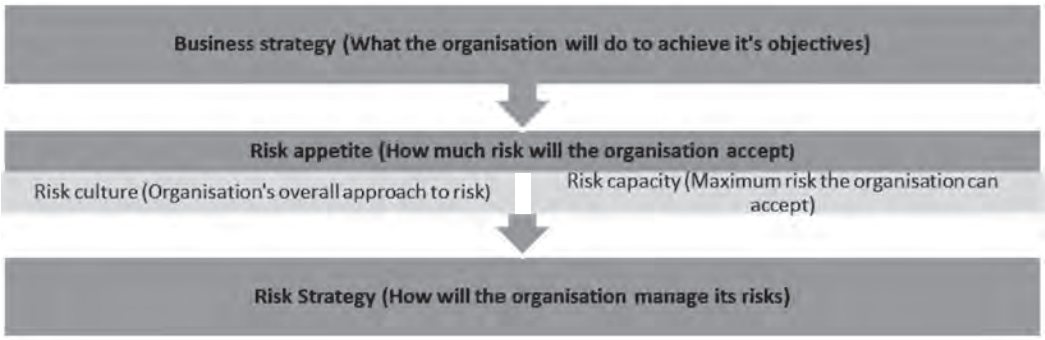
In the financial world, one finds different types of risk. Risks can come from uncertainty in financial markets, such as the future rand/dollar exchange rate, project failures, legal liabilities, credit risk, accidents, natural causes and disasters, as well as fraud and error.

For management accounting, the concepts of probability and sensitivity will be considered in decision-making techniques as well as consequences of relevant costing decisions.

In financial accounting, risk is considered when evaluating investment and financing decisions as well as hedging techniques. Hedging is a transaction that lowers or even eliminates an organisation's risk due to fluctuating commodity prices, interest rates and exchange rates.

## 5 Risk management strategy

The purpose of the risk management strategy is to support the achievement of the required organisation objectives.




**Source:** Author, 2012

FIGURE 22.3: Risk Management Strategy

### RISK APPETITE (RISK TOLERANCE)

This refers to the amount of risk an organisation is willing to accept in pursuit of value/ benefits.

The risk appetite is related to an organisation's strategy and may be expressed as the acceptable balance between growth, risk and return. The risk appetite may be clear/ explicit in an organisation's strategies, policies and procedures. Alternatively, it may be implicit, needing to be determined from an analysis of the organisation's decisions and actions.

It can be classified as follows:

- risk averse – an organisation or investor who will attempt to avoid risk by opting for "safer" investments, such as government bonds despite the lower returns on "safer" investments
- risk neutral – an organisation or investor with a balanced view
- risk seeking – an organisation or investor who is an aggressive risk taker and willing to take many risks in search of high returns

### RISK CULTURE

This is the set of shared attitudes, values and practices that characterise how an organisation considers risk in its day-to-day activities.

This is driven by management and can be determined by analysing the organisation's practices, especially rewards or sanctions for risk-taking or risk-avoiding behaviour.

### RISK CAPACITY

This is the maximum amount of risk that the organisation can accept.

### BOARD OF DIRECTORS

The board of directors (the board) consist of members/directors who are elected to the board by the shareholders to oversee the activities of the organisation and to provide stewardship and leadership from the very top.

**Activity 22.4**

Illustrate your risk appetite if the following are risks in your own life:

- traffic congestion on the road to the exam centre on the day of your exam, which could result in you being late
- that your car or other belongings are stolen

**Feedback on activity 22.4**

Your risk appetite may be that:

- If your risk appetite is low, you will leave home three hours before the exam starts and attempt to avoid the risk of traffic congestion that may cause you to be late.
- If your risk appetite is high, you will leave home an hour before the exam starts and accept the risk of traffic congestion that may cause you to be late.
- Your risk appetite may be low to suffering losses when your car or personal belongings are stolen, so you will want to arrange insurance to reduce the risk.

## 6 Definition of risk management

Below are a few definitions of risk management by different organisations.

① Risk management is the process to reduce significant risks facing the organisation in a cost effective manner to contribute to the achievement of the organisation's objectives.

② CIMA's official terminology (2011:36) defines risk management as:

"The process of understanding and managing the risks that an organisation is subject to in attempting to achieve its corporate objectives."

③ The Committee of Sponsoring Organisations of the Treadway Commission (COSO) defines Enterprise Risk Management (ERM) as follows:

"A process affected by an organisation's board of directors, management and other personnel, applied in strategy setting across the organisation. This process is designed to identify potential events that may affect the organisation (risk), to manage risks within the organisation's risk appetite, and to provide reasonable assurance regarding the achievement of organisation objectives."

④ The Institute of Risk Management gives the following definition for risk management:

"The process by which organisations methodically address the risks attached to their activities to achieve sustained benefit."

**NOTE**

You will not be required to distinguish between the different definitions. Any one of the definitions will be accepted for assessment, as they all convey the same basic message.

The risk management process can be illustrated as follows:


**Source:** Author, 2012

FIGURE 22.4: Components of the risk management process

Based on Valsamakis, Vivian & Du Toit (2010:145), the above components can be described as follows:

- **RISK IDENTIFICATION**

The process to identify internal and external events, which could affect the achievement of the organisation's objectives. This includes risks and opportunities.

- **RISK ASSESSMENT**

Risks are analysed by considering the impact (potential damage or loss) and likelihood of the risk occurring. Risks are assessed at an inherent basis (risk exposure before considering risk responses) and residual basis (risk exposure after considering risk responses).

- **RISK RESPONSE**

Measures to reduce the likelihood and/or impact rating of a risk event.

- **RISK FINANCING**

Maintaining a balance between the economic and operational cost of risk reducing measures and the achievement of the organisation's objectives.

## 7 Why risk management?

**The King Report on Governance for South Africa 2009 (King III)** states that an organisation's strategy, risk, performance and sustainability are inseparable.

**King III** requires the board of directors (the board) to disclose how the board has satisfied itself that risk assessments, responses and interventions are effective. Due care and diligence will need to be exercised and disclosed. This due care and diligence are achieved through:

- the structures of governance – risk/audit committee
- adoption and implementation of an annual risk management plan

- effective risk management practices through the application of recognised frameworks, methodologies, continuous assessments and monitoring
- applying risk considerations into the decision-making frameworks (appetite/tolerance) and specific decisions
- ensuring that the board receives adequate assurance on the effectiveness of the risk management process and on the management of specific risks
- disclosing how the board is satisfied with the effectiveness of risk management in the organisation

## 8 The objective of risk management

The objective is to add maximum sustainable value by aligning the risk management function to the achievement of the organisation's business objectives.

It involves:

- the identification and treatment of risks with reference to the organisation's vision, mission and strategic objectives
- addressing risks (threats) and opportunities
- increasing the probability of success by reducing uncertainties

Risk management should form part of every organisation's strategic management. Risk management should add value by controlling the probability (likelihood) and/or impact of unfortunate events and should maximise the realisation of opportunities.

In CIMA's Official Learning System, Collier & Agyei-Ampomah (2009:122) also indicates that an organisation's risk management strategy should include the following elements:

- the risk profile/risk appetite of the organisation, that is stating the level of risk it finds acceptable
- the risk management process (risk identification and assessment) that the organisation practices
- the organisation's preferred option for risk treatment (that is retention, avoidance, reduction, or transfer)
- who is directly responsible for the organisation's risk management
- how reporting and monitoring take place

## 9 The benefits of effective risk management

The following are benefits of effective risk management:

- aligning the risk appetite and business strategy
- linking growth, risk and return
- focus management responses on the most significant risks
- improving decision-making, planning and prioritisation by contributing to a structured understanding of the business activities and volatility
- developing and supporting people and the organisation's information base
- minimising operational losses and optimising operational efficiency
- protecting and enhancing the organisation's brand and image
- contributing to a more sustainable supply chain and operating environment
- identifying and managing risks throughout the whole organisation
- seizing opportunities
- reducing the cost of finance

## 10 Requirements for effective risk management

The following are requirements for effective risk management:

- management commitment to effective risk management
- integration with the strategic planning process
- using a common language and framework
- acceptance of risk management as a continuous process
- wide ownership with a supportive culture across the organisation
- effective risk management should be embedded in the organisational processes

**NOTE**

The rest of the study units to follow will elaborate on the components of the risk management strategy. At the end of this part of the study guide, you should be able to compile an organisation's risk management strategy or evaluate a strategy presented to you.

## 11 Summary

- In this study unit, we defined risk as a chance or possibility of danger, loss, injury or other adverse consequences.
- Organisations take risks to gain a competitive advantage and increase returns.
- For business decisions, the direct relationship between potential benefits and the associated risks should always be considered.
- Concepts of risk appetite and culture were explained, as well as the relevance of risk in financial management and management accounting.
- The need to manage risks to contribute to the achievement of business objectives was described.
- The key elements of a risk management strategy were identified.

The next study unit will address the components and role players of an adequate risk management programme.

Self-assessment activity

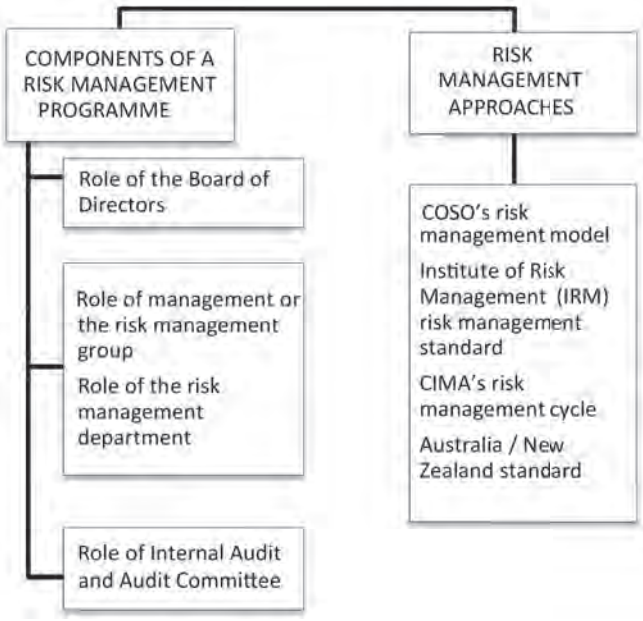
Having worked through this study unit, you should be able to answer the following questions:

a. Illustrate the relationship between risk and return.
b. Explain the concepts risk, risk culture and risk appetite.
c. Summarise the three (3) categories of risk appetite.
d. Discuss the five (5) key elements of an organisation's risk management strategy as defined by CIMA.

STUDY UNIT 23

# Components and role players of an adequate risk management programme

**In this study unit**



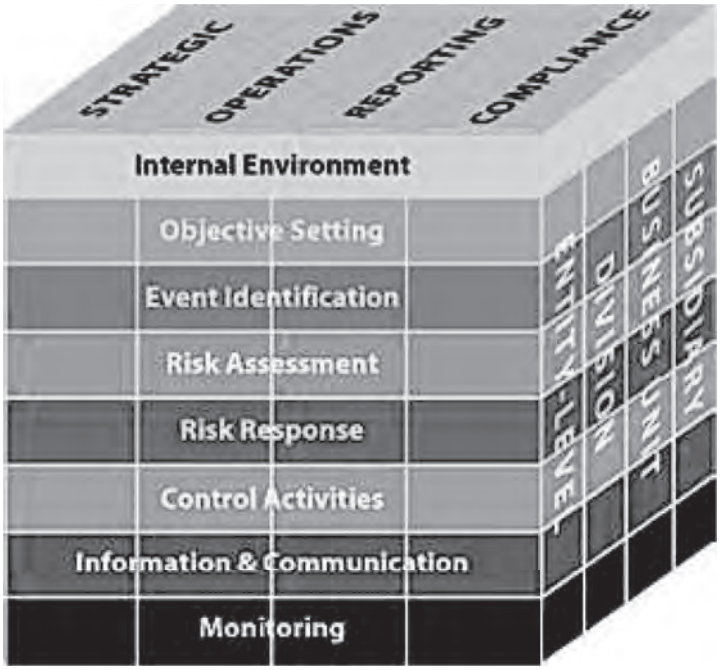

## 1 Introduction

In the previous study unit, we defined and explained risk, risk management and mentioned the requirements of a risk management strategy. In this study unit we will cover the requirements of KING III for risk management and discuss the inter-related components of the COSO Enterprise Risk Management (ERM) Framework (refer to section 2) to formulate a risk management plan.

## 2 Components of a risk management programme

A risk management programme is necessary to achieve the organisation's risk management objectives and could be based on the principles of the Committee of sponsering organisations of the Treadway Commission (COSO)'s Enterprise Risk Management (ERM) – Integrated Framework (COSO, 2004).

The figure below represents COSO's risk management framework.




**Source:** COSO (2004)

FIGURE 23.1: Enterprise Risk Management (ERM) Integrated Framework

Various other commonly used frameworks are also available and will be discussed later in this study unit. They make use of similar concepts and terminology so it is apt that we describe COSO's ERM framework first.

The eight (8) inter-related components of the enterprise risk management (ERM) programme are:

| | INTER-RELATED COMPONENTS OF ERM | RESPONSIBLE PARTY |
|---|---|---|
| 1 | **Internal (control) environment:** The tone of the organisation and management's operating style. This sets the basis of how risk is managed, including the risk management philosophy and risk appetite. | Board of directors (the board). |
| 2 | **Objective setting:** A process to define the organisation's objectives to realise the organisation's mission – whilst being aware of the risk appetite. | The board. |
| 3 | **Event identification:** The process to identify internal and external risk events, which could affect the achievement of objectives. This includes risks and opportunities. | The board can delegate this responsibility to a sub-committee (risk committee or audit committee). |
| 4 | **Risk assessment:** Risks are analysed by considering the impact (potential damage or loss) and likelihood, as a basis for determining how the risk should be managed on both an inherent① (gross) and residual② (net) basis. | The board is ultimately responsible. Management and the risk management department will usually do the assessments and provide feedback to the board or a sub-committee thereof. |

| | INTER-RELATED COMPONENTS OF ERM | RESPONSIBLE PARTY |
|---|---|---|
| 5 | **Risk response:** Management decides whether to avoid, accept, reduce or share the risk. A set of actions is designed to align the residual risk ratings with the organisation's risk appetite. | The board should ensure that management considers and implements appropriate risk responses. The board does this by approving and monitoring the annual risk management plan③. |
| 6 | **Control activities:** The internal control system, including all the policies and procedures to help ensure that risk responses are adequate and effective. The adequacy and effectiveness of risk responses are assessed based on feedback from management, risk management, internal audit and external audit. | The board should ensure continuous risk monitoring by management and the risk management department. The board does this by approving and monitoring the annual risk management plan.③ |
| 7 | **Information and communication:** Relevant information is identified, captured and communicated. This enables people to carry out their responsibilities. | The board should ensure that there are processes in place enabling complete, timely, relevant, accurate and accessible risk disclosure to stakeholders. |
| 8 | **Monitoring:** The entire ERM is monitored through ongoing management activities and separate evaluations and modified when necessary. | The board does this by approving and monitoring the annual risk management plan③. |

① **INHERENT RISK**

This involves the assessment of risk before the application of any controls, transfer or management responses.

② **RESIDUAL RISK**

It is the risk that remains after the application of any controls, transfer or management response to mitigate the risk under consideration.

③ **RISK MANAGEMENT PLAN**

It is the document of identified risks (derived with reference to the organisation's objectives) with the corresponding risk assessment to create risk responses. The achievement of the risk management plan is the responsibility of the risk management group.

**Role players in the execution of the risk management strategy**

| ROLE PLAYERS | RESPONSIBILITIES |
|---|---|
| board of directors | ● ultimately responsible for risk management |
| audit committee | ● board committee charged with oversight of internal control systems and financial reporting<br>● works with external and internal auditors |
| risk committee (the work will be done by an audit committee if a risk committee does not exist) | ● board committee with direct responsibility for risk management |
| risk management group (lead by the risk manager and the risk department) | ● group of senior and middle management responsible for risk management processes<br>● report to the board via the audit and risk committee<br>● monitor the effectiveness of the overall risk management process and make recommendations for improvement |
| internal audit function | ● test the adequacy and effectiveness of key internal controls;<br>● provides recommendations to improve the risk management process |

## 2.1 Role of the board of directors

- The board is ultimately responsible for effective risk management.
- The board is responsible for defining the organisation's risk appetite.

## 2.2 Role of management/risk management group

The board requires management to ensure effective risk management, make recommendations for improvement and to maintain a good control environment.

A good control environment includes an internal control system, which consists of all the policies and procedures necessary to ensure that the organisation's objectives are achieved, including:

- the orderly and efficient conduct of the organisation
- the safeguarding of assets
- the prevention and detection of fraud and error
- accuracy and completeness of the accounting records
- timely preparation of reliable financial information

## 2.3 Role of the risk management department

Based on adaptations from the Institute of Risk Management (IRM) and CIMA (2011:69) the role of the risk management department/risk manager's function includes the following:

- setting policy and strategy for risk management
- primary champion of risk management at strategic and operational level
- building a risk aware culture within the organisation including appropriate education
- establishing internal risk policy and structures for business units

- designing and reviewing processes for risk management
- coordinating the various functional activities which advise on risk management issues within the organisation
- identification and evaluation of the risks affecting an organisation based on the organisation's strategy, operations and policies
- developing risk response processes, including contingency and business continuity programmes
- implementing a set of risk indicators and reports including losses, incidents, key risk exposures and early warning indicators
- liaising with insurance companies with regards to cover available, claims and conditions
- facilitates the monitoring of risk responses based on the risk management plan and reports on the results thereof
- monitors the implementation of internal audit recommendations
- preparing reports on areas of significant residual risk and the achievement of the risk management plan for the board and the stakeholders

The risk management department, usually through the chief risk officer or risk manager, reports to the board or a sub-ordinate committee, such as the risk and compliance committee. Note that these reports may have statutory requirements, such as the Sarbanes-Oxley (SOX) reports for United States companies.

## 2.4 Role of internal audit and audit committee

Risk management is an important precursor to internal control as it allows the internal controls to be focused on the most significant risks. Based on COSO, a model of internal control contains five (5) elements:

1. a control environment that includes management values, operating style, organisation structure, authority and policies
2. the risk assessment of internal and external risks
3. control activities, which should be integrated with a risk assessment
4. a system for monitoring the effectiveness of internal controls
5. means by which information can be captured and communicated

The role of internal audit is therefore to focus on the significant risks, as identified by management, and to audit the risk management processes across an organisation. This includes the testing of the effectiveness and adequacy of controls set to address significant risks to provide reasonable assurance of the effectiveness and adequacy of the financial controls, efficiency of operations and compliance with laws and regulations.

Therefore, risks are assessed and control activities introduced to mitigate the risks to an acceptable level (risk appetite). The monitoring of the controls is the responsibility of management, assisted by the risk management function.

Internal audit can provide advice to the board, or a sub-committee of the board, such as the audit committee, regarding the effectiveness of the processes to identify and assess inherent risks, the adequacy and effectiveness of risk mitigation and the effectiveness of the residual risk assessment.

**NOTE**

The monitoring of risk mitigating actions such as internal controls remains the responsibility of management. An internal audit review cannot be regarded as a control as the internal audit function should remain independent from management and test the adequacy and effectiveness of controls.

**Activity 23.1**

Use your knowledge of the eight components of the ERM programme and rank the following in chronological order/order of dependence:

a. The board of directors approves a risk management programme, which could include all the components of enterprise risk management.
b. The organisation's vision, mission and strategies are formulated.
c. A risk management strategy is defined.

**Feedback on activity 23.1**

a. **The organisation's vision, mission and strategies** are formulated and are used as a basis for risk management.
b. **A risk management strategy** is defined with reference to the organisation's vision, mission and objectives.
c. **A risk management programme** is drafted to achieve the effective identification, assessment and evaluation of risks and the reporting thereof. The risk management programme should ideally include all the components of enterprise risk management as defined by COSO.

## 3 Risk management approaches

Over the years, several risk management standards or approaches have been developed. We will name four and briefly discuss them.

### 3.1 COSO's risk management model

The Committee of Sponsoring Organisations of the Treadway Commission (COSO) established the following Enterprise Risk Management Framework in 2004 (refer to section 2):

- internal environment or control environment (to establish the tone of the organisation and management's operating style towards the management of risks)
- objective setting
- event identification
- risk assessment
- risk response
- control activities
- information and communication
- monitoring

With this framework in mind, one has to identify the risks applicable and categorise them into the following *risk objectives* (see figure 23.1):

1. Strategic: High level goals and related risks which are aligned with the organisation's mission and strategic objectives
2. Operations: Risks related to the efficient and effective use of resources
3. Reporting: Reliability of reporting
4. Compliance: Comply with laws and regulations

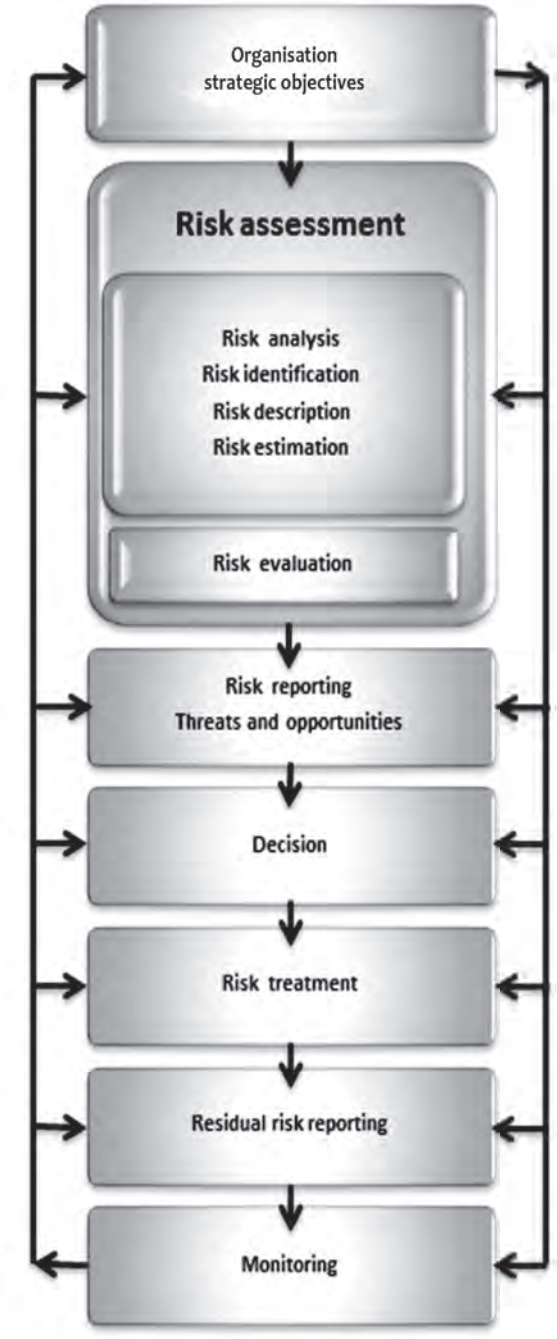
This will then allow you to assess, respond and control the risks.

This process takes place at organisation-, division-, business unit and subsidiary level.

## 3.2 IRM risk management standard

According to the Institute of Risk Management (IRM), risk assessment comprises the analysis and evaluation of risk through processes of identification, description and estimation. Risk assessment leads to risk evaluation, which leads to decision-making.

The IRM risk management standard is also clear about the fact that risks could result from internal and external factors.

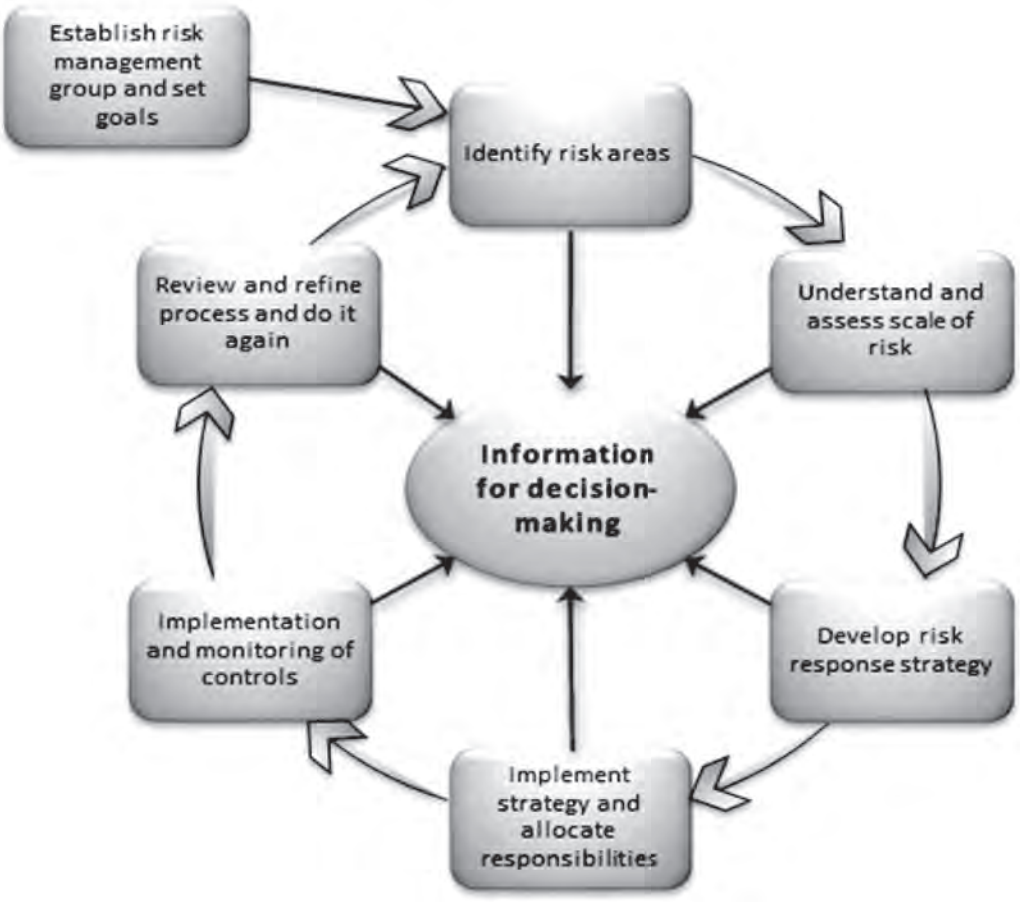



**Source:** AIRMIC, ALARM, IRM (2002:4)

FIGURE 23.2: The Institute of Risk Management risk management standard (adapted)

## 3.3 CIMA's risk management cycle

This model is based on the principle of continued feedback that is inherent in management control systems. The figure below indicates the flow of information needed to make decisions.




**Source:** CIMA (2009:123)

FIGURE 23.3: CIMA risk management cycle

## 3.4 Australia/New Zealand standard

The International Standard Association within the International Organisation for Standardisation (ISO) considers the Australia/New Zealand standard for adoption as an ISO standard. The standard is a generic guide for managing risk and can be applied to a wide range of activities. It comprises five steps, namely:

1. Establish the goals and context for risk management.
2. Identify risks.
3. Analyse risks and estimate the level of risk faced.
4. Evaluate and rank the risks.
5. Treat the risks through appropriate options.

Communication and monitoring are ongoing processes.

### Activity 23.2

A newly established organisation has built a brewery and hopes to establish itself as a leading player in the South African beer industry with the establishment of various unique brands. Identify what could be regarded as the organisation's main "risk objectives", with reference to the COSO risk management framework.

### Feedback on activity 23.2

After considering the internal and external environment, the organisation defined the following objectives:

a. Strategic: Establish the organisation as leading player in the South African beer industry. This could be done by identifying opportunities in the market and positioning the new brands in such a way to achieve sustained success.

b. Operations: Produce and deliver products of the highest quality in an efficient, effective and timely manner.

c. Reporting: Providing reliable and timely information aligned with reporting standards and best practices to enable stakeholders to analyse data and make sound business decisions.

d. Compliance: Conform to all legislative requirements for licensing, production, distribution, branding, advertising, labour relations, taxation, and so forth.

## 4 Summary

In this study unit, we explained the responsibility of the board of an organisation to disclose the effectiveness of risk assessments and responses. This is achieved with due care and diligence by adopting a risk management programme. The success of this programme is largely dependent on a good internal control environment and a comprehensive risk management plan with regular reporting on the achievement of this plan and the results thereof.

We briefly discussed the eight (8) inter-related components of an effective and adequate risk management programme. These eight components link with the Institute of Risk Management's risk management process, which also includes risk assessment, risk response (treatment) and risk reporting (communication).

Four (4) risk management approaches were named and briefly discussed. From these discussions, it became clear that most risk management approaches require an analysis of the organisation's strategic objectives and an analysis of the objectives of risk management. This analysis is necessary to achieve organisation objectives while managing threats and opportunities.

The categories of risk facing an organisation will be discussed in the next topic.

### Self-assessment activity

After having worked through this study unit, you should be able to answer the following questions:

a. Identify the four (4) risk objectives as defined by COSO.

b. Briefly discuss the four (4) risk management approaches.

c. Illustrate the inter-related components of enterprise risk management (ERM) that is part of the COSO risk management approach.

d. Describe the role of management and risk management in the execution of a risk management strategy.

e. Discuss methods to monitor the effectiveness of the risk management process.

## References and additional reading


AIRMIC, ALARM, IRM 2002. *A risk management standard.*

http://www.theirm.org/publications/documents/Risk_Management_Standard_030820.pdf [Accessed on 22 March 2012]

http://www.signnetwork.com (Bart Simpson on a skateboard).

CIMA. 2011. *CIMA Official Learning System. Paper P3 – performance strategy. 1st* edition. Oxford: Elsevier.

BPP Learning Media. 2011. *Performance strategy, strategic paper P3*. 3rd edition. London: BPP Learning Media.

Collier, PM & Agyei-Ampomah, S. 2009. CIMA Official Learning System. *Management accounting risk and control strategy*, *paper P3.* Oxford: Elsevier.

Committee of Sponsoring Organizations of the Treadway Commission (COSO). 2004. *Enterprise risk management – integrated framework*. www.coso.org. [Accessed on 22 March 2012]

Drury, C. 2011. *Management and cost accounting*. 7th South African edition. London: South-Western Cengage Learning.

King Report on Corporate Governance (KING III). 2009.

Valsamakis, AC, Vivian, RW & Du Toit, GS. *Risk management.* 4th edition. Sandton: Heinemann Publishers.

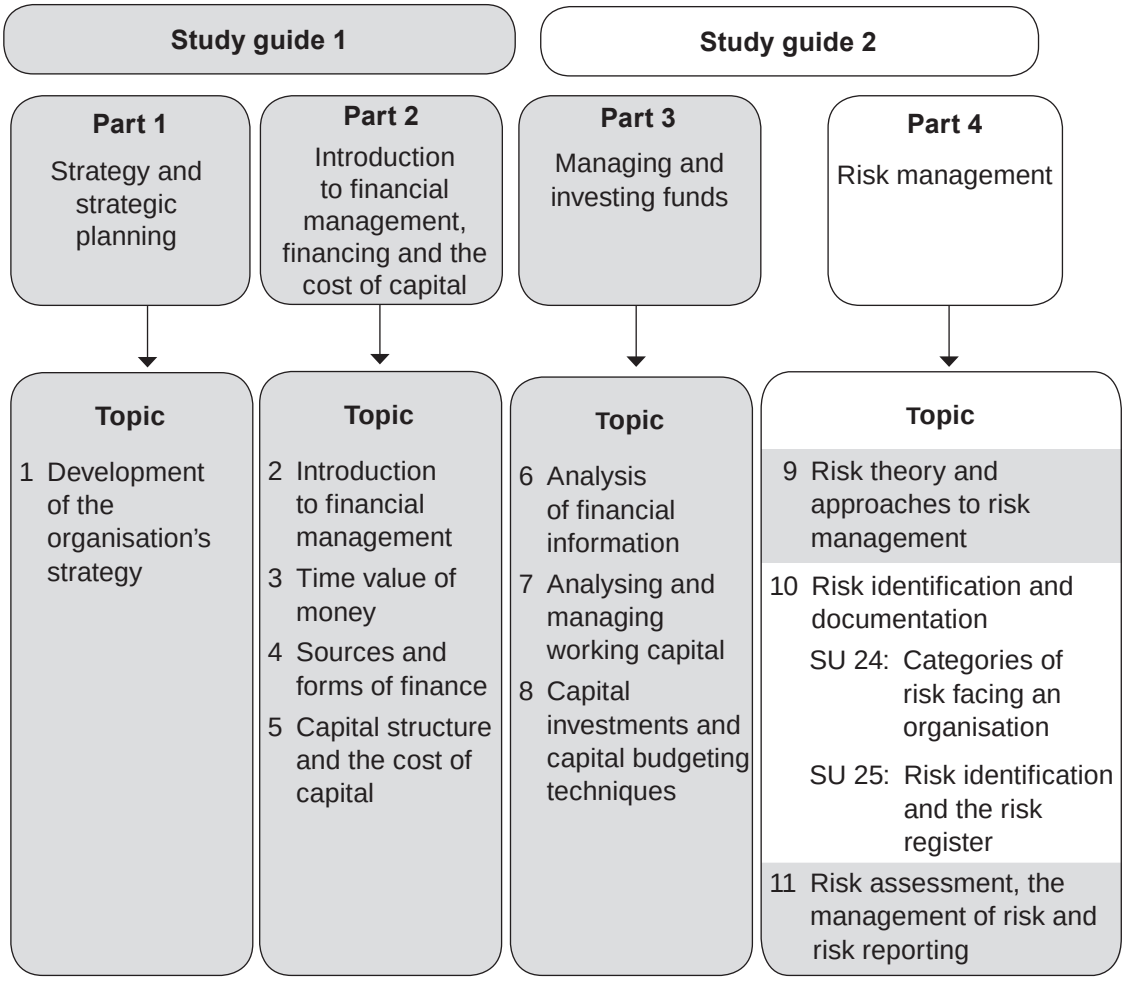
TOPIC 10

# Risk identification and documentation

## LEARNING OUTCOMES

After studying this topic, you should be able to:

- categorise risks facing an organisation
- identify risks facing an organisation by using various methods
- document risks facing an organisation in a risk register



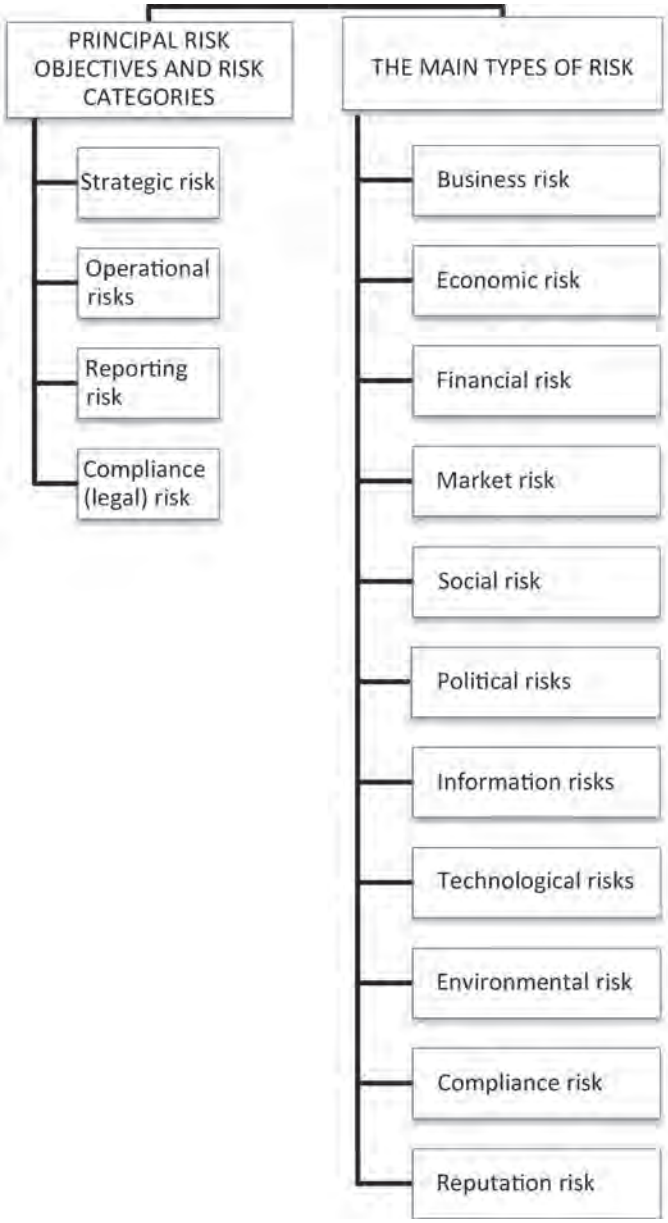
## INTRODUCTION

In the previous topic, we explained the components of an adequate enterprise risk management (ERM) programme. With reference to the ERM framework, this topic will deal with the practical application of risk management by focussing on the categories and types of risk, the tools available to identify risks and the documentation thereof in a risk register.

STUDY UNIT 24

# Categories of risk facing an organisation

**In this study unit**



# 1 Introduction

In this study unit, we will discuss the risk objectives of an organisation and look at types of risk that could face the organisation before we explain the methods to identify these risks in study unit 25.

# 2 Principal risk objectives/categories

Risks are categorised to streamline the management of similar risks with control measures suitable for the specific kind of risk. The categorisation of risks contributes to management and employees' risk awareness leading to an effective risk management programme whereby controls and other risk mitigating actions are introduced and monitored.

You will remember the four (4) risk objectives, as defined by COSO are:

1. Strategic objectives: refer to the high-level goals of the organisation and are aligned with the mission of the organisation.
2. Operational objectives: aim to use the organisation's resources in an effective and efficient manner.
3. Reporting objectives: aim to ensure reliable reporting of financial and non-financial data.
4. Compliance objectives: target compliance with applicable laws and regulations.

These four (4) risk objectives could then be used as the basis to identify categories of risk. A fifth category, namely information and technology as well as a sixth category namely systematic and unsystematic risk could be added to the list of COSO categories/ risk objectives.

## 2.1 Strategic risk

**STRATEGIC RISK**

Strategic risks have more to do with the organisation's position and relation with the external environment in the long-term.

These strategic risks – being from the external environment – are not under the control of the organisation, which make the risks difficult to mitigate. This business environment in which the organisation operates determines the profit volatility. This is strategic risk. The strategy an organisation decides on, regarding resources and possible structural changes of the organisation has a major impact on costs, prices, products, sales and sources of finance. However, some internal functions in an organisation have a key bearing on the organisation's situation in relation to its environment.

Factors, which influence strategic risks specifically, are the following:

- industries within which the organisation operates
- general state of the economy
- actions of competitors
- the specific stage of the product's life cycle
- price fluctuations over which you have little control
- level of operating gearing
- flexibility of production processes when product specifications alter
- research and development capacity with the ability to innovate
- significance of new technology

In many cases, these strategic risks will be out of the control of management, but by diversification, strategic risks can be minimised. Strategic risks are most important and should be clearly understood.

Also refer to the first part of this study guide to understand the role of strategic risks on the development and changes to an organisation's strategy.

### Activity 24.1

The following is an extract from the MultiChoice website (www.multichoice.co.za) illustrating the organisation's mission statement and vision.

Read the information below as well as the *ABOUT US* and *MEDIA* section on the MultiChoice website and try to identify some of the risks faced by the organisation.

***MISSION & VISION***

*MultiChoice Enriches Lives. It's our mission to brighten people's lives with compelling digital media content. Whether it's through Pay TV, the Internet, mobile phones or any other device on the digital horizon, our goal remains the same: We Enrich Lives. It can happen anywhere. In a city. In a remote village. To millions of people. To one person. To someone we don't know. To someone we work with. To the fortunate. To the less fortunate.*

***MISSION STATEMENT***

*We surround you with a world of entertainment.*

***VISION STATEMENT***

*We will be Number One in all chosen market segments, as the most trusted, best value provider of:*

- *The most compelling digital media content*
- *The most innovative delivery*
- *The best customer care*
- *Nurturing the best talent*

**Source:** Quoted from http://www.multichoice.co.za/multichoice/view/multichoice/en/page44128

**NOTE**

Refer to Topic 1 and 2 at the beginning of this module for definitions of an organisations' mission, vision and values and how these concepts are used in strategy setting.

### Feedback on activity 24.1

By visiting websites such as http://engineeringnews.co.za and http://www.channel24.co.za/TV/News, you can could get information such as the following:

**Appetite for mobile TV strong, but take-up hinges on coverage, cost**

Christy van der Merwe

18.02.2011

There has been a "massive leap" in interest in mobile TV in South Africa over the past year, World Wide Worx director **Arthur Goldstuck** tells Engineering News.

"We found previously that, if there is a technology that is incoming in the future and one asks about take-up, enthusiasm is very low. But the moment that the technology becomes available, enthusiasm leaps," Goldstuck notes.

In September 2010 ... the Independent Communications Authority of South Africa (Icasa) issued mobile TV broadcasting licences to e.tv (40), and MultiChoice (60%).

MORE

**Information technology set to play a bigger role in education**

Schalk Burger

2012-03-16

Information technology (IT) will increasingly be used in schools to improve the effectiveness of teaching and the availability of materials, says Department of Basic Education Curriculum Innovation and e-Learning director Phil Mnisi ...

Mindset, which has a dedicated education broadcast channel on Digital Satellite Television and on TopTV, has developed multimedia and video lessons for pupils and teachers to use, said Mindset CEO **Roith Rajpal**.

The non-profit company uses multiple platforms to distribute its content and has installed technology infrastructure at a number of schools ...

MORE

**Source:** Quoted from http://engineeringnews.co.za

**Report: Separate channels will end pay TV**

2012-06-26

Thinus Ferreira

If pay TV operators were forced to sell TV channels separately to their subscribers on a so-called *a la carte* basis or as part of a so-called "unbundling" of their TV channels, it would destroy the billion dollar pay TV industry, a new independent analysis on the pay TV industry has found.

A new report warns that so-called "unbundling" would lead to less choice and to only ten TV channels in America surviving the move.

**Related links**

- DStv Compact overtakes Premium
- Nando's tells MultiChoice to take a hike
- DStv lifts ban of Nando's ad

**Source:** Quoted from http://www.channel24.co.za/TV/News

By analysing the above market news and reading the mission and vision of MultiChoice, we can identify numerous possible risks, which could include:

- The organisation will not be the most compelling digital media provider if it is not able to secure the exclusive broadcast rights for a significant portion of highly rated content, television series, and sporting events. The rising cost of international content, negative currency fluctuations or the introduction/growth of a competitor in the market increase the risk of not being the most compelling digital media provider. Note that the introduction of a competitor increases awareness and interest in the industry, which could also present opportunities for growth.
- MultiChoice will lose its attraction if it does not provide the most innovative delivery, which includes high definition (HD) broadcasts, 3G streaming over the internet and mobile television.
- Not providing the best customer care could result in unhappy customers and losses. With technology at the core of the business, it may be a challenge to find enough skilful employees, which increases the risk of poor customer care. Measures such as learnership programmes and skills development initiatives could be risk responses that will contribute to reducing the likelihood and impact of this risk.
- If the organisation is unable to nurture the best talent, it could negatively impact on service delivery and result in losses. Working in a stressed working environment, which requires precision to ensure the achievement of broadcast schedules could have a negative impact on staff morale.
- Providing employee wellness service programmes and equipping staff with the skills to be efficient and effective reduces the risk of not achieving this objective.

As mentioned before, numerous other risks could be derived from the above.

**NOTE**

In your MAC modules (undergraduate and post-graduate), it is important that you read and watch financial news reports. You will not be examined on news events, but it will give you a better understanding of the context of what we are trying to teach you, especially if you are a full-time student!

## 2.2 Operational risks

As strategic risk focuses on the long-term, operational risk is more concerned with the day-to-day operations of the organisation.

**Key term: OPERATIONAL RISK**

① According to the definition by BPP Learning Media (2011:8):

"Operational risk is the risk of loss from a failure of internal business and control processes."

② The Basel Committee on Banking Supervision defines operational risk as:

"The risk of loss resulting from inadequate or failed internal processes, people, and systems or from external events."

Examples of operational risks are:

- losses from poor internal control systems, for example slack physical access control resulting in theft
- non-compliance with regulations or internal procedures
- information technology failures
- human error
- loss of key-person risk
- fraud
- business interruptions, such as those due to power failures and no back-up power generators

## 2.3 Reporting risk

**REPORTING RISK**

The risk refers to the provision of unreliable financial and non-financial information to all levels of management and other stakeholders.

This could result in inappropriate decisions being made. Reporting risk is also linked to financial risk that relates to the financial operation and position of an organisation.

## 2.4 Compliance (legal) risk

**COMPLIANCE RISK**

These risks arise from non-compliance with legislation or regulations.

This is often a significant risk as it could result in huge fines and penalties or the suspension of operating licences which could create a ***going concern problem*** for the organisation (organisation will not be able to continue operations).

There are often hundreds of acts, pieces of legislation and other regulations that require compliance. This includes labour laws, tax legislation, regulations for listed organisations (if applicable), and so forth.

The term ***going concern problem*** is one that you will come across throughout your studies. When an organisation is threatened by a ***going concern problem,*** it is faced with a significant event or situation that threatens the ongoing survival of the organisation.

### Activity 24.2

Use the risk categories or objectives (as provided by COSO) and categorise the following risks, which were noted by the chief risk officer of an organisation in the courier industry, that delivers mail and packages, and committed itself to specific delivery times and destinations:

- There is no communication with drivers during the day to notify them of traffic problems/delays, which sometimes result in drivers being stuck in traffic, resulting in late deliveries.
- The organisation's management has decided to work for two key customers in future. This has significant benefits for the organisation, as fixed contracts will guarantee work and an excellent revenue stream for next few years. However, one of the customers is already in financial distress and if the

business is lost it will be difficult to collect the money. It will also require marketing cost and time to expand the customer base to the current levels.

- Drivers sometimes exceed the speed limit in an effort to get the work done quickly.
- A driver was recently caught delivering packages with the organisation's vehicle for his own benefit. He also accused other drivers of collecting money for their own benefit for work done with the organisation's resources.
- In an effort to save cost, the chief financial officer has decided to reduce the staff in the financial department and not fill the position before the end of the financial year when the financial statements are drafted.

---

**Feedback on activity 24.2**

- Inadequate communication with drivers resulting in late deliveries is an **operational risk**, as it is part of the day-to-day activities.
- The decision to work for only two key customers increases the risk of future failure of the organisation if one of the key customers suffers financial losses or close down. This is a **strategic risk**, as it is a long-term risk.
- Drivers exceeding the speed limit are breaking the law. This is a **compliance risk**.
- Drivers doing deliveries for their own benefit with the organisation's resources are defrauding the organisation. This is an **operational risk**.
- The reduction in staff in the finance department could result in inaccurate and unreliable financial information, which is a **reporting risk**.

---

## 3 The main types of risk are

| |
|---|
| Business risk |
| Economic risk |
| Financial risk |
| Market risk |
| Social risk |
| Political risk |
| Information risk |
| Technology risk |
| Environmental risk |
| Compliance risk |
| Reputation risk |

We will now discuss the above types of risk in more depth.

## 3.1 Business risk

**Key term: BUSINESS RISK**

Risks that arise from the activities of the organisation and relate to the people, processes, products and structure.

This includes product failure, fraud, loss of suppliers, loss of key employees, business interruptions, contractual inadequacy risk, and so forth. These risks are generally within the organisation's control and can be managed by introducing internal controls or insurance.

## 3.2 Economic risk

**ECONOMIC RISK**

Economic risks are directly related to risks that originate from activities or non-activities in the normal economy. This includes changes to inflation, the unemployment rate and international policy. These economic risks start before transactions take place and are considered to be external.

To understand economic risks, one needs to have a thorough knowledge of the organisation's competitive position on a global basis. Other examples of these risks are:

- Product risk

A product risk arises when consumers' taste change and they do not purchase your product any longer, preferring another product instead of your product. When preferences change, your organisation's sales drop, which result in losses. This could include changes in trends, for example, a sudden preference for leather handbags could result in reduced sales for handbags made from other material.

- Stakeholder risk

Stakeholders or investors can lose interest in your organisation. A non-committed stakeholder can be a huge risk as they might hold back new funds for new developments or the urgent maintenance of the production plant. Employees (as stakeholders) can also be a risk in constant strikes and disruption.

## 3.3 Financial risk

**FINANCIAL RISK**

Financial risk relates to the financial operation and position of an organisation.

The most important financial risk is that the organisation will not be able to continue to function as a going concern. Financial risks are also linked to the organisation's financial structure. This is the mix of equity and debt capital, the risk of not finding funding and for overtrading. The following are examples of financial risks:

- Investment risk

Investment risk arises, for example, when an organisation makes a decision to invest capital in a project, expansion, and so on, but due to uncertainties, the investment decision turns out to have been untimely and wrong. Examples of uncertainties are insufficient data or the definition of cost of capital wrongly interpreted.

- Currency risk

Transactions involving foreign countries always have the possibility of a gain or loss, due to value of one currency fluctuating in relation to another currency. To reduce or eliminate

these risks, organisations can use hedging techniques. The three most important risks arising from currency risks are:

– Transaction risk – changes in the settlement values
– Translation risk – changes to the values of foreign assets and liabilities at year-end
– Economic risk – the effect of the exchange rate on the cost of goods

- Interest rate risk

If an organisation has reasonably high debt not linked to a fixed rate, the uncertainty of interest rate fluctuations is a risk. If it rises, the cost of capital can cripple the organisation. The reverse also being true – if the organisation has high fixed rate debt and the rate drops, the organisation cannot reap the benefits of lower finance cost. Hedging techniques also apply.

Interest rate risk also applies to investments linked to interest rates.

- Credit Risk

The Official CIMA Terminology (2011:23) for credit risk is:

"The possibility of losses due to non-payment by debtors. This usually applies to the organisation's debtors and counter parties to hedging transactions."

Credit risk is influenced by: the organisation's credit policy, the proportion of credit sales, credit terms offered, the screening of debtors and debt collection procedures.

- Trading risks

These are risks that occur due to environmental, cultural and time differences between local and international organisations.

- Financial records and reporting risk

Ineffective accounting systems or a breakdown in accounting systems can lead to financial reporting risk as this could result in invalid, incomplete, and unreliable recording of transactions in the accounting records.

**NOTE**

You will learn more about hedging currency and interest rate risk in your post-graduate modules.

## 3.4 Market risk

**MARKET RISK**

Market risk originates from events and transactions in the market place.

Market risks are risks that can result in a financial loss for an organisation, due to the actions of competitors or a change in the prices of commodities and investments on stock markets. Market risks can be caused by:

- Competitors

Actions taken by competitors can be a risk for your organisation. For example, if your competitor introduces a new product more advanced than your own, you are in danger of having a cash flow problem, ending in a loss, because clients may prefer to buy

the competitor's product, instead of yours. In addition, your competitor can offer a reduced price for his product, at which you cannot manufacture and sell your product.

- Commodities

The possibility exists that certain raw materials crucial to the manufacturing of a product can no longer be supplied. This can force the organisation to use substandard raw materials, resulting in products of lower or inferior standard being sold. This can lead to a decline in market share and a threat to your organisation. Active trading markets exist for certain commodities such as gold, platinum, maize, and so forth. This also includes commodity price risk that relates to the risk of a change in commodity prices.

You can manage some of these risks by hedging contracts.

## 3.5 Social risk

**SOCIAL RISK**

Social risk relates to the impact of the organisation on the community and vice versa.

Social risks include drug addiction and social upheaval, that is as a result of, for example, a decision to close a business unit or a mine in a small mining community.

## 3.6 Political risk

**POLITICAL RISK**

Refers to the effect that detrimental political activities or political instability have on an organisation.

## 3.7 Information risk

**INFORMATION RISK**

Information risk is the risk that decision makers within the organisation use invalid or poor quality information for decision-making, or the loss of information.

*Good* information is information that adds to the understanding of a situation. BPP Learning Media created the mnemonic ***ACCURATE*** to help you remember the qualities of good information. They are:

**A** – Accurate. Figures should add up.
**C** – Complete. All the required information is included.
**C** – Cost-beneficial. Cost to obtain information should not be more than the benefit.
**U** – User-targeted. The needs of the user should be kept in mind to make it user-friendly.
**R** – Relevant. Only information relevant to the decision must be supplied.
**A** – Authoritative. The source of the information must be reliable.
**T** – Timely. Information should be available when required.
**E** – Easy to use. Information should be clearly presented.

The above are the characteristics of *good* information. In business, one does not always have "good" information and sometimes have to make decisions based on inadequate information, which creates an information risk.

The information technology (IT) systems and databases of a short-term insurance company on which all the client information is stored is an example where information risk is prevalent. Clients' personal information and details of their possessions are stored on these systems

and regular back-ups and advanced data security are very important risk responses in order to prevent the loss of information.

This is a very important risk and it is imperative for management to have proper policies and procedures in place to keep the occurrence of such an event to the minimum.

## 3.8 Technological risk

**TECHNOLOGICAL RISK**

① Risk involved with the operation, ownership and sustainability of the organisation's information technology (IT) systems. This includes the negative impact on productivity, service delivery, and so on, when IT systems fail, but also the risk associated with missing opportunities to use technology to enable or enhance the business.

② Technological risks also refer to the manufacturing plant being outdated or a product being obsolete when a more technologically advanced product has replaced it.

**NOTE**

The risks directly related to information technology (IT) are addressed in the AIN1501 module.

## 3.9 Environmental risk

**ENVIRONMENTAL RISK**

- The risk relates to climate change and risk of natural disasters (deemed to be external risks)
- The risk of damage caused by a pollutant, that is, a substance or by-product introduced into an environment other than its intended use/ purpose (deemed to be within the organisation's control). This could result in damage to the environment as well as fines and penalties in countries with strict regulations.

## 3.10 Compliance risk

**COMPLIANCE RISK**

Risks that arise from non-compliance with legislation, regulations or internal procedures.

## 3.11 Reputation risk

**REPUTATION RISK**

A loss of reputation is the adverse consequence created by bad publicity due to the materialisation of another risk. External stakeholders will normally perceive this loss and it has serious consequences.

**NOTE**

As mentioned before, the list of types of risks is endless. You have to think outside the box and apply your mind to the circumstances of the organisation. Think of risks that may be applicable to the specific situation in the organisation.

**Activity 24.3**

List some risks that may be relevant to a South African organisation manufacturing paper from tree pulp. The organisation exports to various clients in South America and Africa. The company operates with 80% debt capital.

**Feedback on activity 24.3**

With reference to the study material, there could be numerous types of risks and the following are just a few examples that you could have considered:

- environmental risks caused by air pollution from the paper mill (paper manufacturing plant)
- environmentalists may place pressure on the organisation and cause restrictions on the cutting of trees if a conscious effort is not made to ensure the sustainability of the water resources, fertile land, natural forests and the biological system in the area
- the high level of gearing increases the financial risk and could place restrictions on future expansion as loans require fixed repayments and are often secured by assets
- the organisation exports to South America and other African countries, which increases currency risk as contract values may change with currency fluctuations

## 4 Summary

In this study unit, we again mentioned the four categories of objectives according to ERM. We also discussed a significant list of types of risks. You might find other risks not mentioned here when reading other textbooks, but as stated, you have to think outside the box.

In the next study unit, we will examine methods to identify risks.

**Self-assessment activity**

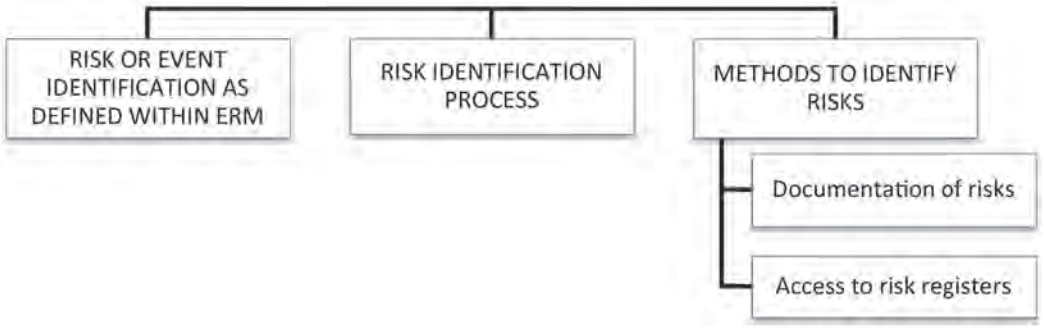
After having worked through the study unit, determine if you are able to answer the following questions:

a. Describe the difference between operational and strategic risks and formulate five (5) examples of each.
b. Describe the characteristics of *good* information for decision-making.

STUDY UNIT 25

# Risk identification and the risk register

**In this study unit**




## 1 Introduction

In the previous study unit, we discussed the types of risk that could affect the organisation. This study unit deals with the identification of risks. This process is often facilitated by a risk management department and will be best to summarise it in a risk register.

## 2 Risk or event identification as defined within ERM

**RISK OR EVENT IDENTIFICATION**

Risk or event identification is the process to identify internal and external events, which could affect the achievement of the organisation's objectives. This includes risks and opportunities.

Risks are identified with reference to the organisation's strategy and objectives.

There are various methods to identify risk. In practice, members of the risk manager/ risk management department often facilitate the risk identification process with the risk management group and the organisation may adopt either a "top down" approach, which starts with senior management, or a "bottom up" approach, which starts with lower ranking employees.

## 3 Risk identification process

- One risk identification method will not be sufficient to identify all the risk exposures.
- The risk identification process has to be supported by consulting with as many people inside the organisation as possible. This includes management, internal audit and key employees.
- Risk identification is a continuous process.

## 4 Methods to identify risks

The methods to identify risks include the following:

| METHOD | DESCRIPTION |
|---|---|
| Control self-assessments completed by management: | Tool to assess management's perception of perceived strengths, risks, weaknesses within the business processes and the adequacy and effectiveness of the controls designed to mitigate the risks and achieve business objectives. |
| SWOT analysis: | Strategic planning method used to evaluate the strengths, weaknesses, opportunities and threats. The management of threats and weaknesses should be prioritised before committing time and resources to the enhancement of strengths or achievement of opportunities. This will contribute to a sustained organisation. |
| PESTEL analysis | An analysis of all the **P**olitical, **E**conomic, **S**ocial, **T**echnological, **E**cological, and **L**egal factors that could affect the organisation. |
| Five Forces Model (Porter, 1980) | Considers the following in an effort to identify risk:<br>● rivalry among existing organisations<br>● bargaining power of buyers<br>● bargaining power of suppliers<br>● threat of new entrants<br>● threat of substitute products or services |
| Brainstorming/risk workshops | A group tries to find a solution for a specific problem or question by gathering a list of ideas spontaneously contributed by the group. |
| Stakeholder consultations | Techniques involving data collection and could include the survey of stakeholders by interview or questionnaire. |
| Benchmarking | Could be applied to risk management as management identifies the best risk management practices in their industry, or in another industry where similar processes exist, and compare the results and processes of those studied (the "targets") to the organisation's own results and processes. |
| Diagnostics | Diagnostics is a term used in risk management to refer to methodologies measuring specific risk exposures ("value-at-risk"), that is tools used to selectively examine actions, performance and events to measure an organisation's safety culture. This enables management to measure and highlight potential shortcomings or risks. |
| Organisation charts and flow charts | These charts indicate the processes/divisions of the organisation and assist to identify risks as well as indicate risk concentrations and dependencies. |

| METHOD | DESCRIPTION |
|---|---|
| Fish bone | The process to break down a business process into its component parts to examine all the risks to that process. |
| Analysis of the financial statements | This helps to identify values that are at risk, possible legal exposures or contractual liabilities (on the statement of financial position); and/or to indicate sources of income and losses (statement of profit or loss and other comprehensive income). |
| Results of quality control checks, inspections and audit reviews | The results of quality control checks, inspections and audit findings will assist with the identification of risks. |

Many of the above techniques are also used to embed risk awareness and risk management into management's activities to improve the control environment.

## NOTE

In the rest of this and other MAC modules, you will encounter questions requiring you to list or discuss other/ qualitative (subjective) factors when evaluating various options. The SWOT and PESTEL analysis are useful tools to consider when answering those questions.

In the following activity, we will demonstrate the use of the more widely used techniques of SWOT and PESTEL analysis.

### Activity 25.1

Consider the following case study of Wakeup (Pty) Ltd, a coffee manufacturer based in South Africa. The organisation's differentiating factor is that it sources unrefined or raw coffee beans from a small region in Ethiopia. These coffee beans are roasted using a refined process to produce an aromatic and rounded flavour. The coffee is expensive and targets a niche (exclusive) segment of the market.

The following information was noted based on recent discussions with key stakeholders including: The chairman of the audit committee (an independent non-executive director), the chief executive officer (CEO), the chief financial officer (CFO), the chief risk officer (CRO) and key members of management, including the head of the legal department:

- The organisation has a strong financial position to facilitate the financing of future projects.
- The organisation has an excellent distribution network across South Africa.
- This distribution network is used to supply two large retailers with stores across South Africa.
- Only one of the retailers has placed their order for the next quarter.
- Based on market research, Wakeup's aromatic and rounded coffee blends will be very popular in the fast growing Russian and Brazilian markets.

- The economic downturn in South Africa is a concern as expensive coffee is a luxury item and there are inexpensive substitutes.
- Wakeup has a contract with an international company for the coffee beans to be shipped in special containers from Ethiopia to South Africa. The shipping company has expressed concerns about the growing number of pirate attacks off the Somalian coast, but has indicated that alternative routes are not economically viable. The attacks have resulted in some cargo being lost or stolen and in the shipping company not achieving the delivery dates.
- There is currently a legal dispute over the patent rights of one of the coffee blends sold by Wakeup.
- The company has a strong and stable base of employees with very good succession planning.
- Wakeup has a strong and recognisable brand in South Africa.

**REQUIRED**

a. Draft a SWOT (Strengths, Weaknesses, Opportunities and Threats) analysis.

b. Draft a PESTEL analysis.

---

## Feedback on activity 25.1

**a. SWOT analysis for Wakeup (Pty) Ltd**

| | Strengths | Weaknesses |
|---|---|---|
| **Internal perspective** | • The organisation has a strong financial position to facilitate financing future projects.<br>• The organisation has an excellent distribution network across South Africa.<br>• Strong and stable base of employees with good succession planning.<br>• Strong and recognisable brand in South Africa. | • Wakeup has a small customer base and only supplies two large retailers.<br>• Wakeup produces expensive coffee blends, which could result in reduced sales in the current economic downturn.<br>• Currency risk exposures from imports. |

| | Opportunities | Threats |
|---|---|---|
| External perspective | • Opportunity to expand to the fast growing Russian and Brazilian markets. | • Only one of the retailers has placed its order for the next quarter.<br>• Growing number of pirate attacks off the Somalian coast could result in delayed delivery dates or the coffee beans (raw material) being lost or stolen.<br>• There is currently a legal dispute over the patent rights of one of the coffee blends sold by Wakeup. |

**NOTE**

This is a SWOT analysis, but based on the above, a number of significant risks can be identified. The assessment of the risks resulting from the threats and weaknesses will be more significant than the advancement of the strengths and opportunities. This is apparent because the threats and weaknesses need to be addressed to ensure the sustainability of the organisation before committing time and resources to the enhancement of strengths or achievement of opportunities.

**b. PESTEL analysis:**

| ANALYSIS | CONSIDERATIONS |
|---|---|
| Political factors | • The government stability in lucrative Russian and Brazilian markets needs to be considered.<br>• Some governments offer agricultural subsidies which could influence the price of raw coffee beans in those countries.<br>• Taxation policies in South Africa, Ethiopia and other potential markets. The taxation policies of countries where significant competitors are based should also be considered.<br>• Some governments and regions offer tax incentives/ grants, which could facilitate new projects or expansion. |

| ANALYSIS | CONSIDERATIONS |
|---|---|
| **E**conomic factors | • The sustainability of Wakeup's two large customers is important when identifying future risks.<br>• Other growing markets around the world offer the opportunity for expansion.<br>• The economic downturn could result in reduced sales as unemployment increases and people have less disposable income.<br>• Rate of inflation in Ethiopia could see an increase in commodity prices, which will be hard to control.<br>• Stricter credit control from banks makes it harder to acquire finance for expansions.<br>• Interest rate fluctuations could influence the cost of production.<br>• Exchange rate fluctuations could influence the competitiveness of Wakeup's product pricing if it hopes to expand into international markets. It could also increase the risk of more inexpensive substitutes in the South African market. |
| **S**ocial factors | • Lifestyle changes influence demand, that is when people work harder and spend more time at work, it could influence the demand for coffee.<br>• Behaviour that is socially acceptable, will drive demand.<br>• The influence of consumer protection movements, which seek to protect consumers from dishonest packaging, advertising and guarantees. This includes promoting healthier products.<br>• The effect of changes in demographics and increased urbanisation. |
| **T**echnological factors | • Government spending on new technologies.<br>• Advancements in the production process which could make it cheaper, quicker and more cost effective.<br>• Advancements in the transport of goods and improvements to ensure that goods remain dry and unscathed.<br>• The ability to apply technologically advanced production processes in foreign markets needs to be considered. |

| ANALYSIS | CONSIDERATIONS |
|---|---|
| **E**cological factors | • Environmental laws and regulations.<br>• By-products of the coffee production process and the cost and effect of waste disposal.<br>• The sustainable management of the fertile land by the Ethiopian coffee bean suppliers.<br>• Changing weather patterns. |
| **L**egal factors | • Foreign trade regulations regarding the unroasted/ raw coffee beans (agricultural commodity) and the coffee (finished product).<br>• Laws and regulations including labour laws, product safety, and so forth.<br>• The organisation is involved in a legal dispute over patent rights. |

These are only some considerations that could be considered when doing a PESTEL analysis and there are many more.

We will discuss the assessment of risks in study unit 26 and risk responses (methods to address risks) in study unit 27.

## 5 Documentation of risks

The risk management department often facilitates this process and documents the risks in a risk register.

**RISK REGISTER**

A risk register is a summary of identified risks, which are listed, described and assessed/ measured (based on their potential impact and likelihood).

Data that could be included in a risk register is:

- risk objective/category that the risk relates to
- date when the risk was identified
- description of the risk
- inherent risk rating (based on the impact and likelihood of the risk, which will be discussed in the next topic)
- root cause analysis
- risk responses (risk mitigating action plan, which will be discussed in the next topic) if any
- the target/ implementation date of the risk responses (This is important as the risk register is a living document, which will change as the organisation grows and changes.)
- residual risk rating (to be discussed in the next topic)
- the "owner" of the risk (The individual responsible for ensuring that risks are appropriately engaged with risk responses.)
- interdependencies with other risks

Various software packages are available for the recording, storing and management of risk registers.

## Activity 25.2

Based on the Wakeup case study noted in activity 25.1 of this study unit, there is a growing number of pirate attacks off the Somalian coast, which could result in delayed delivery dates for the coffee beans (raw material) or the coffee beans (raw material) being lost or stolen.

The risk is that the operations department may be unable to manufacture coffee without the raw material or that unacceptable delays occur while the raw material is at sea.

**REQUIRED**

Indicate how this risk could be documented and tracked in a risk register.

## Feedback on activity 25.2

| Risk objective/ category | Risk type | Date of the risk identifi-cation | Risk description | Inherent risk assess-ment | Risk responses | Risk response target date | Residual risk assess-ment | Risk owner |
|---|---|---|---|---|---|---|---|---|
| Operational | Com-modity risk | 1 March 20XX | Insufficient coffee beans to ensure an effective and efficient manufacturing process | Critical (20) | Negotiate insurance for the shipments or<br>find a feasible alternative supplier | 30 April 20XX | Medium (6) | Head of Opera-tions |

Legends:

| | | |
|---|---|---|
| | Critical | Usually represented by the colour red |
| | High | Usually represented by the colour orange |
| | Medium | Usually represented by the colour yellow |
| | Low | Usually represented by the colour green |

**NOTE**

The calculation of the inherent risk assessment, formulation of risk responses, as well as the calculation of the residual risk assessment will be discussed in the next topic.

## 6 Access to risk registers

Access to edit the risk registers should be limited to key personnel, that is the members of the risk management department. Access to view the risk registers should be broader to enable those members of management responsible for the implementation of risk responses to understand their roles and responsibilities. However, the ability to view the risk registers should also be limited to prevent the risks and weaknesses of the organisation from becoming public knowledge, which could be used by competitors or by people with malicious intent.

Access controls over the risk register is clearly important. Consider other general controls that need to be applied to ensure the effective documentation of risks and related information.

## 7 Summary

In this study unit, we focused on the initial identification of risk and the subsequent documentation of risks. The process to draft and update risk registers on a periodic basis is often facilitated by the risk management department.

We will discuss the assessment of inherent risk in study unit 26, the assessment of residual risks and risk responses to manage risk in study unit 27 and risk monitoring and risk reporting in study unit 28.

Self-assessment activity

After having worked through this study unit, you should be able to answer the following questions:

a. Illustrate methods to identify risks and discuss how the result of external- and internal audit can assist in identifying risks.
b. State data that will typically be noted when drafting a risk register.

## Enrichment/additional reading

Browse the internet for examples of risk management software and reflect on everything that management will need to consider when buying and implementing the software.

## References and additional reading


Basel Committee on Banking Supervision. 2003. *Sound practices for the management and supervision of operational risk*. Basel: Bank for International Settlements.

BPP Learning Media. 2011. *Performance strategy, strategic paper P3*. 3rd edition. London: BPP Learning Media.

MultiChoice Africa. *Mission and Vision*.

http://www.multichoice.co.za/multichoice/view/multichoice/en/page44128 [Accessed on 9 July 2012]

http://engineeringnews.co.za

[Accessed on 9 July 2012]

http://www.channel24.co.za/TV/News [Accessed on 9 July 2012]

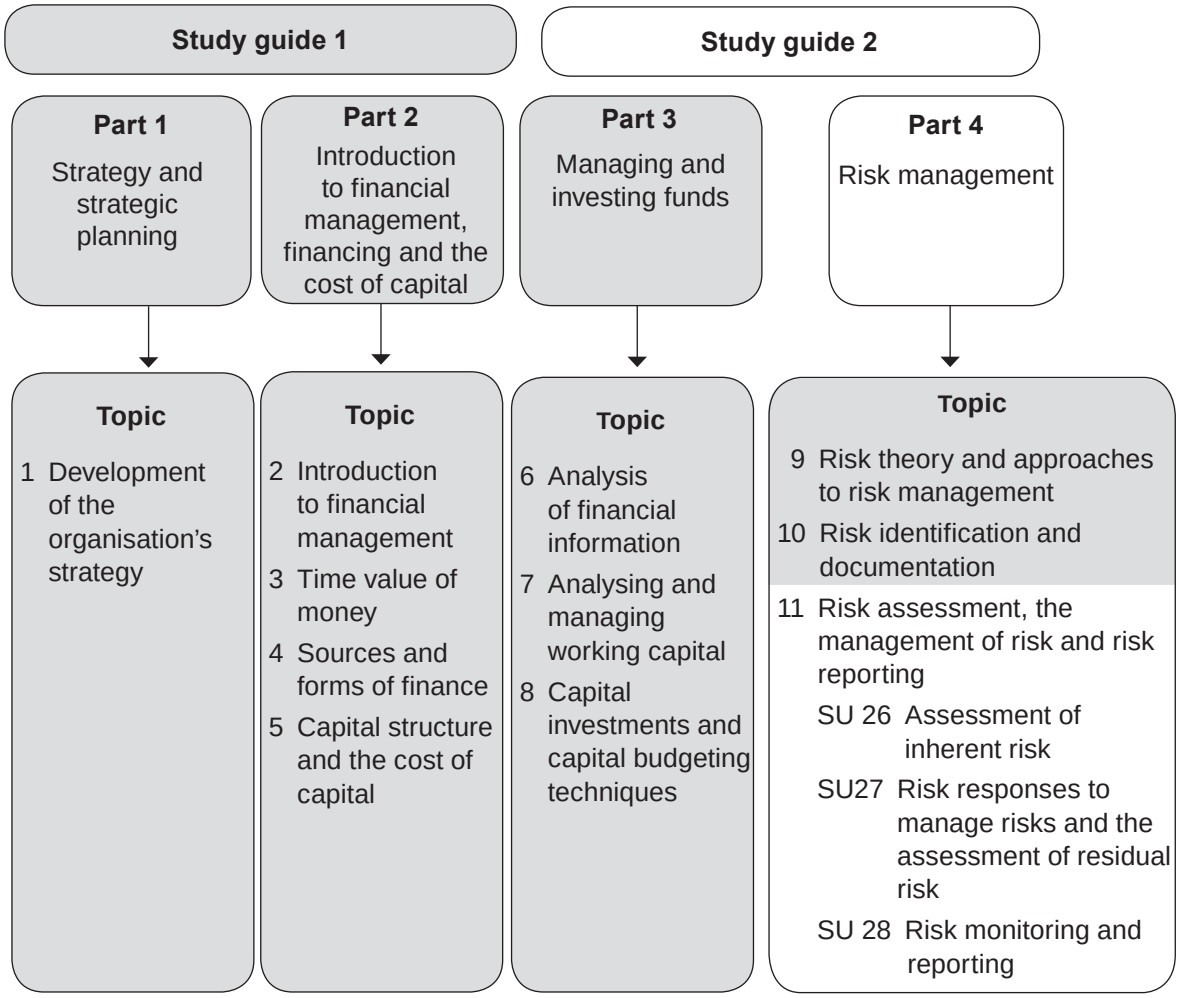
TOPIC 11

# Risk assessment, the management of risk and risk reporting

## LEARNING OUTCOMES

After studying this topic, you should be able to:

- evaluate the assessment of inherent and residual risks
- formulate risk responses to manage risks
- discuss risk reporting



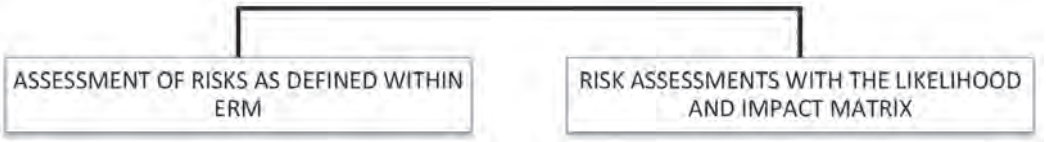
## INTRODUCTION

The previous topic focussed on the identification of risk. Topic 11 will explain the assessment of risk, risk responses to reduce or mitigate the risk, and risk reporting.

STUDY UNIT 26

# Assessment of inherent risk

**In this study unit**




## 1 Introduction

In the previous study units, we dealt with the identification and documentation of risk events. In this study unit, we will examine the next step in the ERM risk management model, which is the assessment of risks at the inherent risk level. This process is often facilitated by a risk management department in consultation with management and should be summarised in a risk register.

## 2 Assessment of risks as defined within ERM

Risks are analysed by considering two dimensions, namely the impact (potential damage or loss) and the likelihood of the event occurring. This is used as a basis for determining how the risk should be managed on both an inherent (gross) and residual (net) basis.

The following definitions are critical:

**INHERENT RISK AND RESIDUAL RISK**

**INHERENT RISK** involves the assessment of risk **BEFORE** the application of any risk responses.

Risk responses can include the introduction of internal controls, the transfer of the risk or management responses.

**RESIDUAL RISK** involves the assessment of risk **AFTER** taking into account the application of any internal controls, transfer or management responses to reduce the risk.

The residual risk rating will indicate whether the remaining risk is within the organisation's risk appetite. Risk responses are discussed in the next study unit.

## 3 Risk assessments with the likelihood and impact matrix

The process to assess risks through the likelihood or impact matrix is called risk mapping. For many organisation's a 3x3 matrix of high/medium/low will suit their needs, while for others a 5x5 matrix or even a 7x7 matrix may be more suitable.

Figure 26.1 (CIMA 2009) below illustrates one way in which risks can be assessed by using a 5x5 matrix.

| LIKELIHOOD/PROBABILITY | | |
|---|---|---|
| **Assessment** | **Measure-ment** | **Description** |
| extreme | 5 | expected to occur |
| very high | 4 | will probably occur |
| medium | 3 | can occur at some time and may be difficult to control |
| low | 2 | not expected to occur |
| negligible | 1 | may occur only in exceptional circumstances |

| IMPACT/CONSEQUENCE | | |
|---|---|---|
| **Assessment** | **Measure-ment** | **Description** |
| extreme | 5 | impact or consequence of the risk will threaten the survival or viability of the organisation |
| very high | 4 | will have a significant impact on the achievement of organisation objectives or threaten the continued operation of the organisation |
| medium | 3 | will have a moderate impact on the achievement of organisation objectives |
| low | 2 | will threaten efficiency or effectiveness of some aspects of the organisation |
| negligible | 1 | limited effect and the impact or consequence of the risk can be dealt with by routine operations |

**Source:** CIMA (2009)

FIGURE 26.1: Risk assessments with the likelihood and impact matrix

Legends:

| | | |
|---|---|---|
| | Critical | usually represented by the colour red |
| | High | usually represented by the colour orange |
| | Medium | usually represented by the colour yellow |
| | Low | usually represented by the colour green |

The risk assessment is calculated by multiplying the likelihood measurement with the impact measurement.

### Activity 26.1

Browse the internet for images of risk-rating matrices.

### Feedback on activity 26.1

Various images of risk rating matrices are available on the internet. The following is an illustrative example of a risk-rating matrix with the calculated values (results of the risk assessments) in brackets:

| IMPACT | LIKELIHOOD | | | | |
|---|---|---|---|---|---|
| | **Negligible (1)** | **Low (2)** | **Medium (3)** | **Very high (4)** | **Extreme (5)** |
| **Extreme (5)** | medium (5) | medium (10) | high (15) | critical (20) | critical (25) |
| **Very high (4)** | low (4) | medium (8) | medium (12) | high (16) | critical (20) |
| **Medium (3)** | low (3) | medium (6) | medium (9) | medium (12) | high (15) |
| **Low (2)** | negligible (2) | low (4) | medium (6) | medium (8) | medium (10) |
| **Negligible (1)** | negligible (1) | negligible (2) | low (3) | low (4) | medium (5) |

Legends:

| | | |
|---|---|---|
| | Critical | usually represented by the colour red |
| | High | usually represented by the colour orange |
| | Medium | usually represented by the colour yellow |
| | Low | usually represented by the colour green |
| | Negligible | usually represented by the colour blue or no colour |

### Activity 26.2

The following three (3) risks were identified as part of a brainstorming session facilitated by the risk analyst (a member of the risk management department):

a. A foreign competitor will be introducing new technologies, which can result in the organisation's products becoming outdated.
b. Employees can enter into inefficient or wasteful contracts on behalf of the organisation.
c. A fluctuation in currencies can have a negative effect on the price of imported raw materials. The organisation currently imports 2% of its raw material from Australia, but can buy the raw material from local suppliers.

The following likelihood and impact ratings were attributed to each risk event:

a. New technologies to be introduced by a competitor:

Likelihood: Will probably occur (4).

Impact: The impact or consequence of the risk will threaten the survival or viability of the organisation (5).

b. Inefficient or wasteful contracts:

Likelihood: Can occur at some time and may be difficult to control (3).

Impact: Will have a significant impact on the achievement of organisation objectives or threaten the continued operation of the organisation (4).

c. A fluctuation in currencies:

Likelihood: Can occur at some time and may be difficult to control (3).

Impact: Limited effect and the impact or consequence of the risk can be dealt with by routine operations as a small percentage of raw material is imported and the raw materials can be sourced from local suppliers (1).

**REQUIRED**

Populate the following selected fields of the risk register. Indicate the applicable risk type and complete the inherent risk rating.

| Risk objective/ category | Risk type | Risk description | Inherent risk rating |
|---|---|---|---|

## Feedback on activity 26.2

Calculation of inherent risk ratings:

a. new technologies to be introduced by a competitor: 4 x 5 = 20

b. inefficient or wasteful contracts: 3 x 4 = 12

c. a fluctuation in currencies: 3 x 1 = 3

The following represents selected fields of the risk register after taking the above information into account.

| Risk objective/ category | Risk type | Risk description | Inherent risk rating |
|---|---|---|---|
| Strategic risk | Technological risk | New technologies to be introduced. | 20 |
| Operational risk | Business risk | Inefficient or wasteful contracts can be entered into on behalf of the organisation. | 12 |
| Financial risk | Currency risk | Fluctuation in currencies can have a negative effect on the price of imported raw materials. | 3 |

Legends:

| | | |
|---|---|---|
| | Critical | usually represented by the colour red |
| | High | usually represented by the colour orange |
| | Medium | usually represented by the colour yellow |
| | Low | usually represented by the colour green |

## 4 Summary

In this study unit, we discussed the concepts “inherent” and “residual risk”. We also noted that the most common way of assessing risks is through the likelihood and impact matrix. Risk assessments are evaluated to make decisions about the significance of the risks and to determine what risk response will be most appropriate.

Risk responses and the assessment of residual risk will be discussed in the next study unit.

### Self-assessment activity

After working through this study unit, you should be able to define:

a. inherent risk
b. residual risk

STUDY UNIT 27

# Risk responses to manage risks and the assessment of residual risk

**In this study unit**


## 1 Introduction

In the previous study unit, we discussed the concepts “inherent” and “residual risk” as well as the assessment of risks. In this student unit, we will discuss strategies to manage risks and how to reduce risks so that the residual risk ratings are at an acceptable level.

## 2 Risk responses are included in the risk management strategy

We have learned that an organisation’s risk management strategy should include:

- the risk profile/risk appetite of the organisation, that is stating the level of risk it finds acceptable
- the risk management processes (risk identification and assessment) the organisation practices, together with its preferred option for risk treatment (that is, avoidance, reduction, transfer, or retention and acceptance)
- who is directly responsible for the organisation’s risk management
- how reporting and monitoring processes will take place

## 3 Risk responses

The purpose of risk responses is to reduce the likelihood and/or impact rating of a risk event.

**COSO’s ERM lists the following possible risk responses (mitigating actions):**

1. **Avoid:** Action is taken to avoid activities, which give rise to high-risk events, that is, to refrain from business activities in a certain geographical market, such as in a war-torn country. Management accepts that avoiding the risks outweighs the benefits.
2. **Reduce:** Action is taken to mitigate the risk likelihood or impact, or both, generally through preventative and detective internal controls.
3. **Transfer or share:** Action is taken to transfer a portion of the risk to a third party through, for example, insurance, hedging or outsourcing.

4. **Accept:** No *action is taken* to change the impact or likelihood of the risk. These risks have a low impact when they occur and the "cost versus benefit" does not justify the mitigation of the risk.

**NOTE**

Based on Valsamakis, Vivian & Du Toit (2010:145), risk financing is a critical term which forms a close link with risk control as it strives to ensure that the cost of risk management does not exceed the benefit.

## 4 Who is responsible for risk responses?

The implementation of adequate and effective risk responses is the responsibility of the risk management team or management. The monitoring and review of risk responses should be done by management and the risk management department (based on the risk management plan) to ensure that:

- risk responses were adequate and effective and achieved their objectives
- the residual risk assessment was reasonable, based on the information and data used
- knowledge and awareness of risk management in the organisation are enhanced for future benefit

### Activity 27.1

With reference to activity 22.4 in study unit 22, what do you think are the risk responses or mitigating actions to the activities below?

- If your risk appetite is low, you will leave home three hours before the exam starts and attempt to avoid the risk of traffic congestion that may cause you to be late.
- If your risk appetite is high, you will leave home an hour before the exam starts and accept the risk of traffic congestion that may cause you to be late.
- Your risk appetite may be low to suffering losses when your car or personal belongings are stolen so you will want to arrange insurance to reduce the risk.

### Feedback on activity 27.1

- Avoidance – if you leave home three hours before the exam starts, you will attempt to avoid the risk
- Acceptance – if you leave home an hour before the exam starts, you will accept the risk
- Transfer – when you arrange insurance, action is taken to transfer the risk

## Activity 27.2

Consider the following risks and the corresponding inherent risk ratings and formulate suitable risk responses if you assume that the organisation's risk appetite is low:

| Risk category | Risk type | Risk description | Inherent risk rating | Risk response |
|---|---|---|---|---|
| Strategic risk | Technological risk | New technologies to be introduced. | 20 | |
| Operational risk | Business risk | Inefficient or wasteful contracts are entered into on behalf of the organisation. | 12 | |
| Financial risk | Currency risk | Fluctuation in currencies can have a negative effect on the price of imported raw materials. | 3 | |

## Feedback on activity 27.2

The risk responses below were introduced to align the residual risk ratings with the organisation's risk appetite (refer to study unit 22, section 5), which is low, for these types of risks.

| Risk category | Risk type | Risk description | Inherent risk rating | Risk response |
|---|---|---|---|---|
| Strategic risk | Technological risk | New technologies to be introduced. | 20 | i. Obtain the rights to incorporate the new technology into the current products. |
| Operational risk | Business risk | Inefficient or wasteful contracts can be entered into on behalf of the organisation. | 12 | i. Draft a policy and procedure document for contract management;<br>ii. Have the board approve a delegation of authority; and<br>iii. Appoint a lawyer to review and sign-off on all contracts. |

| Risk category | Risk type | Risk description | Inherent risk rating | Risk response |
|---|---|---|---|---|
| Financial risk | Currency risk | Fluctuation in currencies can have a negative effect on the price of imported raw materials. | 3 | i. Accept the risk. |

Legends:

| | | |
|---|---|---|
| | Critical | usually represented by the colour red |
| | High | usually represented by the colour orange |
| | Medium | usually represented by the colour yellow |
| | Low | usually represented by the colour green |
| | Negligible | usually represented by the colour blue or no colour |

## 5 Assessment of the residual risk

Residual risk takes into account the application of any internal controls, transfer or management responses to reduce the likelihood and potential impact of the risk under consideration.

### Activity 27.3

Based on the feedback on activity 27.2 above, calculate the residual risk ratings for the risks above and complete the risk register.

Assume the following likelihood and impact or ratings:

- New technologies:

  Likelihood: Will probably occur (4). Previously (4).

  Impact: Limited effect and the impact/consequence of the risk as the organisation will incorporate the new technology in its products (1). Previously (5).

- Inefficient or wasteful contracts:

  Likelihood: May occur only in exceptional circumstances (1). Previously (3).

  Impact: Will have a significant impact on the achievement of organisation objectives or threaten the continued operation of the organisation (4). Previously (4).

A fluctuation in currencies:

Likelihood: Can occur at some time and may be difficult to control (3). Previously (3).

Impact: Limited effect and the impact or consequence of the risk could be dealt with by routine operations as a small percentage of raw materials are imported and the raw materials could be sourced from local suppliers (1). Previously (1).

## Feedback on activity 27.3

Calculation of residual risk ratings:

1. New technologies: 4 x 1 = 4.
2. Inefficient or wasteful contracts: 1 x 4 = 4.
3. A fluctuation in currencies: 3 x 1 = 3.

The following diagram represents selected fields of the risk register after taking the information above into account.

| Risk category | Risk type | Risk description | Inherent risk rating | Risk response | Residual risk rating |
|---|---|---|---|---|---|
| Strategic risk | Technological risk | New technologies to be introduced. | **20** | i. Obtain the rights to incorporate the new technology into the current products. | **4** |
| Operational risk | Business risk | Inefficient or wasteful contracts can be entered into on behalf of the organisation. | **12** | i. Draft a policy and procedure document for contract management;<br>ii. Have the Board approve a delegation of authority; and<br>iii. Appoint a lawyer to review and sign-off on all contracts. | **4** |
| Financial risk | Currency risk | Fluctuation in currencies can have a negative effect on the price of imported raw materials. | **3** | i. Accept the risk. | **3** |

Legends:

| | | |
|---|---|---|
| | Critical | usually represented by the colour red |
| | High | usually represented by the colour orange |
| | Medium | usually represented by the colour yellow |
| | Low | usually represented by the colour green |
| | Negligible | usually represented by the colour blue or no colour |

**NOTE**

① Can you see that the residual risk rating is clearly in line with the organisation's low risk appetite?

② Students should be able to identify and discuss risk responses at the organisation level. Modules presented by the Department of Auditing will address the identification of risks and risk responses within each audit cycle.

## 6 Summary

Risk response is the process of selecting and implementing measures to reduce or mitigate the risk to an acceptable level. The acceptable level will be determined by the organisation's risk appetite, bearing in mind that a certain level of risk is required to acquire the desired level of return. Remember that the potential benefits increase as the exposure to risk increases.

We also discussed and did a practical example to perform a residual risk assessment, which takes into account the application of risk responses to reduce risk to an acceptable level.

The next study unit will elaborate on risk reporting.

Self-assessment activity

Describe practical examples of avoidance, reduction, transfer or sharing and acceptance, which could be applied to mitigate risks.

STUDY UNIT 28

# Risk monitoring and reporting

**In this study unit**


## 1 Introduction

In the previous study unit, we discussed risk responses to reduce risks to an acceptable level. We also did a residual risk assessment, which assesses the likelihood and impact of the risk on the organisation after taking into account the risk responses to the risk.

## 2 Risk monitoring

**RISK MONITORING**

According to Valsamakis, Vivian & Du Toit (2010:146), risk monitoring entails the continuous evaluation of the organisation operations to ensure the adequacy of control measures and to identify new risks to the organisation.

Methods available to the risk management team or risk management department to monitor the effectiveness of the risk management process include:

- **Loss management:** Losses are recorded and a loss report drafted to summarise loss events, values and root causes. Risk responses are the implemented to prevent or reduce the likelihood of similar events occurring in future.
- **Key risk indicators:** Key trends are measured against a specific threshold and risks are highlighted when the threshold is breached. For example, an organisation selling products over the phone may set a maximum waiting time of one minute for all customer calls to be answered. If that waiting time is breached, it is an indicator to management to take action to prevent a negative impact on the organisation.
- **Risk and control self-assessments completed by management:** This is an analysis of the organisation objectives and processes. Tool to assess management's perception of perceived strengths, risks, weaknesses within the organisation processes and the adequacy and effectiveness of the controls designed to mitigate the risks and achieve organisation objectives. This is also an effective method to identify risks.
- **Scenario management:** This is a method to determine future risks, based on the views of experts.

## 3 Residual risk reporting

Periodic risk reporting to the board will enable the board to achieve its responsibilities in terms of King III. Effective risk reporting will enable the board to consider the following:

- the nature and extent of risks facing the organisation
- the extent and categories of risk which is regarded as acceptable (risk strategy)
- the likelihood of risk materialising
- the cost and benefit of risk responses

> **Key term: RISK REPORTING**
>
> Risk reporting is concerned with periodic (usually quarterly) reports to the stakeholders and the board of directors or a sub-committee of the board, such as the risk and compliance committee, setting out the organisation's risk management policies and to provide information for the stakeholders to evaluate whether the policies are effectively achieved.

There is also a need for residual risk reporting where significant risks facing the organisation (despite efforts to reduce these risks) are highlighted to review the adequacy and effectiveness of the risk responses and possibly to gain alternative opinions from relevant stakeholders.

### 3.1 Risk reporting

Risk reporting includes the following:

1. feedback on the annual review of the risk forecast
2. a review of management's responses to significant risks and the risk strategy
3. results from the monitoring of risk responses and significant residual risks that exist
4. results from the regular monitoring of significant key risk indicators (early warning systems) that could indicate a material change in the organisation's risk profile that increase exposures or threaten areas of opportunity
5. results of audit reviews to assess the adequacy and effectiveness of the risk management process and mitigating action plans to reduce risks to an acceptable level

### 3.2 What the IRM-standard indicates that the board of directors should do

The board should do the following:

- know about the most significant risks facing the organisation
- know the possible effects on shareholder value of deviations to expected performance ranges
- ensure appropriate levels of awareness throughout the organisation
- know how the organisation will manage a crisis
- know the importance of stakeholder confidence in the organisation
- know how to manage communications with the investment community where applicable
- be assured that the risk management process is working effectively
- publish a clear risk management policy covering risk management philosophy and responsibilities

**Activity 28.1**

Access the following link and view Implats' Annual Report for 2009 to gain an understanding of the importance of risk management, the role of the audit committee and how key risks are included in the annual report (especially on page 109):

http://www.implats.co.za/reports/2009/AR/f/implats_ar09.pdf

You can also access the following link to view the Implats' Risk Report for 2009, which illustrates how the organisation reported inherent risks and how the risks were mitigated:

http://www.implats.co.za/cr/files/risk_management_sep09.pdf

## 4 Summary

In this study unit, we mentioned that risk reporting to the stakeholders and the board, or a sub-committee, is critical for them to measure the achievement of the organisation's risk management policies. The reporting is more concerned with the processes to manage risks and with the reporting of risks with significant residual risk ratings.

We also discussed the benefits of risk management and that it plays an important role in the achievement of the objectives of the organisation, because risk management improves the organisation's ability to respond and mitigate risks efficiently and effectively. It enables it to take advantage of opportunities without harming its objectives or reputation.

**Self-assessment activity**

Now that you have worked through this study unit, you should be able to answer the following:

a. How could effective risk reporting contribute to the board of directors achieving their responsibilities in terms of King III?

b. What are the components of effective risk reporting to the board of directors?

## References and additional reading


CIMA. 2011. *CIMA Official Learning System. Paper P3 – performance strategy. 1st* edition. Oxford: Elsevier.

Committee of Sponsoring Organizations of the Treadway Commission (COSO). 2004. *Enterprise risk management – integrated framework*. www.coso.org. [Accessed on 22 March 2012]

Implats. *Annual Report 2009.* http://www.implats.co.za/reports/2009/AR/f/implats_ar09.pdf [Accessed on 22 March 2012]

Implats. *Risk Factors September 2009.*http://www.implats.co.za/cr/files/risk_management_sep09.pdf [Accessed on 22 March 2012]

Valsamakis, AC, Vivian, RW & Du Toit, GS. *Risk management.* 4th edition. Sandton: Heinemann Publishers.

# GLOSSARY

| | |
|---|---|
| **ACCOUNTING RATE OF RETURN:** | This is based on an investment's (project's) average net PROFIT after tax (not cash flow), divided by its average book value. It is also called the average rate of return on investment/capital (ROI or ROC) method. |
| **ACCOUNTS PAYABLE (CREDITORS) DAYS:** | Payable days (or the creditor payment period) is the measurement of the average number of days the organisation takes to pay for the goods/services received on credit from its suppliers. |
| **ACCOUNTS RECEIVABLE:** | Accounts receivable refers to the amount outstanding in respect of previous credit sales that customers/debtors have to pay in the near future. |
| **AGEING SCHEDULE FOR CREDITORS:** | Ageing schedule (or creditors' age analysis report) is a classification of accounts payable within bands of different outstanding periods, normally including current debt, up to and including 30 days, up to and including 60 days, up to and including 90 days, and greater than 90 days. |
| **AGEING SCHEDULE FOR DEBTORS:** | Ageing schedule (or debtors' age analysis report) is a classification of accounts receivable within bands of different outstanding periods, normally including, current debt, up to and including 30 days, up to and including 60 days, up to and including 90 days, and greater than 90 days. |
| **ANALYSE:** | To analyse is to examine in detail in order to discover meaning or to break down into smaller parts. |
| **ANNUITY DUE:** | An annuity where the payments fall due at the beginning of each payment interval (period) is an annuity due. The last payment of an annuity due is one payment before the end of the term. |
| **BANK LOAN:** | Medium and smaller companies mainly use bank loans for long-term financing. The loan may be a term loan that is repayable over a fixed period that relates to the specific financing requirement or the loan can be structured in the form of a loan facility from which the company draws down as needed (the money is only advanced by the bank when the client needs it to make a payment to a supplier, etc, up to the maximum loan amount approved). The costs involved (apart from the repayment of the capital amount) are interest charges as well as a charge for the right to use the loan facility. |
| **BANK OVERDRAFT:** | A bank overdraft is the facility that allows an organisation to use more money than is available in its bank account. |
| **BANKER'S ACCEPTANCES (BA's):** | A banker's acceptance is created when the organisation sells a bill of exchange to the bank. |

| | |
|---|---|
| **BARRIERS TO ENTRY:** | Barriers to entry are factors that prevent new players to enter a specific industry or market. These factors refer to the position of the current players, for example, they have good economies of scale, customers are loyal to their brand, and they have a well-established distribution channel. |
| **BARRIERS TO EXIT** | Barriers to exit are factors that prevent an organisation from leaving (exiting) the market for a specific product. If the cost of exiting is higher than the cost (losses) of remaining in the market, the organisation will be prohibited from exiting and will still be competing for market share. |
| **BOARD OF DIRECTORS:** | The board of directors (the board) consist of members/ directors who are elected to the board by the shareholders to oversee the activities of the organisation and to provide stewardship and leadership from the very top. |
| **BOND/DEBENTURE:** | A bond/debenture is a long-term contract between the organisation that issues the bond/debenture (borrower), and the buyer of the bond/debenture (lender of the money or investor). The main terms of this contract are the repayment conditions and the interest rate to be paid. |
| **BUSINESS RISK:** | Risks that arise from the activities of the organisation and relate to the people, processes, products and structure. |
| **CAPITAL:** | Capital is a long-term asset or the money used to support long-term assets and projects and is displayed as long-term debt and equity on the statement of financial position. |
| **CAPITAL GROWTH:** | Capital growth is the growth of an investment in a business. It means that the investment can be sold after a few years for more than it was bought for. Capital growth includes minimum annual returns. |
| **CAPITAL INVESTMENTS/ EXPENDITURE:** | Long-term assets (eg non-current) such as property, plant and equipment acquired individually or as part of large projects that generate returns (cash inflows) over a number of years. |
| **CAPITAL MARKET:** | A capital market is a financial market in which longer-term (longer than one year) debt and equity securities are traded. |
| **CAPITAL STRUCTURE:** | Capital structure is the manner in which an organisation's assets are financed. It is normally expressed in percentages of each type of capital used by the organisation, such as debt and equity. |
| **CASH AND CASH EQUIVALENTS:** | Cash is the money the organisation has on hand (eg petty cash, unbanked payments received) as well as the money in the bank (eg cheque accounts or short-term deposits). |

| | |
|---|---|
| **CASH CONVERSION CYCLE:** | The cash conversion cycle focuses directly on the cash flow associated with the overall cash flow from operations (including accounts payable). It represents the length of time between when an organisation makes payments to its creditors (outflow of cash) and when an organisation receives payments from its customers (inflow of cash). As the cash conversion cycle includes the cash flow benefit afforded by accounts payable, this cycle is shorter than the operating cycle. |
| **CASH FLOW:** | Cash flow is any receipt or payment of money that occur at a specific point in time. It includes capital and interest. |
| **CLOSE CORPORATION:** | A close corporation (CC) is a business that is formed as a legal person that exists separate from its owners. A maximum of ten owners, called members, which must be natural persons, are allowed. |
| **COMPANY:** | A company is a business form that is a legal organisation distinct from its "owners". "Owners" are referred to as shareholders and can be one or more individuals or organisations. |
| **COMPLIANCE RISK:** | These risks arise from non-compliance with legislation or regulations. |
| **COMPOUNDING:** | Compounding refers to the calculation of interest on a principal (initial) amount and adding that interest to the principal for investment in the following period. The interest is therefore not paid at the end of the period in which it accrues. In the next period(s), interest is earned on the interest re-invested. |
| **CORE VALUES:** | Core values are the principles that guide an organisation by describing how every employee is expected to behave. |
| **CORPORATE CULTURE:** | Corporate culture entails employees' shared beliefs, values and symbols (see also core values). |
| **CORPORATE GOVERNANCE:** | Corporate governance is a set of processes, customs, policies, laws and institutions affecting the way that a business is managed. It also includes the relationships among the many stakeholders involved and the goals of the business. |
| **COST OF CAPITAL:** | Cost of capital is defined as being the rate of return that an organisation must earn on its investments to ensure that the minimum requirements of the providers of capital are met. |
| **COUPON INTEREST RATE:** | This is the fixed interest rate that the issuing organisation is required to pay on the face value of the bond. This is similar to the coupon payment divided by the par value. |

| | |
|---|---|
| **CREDIT RATING AGENCY:** | A credit rating agency is an organisation that provides international financial research on bonds and other debt instruments issued by business and government organisations. The agency ranks the creditworthiness of borrowers/issuers by using a standardised ratings scale. The payment history as well as financial heath (ability to pay future obligations) is taken into account in determining the credit rating. |
| **DILUTION:** | Dilution occurs when new ordinary shares are issued. The existing shareholders must then share the control of the organisation with a greater number of shareholders. The control (voting power) that the existing shareholders had over the organisation will be diluted due to the increase in the number of shareholders. |
| **DISCOUNTING:** | Discounting is the process used to determine the original investment (principal) amount by discounting the future value, which resulted from the compounding of interest, back to the present value. (Discounting is thus used to determine the present value of an investment.) |
| **DIVIDEND YIELD:** | The dividend yield on an organisation's share is the organisation's total annual dividend payments divided by its price per share. The dividend yield can also be determined by finding a comparable dividend yield from a similar share and adjust it for growth and risk. |
| **DU PONT RATIO:** | Du Pont ratio is a method that breaks down the return on total asset ratio (ROA) into two components – a profit margin and an asset turnover rate. |
| **ECONOMIC RISK:** | Economic risks are directly related to risks that originate from activities or non-activities in the normal economy. This includes changes to inflation, the unemployment rate and international policy. These economic risks start before transactions take place and are considered to be external. |
| **EFFECTIVE ANNUAL INTEREST RATE:** | Effective annual interest rate (EAR) refers to the annual rate, which derives the same result as the compound interest rate, at a given periodic rate, for a given number of compounding periods PER year. The effective annual rate is therefore the annual rate, which, if compounded once a year, will give the same result as the interest per period compounded a number of times per year. |
| **ENVIRONMENTAL RISK:** | The risk relates to climate change and risk of natural disasters (deemed to be external risks).<br>The risk of damage caused by a pollutant, that is a substance or by-product introduced into an environment other than its intended use/ purpose (deemed to be within the organisation's control). |
| **EXTRAPOLATION:** | Extrapolation refers to the calculation when you need to determine an actual rate where this actual rate lies outside (not within) two specific rates. |

| | |
|---|---|
| **FACTORING:** | Factoring is a form of debtors financing which results in improving the debtors' collection period. |
| **FINANCIAL INFORMATION:** | Financial information refers to the financial results, position and cash flows of an organisation's business operations in a specific period, stated in rand and cent terms. |
| **FINANCIAL LEVERAGE:** | Financial leverage is the extent to which debt is used in the capital structure of an organisation. (An organisation that has a high percentage of debt in its capital structure will be regarded as having a high degree of financial leverage.) |
| **FINANCIAL RISK:** | Financial risk relates to the financial operation and position of an organisation. |
| **FUTURE VALUE:** | The future value is the amount that an investment will be worth at a future date if invested at a particular simple or compound interest rate. |
| **GROWTH RATE:** | Growth rate simply refers to the percentage that a line item in an organisation's financial information has increased or decreased from one period/year to another. |
| **HOLDING COSTS:** | Holding costs are the costs of holding inventory and includes storage costs (eg renting warehouse space and security), insurance costs (for protection against losses), cost of obsolescence (inventory ageing or deteriorating whilst in storage) and opportunity cost (funds invested in inventory could have earned a return elsewhere at a certain rate, eg earning the weighted average cost of capital). |
| **HUMAN RESOURCES:** | The term human resources (HR) refer to the workforce (employees) of an organisation. |
| **INDUSTRIAL RELATIONS:** | Industrial relations deal with the employment relationship (workplace relationships). |
| **INFORMATION RISK:** | Information risk is the risk that decision makers within the organisation use invalid or poor quality information for decision-making, or the loss of information. |
| **INHERENT RISK:** | This involves the assessment of risk before the application of any controls, transfer or management responses. |
| **INSTALMENT SALE AGREEMENT (ISA):** | An instalment agreement entails the granting of a loan to an organisation (buyer) by the supplier (seller) of assets such as machinery, equipment and vehicles itself (supplier credit), or granted by banks. The conditions, interest rate, instalment amount and frequency of payment as well as the period of the agreement are set out in the specific contract. |
| **INTEREST:** | Interest is the price paid for borrowed money or received for money invested. |

| | |
|---|---|
| **INTERNAL RATE OF RETURN:** | The rate at which cash flows must be discounted so that the present value of the cash inflows equals the present value of the initial cash outflow. That is the rate at which the NPV will be equal to Rnil. |
| **INTERPOLATION:** | Interpolation refers to the calculation when you need to determine an actual rate, where the actual rate lies between two specific rates. |
| **INVENTORY:** | Inventory of a reseller is represented by purchased goods (held to be sold), and of a manufacturer by the completed products (held to be sold), work-in-process products (intended for sale) and raw material inventory (held for use in production). Both types of organisations can also have stores of consumable items. |
| **INVENTORY DAYS:** | Length of time that inventory remains unsold (goods for sale) or remains unused (raw materials). |
| **LEASE:** | A lease is a form of financing movable assets. Just like a loan, it can be structured in various ways. The lessor (granting the lease) remains the owner of the asset, while the lessee has the use of the asset. Lease payments are determined in such a way as to offer the lessor the cost of the asset plus a reasonable return thereon. |
| **MARKET RATE/ RULING INTEREST RATE:** | The market rate is the current or ruling market rate of return. It is obtained from similarly publicly traded instruments – a pre-tax rate. |
| **MARKET RISK:** | Risk associated with the economical environment in which all organisations do business and which is influenced by interest rates, exchange rates, oil prices and various other factors that are difficult to quantify. Market risk therefore originates from events and transactions in the market place. |
| **MATURITY DATE/ REDEMPTION DATE:** | The maturity date is the date when a bond/debenture will be redeemed. |
| **MISSION STATEMENT:** | A mission statement defines the core purpose of the organisation, by broadly stating the reason(s) why the organisation exists. |
| **MONEY MARKET:** | The money market is a financial market used mainly for raising short-term (of less than one year) finance. |
| **MORTGAGE LOAN:** | Mortgage loans are long-term loans raised against the value of property. The loan is normally secured over the value of the property offered as security. |
| **NET PRESENT VALUE:** | Net result of future periodic net after tax cash flows discounted to present value, using an appropriate rate, and the present value of the capital invested in the project. |
| **NET WORKING CAPITAL:** | Net working capital refers to the current assets less current liabilities, which is directly related to the operating activities of an organisation. |

| | |
|---|---|
| **NOMINAL ANNUAL RATE:** | In cases where interest is calculated more than once a year, the annual rate quoted is the nominal annual rate or nominal rate. |
| **NOMINAL INTEREST RATE:** | This is the named or quoted rate usually stated on annually compounded basis. It may be different from the effective rate due to non-annual compounding. |
| **OPERATING CYCLE:** | The operating cycle focuses on an organisation's internal (thus excluding accounts payable) cycle's impact on cash flow. It represents the length of time from committing cash for purchases of inventory to the inflow of cash from the sale of inventory on credit. |
| **OPERATIONAL RISK:** | "Operational risk is the risk of loss from a failure of internal business and control processes." |
| **OPPORTUNITY COST:** | Opportunity cost is the cash that could have been realised from the best alternative use of the funds that were given up. |
| **ORDERING COSTS:** | Ordering costs are the costs associated with placing an order, receiving the deliveries and the associated payment. |
| **ORDINARY ANNUITY:** | An ordinary annuity is an annuity where the payments take place at the end of each year or period (payment interval) at the same time that interest is calculated. |
| **ORDINARY PREFERENCE SHARE:** | An ordinary preference share is a security that pays a constant dividend into perpetuity (if not convertible or redeemable). |
| **ORDINARY SHARE:** | This is a security offered to investors in order to raise capital for the company. Investors receive dividends as return on their investment as well as capital growth if the share price increases and they sell their shares. |
| **ORGANISATIONAL STRUCTURE:** | The structure of a business can be defined as organisational arrangements, systems for gathering together human, physical, financial, and information resources at all levels of the system. |
| **PARTNERSHIP:** | Partnership is where a business is formed by between two and twenty individuals or organisations. It is unincorporated. Partners are severally and jointly responsible for all the debts of the partnership. |
| **PAR VALUE/ REDEMPTION VALUE/ NOMINAL VALUE/ FACE VALUE:** | Par value is the stated value (nominal or face value) of bonds /debentures. This is the value which the holder will receive at redemption and also the value on which the bond or debenture pays interest. |
| **PAYBACK PERIOD:** | The period of time required to recoup the total capital amount invested through the cash generation from the project. |
| **PERIODIC PAYMENT:** | The periodic payment I or PMT, is the amount of the annuity, namely the stream of equal amounts, invested per period or the equal periodic repayments of a loan. |

| | |
|---|---|
| **PERIODIC RATE:** | The periodic rate is the rate charged by a lender or paid by a borrower each period. |
| **PERMANENT WORKING CAPITAL:** | Permanent working capital supports a constant minimum level of sales. |
| **PERPETUITY:** | Perpetuity means that the cash flow will be received or paid periodically at certain time intervals into infinity, since there is no termination date. Another example of a perpetuity would be a non-redeemable preference share paying a fixed dividend. |
| **POLITICAL RISK:** | Refers to the effect that detrimental political activities or political instability have on an organisation. |
| **PRESENT VALUE:** | The present value is the current value of future cash flows, determined by application of the discount rate (discounting). |
| **PROFITABILITY:** | Profitability is the term used to describe the annual return or compensation earned on an investment. |
| **PROFITABILITY INDEX (PI):** | The PI is the ratio of the present value of cash flows (PVCF) to the initial investment of the project. PI is also known as a benefit/cash ratio. |
| **PROJECT ANALYSIS:** | Project analysis is the detailed examination of all the technical specifications (operational), marketing (sales units, market, etc) and financial aspects (costs and revenues) and/or problems of a project before funds are allocated and work on it is started. |
| **RATIO ANALYSIS:** | Ratio analysis is a method whereby further calculations are performed on a set of financial statements and is intended to create more meaningful information. Ratio analysis can be made even more useful when we compare the calculated ratios to the same ratios calculated for previous years or to industry norms and other ratios of the same set. |
| **RECEIVABLE DAYS:** | Receivable days (or the debtor collection period) is a measurement of the number of days it takes the average debtor to pay for the goods/services taken on credit. |
| **REPORTING RISK:** | The risk refers to the provision of unreliable financial and non-financial information to all levels of management and other stakeholders. |
| **REPUTATION RISK:** | A loss of reputation is the adverse consequence created by bad publicity due to the materialisation of another risk. |
| **RESIDUAL RISK:** | Residual risk involves the assessment of risk AFTER taking into account the application of any internal controls, transfer or management responses to reduce the risk. |
| **RETURN ON ASSETS (ROA):** | This is a measure of performance generated on all the assets employed in the organisation and expresses earnings before interest and taxes (EBIT) as a percentage of the total assets employed. |

| | |
|---|---|
| **RETURN ON EQUITY:** | This is a measure of the performance realised by management for the equity holders (shareholders) and expresses net profit as a percentage of equity. |
| **REVOLVING CREDIT:** | Revolving credit allows the organisation to withdraw money up to the original limit once a certain percentage (20% to 30%) has been repaid. |
| **RISK:** | The typical dictionary definition of risk is a chance or possibility of danger, loss, injury or other adverse consequences. |
| **RISK APPETITE:** | The risk appetite is related to an organisation's strategy and may be expressed as the acceptable balance between growth, risk and return. |
| **RISK ASSESSMENT:** | Risks are analysed by considering the impact (potential damage or loss) and likelihood of the risk occurring. Risks are assessed at an inherent basis (risk exposure before considering risk responses) and residual basis (risk exposure after considering risk responses). |
| **RISK CAPACITY:** | This is the maximum amount of risk that the organisation can accept. |
| **RISK CULTURE:** | This is the set of shared attitudes, values and practices that characterise how an organisation considers risk in its day-to-day activities. |
| **RISK FINANCING:** | Maintaining a balance between the economic and operational cost of risk reducing measures and the achievement of the organisation's objectives. |
| **RISK IDENTIFICATION:** | The process to identify internal and external events, which could affect the achievement of the organisation's objectives. This includes risks and opportunities. |
| **RISK MANAGEMENT PLAN:** | It is the document of identified risks (derived with reference to the organisation's objectives) with the corresponding risk assessment to create risk responses. |
| **RISK MONITORING:** | Risk monitoring entails the continuous evaluation of the organisation operations to ensure the adequacy of control measures and to identify new risks to the organisation. |
| **RISK OR EVENT IDENTIFICATION:** | Risk or event identification is the process to identify internal and external events, which could affect the achievement of the organisation's objectives. This includes risks and opportunities. |
| **RISK REGISTER:** | A risk register is a summary of identified risks, which are listed, described and assessed/measured (based on their potential impact and likelihood). |

| | |
|---|---|
| **RISK REPORTING:** | Risk reporting is concerned with periodic (usually quarterly) reports to the stakeholders and the board of directors or a sub-committee of the board, such as the risk and compliance committee, setting out the organisation's risk management policies and to provide information for the stakeholders to evaluate whether the policies are effectively achieved. |
| **RISK RESPONSE:** | Measures to reduce the likelihood and/or impact rating of a risk event. |
| **RISK-FREE RATE:** | The risk-free rate is the return that can be earned on investments that has zero risk. An example of a risk-free instrument is government bonds and the return thereon will represent the risk-free rate. |
| **RULING INTEREST RATE/MARKET RATE:** | The market rate is the current or ruling market rate of return. It is obtained from similarly publicly traded instruments – a pre-tax rate. |
| **SALE AND LEASEBACK:** | Trading organisations who own fixed property at times find it more rewarding to sell the properties to a financial institution at a capital profit. A leaseback agreement for a reasonably long term is then entered into immediately, to protect the trading organisation (which operates from this premises) – the period can sometimes be as long as 30 years. |
| **SHORT-TERM:** | Short term refers to a period of one year or less. |
| **SIMPLE INTEREST:** | Simple interest is the interest calculated on the principal only for the entire term. |
| **SINGLE CASH FLOW:** | A single cash flow is a once-off (non-repetitive) cash inflow or outflow. |
| **SOCIAL RISK:** | Social risk relates to the impact of the organisation on the community and vice versa. |
| **SOLE PROPRIETORSHIP:** | Sole proprietorship is where a business is formed by a single individual who is the owner of that organisation. It is unincorporated, meaning the owner and the business is treated as the same legal persona. |
| **SPECIFIC RISK:** | This is the risk associated with an investment in a specific company. |
| **STAKEHOLDERS:** | Stakeholders are those persons and organisations that are affected by the activities of the organisation and therefore have an interest in the strategy of an organisation. Stakeholders include staff, shareholders, creditors, suppliers, customers, government, local authorities, professional bodies, pressure groups and the community at large. |

| | |
|---|---|
| **STRATEGIC FINANCIAL MANAGEMENT:** | Strategic financial management is the identification of possible strategies capable of maximising an organisation's net present value, the allocation of scarce capital resources among the competing opportunities and the implementation and monitoring of the chosen strategy so as to achieve stated objectives. |
| **STRATEGIC OBJECTIVES:** | Strategic objectives clearly formulate measures of progress and targets to be achieved in a specific time frame. |
| **STRATEGIC PLANNING:** | Strategic planning is the process of defining the organisation's strategy and making decisions about the allocation of its resources to follow this strategy. The allocation of resources includes the organisation's capital and people. |
| **STRATEGIC RISK:** | Strategic risks have more to do with the organisation's position and relation with the external environment in the long-term. |
| **STRATEGY:** | Strategy is about choosing long-term activities to achieve the purpose set out in the mission statement and ultimately moving towards realising the vision. |
| **SUBSTITUTE PRODUCTS:** | Substitute products refer to alternative products having the ability of satisfying customers' needs effectively (for example, plastic bottles instead of glass bottles). |
| **SUSTAINABILITY FOR BUSINESSES:** | Sustainability for a business means that all their products, processes and manufacturing activities meet customer needs, while at the same time treating the environment in such a manner that it does not decrease the ability of future generations to meet their own needs. This entails that products, processes and activities should be designed and executed in such a way that current environmental concerns (eg the use of renewable resources) are taken into account while still maintaining a profit. A business should use sustainable development and distribution methods to influence the environment, growth of the business and society. Sustainable development within a business can create value for its investors, customers and the environment. |
| **SUSTAINABILITY FOR HUMANS:** | Sustainability for humans is the potential for long-term maintenance of well-being which has environmental and social dimensions. |
| **SUSTAINABLE CAPITAL BUDGETING:** | Sustainable capital budgeting involves planning and evaluation of how funds are spent on capital investments that will ultimately add to the organisation's value while taking cognisance of the social, environmental and governance impact of the decision. |
| **SWOT ANALYSIS:** | The SWOT analysis approach is to identify and analyse internal and external factors that are of strategic importance, and classify them into strengths, weaknesses, opportunities and threats. |

| | |
|---|---|
| **TAKE-OVER:** | Take-over is the term used when referring to the transfer of control of a company from one group of shareholders to another group of shareholders. |
| **TARGET CAPITAL STRUCTURE:** | Target capital structure or optimal capital structure is a mix of the two capital components at which the share price is maximised – if all other things are kept the same. |
| **TECHNOLOGICAL RISK:** | Risk involved with the operation, ownership and sustainability of the organisation's information technology (IT) systems.<br>Technological risks also refer to the manufacturing plant being outdated or a product being obsolete when a more technologically advanced product has replaced it. |
| **TEMPORARY WORKING CAPITAL:** | Temporary working capital supports seasonal peaks in the organisation's operations. |
| **TRADE ACCOUNTS PAYABLE:** | Trade accounts payable refers to the amount of purchases on credit that has to be paid to the suppliers/ creditors in the near future. Total accounts payable may also include other accounts payable, which do not relate directly to the main operations (trading activities) of the organisation. |
| **TRADITIONAL FINANCIAL MANAGEMENT:** | Traditional financial management is the management and control of money and money-related operations within a business. Financial management therefore includes planning, organising and controlling the financial activities of a business. The financial activities include the acquiring of funds as well as the use of these funds by applying general management principles. |
| **UNEQUAL CASH FLOW:** | Unequal cash flows can occur repetitively at the end of each year or period (payment interval). |
| **VISION STATEMENT:** | The vision statement defines where the organisation wants to go in the future. |
| **WORKING CAPITAL MANAGEMENT:** | Working capital management refers to the controlling of balances included in the current assets and current liabilities, the way the related functions within the organisation are performed and the way working capital is financed. |
| **WORKING CAPITAL POLICY:** | The working capital policy of an organisation stipulates the appropriate amount for the net working capital balance and for each of its components (*investment policy*), and, in addition, how the net working capital balance should be financed (*financing policy*). |
| **YIELD TO MATURITY (YTM):** | The discount rate that achieves a net present value (NPV) of NIL for all the cash in- and outflows. |

## TABLE A

## PRESENT VALUE OF R1 RECEIVED/PAID AFTER N YEARS

**Formula:** $\frac{1}{(1+i)^n}$

| Year N | 1% | 2% | 4% | 6% | 8% | 10% | 12% | 14% | 15% | 16% | 18% | 20% | 22% | 24% | 25% | 26% | 28% | 30% | 35% |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0,990 | 0,980 | 0,962 | 0,943 | 0,926 | 0,909 | 0,893 | 0,877 | 0,870 | 0,862 | 0,847 | 0,833 | 0,820 | 0,806 | 0,800 | 0,794 | 0,781 | 0,769 | 0,741 |
| 2 | 0,980 | 0,961 | 0,925 | 0,890 | 0,857 | 0,826 | 0,797 | 0,769 | 0,756 | 0,743 | 0,718 | 0,694 | 0,672 | 0,650 | 0,640 | 0,630 | 0,610 | 0,592 | 0,549 |
| 3 | 0,971 | 0,942 | 0,889 | 0,840 | 0,794 | 0,751 | 0,712 | 0,675 | 0,658 | 0,641 | 0,609 | 0,579 | 0,551 | 0,524 | 0,512 | 0,500 | 0,477 | 0,455 | 0,406 |
| 4 | 0,961 | 0,924 | 0,855 | 0,792 | 0,735 | 0,683 | 0,636 | 0,592 | 0,572 | 0,552 | 0,516 | 0,482 | 0,451 | 0,423 | 0,410 | 0,397 | 0,373 | 0,350 | 0,301 |
| 5 | 0,951 | 0,906 | 0,822 | 0,747 | 0,681 | 0,621 | 0,567 | 0,519 | 0,497 | 0,476 | 0,437 | 0,402 | 0,370 | 0,341 | 0,328 | 0,315 | 0,291 | 0,269 | 0,223 |
| 6 | 0,942 | 0,888 | 0,790 | 0,705 | 0,630 | 0,564 | 0,507 | 0,456 | 0,432 | 0,410 | 0,370 | 0,335 | 0,303 | 0,275 | 0,262 | 0,250 | 0,227 | 0,207 | 0,165 |
| 7 | 0,933 | 0,871 | 0,760 | 0,665 | 0,583 | 0,513 | 0,452 | 0,400 | 0,376 | 0,354 | 0,314 | 0,279 | 0,249 | 0,222 | 0,210 | 0,198 | 0,178 | 0,159 | 0,122 |
| 8 | 0,923 | 0,853 | 0,731 | 0,627 | 0,540 | 0,467 | 0,404 | 0,351 | 0,327 | 0,305 | 0,266 | 0,233 | 0,204 | 0,179 | 0,168 | 0,157 | 0,139 | 0,123 | 0,091 |
| 9 | 0,914 | 0,837 | 0,703 | 0,592 | 0,500 | 0,424 | 0,361 | 0,308 | 0,284 | 0,263 | 0,225 | 0,194 | 0,167 | 0,144 | 0,134 | 0,125 | 0,108 | 0,094 | 0,067 |
| 10 | 0,905 | 0,820 | 0,676 | 0,558 | 0,463 | 0,386 | 0,322 | 0,270 | 0,247 | 0,227 | 0,191 | 0,162 | 0,137 | 0,116 | 0,107 | 0,099 | 0,085 | 0,073 | 0,050 |
| 11 | 0,896 | 0,804 | 0,650 | 0,527 | 0,429 | 0,350 | 0,287 | 0,237 | 0,215 | 0,195 | 0,162 | 0,135 | 0,112 | 0,094 | 0,086 | 0,079 | 0,066 | 0,056 | 0,037 |
| 12 | 0,887 | 0,788 | 0,625 | 0,497 | 0,397 | 0,319 | 0,257 | 0,208 | 0,187 | 0,168 | 0,137 | 0,112 | 0,092 | 0,076 | 0,069 | 0,062 | 0,052 | 0,043 | 0,027 |
| 13 | 0,879 | 0,773 | 0,601 | 0,469 | 0,368 | 0,290 | 0,229 | 0,182 | 0,163 | 0,145 | 0,116 | 0,093 | 0,075 | 0,061 | 0,055 | 0,050 | 0,040 | 0,033 | 0,020 |
| 14 | 0,870 | 0,758 | 0,577 | 0,442 | 0,340 | 0,263 | 0,205 | 0,160 | 0,141 | 0,125 | 0,099 | 0,078 | 0,062 | 0,049 | 0,044 | 0,039 | 0,032 | 0,025 | 0,015 |
| 15 | 0,861 | 0,743 | 0,555 | 0,417 | 0,315 | 0,239 | 0,183 | 0,140 | 0,123 | 0,108 | 0,084 | 0,065 | 0,051 | 0,040 | 0,035 | 0,031 | 0,025 | 0,020 | 0,011 |
| 16 | 0,853 | 0,728 | 0,534 | 0,394 | 0,292 | 0,218 | 0,163 | 0,123 | 0,107 | 0,093 | 0,071 | 0,054 | 0,042 | 0,032 | 0,028 | 0,025 | 0,019 | 0,015 | 0,008 |
| 17 | 0,844 | 0,714 | 0,513 | 0,371 | 0,270 | 0,198 | 0,146 | 0,108 | 0,093 | 0,080 | 0,060 | 0,045 | 0,034 | 0,026 | 0,023 | 0,020 | 0,015 | 0,012 | 0,006 |
| 18 | 0,836 | 0,700 | 0,494 | 0,350 | 0,250 | 0,180 | 0,130 | 0,095 | 0,081 | 0,069 | 0,051 | 0,038 | 0,028 | 0,021 | 0,018 | 0,016 | 0,012 | 0,009 | 0,005 |
| 19 | 0,828 | 0,686 | 0,475 | 0,331 | 0,232 | 0,164 | 0,116 | 0,083 | 0,070 | 0,060 | 0,043 | 0,031 | 0,023 | 0,017 | 0,014 | 0,012 | 0,009 | 0,007 | 0,003 |
| 20 | 0,820 | 0,673 | 0,456 | 0,312 | 0,215 | 0,149 | 0,104 | 0,073 | 0,061 | 0,051 | 0,037 | 0,026 | 0,019 | 0,014 | 0,012 | 0,010 | 0,007 | 0,005 | 0,002 |
| 21 | 0,811 | 0,660 | 0,439 | 0,294 | 0,199 | 0,135 | 0,093 | 0,064 | 0,053 | 0,044 | 0,031 | 0,022 | 0,015 | 0,011 | 0,009 | 0,008 | 0,006 | 0,004 | 0,002 |
| 22 | 0,803 | 0,647 | 0,422 | 0,268 | 0,184 | 0,123 | 0,083 | 0,056 | 0,046 | 0,038 | 0,026 | 0,018 | 0,013 | 0,009 | 0,007 | 0,006 | 0,004 | 0,003 | 0,001 |
| 23 | 0,795 | 0,634 | 0,406 | 0,262 | 0,170 | 0,112 | 0,074 | 0,049 | 0,040 | 0,033 | 0,022 | 0,015 | 0,010 | 0,007 | 0,006 | 0,005 | 0,003 | 0,002 | 0,001 |
| 24 | 0,788 | 0,622 | 0,390 | 0,247 | 0,158 | 0,102 | 0,066 | 0,043 | 0,035 | 0,028 | 0,019 | 0,013 | 0,008 | 0,006 | 0,005 | 0,004 | 0,003 | 0,002 | 0,001 |
| 25 | 0,780 | 0,610 | 0,375 | 0,233 | 0,146 | 0,092 | 0,059 | 0,038 | 0,030 | 0,024 | 0,016 | 0,010 | 0,007 | 0,005 | 0,004 | 0,003 | 0,002 | 0,001 | 0,001 |
| 26 | 0,772 | 0,598 | 0,361 | 0,220 | 0,135 | 0,084 | 0,053 | 0,033 | 0,026 | 0,021 | 0,014 | 0,009 | 0,006 | 0,004 | 0,003 | 0,002 | 0,002 | 0,001 | |
| 27 | 0,764 | 0,586 | 0,347 | 0,207 | 0,125 | 0,076 | 0,047 | 0,029 | 0,023 | 0,018 | 0,011 | 0,007 | 0,005 | 0,003 | 0,002 | 0,002 | 0,001 | 0,001 | |
| 28 | 0,757 | 0,574 | 0,333 | 0,196 | 0,116 | 0,069 | 0,042 | 0,026 | 0,020 | 0,016 | 0,010 | 0,006 | 0,004 | 0,002 | 0,002 | 0,002 | 0,001 | 0,001 | |
| 29 | 0,749 | 0,563 | 0,321 | 0,185 | 0,107 | 0,063 | 0,037 | 0,022 | 0,017 | 0,014 | 0,008 | 0,005 | 0,003 | 0,002 | 0,002 | 0,001 | 0,001 | 0,001 | |
| 30 | 0,742 | 0,552 | 0,308 | 0,174 | 0,099 | 0,057 | 0,033 | 0,020 | 0,015 | 0,012 | 0,007 | 0,004 | 0,003 | 0,002 | 0,001 | 0,001 | 0,001 | | |
| 40 | 0,672 | 0,453 | 0,208 | 0,097 | 0,046 | 0,022 | 0,011 | 0,005 | 0,004 | 0,003 | 0,001 | 0,001 | | | | | | | |
| 50 | 0,608 | 0,372 | 0,141 | 0,054 | 0,021 | 0,009 | 0,003 | 0,001 | 0,001 | 0,001 | | | | | | | | | |

## TABLE B

## PRESENT VALUE OF R1 PER ANNUM RECEIVED/PAID AT THE END OF THE YEAR FOR N YEARS

**Formula:** $\left[\frac{1-\frac{1}{(1+i)^n}}{i}\right]$

| Year N | 1% | 2% | 4% | 6% | 8% | 10% | 12% | 14% | 15% | 16% | 18% | 20% | 22% | 24% | 25% | 26% | 28% | 30% | 35% |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0,990 | 0,980 | 0,962 | 0,943 | 0,926 | 0,909 | 0,893 | 0,877 | 0,870 | 0,862 | 0,847 | 0,833 | 0,820 | 0,806 | 0,800 | 0,794 | 0,781 | 0,769 | 0,741 |
| 2 | 1,970 | 1,942 | 1,886 | 1,833 | 1,783 | 1,736 | 1,690 | 1,647 | 1,626 | 1,605 | 1,566 | 1,528 | 1,492 | 1,457 | 1,440 | 1,424 | 1,392 | 1,361 | 1,289 |
| 3 | 2,941 | 2,884 | 2,775 | 2,673 | 2,577 | 2,487 | 2,402 | 2,322 | 2,283 | 2,246 | 2,174 | 2,106 | 2,042 | 1,981 | 1,952 | 1,923 | 1,868 | 1,816 | 1,696 |
| 4 | 3,902 | 3,808 | 3,630 | 3,465 | 3,312 | 3,170 | 3,037 | 2,914 | 2,855 | 2,798 | 2,690 | 2,589 | 2,494 | 2,404 | 2,362 | 2,320 | 2,241 | 2,166 | 1,997 |
| 5 | 4,853 | 4,713 | 4,452 | 4,212 | 3,993 | 3,791 | 3,605 | 3,433 | 3,352 | 3,274 | 3,127 | 2,991 | 2,864 | 2,745 | 2,689 | 2,635 | 2,532 | 2,436 | 2,220 |
| 6 | 5,795 | 5,601 | 5,242 | 4,917 | 4,623 | 4,355 | 4,111 | 3,889 | 3,784 | 3,685 | 3,498 | 3,326 | 3,167 | 3,020 | 2,951 | 2,885 | 2,759 | 2,643 | 2,385 |
| 7 | 6,728 | 6,472 | 6,002 | 5,582 | 5,206 | 4,868 | 4,564 | 4,288 | 4,160 | 4,039 | 3,812 | 3,605 | 3,416 | 3,242 | 3,161 | 3,083 | 2,937 | 2,802 | 2,508 |
| 8 | 7,652 | 7,325 | 6,733 | 6,210 | 5,747 | 5,335 | 4,968 | 4,639 | 4,487 | 4,344 | 4,078 | 3,837 | 3,619 | 3,421 | 3,329 | 3,241 | 3,076 | 2,925 | 2,598 |
| 9 | 8,566 | 8,162 | 7,435 | 6,802 | 6,247 | 5,759 | 5,328 | 4,946 | 4,772 | 4,607 | 4,303 | 4,031 | 3,786 | 3,566 | 3,463 | 3,366 | 3,184 | 3,019 | 2,665 |
| 10 | 9,471 | 8,983 | 8,111 | 7,360 | 6,710 | 6,145 | 5,650 | 5,216 | 5,019 | 4,833 | 4,494 | 4,192 | 3,923 | 3,682 | 3,571 | 3,465 | 3,269 | 3,092 | 2,715 |
| 11 | 10,368 | 9,787 | 8,760 | 7,887 | 7,139 | 6,495 | 5,937 | 5,453 | 5,234 | 5,029 | 4,656 | 4,327 | 4,035 | 3,776 | 3,656 | 3,544 | 3,335 | 3,147 | 2,752 |
| 12 | 11,255 | 10,575 | 9,385 | 8,384 | 7,536 | 6,814 | 6,194 | 5,660 | 5,421 | 5,197 | 4,793 | 4,439 | 4,127 | 3,851 | 3,725 | 3,606 | 3,387 | 3,190 | 2,779 |
| 13 | 12,134 | 11,343 | 9,986 | 9,853 | 7,904 | 7,103 | 6,424 | 5,842 | 5,583 | 5,342 | 4,910 | 4,533 | 4,203 | 3,912 | 3,780 | 3,656 | 3,427 | 3,223 | 2,799 |
| 14 | 13,004 | 12,106 | 10,563 | 9,295 | 8,244 | 7,367 | 6,628 | 6,002 | 5,724 | 5,468 | 5,008 | 4,611 | 4,265 | 3,962 | 3,824 | 3,695 | 3,459 | 3,249 | 2,814 |
| 15 | 13,865 | 12,849 | 11,118 | 9,712 | 8,559 | 7,606 | 6,811 | 6,142 | 5,847 | 5,575 | 5,092 | 4,675 | 4,315 | 4,001 | 3,859 | 3,726 | 3,483 | 3,268 | 2,825 |
| 16 | 14,718 | 13,578 | 11,652 | 10,106 | 8,851 | 7,824 | 6,974 | 6,265 | 5,954 | 5,669 | 5,162 | 4,730 | 4,357 | 4,033 | 3,887 | 3,751 | 3,503 | 3,283 | 2,834 |
| 17 | 15,562 | 14,292 | 12,166 | 10,477 | 9,122 | 8,022 | 7,120 | 6,373 | 6,047 | 5,749 | 5,222 | 4,775 | 4,391 | 4,059 | 3,910 | 3,771 | 3,518 | 3,295 | 2,840 |
| 18 | 16,398 | 14,992 | 12,659 | 10,828 | 9,372 | 8,201 | 7,250 | 6,467 | 6,128 | 5,818 | 5,273 | 4,812 | 4,419 | 4,080 | 3,928 | 3,786 | 3,529 | 3,304 | 2,844 |
| 19 | 17,226 | 15,678 | 13,134 | 11,158 | 9,604 | 8,365 | 7,366 | 6,550 | 6,198 | 5,877 | 5,316 | 4,844 | 4,442 | 4,097 | 3,942 | 3,799 | 3,539 | 3,311 | 2,848 |
| 20 | 18,046 | 16,351 | 13,590 | 11,470 | 9,818 | 8,514 | 7,469 | 6,623 | 6,259 | 5,929 | 5,353 | 4,870 | 4,460 | 4,110 | 3,954 | 3,808 | 3,546 | 3,316 | 2,850 |
| 21 | 18,857 | 17,011 | 14,029 | 11,764 | 10,017 | 8,649 | 7,562 | 6,687 | 6,312 | 5,973 | 5,384 | 4,891 | 4,476 | 4,121 | 3,963 | 3,816 | 3,551 | 3,320 | 2,852 |
| 22 | 19,660 | 17,658 | 14,451 | 12,042 | 10,201 | 8,772 | 7,645 | 6,743 | 6,359 | 6,011 | 5,410 | 4,909 | 4,488 | 4,130 | 3,970 | 3,822 | 3,556 | 3,323 | 2,853 |
| 23 | 20,456 | 18,292 | 14,857 | 12,303 | 10,371 | 8,883 | 7,718 | 6,792 | 6,399 | 6,044 | 5,432 | 4,925 | 4,499 | 4,137 | 3,976 | 3,827 | 3,559 | 3,325 | 2,854 |
| 24 | 21,243 | 18,914 | 15,247 | 12,550 | 10,529 | 8,985 | 7,784 | 6,835 | 6,434 | 6,073 | 5,451 | 4,937 | 4,507 | 4,143 | 3,981 | 3,831 | 3,562 | 3,327 | 2,855 |
| 25 | 22,023 | 19,523 | 15,622 | 12,783 | 10,675 | 9,077 | 7,843 | 6,873 | 6,464 | 6,097 | 5,467 | 4,948 | 4,514 | 4,147 | 3,985 | 3,834 | 3,654 | 3,329 | 2,856 |
| 26 | 22,795 | 20,121 | 15,983 | 13,003 | 10,810 | 9,161 | 7,896 | 6,906 | 6,491 | 6,118 | 5,480 | 4,956 | 4,520 | 4,151 | 3,988 | 3,837 | 3,566 | 3,330 | 2,856 |
| 27 | 23,560 | 20,707 | 16,330 | 13,211 | 10,935 | 9,237 | 7,943 | 6,935 | 6,514 | 6,136 | 5,492 | 4,964 | 4,524 | 4,154 | 3,990 | 3,839 | 3,567 | 3,331 | 2,856 |
| 28 | 24,316 | 21,281 | 16,663 | 13,406 | 11,051 | 9,307 | 7,984 | 6,961 | 6,534 | 6,152 | 5,502 | 4,970 | 4,528 | 4,157 | 3,992 | 3,840 | 3,568 | 3,331 | 2,857 |
| 29 | 25,066 | 21,844 | 16,984 | 13,591 | 11,158 | 9,370 | 8,022 | 6,983 | 6,551 | 6,166 | 5,510 | 4,975 | 4,531 | 4,159 | 3,994 | 3,841 | 3,569 | 3,332 | 2,857 |
| 30 | 25,808 | 22,396 | 17,292 | 13,765 | 11,258 | 9,427 | 8,055 | 7,003 | 6,566 | 6,177 | 5,517 | 4,979 | 4,534 | 4,160 | 3,995 | 3,842 | 3,569 | 3,332 | 2,857 |
| 40 | 32,835 | 27,355 | 19,793 | 15,046 | 11,925 | 9,779 | 8,244 | 7,105 | 6,642 | 6,234 | 5,548 | 4,997 | 4,544 | 4,166 | 3,999 | 3,846 | 3,571 | 3,333 | 2,857 |
| 50 | 39,196 | 31,424 | 21,482 | 15,762 | 12,234 | 9,915 | 8,304 | 7,133 | 6,661 | 6,246 | 5,554 | 4,999 | 4,545 | 4,167 | 4,000 | 3,846 | 3,571 | 3,333 | |

If you need to use a factor for annuities due (paid in advance or at the beginning of the period):

1. Look up the factor for periods n + 1 2. **Then** add one (the PV of R1 invested now is R1). Or use the mathematical formula.

## TABLE C

## FUTURE VALUE OF R1 RECEIVED NOW, AFTER N YEARS

**Formula:** $(1 + i)^n$

| Year N | 1% | 2% | 3% | 4% | 5% | 6% | 7% | 8% | 9% | 10% | 12% | 14% | 15% | 16% | 18% | 20% |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1,0100 | 1,0200 | 1,0300 | 1,0400 | 1,0500 | 1,0600 | 1,0700 | 1,0800 | 1,0900 | 1,1000 | 1,1200 | 1,1400 | 1,1500 | 1,1600 | 1,1800 | 1,2000 |
| 2 | 1,0201 | 1,0404 | 1,0609 | 1,0816 | 1,1025 | 1,1236 | 1,1449 | 1,1664 | 1,1881 | 1,2100 | 1,2544 | 1,2996 | 1,3225 | 1,3456 | 1,3924 | 1,4400 |
| 3 | 1,0303 | 1,0612 | 1,0927 | 1,1249 | 1,1576 | 1,1910 | 1,2250 | 1,2597 | 1,2950 | 1,3310 | 1,4049 | 1,4815 | 1,5209 | 1,5609 | 1,6430 | 1,7280 |
| 4 | 1,0406 | 1,0824 | 1,1255 | 1,1699 | 1,2155 | 1,2625 | 1,3108 | 1,3605 | 1,4116 | 1,4641 | 1,5735 | 1,6890 | 1,7490 | 1,8106 | 1,9388 | 2,0736 |
| 5 | 1,0510 | 1,1041 | 1,1593 | 1,2167 | 1,2763 | 1,3382 | 1,4026 | 1,4693 | 1,5386 | 1,6105 | 1,7623 | 1,9254 | 2,0114 | 2,1003 | 2,2878 | 2,4883 |
| 6 | 1,0615 | 1,1262 | 1,1941 | 1,2653 | 1,3401 | 1,4185 | 1,5007 | 1,5869 | 1,6771 | 1,7716 | 1,9738 | 2,1950 | 2,3131 | 2,4364 | 2,6996 | 2,9860 |
| 7 | 1,0721 | 1,1487 | 1,2299 | 1,3159 | 1,4071 | 1,5036 | 1,6058 | 1,7138 | 1,8280 | 1,9487 | 2,2107 | 2,5023 | 2,6600 | 2,8262 | 3,1855 | 3,5832 |
| 8 | 1,0829 | 1,1717 | 1,2668 | 1,3686 | 1,4775 | 1,5938 | 1,7182 | 1,8509 | 1,9926 | 2,1436 | 2,4760 | 2,8526 | 3,0590 | 3,2784 | 3,7589 | 4,2998 |
| 9 | 1,0937 | 1,1951 | 1,3048 | 1,4233 | 1,5513 | 1,6895 | 1,8385 | 1,9990 | 2,1719 | 2,3579 | 2,7731 | 3,2519 | 3,5179 | 3,8030 | 4,4355 | 5,1598 |
| 10 | 1,1046 | 1,2190 | 1,3439 | 1,4802 | 1,6289 | 1,7908 | 1,9672 | 2,1589 | 2,3674 | 2,5937 | 3,1058 | 3,7072 | 4,0456 | 4,4114 | 5,2338 | 6,1917 |
| 11 | 1,1157 | 1,2434 | 1,3842 | 1,5395 | 1,7103 | 1,8983 | 2,1049 | 2,3316 | 2,5804 | 2,8531 | 3,4785 | 4,2262 | 4,6524 | 5,1173 | 6,1759 | 7,4301 |
| 12 | 1,1268 | 1,2682 | 1,4258 | 1,6010 | 1,7959 | 2,0122 | 2,2522 | 2,5182 | 2,8127 | 3,1384 | 3,8960 | 4,8179 | 5,3503 | 5,9360 | 7,2876 | 8,9161 |
| 13 | 1,1381 | 1,2936 | 1,4685 | 1,6651 | 1,8856 | 2,1329 | 2,4098 | 2,7196 | 3,0658 | 3,4523 | 4,3635 | 5,4924 | 6,1528 | 6,8858 | 8,5994 | 10,699 |
| 14 | 1,1495 | 1,3195 | 1,5126 | 1,7317 | 1,9799 | 2,2609 | 2,5785 | 2,9372 | 3,3417 | 3,7975 | 4,8871 | 6,2613 | 7,0757 | 7,9875 | 10,147 | 12,839 |
| 15 | 1,1610 | 1,3459 | 1,5580 | 1,8009 | 2,0789 | 2,3966 | 2,7590 | 3,1722 | 3,6425 | 4,1772 | 5,4736 | 7,1379 | 8,1371 | 9,2655 | 11,974 | 15,407 |
| 16 | 1,1726 | 1,3728 | 1,6047 | 1,8730 | 2,1829 | 2,5404 | 2,9522 | 3,4259 | 3,9703 | 4,5950 | 6,1304 | 8,1372 | 9,3576 | 10,748 | 14,129 | 18,488 |
| 17 | 1,1843 | 1,4002 | 1,6528 | 1,9479 | 2,2920 | 2,6928 | 3,1588 | 3,7000 | 4,3276 | 5,0545 | 6,8660 | 9,2765 | 10,761 | 12,468 | 16,672 | 22,186 |
| 18 | 1,1961 | 1,4282 | 1,7024 | 2,0258 | 2,4066 | 2,8543 | 3,3799 | 3,9960 | 4,7171 | 5,5599 | 7,6900 | 10,575 | 12,375 | 14,463 | 19,673 | 26,623 |
| 19 | 1,2081 | 1,4568 | 1,7535 | 2,1068 | 2,5270 | 3,0256 | 3,6165 | 4,3157 | 5,1417 | 6,1159 | 8,6128 | 12,056 | 14,232 | 16,777 | 23,214 | 31,948 |
| 20 | 1,2202 | 1,4859 | 1,8061 | 2,1911 | 2,6533 | 3,2071 | 3,8697 | 4,6610 | 5,6044 | 6,7275 | 9,6463 | 13,743 | 16,367 | 19,461 | 27,393 | 38,338 |
| 21 | 1,2324 | 1,5157 | 1,8603 | 2,2788 | 2,7860 | 3,3996 | 4,1406 | 5,0338 | 6,1088 | 7,4002 | 10,804 | 15,668 | 18,822 | 22,574 | 32,324 | 46,005 |
| 22 | 1,2447 | 1,5460 | 1,9161 | 2,3699 | 2,9253 | 3,6035 | 4,4304 | 5,4365 | 6,6586 | 8,1403 | 12,100 | 17,861 | 21,645 | 26,186 | 38,142 | 55,206 |
| 23 | 1,2572 | 1,5769 | 1,9736 | 2,4647 | 3,0715 | 3,8197 | 4,7405 | 5,8715 | 7,2579 | 8,9543 | 13,552 | 20,362 | 24,891 | 30,376 | 45,008 | 66,247 |
| 24 | 1,2697 | 1,6084 | 2,0328 | 2,5633 | 3,2251 | 4,0489 | 5,0724 | 6,3412 | 7,9111 | 9,8497 | 15,179 | 23,212 | 28,625 | 35,236 | 53,109 | 79,497 |
| 25 | 1,2824 | 1,6406 | 2,0938 | 2,6658 | 3,3864 | 4,2919 | 5,4274 | 6,8485 | 8,6231 | 10,835 | 17,000 | 26,462 | 32,919 | 40,874 | 62,669 | 95,396 |

## TABLE D

### FUTURE VALUE OF R1 PER ANNUM RECEIVED FOR N YEARS AT THE END OF EACH YEAR

**Formula:** $\frac{(1+i)^n - 1}{i}$

| Year N | 1% | 2% | 3% | 4% | 5% | 6% | 7% | 8% | 9% | 10% | 12% | 14% | 15% | 16% | 18% | 20% |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1,0000 | 1,0000 | 1,0000 | 1,0000 | 1,0000 | 1,0000 | 1,0000 | 1,0000 | 1,0000 | 1,0000 | 1,0000 | 1,0000 | 1,0000 | 1,0000 | 1,0000 | 1,0000 |
| 2 | 2,0100 | 2,0200 | 2,0300 | 2,0400 | 2,0500 | 2,0600 | 2,0700 | 2,0800 | 2,0900 | 2,1000 | 2,1200 | 2,1400 | 2,1500 | 2,1600 | 2,1800 | 2,2000 |
| 3 | 3,0301 | 3,0604 | 3,0909 | 3,1216 | 3,1525 | 3,1836 | 3,2149 | 3,2464 | 3,2781 | 3,3100 | 3,3744 | 3,4396 | 3,4725 | 3,5056 | 3,5724 | 3,6400 |
| 4 | 4,0604 | 4,1216 | 4,1836 | 4,2465 | 4,3101 | 4,3746 | 4,4399 | 4,5061 | 4,5731 | 4,6410 | 4,7793 | 4,9211 | 4,9934 | 5,0665 | 5,2154 | 5,3680 |
| 5 | 5,1010 | 5,2040 | 5,3091 | 5,4163 | 5,5256 | 5,6371 | 5,7507 | 5,8666 | 5,9847 | 6,1051 | 6,3528 | 6,6101 | 6,7424 | 6,8771 | 7,1542 | 7,4416 |
| 6 | 6,1520 | 6,3081 | 6,4684 | 6,6330 | 6,8019 | 6,9753 | 7,1533 | 7,3359 | 7,5233 | 7,7156 | 8,1152 | 8,5355 | 8,7537 | 8,9775 | 9,4420 | 9,9299 |
| 7 | 7,2135 | 7,4343 | 7,6625 | 7,8983 | 8,1420 | 8,3938 | 8,6540 | 8,9228 | 9,2004 | 9,4872 | 10,089 | 10,730 | 11,067 | 11,414 | 12,142 | 12,916 |
| 8 | 8,2857 | 8,5830 | 8,8923 | 9,2142 | 9,5491 | 9,8975 | 10,260 | 10,637 | 11,028 | 11,436 | 12,300 | 13,233 | 13,727 | 14,240 | 15,327 | 16,499 |
| 9 | 9,3685 | 9,7546 | 10,159 | 10,583 | 11,027 | 11,491 | 11,978 | 12,488 | 13,021 | 13,579 | 14,776 | 16,085 | 16,786 | 17,519 | 19,086 | 20,799 |
| 10 | 10,462 | 10,950 | 11,464 | 12,006 | 12,578 | 13,181 | 13,816 | 14,487 | 15,193 | 15,937 | 17,549 | 19,337 | 20,304 | 21,321 | 23,521 | 25,959 |
| 11 | 11,567 | 12,169 | 12,808 | 13,486 | 14,207 | 14,972 | 15,784 | 16,645 | 17,560 | 18,531 | 20,655 | 23,045 | 24,349 | 25,733 | 28,755 | 32,150 |
| 12 | 12,683 | 13,412 | 14,192 | 15,026 | 15,917 | 16,870 | 17,888 | 18,977 | 20,141 | 21,384 | 24,133 | 27,271 | 29,002 | 30,850 | 34,931 | 39,581 |
| 13 | 13,809 | 14,680 | 15,618 | 16,627 | 17,713 | 18,882 | 20,141 | 21,495 | 22,953 | 24,523 | 28,029 | 32,089 | 34,352 | 36,786 | 42,219 | 48,497 |
| 14 | 14,947 | 15,974 | 17,086 | 18,292 | 19,599 | 21,015 | 22,550 | 24,215 | 26,019 | 27,975 | 32,393 | 37,581 | 40,505 | 43,672 | 50,818 | 59,196 |
| 15 | 16,097 | 17,293 | 18,599 | 20,024 | 21,579 | 23,276 | 25,129 | 27,152 | 29,361 | 31,772 | 37,280 | 43,842 | 47,580 | 51,660 | 60,965 | 72,035 |
| 16 | 17,258 | 18,639 | 20,157 | 21,825 | 23,657 | 25,673 | 27,888 | 30,324 | 33,003 | 35,950 | 42,753 | 50,980 | 55,717 | 60,925 | 72,939 | 87,442 |
| 17 | 18,430 | 20,012 | 21,762 | 23,698 | 25,840 | 28,213 | 30,840 | 33,750 | 36,974 | 40,545 | 48,884 | 59,118 | 65,075 | 71,673 | 87,068 | 105,93 |
| 18 | 19,615 | 21,412 | 23,414 | 25,645 | 28,132 | 30,906 | 33,999 | 37,450 | 41,301 | 45,599 | 55,750 | 68,394 | 75,836 | 84,141 | 103,74 | 128,12 |
| 19 | 20,811 | 22,841 | 25,117 | 27,671 | 30,539 | 33,760 | 37,379 | 41,446 | 46,018 | 51,159 | 63,440 | 78,969 | 88,212 | 98,603 | 123,41 | 154,74 |
| 20 | 22,019 | 24,297 | 26,870 | 29,778 | 33,006 | 36,786 | 40,995 | 45,762 | 51,160 | 57,275 | 72,052 | 91,025 | 102,44 | 115,38 | 146,63 | 186,69 |
| 21 | 23,239 | 25,783 | 28,676 | 31,969 | 35,719 | 39,993 | 44,865 | 50,423 | 56,765 | 64,002 | 81,699 | 104,77 | 118,81 | 134,84 | 174,02 | 225,03 |
| 22 | 24,472 | 27,299 | 30,537 | 34,248 | 38,505 | 43,392 | 49,006 | 55,457 | 62,873 | 71,403 | 92,503 | 120,44 | 137,63 | 157,41 | 206,34 | 271,03 |
| 23 | 25,716 | 28,845 | 32,453 | 36,618 | 41,430 | 46,996 | 53,436 | 60,893 | 69,532 | 79,543 | 104,60 | 138,30 | 159,28 | 183,60 | 244,49 | 326,24 |
| 24 | 26,973 | 30,422 | 34,426 | 39,083 | 44,502 | 50,816 | 58,177 | 66,765 | 76,790 | 88,497 | 118,16 | 158,66 | 184,17 | 213,98 | 289,49 | 392,48 |
| 25 | 28,243 | 32,030 | 36,459 | 41,646 | 47,727 | 54,865 | 63,249 | 73,106 | 84,701 | 98,347 | 133,33 | 181,87 | 212,79 | 249,21 | 342,60 | 471,98 |

If you need to use a factor for annuities due (paid in advance or at the beginning of the period):

1. Look up the factor for periods n + 1  2. **Then** subtract ONE

Or look up factor for n and multiply with (1 + i)

Or use the mathematical formula.

# Notes

# Notes