



**NATIONAL OPEN UNIVERSITY OF NIGERIA
FACULTY OF MANAGEMENT SCIENCES**

COURSE TITLE: BUSINESS FINANCE

COURSE CODE: BFN732

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COURSE GUIDE

1.0 INTRODUCTION

This course is designed to give you self-instruction on the concept of Business Finance for PGD in Banking and Finance of the School of Management Sciences.

2.0 COURSE AIMS

The aim of this course is to introduce Finance to first year of the programme Post Graduate Programme (PGD) students of Banking and Finance to understand business finance in a firm, enterprise or business organization.

3.0 COURSEOBJECTIVES

By the end of this course, the student should be able to:

- ❖ Explain working capital-Concept, stock and cash management,
- ❖ Acquit you with the concept of capital Budgeting, capital Rationing and capital structure
- ❖ Introduce working capital management

4.0 WORKINGTHROUGHTHECOURSE

This course, BFN 732 Business Finance, it is expected of you to do a lot of reading in order to cover the materials in the course material. It implies that you should devote much time to this course by reading through this material and getting more information from numerous texts and journals in research. The course material has been made easy to read and user-friendly.

5.0 COURSEMATERIALS

The National Open University of Nigeria provides you with the following items:

- ❖ Course Guide
- ❖ Study Units
- ❖ TMA Assignment file

In addition, at the end of every unit is a list of texts for your references and for further reading. It is not compulsory for you to read all of them. They are only essential supplements to this course material.

6.0 STUDY UNITS

The study units in this course are located under Modules as follows:

MODULE 1	WORKING CAPITAL MANAGEMENT
Unit 1	concept of working capital
Unit 2	Cash Management
Unit 3	Stock Management
MODULE 2	CAPITAL BUDGETING DECISION
Unit 1	Payback Period
Unit 2	Accounting Rate of Return
Unit 3	Net Present Value
Unit 4	Internal Rate of Return
Unit 5	Profitability Index
MODULE 3	CAPITAL RATIONING
Unit 1	Types and Causes of Capital Rationing
Unit 2	Different Situation of Capital Rationing
Unit 3	Project selection methods
MODULE 4	CAPITAL STRUCTURE DECISION
Unit 1	Concept of Capital Structure
Unit 2	Financing Structure and Capital Structure
Unit 3	Theories of Capital Structure
Unit 4	Planning of Capital Structure

COURSE DESCRIPTION

The modules and units are self-explanatory as they summarize **BUSINESS FINANCE** - for PGD students of Banking and Finance. You will need to work in groups with other students in this course and program in order to discuss, compare notes and thoughts and to exchange and share ideas.

6.0 ASSESSMENTS

There are two aspects to the assessment of the course: first are the tutor- marked assignments (TMA); and the end of course examination. Within each unit are self-assessment exercises which are aimed at helping you check your assimilation as you proceed. Try to attempt each of the exercises before finding out the expected answer from lecture.

8.0 TUTOR-MARKED ASSIGNMENT (TMA)

This is your continuous assessment and accounts for 30% of your total score. You are expected to answer at least four TMA's, three of which must be answered and submitted before you sit for the end of course examination. Your Facilitator will give you the TMA's and you must submit to your Centre your responses.

9.0 FINAL EXAMINATION AND GRADING

With this examination written successfully, you have completed your course in Basic Research and one believes you would apply your knowledge (new or up-graded) in your project. The 'end of course examinations' would earn you

70% which would be added to your TMA score (30%). The time for this examination would be communicated to you.

Table1: Course Marking Scheme

ASSESSMENT	MARKS
Assignment (TMAs)1-4	Four (4) assignments, best three (3) marks of the four account at 10% each = 30%
End of course examination	70% of overall course marks
Total	100% of course marks

10.0 HOW TO GET THE MOST FROM THIS COURSE

In distance learning, the study units are specially developed and designed to replace the conventional lectures. Hence, you can work through these materials at your own pace, and at a time and place that suits you best.

Visualize it as reading the lecture.

Each of the study units follows a common format. The first item is an introduction to the subject matter of the unit, and how a particular unit is integrated with the other units and the course as a whole. Next is a set of learning objectives. These objectives let you know what you should be able to do by the time you have completed the unit. You should use these objectives to guide your study. When you have finished the unit, you must go back and check whether you have achieved the objectives. If you make a habit of doing this, you will significantly improve your chances of passing the course.

The main body of the unit guides you through the required reading from other sources.

This will usually be either from your set books or from a **Reading Section**. Activities are interspersed throughout the units, and answers are given at the end of the units.

Practice these self-assessment exercises to help you to achieve the objectives of the units and prepare you for the assignments and the examinations. Keep tap with your facilitator for assistance.

In summary,

- (1) Try to read this course guide;
- (2) Organize a study schedule;
- (3) Do everything you can to stick to the schedule;
- (4) Assemble the study materials;

- (5) Work through the unit. The content of the unit itself has been arranged to provide a sequence for you to follow. As you work through this unit, you will be instructed to read sections from your set books or other articles.
- (6) Review the objectives for each study unit confirms that you have achieved them. If you feel unsure about any of the objectives, review the study material or consult;
- (7) When you are sure of having achieved a unit's objectives, you can then start on the next unit;
- (8) After completing the last unit, review the course and prepare yourself for the final examination. Check that you have achieved the unit objectives and the course objectives.

To gain the maximum benefit from course tutorials, prepare a question list before attempting them.

11.0 SUMMARY

This course BFN 732 is designed to introduce you to Business Finance to give you some knowledge which would help you to understand the role of business finance in business enterprise and other organizations. Endeavour to go through this course successfully and you would be in a good position to pass your examination at the end of the semester. We wish you success in your examination.

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1.0 INTRODUCTION

Working capital is a very crucial part of capital as to represents the productive capacity applied to productive assets yielding productive results which is known as utility. The working capital of a company refers to the resources needed for day to day production of utility which a company sells as goods or services. It is also known as the excess of current assets over current liabilities.

They can be funded either by short or long-term finance. It is not a permanent investment, it is only invested in a business production for a short while and is reinvested continually as it yields more income for the company.

Current assets and current liabilities share a relationship of which current Assets should at least be double of current liabilities for the firm to be said to have an ideal current ratio showing how solvent a company is.

Working capital is that portion of a firm's capital which is employed in short term operations. Current assets represent Gross Working Capital. The excess of current assets over current liabilities is Net Working Capital. Current assets consists of all stocks including finished goods, work in progress, raw material, cash, marketable securities, accounts receivables, inventories, short term investments, etc. These assets can be converted into cash within an accounting year. Current liabilities represent the total amount of short term debt which must be settled within one year. They represent creditors, bills payable, bank overdraft, outstanding expenses, short term loans, etc. The working capital is the finance required to meet the costs involved during the operating cycle or business cycle. Operating cycle is the period involved from the time raw materials are purchased to the time they are converted into finished goods and the same are finally sold and realized. The need for current assets arises because of operating cycle. The operating cycle is a continuous process and therefore the need for current assets is felt constantly. Each and every current asset is nothing but blockage of funds. Therefore, these current assets need to be financed which is done through Working Capital Financing. There is always a minimum level of current assets or working capital which is continuously required by the firm to carry on its business operations. This minimum level of current assets is known as permanent or fixed working capital. It is permanent in the same way as the firm's fixed assets are. This portion of working capital has to be financed by permanent sources of funds such as; share capital, reserves, debentures and other forms of long term borrowings. The extra working capital needed to support the changing production and sales is called fluctuating or variable or temporary working capital. This has to be financed on short term basis.

2.0 OBJECTIVES

The objectives of this study is to enable students know the importance of efficient of working capital and also the concept of over or under capitalization.

- To understand working capital management
- To know the classification of working capital
- How to manage working capital in firms and how it improves earnings
- To know the determinant of working capital
- To be acquainted with the theories of working capital

3.0 Main Content

3.1 Definition of Working Capital

Working Capital is a liquidity ratio that measures a company's ability to pay off its current liabilities with its current assets. Working Capital is calculated by subtracting current liabilities from current assets. Working Capital Management is a managerial accounting strategy focusing on maintaining efficient levels of both components of Working Capital, current assets and current liabilities, in respect to each other. Working Capital Management ensures a company has sufficient cash flow in order to meet its short-term debt obligations and operating expenses. Implementing an effective Working Capital is an excellent way for many companies to improve their earnings. Working capital is the lifeblood of a business enterprise

3.2 Concepts of Working Capital

A Net Working capital

This is the difference between current assets and current liabilities. It epitomize the margin of safety for meeting current liabilities and climaxes the financial health of the company.

Therefore Net Working Capital ($NWC = CA - CL$)

B GROSS WORKING CAPITAL:

This refers to the amount of funds invested in current assets that are employed in the business. It is these assets that the finance manager concerns himself with in an attempt to bring about productivity from other assets.

3.2.1 CLASSIFICATION OF WORKING CAPITAL

Working capital may be classified in two ways:

(a) **GROSS WORKING CAPITAL:** This classification is directly related to the gross concept as capitals invested in the various components of current assets such as dash, inventories, receivables and short-term assets.

(b) PERMANENT OR TEMPORARY WORKING CAPITAL

A second classification alluding to time is also necessary. Using time as a basis, working capital may be classified either permanent or temporary:

First, unlike fixed assets, which retain their form over a long period of time permanent working capital is constantly changing from one asset to another. Secondly, permanent working capital never leaves the business process. Third, as long as a firm experiences growth, the size of the permanent working capital amount will always increase.

Temporary or variable working capital, like permanent working capital, changes its form from cash to inventory to, receivables and back to cash, but it differs from permanent working capital in that it is not always gainfully employed. Businesses that are seasonal and/or cyclical in nature need more temporary working capital than firms that are into real manufacturing of physical goods.

3.3 DETERMINANTS OF WORKING CAPITAL

A firm's requirement for working capital is primarily affected by the following factors:

a. VOLUME OF SALES

This is the most important factor affecting the size of the firm's working capital. A firm maintains current assets because they are needed to support the operational activities that result in sales. Over time a firm will keep a fairly steady ratio of 20 to 30 percent (between current assets and sales). This means that a firm realizing constant level of sales will operate with a fairly constant level of cash, receivables, and inventory if properly managed. Firms experiencing growth in sales will require additional permanent working capital. If, sales are declining, a reduction in permanent working capital would usually be the case.

b. SEASONAL AND CYCLICAL FACTORS

Most firms experience seasonal fluctuation in the demand for their products and services. These variations in sales will affect the level of working capital needed. Similarly, when the overall economy experiences a varying level of economic activity, with changes in the business cycle, the need for working capital will also be affected.

If the economy enters a recession, a firm's, sales will temporarily decline because customers will be more cautious in purchasing goods and services. This will decrease the need for working capital. A boom economy will have the opposite effect.

c. CHANGES IN TECHNOLOGY

Technological changes/developments particularly those related to the production process, exert a high impact on the need for working capital. If the faster processing requires increased materials for efficient production runs, the permanent, inventory will increase. Thus, the working needs of the firm.

d. FIRM'S POLICES

The Firm's policies will affect the levels of working capital. Assuming the firm changes its credit policy from net 30 to net 60, additional funds will be permanently tied up in receivables. If it changes production policies, inventory requirements may be permanently or temporarily affected, if it changes its safety level of cash on hand, permanent working capital may increase or decrease. If the level of cash is linked to the level of sales, variable working capital may be affected. This can be summarized as follows:

Table 1.1 Sources of changes in working capital needs

Sources of change	Working capital affected	Reason
Sales volume	Permanent	Different levels of cash receivables needed at new sales level receivables and inventory must be available on temporary basis
Seasoned and cyclical factor technology	Variable and, Permanent	Level of inventory must support the new production capability
Policies of firm	Variable and Permanent	Some policies tie up working capital while some others release it.

e. NATURE OF THE BUSINESS

A company's working capital requirements are basically related to the kind of business it conducts. Trading and manufacturing concerns require more working capital than concerns engaged in provision of public utilities and services. A trading concern generally needs comparatively small working capital, whereas manufacturing cum trading stands between these two.

f. TYPE OF INDUSTRY

The requirement of working capital also varies from industry to industry. A plant that engages in producing beans would require more working capital than a firm that manufactures bread.

g. PRODUCTION POLICY ANTI PROCESS

Seasonal industries obviously have varied need for working capital. Here, the working capital requirements will depend upon the production policy adopted by the particular company. Where a longer period is required in the manufacturing process, the need for a higher working capital will be apparent.

h. GROWTH PROSPECTS OF THE BUSINESS

The expansion and growth of the business will lead to increased demand for finished goods of the company, which consequently leads to increased need for working capital. Where the growth prospect is higher, the need for working capital will also increase.

i. BUSINESS CYCLE FLUCTUATION

The business cycle also has an impact on the requirement of working capital. In boom periods businessmen purchase a high stock of raw materials and other goods to be used in the business operations in order to take advantage of higher demand and incomes. Thus, more working capital is need during boom period. The converse is the case in recession periods.

j. Dividend Policy

The dividend policy of the company also affects its working capital requirements. A company-paying dividend in cash will require more cash than a company, which gives dividend in form of bonus shares.

k. Economic Factors and Government Policy

Government policies have great impact on the working capital requirements of a company. Government policy, particularly in respect of import of raw materials, foods, and spares, control of prices and distribution, credit control, bank rates and other labour laws, have great effect on the requirements of working capital of a firm. Besides the above, other factors may affect the requirement of working capital of a particular company. These include transport, and communication facilities, social responsibility etc.

Other factors that determine the amount of working capital needed by the firm include:

1. Availability of credit
2. Attitude towards profits and
3. Attitude towards risk.

3.4 THEORIES OF WORKING CAPITAL

Working capital affects the risk and return profit of a firm. The successful firms usually maintain the necessary amount of working capital to meet their needs. In fact, studies indicate that the most successful firms generally keep more than enough working capital. A basic fact here is that a firm needs to concentrate attention on solving liquidity problems. We have two theories on the effects of keeping excessive working capital:

Theory one: High levels of working capital decrease risks and decrease returns. Proponents of this theory argue that it is logically correct to say that excessive current assets cost money. If they are kept, the 'firm must pay for them and the additional costs lower the after-tax-profits of the firm and the returns to shareholders.

Theory two: This theory holds that high levels of working capital decrease risk and increase return. Proponents of this theory observed that the large and successful firms keep just enough working capital. They argue that the concentration on profits, rather than liquidity, overcomes the extra cost of the excessive working capital and results both in decreased risk and higher returns.

Each theory has its own merit and is worthy of further investigations. The two theories agree that inadequate working capital causes high risk and low returns. The level of production generally determines working capital only when actual production is undertaken, and the volume required. The precise level of investment in working capital predicated on:

1. Management's attitude towards risk, and
2. Factors that influence the amount of cash inventories, receivables and other current assets, required to support a given volume of output.

Risk means the risk of not maintaining sufficient current assets to:

1. Meet all financial obligations as they mature, and
 2. Support the proper level of sales.
- i. The first principle is concerned with the relationship between the rate of working capital and sales. This relationship could be said to be that of working capital is varied relative to sales, the amount of risk that a firm assumes is also varied, and the opportunity for gain or loss increased. This principle implies that a definite relationship exist between the degree of risk management assumes and the rate of return. This means that the more risk that a firm assumes, the greater is the opportunity for a higher return.
 - ii. Funds should be invested in each component of working capital as long as the equity position of the firm increases.
 - iii. The type of funds used to finance working capital directly affects the amount of risk that a firm assumes as well as the opportunity for gain or loss and cost of capital,
 - iv. The, greater the disparity between the maturity of a firm's short-term debt instruments and its flow of internally generated funds, the greater the risk, and vice-versa.

Working capital management involves a relationship between the current assets namely cash and marketable securities, receivables and inventories, and the current liabilities. Working capital management has been confined to the left hand side of the balance sheet where it has

been directed to optimizing the levels of cash and marketable securities of receivable and of inventories.

3.5 Structure of Working Capital

The different elements or components of current assets and current liabilities constitute the structure of working capital which can be illustrated in the table below.

Structure of Current Assets and Current Liabilities

Current Liabilities	Current Assets
Bank Overdraft	Cash and Bank Balance
Creditors	Inventories: Raw-Materials Work-in-progress
Outstanding Expenses	Spare Parts
Bills Payable	Accounts Receivables
Short-term Loans	Bills Receivables
Proposed Dividends	Accrued Income
Provision for Taxation, etc.	Prepaid Expenses Short-term Investments

Structure of Working Capital

The study of structure of working capital is another name for the study of working capital cycle. In other words, it can be said that the study of structure of working capital is the study of the elements of current assets *viz.* inventory, receivable, cash and bank balances and other liquid resources like short-term or temporary investments. Current liabilities usually comprise bank borrowings, trade credits, assessed tax and unpaid dividends or any other such things. The following points mention below are the elements of working capital:

Inventory–Inventory is the major item of current assets. The management of inventories–raw material, goods-in-process and finished goods are an important factor in the short-run liquidity positions and long-term profitability of the company.

Raw material inventories – Uncertainties about the future demand for finished goods, together with the cost of adjusting production to change in demand will cause a financial manager to desire some level of raw material inventory. In the absence of such inventory, the company could respond to increased demand for finished goods only by incurring explicit clerical and

other transactions costs of ordinary raw material for processing into finished goods to meet that demand. If changes in demand are frequent, these order costs may become relatively large.

Moreover, attempts to purchase hastily the needed raw material may necessitate payment of premium purchase prices to obtain quick delivery and, thus, raise cost of production. Finally, unavoidable delays in acquiring raw material may cause the production process to shutdown and then re-start again raising cost of production. Under these conditions the company cannot respond promptly to changes in demand without sustaining high costs. Hence, some level of raw materials inventory has to be held to reduce such costs. Determining its proper level requires an assessment of costs of buying and holding inventories and a comparison with the costs of maintaining insufficient level of inventories.

Work-in-process inventory—This inventory is built up due to production cycle. Production cycle is the time-span between introduction of raw material into production and emergence of finished product at the completion of production cycle. Till the production cycle is completed, the stock of work-in-process has to be maintained.

Finished goods inventory— Finished goods are required for reasons similar to those causing the company to hold raw materials inventories. Customer's demand for finished goods is uncertain and variable. If a company carries no finished goods inventory, unanticipated increases in customer demand would require sudden increases in the rate of production to meet the demand. Such rapid increase in the rate of production may be very expensive to accomplish. Rather than loss of sales, because the additional finished goods are not immediately available or sustain high costs of rapid additional production, it may be cheaper to hold a finished goods inventory. The flexibility afforded by such an inventory allows a company to meet unanticipated customer demands at relatively lower costs than if such an inventory is not held. Thus, to develop successfully optimum inventory policies, the management needs to know about the functions of inventory, the cost of carrying inventory, economic order quantity and safety stock. Industrial machinery is usually very costly and it is highly uneconomical to allow it to lie idle. Skilled labour also cannot be hired and fired at will. Modern requirements are also urgent. Since requirements cannot wait and since the cost of keeping machine and men idle is higher, than the cost of storing the material, it is economical to hold inventories to the required extent. The objectives of inventory management are:

- (1) To minimize idle cost of men and machines caused by shortage of raw materials, stores and spare parts.
- (2) To keep down:
 - (a) Inventory ordering cost.
 - (b) Inventory carrying cost,
 - (c) Capital investment in inventories
 - (d) Obsolescence losses

Receivables—Many firms make credit sales, and as a result carry receivable as a current asset. The practice of carrying receivables has several advantages *viz.*, (i) reduction of collection costs over cash collection, (ii) Reduction in the variability of sales, and (iii) increase in the level of near-term sales. While immediate collection of cash appears to be in the interest of shareholders, the cost of that policy may be very high relative to costs associated with delaying the receipt of cash by extension of credit. Imagine, for example, an electricity supply company employing a person at every house constantly reading electricity meter and collecting cash from him every minute as electricity is consumed. It is far cheaper for accumulating electricity usage and bill once a month. This of course, is a decision to carry receivables on the part of the company. It may also be true that the extension of credit by the firm to its customers may reduce the variability of sales over time. Customers confined to cash purchases may tend to purchase goods when cash is available to them. Erratic and perhaps cyclical purchasing patterns may then result unless credit can be obtained elsewhere. Even if customers do obtain credit elsewhere, they must incur additional cost of search in arranging for a loan costs that can be estimated when credit is given by a supplier. Therefore, extension of credit to customers may well smooth out of the pattern of sales and cash inflows to the firm over time since customers need not wait for some in flows of cash to make a purchase. To the extent that sales are smoothed, cost of adjusting production to changes in the level of sales should be reduced.

Finally, the extension of credit by firms may act to increase near-term sales. Customers need not wait to accumulate necessary cash to purchase an item but can acquire it immediately on credit. This behaviour has the effect of shifting future sales close to the present time.

Therefore, the extensions of credit by affirm and the resulting investment in receivables occurs because it pays a firm to do so. Costs of collecting revenues and adapting to fluctuating

customer demands may make it desirable to offer the convenience associated with credit to a firm's customers. To the extent that near sales are also increased, extension of credit is made even more attractive for the firm.

Cash and interest-bearing liquid assets—Cash is one of the most important tools of day-to-day operation, because it is a form of liquid capital which is available for assignment to any use. Cash is often the primary factor which decides the course of business destiny. The decision to expand a business may be determined by the availability of cash and the borrowing of funds will frequently be dictated by cash position.

Cash-in-hand, however, is a non-earning asset. This leads to the question as to what is the optimum level of this idle resource. This optimum depends on various factors such as the manufacturing cycle, the sale and collection cycle, age of the bills and on the maturing of debt. It also depends upon the liquidity of other current assets and the matter of expansion. While a liberal maintenance of cash provides a sense of security, a lack of sufficiency of cash hampers day-to-day operations. Prudence, therefore, requires that no more cash should be kept on hand than the optimum required for handling miscellaneous transactions over the counter and petty disbursements etc.

It has not become a practice with business enterprises to avoid too much redundant cash by investing a portion of their earnings in assets which are susceptible to easy conversion into cash. Such assets may include government securities, bonds, debentures and shares that are known to be readily marketable and that may be liquidated at a moment's notice when cash is needed.

Working Capital Management theory is based on the traditional models of the Cash Conventional Cycle that is initiated by Richards and Laughlin (1980). In fact, it tells about the investment and credit decisions in the customer, inventory and suppliers, which show average number of days started from the date when the firm starts payments to its suppliers and the date when it begins to receive payments from its regulars. Padachi (2006) analysed the trends in the Working Capital and its influence on business performance for small manufacturers of Mauritius. He reported that firm's needs for Working Capital of change over time depending

on the rate of creation of money and high internal investment in inventories and receivables led to reduced profitability.

3.6 Working Capital Policy

Working Capital Policy into three categories as defensive or hedging, aggressive and conservative Working Capital policy Arnold, (2008) and discussed as follows:

Defensive policy: Company follows defensive policy by using long term debt and equity to finance its fixed assets and major portion of current assets. Under this approach, the business concern can adopt a financial plan which matches the expected life of assets with the expected life of the sources of funds raised to finance assets Paramasivan and Subramanian, (2009). Inventory expected to be sold in 30 days could be financed with a 30- day bank loan; a machine expected to last for 5 years could be financed with a 5-year loan; a 20-year building could be financed with a 20 year mortgage bond; and so forth Weston and Brigham, (1977). Defensive policy reduces the risk by reducing the current liabilities but it also affects profitability because long term debt offers high interest rate which will increase the cost of financing Arnold, (2008). This means a company is not willing to take risk and feel it appropriate to keep cash or near cash balances, higher inventories and generous credit terms. Mostly companies that are operating in an uncertain environment prefer to adopt such a policy because they are not sure about the future prices, demand and short term interest rate. In such situation it is better to have a high level of current assets. Which means, keeping higher level of inventory in the stock, to meet sudden rise in demand and to avoid the risk of stoppage in production. This approach gives a longer Cash Conversion Cycle for the company. It also provides the shield against the financial distress created by the lack of funds to meet the short term liability but as the researcher discussed earlier long term debt have high interest rate which will increase the cost of financing. Similarly, funds tied up in a business because of generous credit policy of

company and it also have opportunity costs. Hence, this policy might reduce the profitability and the cost of following this policy might exceed the benefits of the policy Arnold (2008).

Aggressive policy: Companies can follow aggressive policy by financing its current assets with short term debt because it gives low interest rate. However, the risk associated with short term debt is higher than the long term debt. Paramasivan and Subramanian (2009) pinpointed that in aggressive policy the entire estimated requirement of current assets should be financed from short- term sources and even a part of fixed assets financing be financed from short- term sources. This approach makes the finance mix more risky, less costly and more profitable. Furthermore, few finance managers take even more risk by financing long term asset with short term debts and this approach push the Working Capital on the negative side.

Managers try to enhance the profitability by paying lesser interest rate but this approach can be proved very risky if the short term interest rate fluctuates or the cash inflow is not enough to fulfill the current liabilities Weston and Brigham, (1977). Therefore, such a policy is adopted by the company which is operating in a stable economy and is quite certain about future cash flows. A company with aggressive Working Capital policy offers short credit period to customers, holds minimal inventory and has a small amount of cash in hand. This policy increases the risk of default because a company might face a lack of resources to meet the short term liabilities but it also gives a high return as the high return is associated with high risk Arnold, (2008).

Conservative policy: Some companies want neither to be aggressive by reducing the level of current assets as compared to current liabilities nor to be defensive by increasing the level of current assets as compared to current liabilities. So, in order to balance the risk and return these firms are following the conservative approach. It is also a mixture of defensive Working Capital

policy and aggressive Working Capital Policy. Moreover, this policy not only reduces the risk of default but it also reduces the opportunity cost of additional investment in the current assets. On the other hand apart from the above points the level of Working Capital also depends on the level of sale, because, sales are the source of revenue for every companies. As sales increase Working Capital will also increase with the same proportion so, the length of Cash Conversion Cycle remains the same. As the sales increase Working Capital increase in a slower rate. As the sales increase the level of Working Capital rises in misappropriate manner i.e. the Working Capital might raise in a rate more than the rate of increased in the sale. Company with stable sale or growing sale can adopt the aggressive policy because it has a confidence on its future cash inflows and is confident to pay its short term liabilities at maturity. On the other hand a company with unstable sale or with fluctuation in the sale can't think of adopting the aggressive policy because it is not sure about its future cash inflows. In such a situation adoption of aggressive policy is similar to committing a suicide. Hence, searching other method might be the best choice.

Examples:

Sales	200000
Cost of goods sold	150000
Purchases	90000
Stock	50000
Debtors	15000
Creditors	11000

Assume all sales and purchases are on credit calculate cash operating cycle.

Solution:

Stock Turnover	cost of goods sold/ average stock = $150000/50000 = 1/3 * 365 = 122$ days
Average collection period	trade debtors/ credit sales* 365 = $15000/200000*365 = 27$ days
Average payment period	trade creditors/credit purchases *365= $11000/90000*365= 45$ days

Length of cash operating cycle = $122+27-45 = 104$ days

4.0 Conclusion

The management of any business need ensure that the firm has a balanced trading capital. They should monitor the level of funds that they should allocate to the current assets and monitor the relationship between fixed and current assets. Effects of overtrading and under trading could be quite detrimental.

Therefore firms try to keep an optimal level of Working Capital that maximizes their value Deloof, (2003). In addition to that, the effective Working Capital is very important because it affects the performance and liquidity. The major problem of Working Capital Management in a profit making organization is its optimization which is inherently complex, It is a matter of balancing each component and each organization need to manage it carefully in order to maintain low Working Capital and the resources they need to fund product development, make and deliver products and offer high levels of customer services. It was observed that poor Working Capital management in many profit making organizations has resulted into distress in profitability and erosion of equity.

5.0 Summary

In summary, the management of working capital is the biggest challenge of making a business a going concern, working capital refers to turning over temporary investments of operational resources.

The operating / cash / working capital cycle is the period in between inventory of raw materials are obtained and converted to finished goods.

If the operating cycle is properly monitored, overtrading / under capitalization could be avoided thereby ensuring that finances are properly regulated.

Working Capital policy can be best described as a strategy which provides the guideline to manage the current assets and current liabilities in such a way that it reduces the risk of default Afza and Nazir, (2007). Working Capital policy is mainly focusing on the liquidity of current

assets to meet current liabilities. Liquidity is very important because, if the level of liquidity is too high then a company has lot of idle resources and it has to bear the cost of these idle resources. However, if liquidity is too low then it will face lack of resources to meet its current financial liabilities Arnold, (2008). Current assets are key component of Working Capital and the Working Capital also depends on the level of current assets against the level of current liabilities.

6.0 TUTOR MARKED ASSIGNMENT

- Differentiate between operating cycle and cash cycle
- What is overtrading?
- What is capitalization?
- What is overcapitalization?
- Outline the various working capital ratios
- Explain the term Working Capital?
- Why should firms manage Working Capital?
- What is the Concept Working Capital Policy?
- List and explain the determinants of working capital

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Unit 2 Cash Management

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- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main Content

- 3.1 Definition and importance
 - 3.2 Reasons for holding cash
 - 3.3 Cash budgets
 - 3.4 Functions of cash management
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Introduction

The importance of cash and liquidity for a business cannot be underestimated as it is very vital to the going concern of the firm. If a company is unable to pay what it owes at the required time, a creditor might take legal action to recover the unpaid amount. Even if such extreme action is not taken, but a company is slow in paying invoices, creditors will be reluctant to provide additional credit. It is therefore essential for a business to ensure that its cash flows are well managed and that it has sufficient liquidity.

2.0 Objectives

The objective here is to establish understanding of what cash management is and how it is important to the daily activities of the firm. Various components of cash management will also be briefly discussed and we would also discuss about the functions it plays in organisations, receivables, payables, cash budgets. Examples will also be included to aid better understanding.

3.0 Main Content

3.1 Definition and importance of Cash Management

Cash management involves not only avoiding insolvency, but also reducing the length of account receivables (AR), increasing collection rates, selecting appropriate short-term investment vehicles, and increasing cash on hand to improve a company's cash position and profitability. This involves shortening of cash collection periods, regular follow ups for collections, negotiation of favorable terms with suppliers allowing delay in payment periods, and preparation of cash flow forecasts. Businesses also use of technology to speed up cash collection process. They must do all of this while maintaining adequate amount of funds to meet daily operations.

Successfully managing cash is an essential skill for small business developers, because they typically have less access to affordable credit and have a significant amount of upfront costs to manage while waiting for receivables. Wisely managing cash enables a company to meet unexpected expenses, and to handle regularly occurring events such as payroll distribution.

3.2 Reasons for holding cash

1. Transaction Motive of Holding Cash

Transaction motive refers to the need to hold cash to satisfy normal disbursement collection activities associated with a firm's ongoing operation. Transaction means the act of giving and taking of cash or kinds in the ordinary course of business. A firm frequently involves in purchase and sales of goods or services. A firm should make payment in terms of cash for the purchase of goods, payment of salary, wages, rent, interest, tax, insurance, and dividend and so on. A firm also receives cash in terms of sales revenue, interest on loan, return on investments made outside the firm and so on. If these receipts and payments were perfectly synchronized, a firm would not have to hold cash for transaction motive. But in real, cash inflows and outflows cannot be matched exactly. Sometimes receipts of cash exceed the disbursement whereas at other time disbursement exceeds the receipt. Because of this reason, if disbursement exceeds the receipt, a firm should hold certain level of cash to meet current payment of cash in excess of its receipt during the period.

2. Precautionary Motive of Holding Cash

Precautionary motive refers to hold cash as a safety margin to act as a financial reserve. A firm should hold some cash for the payment of unpredictable or unanticipated events. A firm may have to face emergencies such as strikes and lock-up from employees, increase in cost of raw

materials, funds and labor, fall in market demand and so on. These emergencies also bound a firm to hold certain level of cash. But how much cash is held against these emergencies depends on the degree of predictability associated with future cash flows. If there is high degree of predictability, less cash balance is sufficient. Some firms may have strong borrowing capacity at a very short notice, so that they can borrow at the time when emergencies occur. Such a firm may hold very minimum amount of cash for this motive.

3. *Speculative Motive of Holding Cash*

The speculative motive refers to the need to hold cash in order to be able to take advantage of bargain purchases that might arise, attractive interest rates and favorable exchange rate fluctuations. Some firms hold cash in excess than transaction and precautionary needs to involve in speculation. Speculative needs for holding cash require that a firm possibly may have some profitable opportunities to exploit, which are out of the normal course of business. These opportunities arise in conditions, when price of raw material is expected to fall, when interest rate on borrowed funds are expected to decline and purchase of inventory occurs at reduced price on immediate cash payment.

3.3 Cash Budgets

A cash budget is a detailed plan of cash receipts and cash payments during a planning period. The planning period is sub-divided into shorter periods, and the cash receipts and payments are forecast/planned for each of the sub-divisions of time. For an annual master budget, the cash budget might be prepared on a monthly basis, or possibly a quarterly basis. Some business entities prepare new cash budgets regularly, possibly forecasting daily cash flows for the next week, or weekly cash flows for the next month. The main uses of a cash budget are as follows: To forecast how much cash receipts and payments are expected to be over the planning period. To learn whether there will be a shortage of cash at any time during the period, or possibly a cash surplus. If there is a forecast shortage of cash, to consider measures in advance for dealing with the problem - for example by planning to defer some purchases of non-current assets, or approaching the bank for a larger bank overdraft facility. To monitor actual cash flows during the planning period, by comparing actual cash flows with the budget.

3.4 Functions of Cash Management

Cash management is the treasury function of a business, responsible for achieving optimal efficiency in two key areas: receivables, which is cash coming in, and payables, which is cash going out.

3.5 Receivables Management

When a business issues an invoice it is reported as a receivable, which is cash earned but yet to be received. Depending on the terms of the invoice, the business may have to wait 30, 60 or 90 days for the cash to be received. It is common for a business to report increasing sales, yet still run into a cash crunch because of slow or poorly managed receivables. There are a number of things a business can do to accelerate its receivables and reduce payment float, including clarifying billing terms with customers, using an automated billing service to bill customers immediately, using electronic payment processing through a bank to collect payments, and staying on top of collections with an aging receivables report.

3.6 Payables Management

When a business controls its payables, it can better control its cash flow. By improving the overall efficiency of the payables process, a business can reduce costs and keep more cash working in the business. Payables management solutions, such as electronic payment processing, direct payroll deposit, and controlled disbursement can streamline and automate the payable functions.

Most of the receivables and payables management functions can be automated using business banking solutions. The digital age has opened up opportunities for smaller businesses to access the same large-scale cash management technologies used by bigger companies. The cost savings generated from more efficient cash management techniques easily offsets the costs. More importantly, management will be able to reallocate precious resources to growing the business.

3.7 Example

A computer manufacturing company, Techno Ltd., uses supplier Beta & Co. to purchase its core materials. Beta & Co. has the policy of allowing its customers who buy on credit to pay within 30-days period.

At the moment Techno Ltd. has \$20 million cash resources available and has to pay \$5 million to Beta & Co. after 30-day period for the purchases. However, after 30-day period Techno Ltd. has an investment opportunity requiring use of the full \$20 million cash resources.

If the company is able to renegotiate its terms with suppliers all

4.0 Conclusion

Cash management is the efficient collection, disbursement, and investment of cash in an organization while maintaining the company's liquidity. In other words, it is the way in which a particular organization manages its financial operations such as investing cash in different short-term projects, collection of revenues, payment of expenses, and liabilities while ensuring it has sufficient cash available for future use.

5.0 Summary

Cash management refers to a broad area of finance involving the collection, handling, and usage of cash. It involves assessing market liquidity, cash flow, and investments.¹

6.0 Tutor-Marked Assignment

- 1) Briefly define and highlight the importance of cash management in a modern day organisation.
- 2) What are the motives for holding cash.
- 3) In what way is cash management Vital to an organisation.
- 4) Poor cash management could lead to insolvency of a firm **True/False**
- 5) Enumerate functions of Cash management in a firm.

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Unit 3 STOCK MANAGEMENT

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1.0 INTRODUCTION

Understanding what you have, where it is in your warehouse, and when stock is going in and out can help lower costs, speed up fulfilment, and prevent fraud. Your company may also rely on stock management systems to assess your current assets, balance your accounts, and provide financial reporting.

Stock management is also important to maintaining the right balance of stock in your warehouses. You don't want to lose a sale because you didn't have enough stock to fill an order. Constant stock issues (frequent backorders, etc.) can drive customers to other suppliers entirely. The bottom line? When you have control over your stock, you're able to provide better customer service. It will also help you get a better, more real-time understanding of what's selling and what isn't.

You also don't want to have excess stock taking up space in your warehouses unnecessarily. Too much stock can trigger profit losses—whether a product expires, gets damaged, or goes out of season. Key to proper stock management is a deeper understanding of customer demand for your products.

2.0 OBJECTIVES

To achieve a full understanding of

- Stock
- Types of stock
- Management
- Stock management
- Stock control
- Importance of stock management
- Who a stock manager is

3.0 CONTENT

3.1 WHAT IS STOCK?

The goods or merchandise kept on the premises of a shop or warehouse and available for sale or distribution. The capital raised by a company or corporation through the issue and subscription of shares.

A **stock** is a type of security that signifies ownership in a corporation and represents a claim on part of the corporation's assets and earnings. There are two main types of **stock**: common and preferred. Common **stock** usually entitles the owner to vote at shareholders' meetings and to receive dividends.

“A **stock** is a share in the ownership of a company. **Stock** represents a claim on the company's assets and earnings. As you acquire more **stock**, your ownership stake in the company becomes greater.”

According to the Business Dictionary, Stock can be defined as:

1. A share of a company held by an individual or group.

Corporations raise capital by issuing stocks and entitle the stock owners (shareholders) to partial ownership of the corporation. Stocks are bought and sold on what is called an exchange. There are several types of stocks and the two most typical forms are preferred stock and common stock.

2. The proportional part of a company's equity capital represented by fully paid up shares.

3. British term for a fixed interest government debt security issued usually in denominations

Definition: A stock is a general term used to describe the ownership certificates of any company. A share, on the other hand, refers to the stock certificate of a particular company. Holding a particular company's share makes you a shareholder.

Description: Stocks are of two types—common and preferred. The difference is while the holder of the former has voting rights that can be exercised in corporate decisions, the later doesn't. However, preferred shareholders are legally entitled to receive a certain level of dividend payments before any dividends can be issued to other shareholders

there is also something called 'convertible preferred stock'. This is basically a preferred stock with an option of converting into a fixed number of common shares, usually any time after a predetermined date.

3.1.1 TYPES OF STOCK

Everything you use to make your products, provide your services and to run your business is part of your stock.

There are four main types of stock:

1. **Raw materials and components** - Ready to use in production
2. **Work in progress** - Stock of unfinished goods in production
3. **Finished goods** - Stock of completely processed goods ready for sale.
4. **Consumables** - For example, fuel and stationery

3.1.2 STOCK VALUE

You can categorise stock further, according to its value. For example, you could put items into low, medium and high value categories. If your stock levels are limited by capital, this will help you to plan expenditure on new and replacement stock.

You may choose to concentrate resources on the areas of greatest value.

However, low-cost items can be crucial to your production process and should not be overlooked.

3.2 WHAT IS MANAGEMENT?

The process of dealing with or controlling things or people.

The organization and coordination of the activities of a business in order to achieve defined objectives. ... **Management** consists of the interlocking functions of creating corporate policy and organizing, planning, controlling, and directing an organization's resources in order to achieve the objectives of that policy.

Management is often included as a factor of production along with machines, materials, and money. According to the management guru Peter Drucker (1909-2005), the basic task of management includes both marketing and innovation. Practice of modern management

originates from the 16th century study of low-efficiency and failures of certain enterprises, conducted by the English statesman Sir Thomas More (1478-1535).

The directors and managers who have the power and responsibility to make decisions and oversee an enterprise.

The size of management can range from one person in a small organization to hundreds or thousands of managers in multinational companies.

Management includes the activities of setting the strategy of an organization and coordinating the efforts of its employees or volunteers to accomplish its objectives through the application of available resources, such as financial, natural, technological, and human resources.

Management is the process of reaching organizational goals by working with and through people and other organizational resources.

Management definition, the act or manner of managing; handling, direction, or control.

Management: the act or skill of controlling and making decisions about a business, department, sports team, etc.

The Act or Art of managing : the conducting or supervising of something (such as a business) The act or skill of controlling and making decisions about a business, department, sports team, etc. The people who make decisions about a business, department, and sports team, etc. The act or process of deciding how to use something

3.3 WHAT IS STOCK MANAGEMENT?

Stock management is the function of understanding the stock mix of a company and the different demands on that stock. The demands are influenced by both external and internal factors and are balanced by the creation of purchase order requests to keep supplies at a reasonable or prescribed level.

The monitoring and control of goods and stock so that new stock can be ordered as required and the right numbers and quantities made available at all times

The administrative role of assessing the stock of a business and making sure it is sufficient to meet consumer demand. The demands that a stock management process seeks to satisfy are affected by external and internal factors, and can be expressed using purchase order requests to help maintain appropriate stock levels.

Definition: Stock management largely refers to when a company works to obtain and preserve a suitable assortment of goods while also keeping track of all orders, shipping and handling, and other related costs.

Primarily, stock management is about specifying the size and placement of the goods that a company has in stock. Stock management is often important for numerous departments within a facility in order to protect the planned course of production against the possibility of running out of critical materials or goods.

Stock management is something that should be front-of-mind for anyone in the wholesale distribution business. In the simplest of terms, stock management involves having greater oversight over one's stock. Some refer to it as "internal control" or even as an accounting system set up to safeguard assets. Let's take a look at why stock management is so important as well as what's involved in developing an effective system.

3.3.1 RETAIL SUPPLY CHAIN

Stock management in the retail supply chain follows the following sequence:

1. Request for new stock from stores to head office
2. Head office issues purchase orders to the vendor
3. Vendor ships the goods
4. Warehouse receives the goods
5. Warehouse stores and distributes to the stores
6. Shops and/or consumers (e.g. wholesale shops) receive the goods
7. Goods are sold to customers at the shops.

The management of the stock in the supply chain involves managing the physical quantities as well as the costing of the goods as it flows through the supply chain.

In managing the cost prices of the goods throughout the supply chain, several costing methods are employed:

1. Retail method
2. Weighted Average Price method
3. FIFO (First In First Out) method
4. LIFO (Last In First Out) method
5. LPP (Last Purchase Price) method
6. BNM (Bottle neck method)

The calculation can be done for different periods. If the calculation is done on a monthly basis, then it is referred to the periodic method. In this method, the available stock is calculated by:

- Add Stock at beginning of period
- Add Stock purchased during the period
- Average total cost by total quantity to arrive at the Average Cost of Goods for the period.
- This Average Cost Price is applied to all movements and adjustments in that period.
- Ending stock in quantity is arrived at by applying all the changes in quantity to the Available balance.
- Multiplying the stock balance in quantity by the Average cost gives the Stock cost at the end of the period.

Using the perpetual method, the calculation is done upon every purchase transaction.

Thus, the calculation is the same based on the periodic calculation whether by period (periodic) or by transaction (perpetual). The only difference is the 'periodicity' or scope of the calculation. - Periodic is done monthly - Perpetual is done for the duration of the purchase until the next purchase

3.3.2 BUSINESS MODELS

Just-in-time Stock (JIT), Vendor Managed Stock (VMI) and Customer Managed Stock (CMI) are a few of the popular models being employed by organizations looking to have greater stock management control.

JIT is a model that attempts to replenish stock for organizations when the stock is required. The model attempts to avoid excess stock and its associated costs. As a result, companies receive stock only when the need for more stock is approaching.

VMI and CMI are two business models that adhere to the JIT stock principles. VMI gives the vendor in a vendor/customer relationship the ability to monitor, plan and control stock for their customers. Customers relinquish the order making responsibilities in exchange for timely stock replenishment that increases organizational efficiency.

CMI allows the customer to order and control their stock from their vendors/suppliers. Both VMI and CMI benefit the vendor as well as the customer. Vendors see a significant increase in sales due to increased stock turns and cost savings realized by their customers, while customers realize similar benefits.

3.3.3 COMPETING STOCK REQUIREMENTS

Stock management also encompasses the important connections between replenishment lead time, asset management, carrying costs of stock, future stock price forecasting, physical stock, available stock space, demand forecasting and much more.

By balancing these competing requirements, a company will discover their optimal stock levels. This is a never-ending process, as the company will need to shift and react to its environment as it changes and grows.

3.3.4 PUSH AND PULL

To put it simply, stock management is ruled by first the customers, who pull goods out of stock, and second by the company that pushes the goods out of stock based on orders and demand.

3.4 IMPORTANCE OF STOCK MANGEMENT

If your business requires maintaining a stock, you might sometimes feel like you're walking a tightrope. Not having enough stock means you run the risk of losing sales, while having too much stock is costly in more ways than one. That's why having an efficient stock management system is so important.

3.4.1 AVOIDING STOCK OUTS

One of the worst things you can do in business is to turn away customers -- people who are ready to give you their money -- because you've run out of the item they want. "Stock outs" not only cost you money from missed sales, they can also make you lose customers for good, as people resolve to take their business somewhere that can satisfy their needs. An efficient stock management system tracks how much product you have in stock and forecasts how long your supplies will last based on sales activity. This allows you to place orders far enough ahead of time to prevent stock outs.

3.4.2 OVERSTOCK HAZARDS

When stock isn't managed well, you can also wind up with overstock -- too much of certain items. Overstock comes with its own set of problems. The longer an item sits unsold in stock, the greater the chance it will never sell at all, meaning you'll have to write it off, or at least discount it deeply. Products go out of style or become obsolete. Perishable items spoil. Items that linger in storage get damaged or stolen. And excessive stock has to be stored, counted and handled, which can add ongoing costs.

3.4.3 WORKING CAPITAL ISSUES

Stock is expensive to acquire. When you pay, say, \$15 for an item from a supplier, you do so with the expectation that you will soon sell the item for a higher price, allowing you to recoup the cost plus some profit. As long as the item sits on the shelf, though, its value is locked up in stock. That's \$15 you can't use elsewhere in your business. So stock management isn't just about managing the "stuff" going in and out of your company; it's also about managing your working capital, keeping you from having too much precious cash tied up in operations.

3.4.4 MANUFACTURER'S ANGLE

Stock management isn't just a concern for companies that deal in finished goods, such as retailers and wholesalers. It's also critical for manufacturers, who maintain three types of stock: raw materials, works in process and finished goods. If you run out of an essential ingredient or component, production will halt, which can be extremely costly. If you don't have a supply of finished goods on hand to fill orders as they come in, you risk losing customers. Staying on top of stock is essential if you're to keep the line running and keep products moving out the door.

3.4.5 STOCK CONTROL

A retail store occasionally runs out of certain items. This happens for a number of reasons: unexpected popularity of a particular item, such as one that has attained fad appeal among schoolchildren; an unusually large purchase, such as buying up all of a store's hotdog buns for a party; or a failure by the manufacturer to make and ship on time certain items. Stock control

is a way the retailer avoids running out of stock through tracking what is on hand, what has been sold and what is on order.

3.4.6 CUSTOMER SERVICE

Good customer service for a retailer consists partly of having adequate supplies of what the customer wants to buy. If a store runs out of a particular product, the customer buys it somewhere else -- perhaps establishing a relationship with a competitor. Not only has the retailer lost a sale; it possibly has lost a good customer as well.

3.4.7. STOCK

Retail stock consists of what products are on the store shelves plus the products in boxes in the storage room. As customers deplete the stocked shelves, more stock comes out of storage to replace what has been sold. Keeping track of the stock on hand allows the store owner or manager to know when to order additional stock of the items before they sell out.

3.4.8. SALES TRACKING

"Shrinkage" is a term used in retail to designate any mysterious disappearance of stock. It is derived from a starting count of stock on the shelves and in storage. As goods are sold, the stock should decline by the amount of sales. Sometimes, there is less stock than expected, which normally means goods have been stolen or misplaced. Identifying missing stock helps the retailer know to improve store security or stock tracking procedures. Tracking sales over years also helps the retailer know how much to order of certain products at different times of the year. For example: When hot dog buns sell out at the beginning of July, the retailer can figure it is because of Fourth of July parties, and he will know to order more hot dog buns, and possibly plan a special Fourth of July promotion of buns, condiments and hot dogs.

3.4.9 ORDERS

Keeping track of goods on order allows a retailer to verify that replacement stock has been ordered. Monitoring order status alerts the retailer to possible delays in delivery in time to find another source of those goods from an alternate distributor. Manufacturers and distributors occasionally face fulfillment problems due to weather, machinery breakdown, labour strikes, and unexpected demand and transportation problems. A detailed analysis of delivery times can prompt a retailer to change distributors or to figure seasonal delays into the timing of his orders. Customers don't care why a product is not available for purchase when they want it; they only know the retailer failed. A detailed system of stock control keeps the customer satisfied and the retailer in business.

3.5 *STOCK CONTROL*

- A. The process of making sure that the correct level of stock is maintained, to be able to meet demand while keeping the costs of holding stock to a minimum.
- B. The fact or process of ensuring that appropriate amounts of stock are maintained by a business, so as to be able to meet customer demand without delay while keeping the costs associated with holding stock to a minimum.
- C. Stock control, otherwise known as **inventory control**, is used to show how much stock you have at any one time, and how you keep track of it.

It applies to every item you use to produce a product or service, from raw materials to finished goods. It covers stock at every stage of the production process, from purchase and delivery to using and re-ordering the stock.

3.5.1. STOCK CONTROL METHODS

There are many different ways to keep control of your stock. One basic way is to create a spreadsheet with various columns for product name, item number, and quantity. You can have a column to deduct what you sell and ship. You can also keep a log of returns and new incoming stock.

Of course, this is an incredibly labour-intensive process that no growing business wants to deal with. It requires continuous manual monitoring to ensure every transaction is accounted for. The information is difficult to share, and another huge pitfall is human error. People are prone to make mistakes, mistakes that are difficult to track and result in inaccurate stock numbers.

Ultimately, the more automated your system is, the less paperwork there will be. There is a whole host of stock management software options out there. These software systems may offer integration with your enterprise resource planning systems, or multichannel integrations.

You may have the option to use barcode scanners that will communicate with other devices, such as barcode printers or mobile devices. Some are designed to track the location of the product within the warehouse, which helps when it's time for picking and packing.

Of course, once you have the tracking systems in place, you need to figure out how you're going to determine when to order new stock. Some use a stock control method called minimum stock, in which new stock is ordered once it reaches a pre-set minimum level.

If your needs are very predictable, you can use a fixed quantity control system. With this method, every time you place an order, whether it's weekly, monthly, semi-monthly, your order will be for the same amount. Some people refer to this as a standing order

Some of the conventional stock control models are:

Minimum stock level - you identify a minimum stock level, and re-order when stock reaches that level. This is known as the Re-order Level.

Stock review - you have regular reviews of stock. At every review you place an order to return stocks to a predetermined level.

Just In Time (JIT) - this aims to reduce costs by cutting stock to a minimum. Items are delivered when they are needed and used immediately. There is a risk of running out of stock, so you need to be confident that your suppliers can deliver on demand.

These methods can be used alongside other processes to refine the stock control system. For example:

Re-order lead time - allows for the time between placing an order and receiving the items ordered for.

Economic Order Quantity (EOQ) - a standard formula used to arrive at a balance between holding too much or too little stock. It's quite a complex calculation, so you may find it easier to use stock control software.

Batch control - managing the production of goods in batches. You need to make sure that you have the right number of components to cover your needs until the next batch. If your needs are predictable, you may order a fixed quantity of stock every time you place an order, or order at a fixed interval - say every week or month. In effect, you're placing a standing order, so you need to keep the quantities and prices under review.

First in, first out (FIFO) - a system to ensure that perishable stock is used efficiently so that it doesn't deteriorate. Stock is identified by date received and moves on through each stage of production in strict order.

3.6 THE BASIC EOQ MODEL

OBJECTIVES OF ECONOMIC ORDER QUANTITY (EOQ)

There are two fundamental objectives

- i. To determine the quantity that should be purchased anytime a fresh order is made.
- ii. To reduce to the barest minimum all cost that are associated with replenishment.

DERIVATION OF EOQ FORMULA

Total Relevant Cost = total carrying cost + total ordering cost

$$\text{TRC} = \{ \text{average stock} \times \text{carrying cost per unit per year (c)} \} \\ + \\ \{ \text{No of orders} \times \text{ordering cost per unit (o)} \}$$

$$\text{TRC} = \frac{Q}{2}c + \frac{D}{Q}o$$

Where:

Q = Quantity ordered or EOQ

D = Annual demand

o = Ordering cost

c = Carrying Cost

EOQ is at the point where TCC is equal to TOC

$$Q^2c = 2Do$$

$$Q^2 = \frac{2Do}{c}$$

$$Q = \sqrt{\frac{2Do}{c}}$$

QUESTION 1

Ebiere Ltd use a particular component at the rate of 24,000 per year. These are obtained from an outside supplier at a basic cost of 25k each. Replenishment orders can be obtained promptly, though it entails sending a man and a lorry to collect the components, this would cost #20, this is assumed to be the only cost of ordering.

The storage cost of stock is 15% of the cost of the component.

Required:

1. What is the EOQ?
2. What is the total controllable cost?
3. What is the total cost of this order?

SOLUTION

$$1. Q = \sqrt{\frac{2Do}{c}}$$

$$Q = \sqrt{\frac{2 \times 24,000 \times \#20}{25K \times 15\%}}$$

$$Q = \sqrt{\frac{960,000}{0.0375}}$$

$$Q = 5,059.6 \text{ units}$$

2. TOTAL CONTROLLABLE COSTS

$$\text{TRC} = \text{TOC} + \text{TCC}$$

$$\text{TRC} = \frac{Q}{2}c + \frac{D}{Q}o$$

$$\text{TRC} = \frac{5,059.6(0.0375)}{2} + \frac{24,000(20)}{5,059.6}$$

$$\text{TRC} = 94.87 + 94.87$$

$$\text{TRC} = \#189.74$$

3. TOTAL COST OF THE ORDER

$$\text{TC} = \text{TRC} + \text{TPC}$$

$$= \#189.74 + (0.25 \times 24,000)$$

$$= \#189.74 + 6,000$$

$$= \#6,189.74$$

QUESTION 2

Green Trees Plc. uses 32,000 units of a particular component in a year. The basic purchase price is #100 and cost per order is #200. Carrying cost is 20% of the purchase price.

The company is offered the following discounts on the purchase price:

Order quantity	Discount
1,000-1,499	less 2%
1,500-1,999	less 4%
2,000 and over	less 5%

Required:

Calculate the appropriate order quantity.

Solution

$$EOQ = \sqrt{\frac{2Do}{c}}$$

$$Q = \sqrt{\frac{2 \times 32,000 \times \#200}{20}}$$

$$Q = \sqrt{\frac{12,800,000}{20}}$$

$$Q = 800 \text{ units}$$

Possible Quantities	800	1,000	1,500	2,000
Purchas Price	100	98	96	95
Holding cost/unit	20	19.60	19.20	19
	#	#	#	#

Purchase cost

(32,000 x P)	3,200,000	3,136,000	3,072,000	3,040,000
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Holding cost

$\frac{Q}{2} \times H$	8,000	9,800	14,000	19,000
------------------------	-------	-------	--------	--------

Ordering cost

$\frac{32,000}{Q} \times 200$	8,000	6,400	4,267	3,200
EOQ	3,216,000	3,152,000	3,090,000	3,062,200

Recommendation

The appropriate order quantity is to buy in batches of 2,000 units.

4.0 CONCLUSION

The direction or method you chose will all depend upon the business you're conducting and the essentials you feel must be fulfilled.

The bottom line is that stock management is vital to the survival of your business. If you don't have a good handle on your stock you'll never have a true account for how your business is doing. It's a competitive market out there. Don't let stock excess or shortages become your downfall.

5.0 SUMMARY

Efficient inventory management is crucial to the success of a business, and as such it's incredibly important to hire a capable inventory manager. Salary.com lists the median expected salary for an inventory manager in the United States at \$78,760; this isn't surprising considering these individuals are responsible for guaranteeing your organization stays in control of its inventory needs.

Inventory managers have a number of responsibilities – many of which require daily monitoring and evaluation. As detailed in the following job description, the obligations of an inventory manager range from specific inventory duties to more managerial tasks.

An inventory manager is in charge of inventory in a warehouse or similar facility. Inventory managers lead a team of inventory or warehouse workers to receive and record new stock as it comes in and move stock onto trucks or shelves as needed.

Inventory managers also have the important responsibility of finding a supplier who will provide your company with the goods needed to operate and be profitable. Part of that role means maintaining a good working relationship with suppliers by communicating and dealing with concerns or problems, such as a delay in an order being processed. In addition, an inventory manager needs to be aware of other available suppliers in the area who may be willing to provide your business with materials at a better cost.

Inventory managers are responsible for managing inventory documentation. They must accurately record the quality, quantity, type, style, and any other characteristics of the inventory

so your company has a clear understanding of what is and isn't available. These documents also help your company avoid shrinkage due to loss or theft because the inventory manager always has a running tally.

6.0 TUTOR – MARKED ASSIGNMENT

1. What is stock management
2. What is involve in stock management
3. Critically examine and discuss the job description of an inventory manger.
4. Highlight the differences between stock management and stock control.

7.0 REFERENCES/FURTHER READINGS

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MODULE 2 CAPITAL BUDGETING DECISION

Unit	1	Payback Period
Unit	2	Accounting Rate of Return
Unit	3	Net Present Value
Unit	4	Internal Rate of Return

Unit 1 PAYBACK PERIOD**CONTENTS**

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main Content
 - 3.1 Workings
 - 3.2 Decision Rule
 - 3.3 Advantages of Payback Period
 - 3.4 Disadvantages of Payback Period
- 4.0 Conclusion
- 5.0 Summary
- 6.0 Tutor-Marked Assignment
- 7.0 References/Further Reading

1.0 Introduction

Payback Period – Appraising capital investment on the basis of time that would be taken to get back your initial investment is called as payback period.

Payback period is one of the easiest methods of capital investment appraisal techniques. Projects with a shorter payback period are usually preferred for investment when compared to one with longer payback period.

Discounted Payback Period – Capital Investment Appraisal using discounted payback period is similar to payback period but here, the time value of money or discounted value of cash flow is considered for calculation of payback period.

2.0 OBJECTIVES

- 1) To understand what payback period is all about and the formula involved in calculating it.
- 2) To know how to make decisions after calculations especially when there are mutually exclusive projects.
- 3) To understand the advantages and disadvantages of the technique.

3.0 THE MAIN CONTENT

3.1 Workings

The formula to calculate payback period of a project depends on whether the cash flow per period from the project even or uneven. In case they are even, the formula to calculate payback period is:

$$\text{Payback Period} = \frac{\text{Initial Investment}}{\text{Cash flow per Period}}$$

N/B: When cash inflows are uneven, we need to calculate the cumulative net cash flow for each period and then use the following formula for PBP –

$$\text{Payback period} = A + \frac{B}{C}$$

Where:

A = the last period with a negative cumulative cash flow

B = the absolute value of cumulative cash flow at the end of the period A.

C = is the total cash flow during the period after A.

N/B: Payback period uses only cash flows not profit.

Example 1 = Even Cash flow

Ogege's Company is planning to undertake a project requiring initial investment of N200,000,000. The project is expected to generate N45, 000,000 per year for 6 years, calculate the payback period of the project.

Solution:

$$\text{Payback Period} = \frac{\text{Initial Investment}}{\text{Annual Cash flow}}$$

$$\text{Payback Period} = \frac{200,000,000}{45,000,000} = 4.44 \text{ years}$$

Example 2

Akoka Limited is to undertake a project requiring N1, 000,000 outlay.

Required: what is the payback period?

- a) The project generates N200,000 annually.
- b) The project has the following cash flow profile:

Yr	cf(₦)
1	2000,000
2	220,000
3	240,000
4	200,000
5	190,000

Solution:

$$\text{A. Payback Period} = \frac{\text{Initial Investment}}{\text{Cash flow}} \text{ i.e. } \frac{1,000,000}{200,000 \text{Cash flow}} = 5 \text{ years}$$

B.	A	B	C	
	Yrs.	Outlays N	Cashflows	Balance
	0	1,000,000	(1,000,000)	
	1		200,000	(800,000)
	2		220,000	(580,000)
	3		240,000	(340,000)
	4		200,000	(140,000)
	5		190,000	

$$= 4 + \frac{140,000}{190,000} = 4.74 \text{ years.}$$

N/B: Decision Rule:

Project B should be taken and A should be rejected since B has short period than A.

Example 3

Samson. Plc is to undertake a project requiring N500,000 outlay, Discounted at 10%

Yr	Cash flows
1	200,000
2	220,000
3	240,000
4	200,000
5	190,000

You are required to get the discounted payback period.

Solution

Yrs	Cashflows	Df (10%) $\frac{1}{(1+r)^t}$	PV	Balance
0	(500,000)	1	(500,000)	(500,000)
1	200,000	0.9091	181,818	(318,182)
2	220,000	0.8264	181,808	(136,274)
3	240,000	0.7513	180,312	
4	200,000	0.6830	136,600	
5	190,000	0.6209	117,975	
		$2 + \frac{136,374}{180,312}$		= 2.76 years

Example 4

Consider the following two Projects:

	Project A	Project B
Cost	150,000	150,000
Residual value after 5years	Nil	Nil
Estimated profit after depreciation.		

Yr 1	35,000	100,000
Yr 2	50,000	80,000
Yr 3	60,000	60,000
Yr 4	70,000	40,000
Yr 5	80,000	30,000

Which of the projects is preferable using Payback Period?

Solution:

First of all PBP uses cash flows not profit, therefore, we have to convert it to cashflow.

Cash flow = Profit after Dep. + Depreciation

$$\text{Depreciation} = \frac{150,000 - 0}{5} \quad \mathbf{30,000}$$

Add Back the Depreciation to get the cash flow.

	Project A	Project B
Cost	150,000	150,000
Annual Depreciation	30,000	30,000
Annual Cashflow (1)	35,000 + 30,000	100,000 + 30,000
Yr 2	50,000 + 30,000	80,000 + 30,000
Yr 3	60,000 + 30,000	60,000 + 30,000
Yr 4	70,000 + 30,000	40,000 + 30,000
Yr 5	80,000 + 30,000	30,000 + 30,000

Current Cashflow

	Project A	Project B
Cost	150,000	150,000
Cashflow for Yr 1	65,000	130,000
Yr 2	80,000	110,000
Yr 3	90,000	90,000

Yr 4	100,000	70,000
Yr 5	110,000	60,000

$$\text{Payback Period for Project A} = 2 + \frac{5,000}{90,000} = \mathbf{2.06 \text{ years}}$$

$$\text{Payback Period for Project B} = 1 + \frac{20,000}{110,000} = \mathbf{1.18 \text{ years}}$$

Decision Rule:

Project B should be taken because it has lower payback period.

Example 5

A project has a cost of ₦53,500 and its expected net cash inflows are ₦11,500 per annum for 6 years. If the cost of capital is 5%, what is the projects payback period.

Solution:

$$\frac{53,500}{11,500} = \mathbf{4.7 \text{ years.}}$$

N/B. Calculate the discounted payback period.

Example 6

With the illustration and example above calculate the discounted payback period.

Solution;

Cost = 53,500, discount factor = 5%, Cashflows = 11,500, Year = 6.

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

$$\frac{1 - (1+0.05)^{-6}}{0.05} = \frac{1 - (1.05)^{-6}}{0.05} = 5.0757.$$

$$\therefore 11500 \times 5.0757 = 58,370$$

$$\text{DPBP} = \frac{53,500}{58,370} = \mathbf{0.9 \text{ years.}}$$

3.2 Decision Rules

A. Independent project

1. Accept if the project has a PBP that equal to or less than that set by the management.
2. Reject if the project has a PB that is greater than the time set by the management.

B. Mutually Exclusive Project

1. Select the project with the least PBP.
2. Ensure that the project selected has a PBP that is equal to or less than that set by the management.

3.3 Advantages of Payback period

1. It is simple to calculate.
2. It can be a measure of risk inherent in a project since cash flows that occurs later in a projects life are considered more uncertain, payback period provides an indication of how certain the project cash inflow are.
3. For companies facing liquidity problems it provides a good ranking of projects that would return money early.
4. Unlike ARR, it uses cash flows instead of accounting profit, cash profit or inflows is superior to accounting profit.
5. It serves as a first screening process i.e. as a simple initial screening process for new projects.

3.4 Disadvantages of PBP

1. Unless discounted cash flows are used, it is ignored the time value of money.
2. It does not take into account the cash flows that occur after the payback period.
3. It may lead to excessive investment in short term projects.
4. It is unable to distinguish between projects with the same payback period.

4.0 Conclusion

Payback period as one of the budgeting techniques is one of the best traditional methods of assessing project and it has been going a long way in selecting a good projects among bad ones.

5.0 Summary

Payback period always serve as the first screening process for new project. Based on the decision rule, one can easily determine which projects to choose after calculation and it has a lot of advantages that makes it outstanding among other budgeting techniques.

6.0 Tutor Marked Question

Ogege Plc is to undertake a project requiring an investment of N200,000 on necessary plant and machinery. The project is to last for 5 years at the end of which the plant and machinery will have net book value or scrap value of N40,000 – profit after depreciation are as follows.

Yrs	Cash flows
1	50,000
2	45,000
3	40,000
4	30,000
5	20,000

You are required to calculate the payback period.

7.0 References

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UNIT 2: ACCOUNTING RATE OF RETURN (ARR)

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main Content
 - 3.1 Workings
 - 3.2 Decision Rule
 - 3.3 Advantages of ARR
 - 3.4 Disadvantages of ARR
- 4.0 Conclusion
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- 7.0 References

1.0 Introduction

This Capital Investment Appraisal technique compares the profit that can be earned by the concerned project to the amount of initial investment capital that would be required for the project. Projects that can earn a higher rate of return is naturally preferred over ones with low rate of return. ARR is a non-discount capital investment appraisal technique in that it does not take into consideration the time value of money involved.

2.0 Objectives

At the end of this lesson/topic one should be able to:

1. Define and calculate the ARR technique.
2. Make decision regarding the answers and observation especially when there are mutually exclusive projects.
3. Understand the advantages and disadvantages of ARR

3.0 THE MAIN CONTENT

3.1 Workings

Accounting Rate of Return is calculated using the following formulas:

$$\text{ARR} = \frac{\text{Average Accounting Profit}}{\text{Average Investment}} \times \frac{100}{1}$$

OR

$$\text{ARR} = \frac{\text{Average Accounting Profit}}{\text{Investment}} \times \frac{100}{1}$$

N/B: The formula can be used depending on the question but if asked to get the ARR without specifying the one to use, it is advisable to use the first formula. ARR uses profit not cash flow, you have convert it to profit by subtracting the depreciation.

3.2 General Decision Rule

Accept the project only if it's ARR is equal or greater than the required Accounting rate of return. In case of mutually exclusive project, accept the one with highest ARR.

Example 1:

An initial investment of N130,000 is expected to generate annual cash flow of N32,000 for 6 years. Depreciation is allowed on the straight line basis. It is estimated that the project will generate scrap value of N10,500 at the end of 6 years. Calculate its accounting rate of return assuming that there are no other expenses on the project.

Solution:

$$\begin{aligned} \text{Annual Depreciation} &= \frac{\text{Initial Inv.} - \text{Scrap V}}{\text{useful Life}} \\ &= \frac{130,000 - 10,500}{6} = \text{N}19,917 \end{aligned}$$

$$\text{Accounting Income} = \text{N}32,000 - 19,917 = \text{N}12,083$$

N/B: We were given cash flow instead of profit so we subtracted depreciation to get profit.

Then Average Investment

$$= \frac{130,000 + 10,500}{2} = \text{N}70,250$$

$$\text{ARR} = \frac{12,083}{70,250} \times \frac{100}{1} = 17.2\%$$

Example 2:

Edo Plc is to undertake a project requiring an investment of N100, 000 on necessary plant and machinery. The project is to last for 5 years at the rate of which the plant and machinery will have net book value of N20, 000. Profit before depreciation are as follows:

Yrs	Cash flows
1	40,000
2	44,000
3	48,000
4	52,000
5	58,000

You are required to calculate the ARR of the project.

Solution:

$$\text{Annual Depreciation} = \frac{\text{Initial Outlay} - \text{Scrap V.}}{\text{useful Life in Year}}$$

$$\frac{100,000 - 20,000}{5} = \text{N}16,000$$

$$\text{Average Investment} = \frac{\text{Initial Outlay} + \text{Useful Life}}{2}$$

$$\frac{100,000 + 20,000}{2} = \frac{120,000}{2}$$

$$= 60,000$$

Average Profit

Yr	Profit	Depreciation	Net Profit
1	40,000	16,000	24,000
2	44,000	16,000	28,000
3	48,000	16,000	32,000
4	52,000	16,000	36,000
5	58,000	16,000	42,000
			162,000

$$\text{Average Profit} = \frac{162,000}{5} = 32,400$$

$$\text{ARR} = \frac{32,400 \times 100}{60,000} = 54\%$$

Example 3

If Eloho Plc has a project with the Initial Outlay ₦20, 000, annual profit of N5, 000 for 6 years what is the ARR

Solution:

$$\text{Average Investment} = \frac{20,000 + 0}{2} = \mathbf{10,000}$$

$$\text{Average Profit} = 5,000$$

$$\text{ARR} = \frac{5,000}{10,000} \times \frac{100}{1} = \mathbf{50\%}.$$

Example 4

A project has a cost of N53, 500 and its expected cash inflows are N11, 500 per annum for 6 years. If the cost of capital is 5%, what is the project's ARR?

$$\text{Average Investment} = \frac{N53,500 + 0}{2} = \mathbf{26,750}$$

$$\text{Average Profit} = N11,500$$

$$\text{ARR} = \frac{11,500}{26,750} \times \frac{100}{1} = \mathbf{43\%}$$

Example 5

Consider the following two projects

	Project A	Project B
Cost	150,000	150,000
Residual value	0	0
Estimated Profit after Depreciation.		
Yr 1	35,000	100,000
Yr 2	50,000	80,000
Yr 3	60,000	60,000
Yr 4	70,000	40,000
Yr 5	80,000	30,000

What project is ARR?

Solution:

Since we were given direct profit.

$$\text{Average profit for Project A} = \frac{295,000}{5} = \mathbf{59,000}$$

$$\text{Average profit for Project B} = \frac{310,000}{5} = \mathbf{62,000}$$

$$\text{Average Investment for Project A} = \frac{150,000 + 0}{2} = \mathbf{75,000}$$

$$\text{Average Investment for Project B} = \frac{150,000 + 0}{2} = \mathbf{75,000}$$

$$\text{There ARR for profit A} = \frac{59,000}{75,000} \times \frac{100}{1} = \mathbf{78.67\%}$$

$$\text{The ARR for Profit B} = \frac{62,000}{75,000} \times \frac{100}{1} = \mathbf{82.67\%}$$

Decision

Chose Project B because it has higher retarded using ARR

3.3 Advantages of ARR

1. Like Payback Period, this method of investment appraisal is easy to calculate.
2. It recognizes the profitability factor of investment.
3. Unlike the Payback Period, it considered the profit over the entire life of the project.
4. It uses readily available accounting data.
5. It could be used to compare performance for many companies.

3.4 Disadvantages of ARR

1. It ignores the time value of money.
2. It can be calculated in different ways. Thus there is problem of consistency.
3. It uses accounting income instead of cash flow information.
4. It ignores risk and management attitude towards risk
5. There are no rules for setting the minimum acceptable ARR by the management.

4.0 Conclusion

Having seen the way, ARR works based on the calculations and decision using the answers and observation one can categorically say that the objective of this unit has been achieved.

5.0 Summary

Accounting Rate of Return as one of the basic method of budget appraisal is very necessary because it gives a strength forward answer and it makes use of the entire profit throughout the project life and the decision using the technique is very easy to make.

6.0 Tutor marked Assignment

From the example 5 given in the contest above, assume that the scrap value is N10,000 for project A and N15,000 for project B and the profit given was before depreciation.

Recalculate the ARR and choose between the two projects.

7.0 References

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UNIT 3: NET PRESENT VALUE (NPV)

- 1.0 Introduction
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 - 3.1 Workings
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 - 3.3 Advantages of NPV
 - 3.4 Disadvantages of NPV
- 4.0 Conclusion
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- 6.0 Tutor Marked Assignment
- 7.0 References

1.0 Introduction

This capital investment appraisal technique measures the cash-in-flow, whether excess or shortfall, after the routine finance commitments are met. All capital investment appraisals have a single objective drive towards a positive NPV. The NPV is a mathematical calculation involving net cash flows at a particular present time 't' at discount rate at the same time, i.e. (t – Initial capital outlay). Thus, there is an inverse proportional relationship between rate and NPV. A high discount rate would reduce the net present value of capital. A high interest rate increases discount rates over a period of time and most capital investment appraisal are way of such an increase.

N/B: If a scrap value occurs, it must be added to the last year inflow because it is one of the incomes of the firm.

2.0 Objectives

At the end of the study, one will be able to:

- a) Define and calculate Net Present value.
- b) Make decision using the answers gotten from the calculation.

- c) Should be able to choose between projects especially when there are mutually exclusive projects.
- d) Understand the advantages and disadvantages of NPV.

3.0 THE MAIN CONTENT

3.1 Workings

$$NPV = R \times \frac{1 - (1+r)^{-n}}{r} - C_0$$

Where:

R = Cash flow

r = Rate

n = Number of years

C₀ = Initial Outlay

Example 1: (even cash flows)

Calculate the Net Present Value (NPV) of a project which requires an initial investment of N243,000 and it is expected to generate a cash flow of N50,000 each month for 12 months. Assume the salvage value of the project is zero. The target rate of return is 12% per annum.

Solution:

Initial Investment = 243,000

Net cash inflow per period = 50,000

Number of Period = 12 months

Discounted Rate per period = 12% ÷ 12 = 1%

Net Present Value = ?

$$NPV = R \times \frac{1 - (1+r)^{-n}}{r} - C_0$$

$$NPV = 50,000 \times \frac{1 - (1+0.01)^{-12}}{0.01} - 243,000$$

$$50,000 \times \frac{(1-(1+0.01)^{-12})}{0.01} - 243,000$$

$$50,000 \times \frac{(1-0.887449)}{0.01}$$

$$50,000 \times 11.2551 - 243,000$$

$$= 562,754 - 243,000$$

$$\text{NPV} = \text{N}319,754$$

Example 2:

Ebiere Plc is to start up a project worth N8m and having the following cash flows:

Yrs	Cash flows (₦)
1	5,000,000
2	6,000,000
3	8,000,000

If the discount rate is 25% calculate the NPV if the scrap value at the end of 3 years is ₦100,000.

Solution:

Yrs	Cf(N)	Df 25%	PV ₦
0	(8,000,000)	1	(8,000,000)
1	5,000,000	0.8000	4,000,000
2	6,000,000	0.6400	3,840,000
3	8,100,000	0.5120	<u>4,147,200</u>
		NPV +	= <u>3,987,200</u>

N/B: Scrap value was included in the last year.

Example 3

A project has a cost of N53,500 and its expected net cash inflow are N11,500 per annum for 6 years. If the cost of capital is 5%, what is the projects Net present value?

Solution:

$$\begin{aligned}
\text{NPV} &= \frac{R \times (1 - (1+r)^{-n})}{r} - C_0 \\
&= 11,500 \times \frac{(1 - (1+0.05)^{-6})}{0.05} - 53,500 \\
&= 11,500 \times \frac{(1 - (0.95)^{-6})}{0.05} - 53,500 \\
&= 11500 \times 5.0757 - 53500 \\
&= 58,370 - 53500 \\
&= \mathbf{4870}
\end{aligned}$$

Example 4:

If a project has the initial cost of N150,000 and a book value of N20,000 at the end of 5 years and the profit after Depreciation are assume with 10% discount factor

Yr1	35,000
Yr2	50,000
Yr3	60,000
Yr4	70,000
Yr5	80,000

- i. Calculate the NPV of the project.
- ii. Make decision whether it should be accepted or rejected.

Solution

NPV uses cash flows not profit therefore we have to convert it to cash flow by adding back depreciation.

$$\text{Depreciation} = \frac{\text{Initial Outlay} - \text{Scrap Value}}{\text{useful Life}} = \frac{150,000 - 20,000}{5} = 26,000$$

Current Cash flow are

Yr1	35,000	+	26,000	=	61,000
Yr2	50,000	+	26,000	=	76,000
Yr3	60,000	+	26,000	=	86,000
Yr4	70,000	+	26,000	=	96,000
Yr5	80,000	+	26,000	=	106,000

NPV =

Yrs	Cf(N)	Df 50%	PV ₦
0	(150,000)	1	(150,000)
1	61,000	0.9091	55,455
2	76,000	0.8264	62,806
3	86,000	0.7513	64,611
4	96,000	0.6830	65,568
5	106,000	0.6209	65,815
Scrap Value	20,000	0.6209	12,418
		NPV +	=
			<u>176,673</u>

3.2 Decision Rules

1. Accept if the project has a positive NPV.
2. Reject if the project has a negative NPV.

N/B: For mutually exclusive projects, select the project with the highest positive NPV.

3.3 Advantages of NPV

1. Net present value account for time value of money which makes it a sounder approach than other investment appraisal techniques which do not discount future cash flows such as Payback Period and Accounting Rate of Return.

2. Net Present Value is even better than some other discounted cash flow techniques such as IRR, in situations where IRR and NPV gives conflicting decision, NPV decision should be preferred.
3. It gives a clear accept/reject recommendation.
4. It makes use of all the cash flow over the project life span unlike Payback Period.
5. NPV gives absolute measures of profit ability which immediately reflects in the shareholder's wealth.
6. NPV of projects is additive, it can be summed up.

3.4 Disadvantages of NPV

1. It may be difficult to calculate.
2. Net present Value does not take into account the size of the project. For example say project A requires initial investment of N4million to generate NPV of N1m while a competing project B requires N2m investment to generate an NPV of N0.8m. if we base our decision on NPV alone, we will prefer project A. because it has higher NPV, but project B has generated more shareholder wealth per Dollar of initial investment ($N0.8m/N2m$ is $N1m/4m$).

N/B: NPV uses cash flows in the calculation i.e. profit before depreciation so if the net profit is given i.e. profit after depreciation, we must add back depreciation to make it cash flows.

4.0 Conclusion: Net Present Value is one of the modern methods of Capital Budgeting. It makes use of the time value of money and can be additive. With the above illustration and examples one will be able to make a reasonable decision using NPV.

5.0 Summary

The main objective of the unit has been achieved by giving in the necessary data and information needed in using NPV. One can also understand the importance of NPV OVER ANY OTHER Capital Budgeting methods listed above. Even when there are disputes between NPV and IRR in decision making NPV is always superior and it is always chosen over IRR in decision making.

6.0 Tutor Marked Assignment

Consider the following two projects:

Cost	Project A 300,000	Project B 250,000
Estimated Cash flow		
Yr1	40,000	90,000
Yr2	50,000	60,000
Yr3	60,000	45,000
Yr4	70,000	30,000
Yr5	80,000	25,000

Scrap value at the end of the 6th year is 10,000, for the both projects the cost of capital is 8%. Calculate the NPV of the projects and choose between them.

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UNIT 5: PROFITABILITY INDEX

Contents

- 1.0** Introduction
- 2.0** Objectives
- 3.0** Main Content
 - 3.1** Definition and importance
 - 3.2** Profitability index
 - 3.3** Present value of future cash flows(numerator)
 - 3.4** Initial investment(denominator)
 - 3.5** Decision Process
 - 3.6** Decision criteria
 - 3.7** Advantages and Disadvantages
 - 3.8** Workings
- 4.0** Conclusion
- 5.0** Summary
- 6.0** Tutor-Marked Assignment
- 7.0** References / Further Reading

Introduction

The Profitability index is one of the key techniques or indices used by financial professionals in ranking and also estimating the value of the investment projects firms undergo. The profitability index serves as a signal and is used in capital rationing to know what projects are viable and which the firm should invest more in.

Objectives

The objective here is to build a basic understanding of profitability index which is a technique used in finance and how firms utilize the use of this index. Examples are also given to enable further understanding of the index and how it is used.

Main Content

Definition and importance

Profitability index is a method used in finance to quantify and also rank the value created by an investment. Profitability index helps in ranking investments and deciding the best investment that should be made. PI greater than one indicates that present value of future cash inflows from the investment is more than the initial investment, thereby indicating that it will earn profits.

PI of less than one indicates loss from the investment. PI equal to one means that there are no profits. Thus, profitability index helps investors in making decisions about whether or not to make a particular investment.

Profitability index (PI), also known as **profit investment ratio (PIR)** and **value investment ratio (VIR)**, is therefore the ratio of payoff to investment of a proposed project. It is a useful tool for ranking projects because it allows you to quantify the amount of value created per unit of investment.

Profitability Index

Profitability index is an appraisal technique applied to potential capital outlays. The technique divides the projected capital inflow by the projected capital outflow to determine the profitability of a project. The main feature of using profitability index is the technique disregards project size. Therefore, projects with larger cash inflows may result in lower profitability index calculations because their profit margin is not as high.

Present Value of Future Cash Flows (Numerator)

The present value of future cash flows requires the implementation of time value of money calculations. Cash flows are discounted the appropriate number of periods to equate future cash flows to current monetary levels. This discounting occurs because the value of \$1 does not equate the value of \$1 received in one year. Because the \$1 received now may be invested and gain value, money received closer to the present is considered to have more value than money received further in the future.

Initial Investment (Denominator)

The discounted projected cash outflows represent the initial capital outlay of a project. The initial investment required is only the cash flow required at the start of the project; all other outlays may occur at any point in the project's life, and these are factored into the calculation through the use of discounting in the numerator. These additional capital outlays may factor in benefits relating to taxation or depreciation.

Decision Process

Profitability index calculations cannot be negative and must be converted to a positive figure before they are useful. Calculations greater than one indicate the future anticipated discounted cash inflows of the project are greater than the anticipated discounted cash outflows. Calculations less than one indicate the deficit of the outflows is greater than the discounted inflows and the project should not be accepted. Calculations that equal one bring about situations of indifference where any gains or losses from a project are minimal.

When using the profitability index exclusively, calculations greater than one are ranked based on highest calculation. When limited capital is available and projects are mutually exclusive, the project with the highest profitability index is to be accepted as it indicates the project with the most productive use of limited capital. Profitability index is also called the benefit-cost ratio for this reason. Although some projects result in a higher net present value, those projects may be passed over because they do not have the highest profitability index and do not represent the most beneficial usage of company assets.

Decision Criteria

Assuming that the cash flow calculated does not include the investment made in the project, a profitability index of 1 indicates breakeven. Any value lower than one would indicate that the project's present value (PV) is less than the initial investment. As the value of the profitability index increases, so does the financial attractiveness of the proposed project.

Rules for selection or rejection of a project:

- If $PI > 1$ then accept the project
- If $PI < 1$ then reject the project

Advantages And Disadvantages Of Profitability Index (PI)

Advantages Of Profitability Index (PI)

1. PI considers the time value of money.
2. PI considers analysis all cash flows of entire life.
3. PI makes the right in the case of different amount of cash outlay of different project.
4. PI ascertains the exact rate of return of the project.

Disadvantages Of Profitability Index(PI)

1. It is difficult to understand interest rate or discount rate.
2. It is difficult to calculate profitability index if two projects having different useful life.

3.8 WORKINGS

Example 1

Company C is undertaking a project at a cost of \$50 million which is expected to generate future net cash flows with a present value of \$65 million. Calculate the profitability index.

Solution

Profitability Index = PV of Future Net Cash Flows / Initial Investment Required

Profitability Index = \$65M / \$50M = 1.3

Net Present Value = PV of Net Future Cash Flows – Initial Investment Required

Net Present Value = \$65M-\$50M = \$15M.

The information about NPV and initial investment can be used to calculate profitability index as follows:

Profitability Index = 1 + (Net Present Value / Initial Investment Required)

Profitability Index = 1 + \$15M/\$50M = 1.3

Example 2

Investment = \$40,000, Life of the Machine = 5 Years

CFAT Year CFAT

1	18000
2	12000
3	10000
4	9000
5	6000

Calculate Net present value at 10% and PI:

Year	CFAT	PV@10%	PV
1	18000	0.909	16362
2	12000	0.827	9924
3	10000	0.752	7520
4	9000	0.683	6147
5	6000	0.621	3726
	Total present value		43679
	(-) Investment		40000
	NPV		3679

PI = 43679/40000 = 1.092 > 1 ⇒ Accept the project

Conclusion

This index computes the present value of the expected cash flows that the investment can generate. Depending on the outcome of the calculation, financial professionals decide if they should accept the project or not. More specifically:

- if the profit index > 1 , the project should be undertaken
- if the profit index < 1 , the project should be abandoned
- if the profit index $= 1$, the project is indifferent, i.e. it makes no difference accepting or rejecting it.

Summary

Profitability index means a financial calculation that investors use to measure the value of an investment based on its present and future values

Tutor-Marked Assignment

- 1) Briefly define profitability index
- 2) Highlight the major importance of profitability index
- 3) State the advantages and disadvantages of profitability index

References / Further Reading

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UNIT 4: INTERNAL RATE OF RETURN – IRR

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main Content
 - 3.1 Decision Rule
 - 3.2 Steps in Calculating IRR
 - 3.3 Workings
 - 3.4 Advantages of IRR
 - 3.5 Disadvantages of IRR
- 4.0 Conclusion
- 5.0 Summary
- 6.0 Tutor Marked Assignment
- 7.0 References

1.0 Introduction

Internal rate of Return (IRR) is the discount rate at which the NPV of an investment becomes zero. In other words, IRR is the discount rate at which equates the present value of the future cash flows of an investment with the initial investment. It is one of the several measure used in investment appraisal.

2.0 Objectives

At the end of this study, one will understand:

1. How to define and calculate IRR.
2. How to make decisions and choose between mutually exclusive projects using IRR.
3. The basic advantages and disadvantages of IRR over other capital appraisal methods.

3.0 THE MAIN CONTENT

3.1 The Decision Rule:

A project should only be accepted if its IRR is not less than the target internal rate of return. When comparing two or more mutually exclusive projects. The project having highest value of IRR should be accepted.

3.2 Steps in Calculating IRR

$$\text{NPV} = 0$$

Step I: = Guess the value of 'r' is not given and calculate the NPV of the Project at that value.

Step II = If NPV is close to zero then IRR is equal to r.

Step III = If NPV is greater than 0 then increase 'r' and jump to step 5.

Step IV = If NPV is smaller than 0 then decrease 'r' and jump to step 5.

Step V = Recalculate NPV using the new value of 'r' and go back to step 2.

3.3 Workings

$$= \text{LDF} + \frac{\text{NPV} +}{\text{NPV} + - (\text{NPV} -)} \times (\text{HDF} - \text{LDF})$$

Ldf = Low discount factor

Hdf = High discount factor

NPV + = Positive NPV

NPV - = Negative NPV

Example 1

Calculate the IRR of a project having the following cash flows.

Yrs	CF(₹)
0	(5,000)
1	1,500
2	2,000
3	3,500

Discount factor is 15%.

Solution:

Yrs	Cash flow	DF 15%	PV(₦)	DF 20%	PV(₦)
0	(5,000)	1	(5,000)	1	(5,000)
1	1500	0.87	1,305	0.83	1,245
2	2000	0.76	1,520	0.69	1,380
3	3500	0.66	2,310	0.58	2,030
		NPV+ =	135	NPV- =	(345)

$$\text{IRR} = \text{LDF} + \frac{\text{NPV} +}{\text{NPV} + - (\text{NPV} -)} \times (\text{HDF} - \text{LDF})$$

$$15\% + \frac{135}{135 - (-345)} \times (20\% - 15\%)$$

$$15\% + \frac{135}{480} \times 5\%$$

$$0.16406 = 16.4\%$$

Example II

Calculate the projects IRR if the initial outlay is N80,000 and the cash flow are as follows:

Yrs	CF (₦)
Yr1	10,000
Yr2	12,000
Yr3	40,000
Yr4	25,000
Yr5	15,000

If the expected scrap value is 5,000 at the end of five years and the discount factor is 15%.

Solution

Yrs	Cash flow	DF 15%	PV(₦)	DF 20%	PV(₦)
0	(80,000)	1	(80,000)	1	(80,000)
1	10,000	0.87	8,700	0.95	9,500
2	12,000	0.76	9,120	0.91	10,920
3	40,000	0.66	26,400	0.86	34,000
4	25,000	0.57	14,250	0.82	20,500
5	20,000	0.50	10,000	0.78	15,600

$$\text{NPV- (11,530)} \quad \text{NPV+} = 10,520$$

N/B: Scrap value was added in the last year.

$$\text{IRR} = \text{LDF} + \frac{\text{NPV} +}{\text{NPV} + - (\text{NPV} -)} \times (\text{HDF} - \text{LDF})$$

$$\text{IRR} = 5\% + \frac{10,520}{(10,520 + 11,530)} \times 10\%$$

$$\begin{aligned} \text{IRR} &= 5\% + 0.4771 \times 10\% \\ 0.098 &= 9.8\% \end{aligned}$$

Example 3

Calculate the IRR of a project 50,000 initial outlay with the scrap value of N5,000 and profit after depreciation of

YrsCf(₦)

1	10,000
2	15,000
3	20,000

Cost of capital 10%.

Solution:

IRR use cash flows since we have profit after depreciation we have to add back depreciation to get cash flows.

$$\text{Depreciation} = \frac{(50,000 - 5,000)}{3}$$

$$\text{Dep} = \frac{45,000}{3} = 15,000$$

Cash flows

Yr1	10,000	+	15,000	=	25,000
Yr2	15,000	+	15,000	=	30,000
Yr3	20,000	+	15,000	=	35,000

IRR is

Yrs	Cash flow	DF 10%	PV(₦)	DF 50%	PV(₦)
0	(50,000)	1	(50,000)	1	(50,000)
1	25,000	0.9091	22,728	0.6667	16,668
2	30,000	0.8264	25,392	0.4444	13,332
3	40,000	0.7513	80,052	0.2963	11,852
			NPV+ = 28,172		NPV+ = (8,148.5)

$$\text{IRR} = \text{LDF} + \frac{\text{NPV} +}{\text{NPV} + -(\text{NPV}-)} \times (\text{HDF} - \text{LDF})$$

$$\text{IRR} = 10\% + \frac{28,172}{(28172 + 8749)} \times 40\%$$

$$\text{IRR} = 10\% + 0.7756 \times 40\%$$

$$\text{IRR} = 0.410 = 41\%$$

3.4. Advantages of IRR

1. It shows the return on the original money invested.
2. IRR rates are presented in form of familiar figures that can easily be interpreted by the user of the data.
3. IRR though peculiar to a given project avoids disputes that characterize the choice of the appropriate cost of capital to use when appraising project.

3.5 Disadvantages of IRR

1. It is difficult to compute and interpret.
2. It most times bring conflicting answers with NPV of which NPV will be used for decision making therefore making IRR more irrelevant.

4.0 Conclusion

With the help of illustration and examples, it will be easier now to compute IRR and make decisions with the result. The objectives of the paper has been achieved since it covered everything stipulated in it both the advantages and disadvantages.

5.0 Summary

IRR is one of the major tool in modern capital budgeting appraisal. It makes use of the NPV and observed the time value of money it shows the best cost of capital of which the company must choose. It is very tactical but good in decision making.

6.0 Tutor Marked Assignment

If the cost of capital is 10% and the scrap value is N10,000 at the end of 5 years, calculate the:

- a) PBP - Payback Period
- b) ARR - Accounting Rate of Return
- c) NPV - Net Present Value
- d) IRR - Internal Rate of Return

e) P I - Profitability Index

N/B: P. I = $\frac{\text{Present Value}}{\text{Initial Outlay}}$

7.0 Reference Point

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MODULE THREE: CAPITAL RATIONING

- Unit 1: The Concepts of Capital Rationing
- Unit 2: Different Situation in Capital Rationing
- Unit 3: Project Selection Methods

UNIT 1: THE CONCEPTS OF CAPITAL RATIONING

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main Content
 - 3.1 Definition of capital rationing
 - 3.2 Causes of Capital Rationing
 - 3.3 Advantages of Capital Rationing
 - 3.4 Disadvantages of Capital Rationing
 - 3.5 Assumptions of Capital Rationing
 - 3.6 Reasons for Hard Capital Rationing
 - 3.7 Reasons for Soft Capital Rationing
- 4.0 Conclusion
- 5.0 Summary
- 6.0 Tutor Marked Assignment
- 7.0 References

1.0 Introduction

Capital rationing is a common practice in most of the companies as they have more profitable projects available for investment as compared to the capital available.

In theory, there is no place for capital rationing as companies should invest in all profitable projects. However, a majority of companies follow capital rationing as a way to isolate and pick up the best project under the existing capital restriction.

2.0 Objectives

- To know what is capital rationing
- Understand the causes of capital rationing
- Explain the advantages and disadvantages of capital rationing
- State the reason of hard and soft capital rationing

3.0 MAIN CONTENT:

3.1 Definition of Capital Rationing

It is the process of putting restriction on the projects that can be undertaken by the company or the capital that can be invested by the company. This aims in choosing only the most profitable investments for the capital investment decision.

This can be accomplished by putting restrictive limits on the budget or selecting a higher cost of capital as the hurdle rate of all the projects under consideration, capital rationing can either be hard or soft.

3.2 Causes and Types of Capital Rationing

They can be categorized into two:

1. Those that are within the company's control i.e. artificial, internal/soft capital rationing.
2. Those that are not within the company's control: Real/External, Hard Capital Rationing.

The two situations can arise as follows:

1. Artificial/internal cause/soft capital rationing.
 - a) When management considers that raising money through the stock market may not be possible if share prices are at depressed levels.
 - b) Where management decides to maintain stable dividend payment instead of ploughing back all the profit to finance expansion.

- c) Where the company sets for itself a cut off rate above which it will be unwilling to borrow.

2. REAL/EXTERNAL CAUSES/HARD CAPITAL RATIONING

- a) Where the financial institutions are unwilling to lend at whatever price to a company.
- b) Where the company does not belong by the fiscal policy to the priority sectors that are favoured under the government new fiscal policy guideline.
- c) Global policies as they may affect the country where such companies are based.

3.3 Advantages of Capital Rationing

Advantages

1. **Budget:** The first and an important advantages are that capital rationing introduces a sense of strict budgeting of corporate resources of a company. Whenever there is an injunction of capital in the form of more borrowings or stock issuance capital the resources are properly handled and invested in profitable projects.
2. **No Wastage:** Capital Rationing prevent wastage of resources by not investing in each and every new project available for investment.
3. **Fewer Projects:** It ensures that less number of projects are selected by imposing capital restriction. This helps in keeping the number of active projects to a minimum and this manage them well.
4. **Higher Returns:**
Through Capital Rationing, companies invest only in projects where the expected return in high, thus eliminating project with lower returns on capital.
5. **More Stability:** As the company is not investing in every project, the finances are not over-extended. This helps in having adequate finances for tough times and ensure more stability and increase in the stock price of the company.

3.4 Disadvantages of Capital Rationing

Capital rationing comes with its own set of disadvantages as well. Let us describe the problems that rationing can lead to.

- 1) **Effective and efficient Capital Market:** Under efficient capital market theory, all the projects that add to company's value and increase shareholders wealth should be

invested in. However by following capital rationing and investing in only certain projects, this theory is violated.

2) **The Cost of Capital:**

In addition to limits on budget, capital rationing also places selective criteria on the cost of capital of shortlisted projects. However, in order to follow this restriction a firm has to be very accurate in calculation the cost of capital. Any miscalculation could result in selecting a less profitable projects.

3) **Un – Maximizing Value:** Capital rationing does not allow for maximizing the maximum value creation as all profitable projects are not accepted and thus, the NPV is not maximized.

4) **Small Projects:**

Capital rationing may lead to the selection of small project rather than larger scale investment.

5) **Intermediate Cash flow:**

Capital rationing does not add intermediate cash flows from a project while evaluating the projects. It bases its decision only the final returns from the project intermediate cash flows should be considered in keeping the time value of money in mind.

3.5 Assumptions of Capital Rationing

The primary assumption of capital rationing is that there are restrictions on capital expenditure either by way of all internal financing or investment budget restriction.

Firms do not have unlimited fund available to insist in all the projects. It also assumes that capital rationing can come out with an optimal return on investment for the company whether by normal trial and error process or by implementing mathematical techniques like integer, linear or goal programming.

3.6 Reasons for Hard Capital Rationing

Hard Capital Rationing is an external form of capital rationing. The company finds itself in a position where it is not able to generate external funds to finance its investment - reasons are:

1) **Poor Management/Track Record:**

The external funds can also be affected by the bad track record of the company or the poor management team. The leaders can consider such companies as a risky asset any and may shy away from investing in projects of the company.

2) **Lenders Restriction:**

Quite often, medium sized and large size companies rely on institutional investors and banks for most of their debt requirements. There may be restrictions and debt covenants placed by these lenders which affect the company's fund-raising strategy.

3) **Industry Specific Factors**

There could be a general down fall in the entire industry affecting the fund raising abilities of a company.

4) **Start Up Firms**

Generally, young start-up firms are not able to raise the funds from equity markets. This may happen despite the high projected returns or the lucrative future of the company.

3.7 Reasons for Soft Capital Rationing

Soft capital rationing, on the other hand, is a company-led capital restriction due to the following reasons:

1) **Promoters Decision:** The promoters of the company may decide to limit raising more capital too soon for the fear of losing control of the company's operations. They may prefer to raise funds slowly and over a long period to ensure their control of the company. Moreover, this could also help in getting a better valuation while raising capital in the future.

2) **An increase in opportunity cost of capital:**

Too much leverage in the capital structure makes the company riskier investment. This leads to increase in the opportunity cost of capital. The companies aim to keep their solvency and liquidity ratios under control by limiting the amount of debt raised.

3) **Future Scenarios:**

The companies follow soft rationing to be ready for the opportunity available in the future, such as a project with a better rate of return or a decline in the cost of capital. There is prudence in conserving some capital for such future scenarios.

4.0 Conclusion

Though the capital rationing seems to contradict maximizing shareholders wealth, it is a very important process of the budgeting process of a company. Depending on the type of capital rationing, the company can decide on the techniques for analyzing the investment.

5.0 Summary

With the text above, I believe one can easily understand what capital rationing is talking about, the advantages and disadvantages the causes and types and the reasons for hard or soft capital rationing. This will enable the management to make radical decision on the best way to ration their limited capitals.

6.0 Tutor Marked Assignment

What is soft capital rationing?

Explain the concept of capital rationing?

Explain why people ration their capital

List and discuss the advantages and disadvantages of capital rationing

7.0 References

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UNIT 2: DIFFERENT SITUATIONS OF CAPITAL RATIONING AND PROJECT SELECTION

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main Content
 - 3.1 Different Situations of Capital Rationing
 - 3.2 Relationships between DPI and EPVI
 - 3.3 Projects Selection Based on Calculations
 - 3.4 Ranking of Projects
 - 3.5 Decision Rule
- 4.0 Conclusion
- 5.0 Summary
- 6.0 Tutor Marked Assignment
- 7.0 References

1.0 INTRODUCTION

There are different situation of capital rationing through a project can be selected depending on the type adopted by the management of a firm.

2.0 OBJECTIVES

At the end of the lesson one will be able to:

1. Identify the different situation through which capital can be rationed.
2. Be able to calculate following the necessary procedure for a reasonable answer.
3. Be able to select projects and make decisions based on the answers and observations from the calculations.

3.0 THE MAIN CONTENT

3.1 Different Situations of Capital Rationing

1. **Independent Projects:**

These are projects that are to be appraised for acceptance/rejection solely on each projects individual merit.

2. **Mutually Dependent Project:**

These are projects that are appraised for Joint acceptance/rejection.

3. **Mutually Exclusive Project**

These are projects that cannot be accepted at the same time. If a particular project is accepted, the other must be rejected.

4. **Divisible Projects;**

These are projects that can be part-financed i.e. fractions can be undertaken.

5. **Indivisible Projects**

These are projects that cannot be part-financed i.e fractions cannot be undertaken.

6. **Single-Period Capital Rationing**

This occurs where there is financial constraint over just a period.

7. **Multi-Period Capital Rationing:**

This occurs where there is financial constraint spanning more than 1 year.

8. **Discounted Profitability Index:**

It measures the return per every ₦1 invested. It is calculated as follows:

$$\text{DPI} = \frac{\text{GPV}}{\text{Outlay}}$$

Where:

$$\text{GPV} = \text{Gross Present Value.}$$

N/B: A major advantage of DPI is that it facilitates maximization of profit earned per unit of Naira invested.

9. Excess Present Value Index = $\frac{NPV}{Co}$

3.2 Relationships between DPI and EPVI

1. $\text{DPI} = \text{EPVI} + 1$

2. $\text{EPVI} = \text{DPI} - 1$

3. $\text{NPV} = \text{Outlay} \times \text{EPVI}$

4. NPV = Outlay x (DPI – 1)
5. If DPI is greater than 1, NPV will be greater than 0 i.e. NPV is positive.
6. If DPI is less than 1, NPV will be less than 0 i.e. NPV will be negative.
7. If DPI equals 1, NPV equals 0.

3.3 Project Selection Based on Calculation

Example 1

Ebiere Plc undertakes a new project having the following cash flow:

Yrs	CF(₦)
0	(80,000)
1	36,000
2	38,000
3	52,000

The company's cost of capital is 14%

Calculate:

1. DPI or Profitability Index
2. EPVI = Excess Present Value Index.

Solution:

Yrs	Cash flows (₦)	DF 14%	GPV
0	(80,000)	1	(80,000)
1	36,000	0.8772	31,579
2	38,000	0.7695	29,241
3	52,000	0.6750	35,100
			NPV = 15,920

$$a) \quad \text{DPI} = \frac{\text{GPV}}{\text{Co}} = \frac{95,920}{80,000} = 1.2$$

$$b) \quad EPVI = \frac{15920}{80,000} = 0.2$$

$$\text{There} \quad DPI = EPVI + 1$$

$$EPVI = DPI - 1$$

Example 2

Ration the capital of ₦25,000,000 among these projects if they are mutually divisible.

Yr	Project A	Project B	Project C
0	(25)	(20)	(10)
1	80	16	15
2	15	30	37.5

All the initial outlay are in millions. The cost of capital is 11%

$$NPV - A = 59.22$$

$$NPV - B = 43.11$$

$$NPV - C = 33.95$$

Solution:

N/B: Since we cannot determine or ration the capital using only NPV, we quickly calculate the EPVI $= \frac{GPV}{Co}$

$$1. \quad EPVI \text{ for Project A} = \frac{59.22}{25} = 2.37$$

$$2. \quad EPVI \text{ for Project B} = \frac{43.0}{20} = 2.16$$

$$3. \quad EPVI \text{ for Project C} = \frac{33.95}{10} = 3.40$$

N/B: With this EPVI, we can easily determine our DKPI which is the best for project selection or ranking.

$$1. \quad EPVI = DPI - 1$$

$$DPI = EPVI + 1$$

$$a. \quad DPI \text{ for Project A} = 37 + 1 = 3.37$$

- b. DPI for Project B = 2.16 + 1 = 3.16
 c. DPI for Project C = 3.40 + 1 = 4.40

N/B: You can solve with either EPVI or DPI they will always produce the same result in ranking.

3.4. Ranking of Projects:

Project	(000,000) Co	NPV	PI	EPVI	Ranking
A	-25	59.22	3.37	2.37	2 nd
B	-20	43.11	3.16	2.16	3 rd
C	-10	33.95	4.40	3.40	1 st

N/B: Since we have only N25m to apportion we are going to start selecting the best project based on the ranking.

$$\begin{aligned} \text{Project C} &= 10,000,000 & \text{NPV} &= 33.95 \\ &= \frac{25,000,000}{15,000,000} + \frac{15,000,000}{25,000,000} = \frac{3}{5} \end{aligned}$$

$$33.95 + \frac{3}{5} (59.22) = 69.482$$

N/B: We used the DPI to rank and select but we apportion using NPV.

Example 3

Project	Year 0	Year 1	Year 2		NPV
A	(10,000)	6000	7000	+	1240
B	(20,000)	14,000	10,000	+	991
C	(30,000)	10,000	28,000	+	2280
D	(40,000)	30,000	20,000	+	3801

N/B: Without capital rationing, all four projects would be viable investments because they have positive NPV. However, if there is a restriction to the amount of finance available, so that only N60,000 is available in Year 0, the company will optimize its return by maximizing the NPV generated per N1 spent in Year 0 as follows:

Project	NPV	Co	EPVI	PI	Ranking
A	+ 1240	(10,000)	0.124	1.124	1 st
B	+ 991	(20,000)	0.050	1.050	4 th
C	+ 2230	(30,000)	0.074	1.074	3 rd
D	+ 3801	(40,000)	0.095	1.095	2 nd

₦60,000 available will be spent as:

Project	Ranking	Outlay	PVI
A	1 st	10,000	1240
D	2 nd	40,000	3801
C	3 rd	10,000	743
TOTAL		60,000	5784

N/B: Remember Project C is 10,000, because the $\frac{1}{3}$ of the outlay. Since we have only 10,000 to apportion for the project which is $\frac{10,000}{30,000} = \frac{1}{3}$

Example 4:

If project A and C are mutually exclusive, and the company has N2m to invest on these projects, select the projects to be invested in.

N/B: The projects are divisible.

Project	Co	NPV	PI	EPVI
A	400	154	0.39	1.39
B	800	580	0.73	1.73
C	700	800	1.14	2.14
D	1000	628	0.63	1.63
E	300	80	0.29	1.27
F	900	-100	-0.01	0.99

If the cost of capital is 18%

Solution

A and C are mutually exclusive.

Project	Co	NPV	Project	Co	NPV
A	400	154	C	700	800
B	800	680	B	800	580
D	1000	502	D	1000	314
E	300		E	300	
		1236.4			1694

N/B: We removed project F because it has a negative NPV.

3.5 Decision Rule

Since they are mutually exclusive, Project C should be undertaken because it has higher NPV than Project A.

Example 5

When the project is indivisible, Ejiro Plc has a limited of ₦2million in the current period. Capital is expected to be freely available in future period. The cost of capital is 20%.

Project	Outlay (000)	NPV 20%	EPVI
A	700	350	0.50
B	800	450	0.56
C	1300	760	0.58
D	960	630	0.66
E	460	180	0.39

You are required to calculate the optimal combination of the projects there are no alternative investments available for any surplus funds.

N/B: Cash outlay and NPV are in (000).

Solution:

Since the projects are not divisible we can only look for possible combination without repetition. Remember they are in (‘000)

$$A + C = 2000$$

$$A + B + C = 1960$$

$$A + D = 1660$$

$$B + D = 1760$$

$$C + E = 1760$$

$$D + E = 1420$$

Then let's look for cash surplus

$$A + C = 2000 - 2000 = 0 \text{ surplus}$$

$$A + B + C = 1960 - 2000 = 40 \text{ surplus}$$

$$A + D = 1660 - 2000 = 340 \text{ surplus}$$

$$B + D = 1760 - 2000 = 240 \text{ surplus}$$

$$C + E = 1760 - 2000 = 240 \text{ surplus}$$

$$D + E = 1420 - 2000 = 580 \text{ surplus}$$

N/B: Ignore the negative signs in the surplus. The surplus are not enough to be invested in other projects. Remember no repetition of project.

$$\text{The weighted EPVI} = \frac{\text{Outlay}}{\text{Capital Limit}} \times \text{EPVI}$$

$$AC = \frac{700}{2000} \times (0.5) + \frac{1300}{2000} \times (0.58)$$

$$0.175 + 0.377 = 0.552$$

$$ABE = \frac{700}{2000} \times (0.5) + \frac{800}{2000} \times (0.56) + \frac{460}{2000} \times (0.39)$$

$$0.175 + 0.224 + 0.0897 = 0.489$$

$$AD = \frac{700}{2000} (0.5) + \frac{960}{2000} \times (0.66)$$

$$0.175 + 0.3168 = 0.492$$

$$BD = \frac{800}{2000} \times (0.56) + \frac{960}{2000} \times (0.66)$$

$$0.224 + 0.3168 = 0.541$$

$$CE = \frac{1300}{2000} \times (0.58) + \frac{460}{2000} \times (0.39)$$

$$0.377 + 0.0897 = 0.467$$

$$DE = \frac{960}{2000} \times (0.6) + \frac{460}{2000} \times (0.39)$$

$$0.3168 + 0.0897 = 0.407$$

Table showing the full detail

Projects	Total Outlay Combination	Surplus fund (000)	Total NPV of Comb. (000)	Weighted EPVI
AC	2000	-	1110	0.552
ABE	1960	40	980	0.489
AD	1660	840	980	0.492
BD	1760	240	1080	0.541
CE	1760	240	940	0.467
DE	1420	580	810	0.407

The best combination of Project is AC i.e. Project A and C with a combined total NPV of N1110,000 and weighted EPVI of 0.552.

Example 6

Based on example 6, assuming the surplus fund are to be invested to produce 22% per annum in perpetuity, calculate the optimal combination of projects.

Solution

Surplus funds are:

NPV of Surplus fund

AC - -

ABE	40	4
AD	340	34
BD	340	24
CE	240	24
DC	580	58

NPV of surplus fund or external investment are calculated as

$$NPV = \frac{As}{K} \times r - As$$

Where

As = surplus fund

k = Cost of Capital

r = Interest rate on investment.

$$ABE = \frac{40 \times 0.22}{0.2} - 40 = 4$$

$$AD = \frac{340 \times 0.22}{0.2} - 340 = 34$$

$$BD = \frac{240 \times 0.22}{0.2} - 240 = 24$$

$$CE = \frac{240 \times 0.22}{0.2} - 240 = 24$$

$$DC = \frac{580 \times 0.22}{0.2} - 580 = 58$$

Project Comb.	Total Outlay Comb.	Surplus Funds	NPV of ext. Invest.	Total NPV including NPV of Ext	EPVI Surplus fund Ext.	Weighted EPVI
AC	2000	-	-	1110	0.1	0.552
ABE	1960	40	4	984	0.1	0.491
AD	1660	340	34	1014	0.1	0.509
BD	1760	240	24	1104	0.1	0.553
CE	1760	240	24	964	0.1	0.479
DE	1420	580	58	868	0.1	0.436

$$EPVI \text{ surplus funds externally invested} = \frac{NPV \text{ of Externally Invest}}{Surplus Fund}$$

Calculation of Weighted EPVI on surplus fund

AC 0.552

$$ABE = \frac{700}{2000} \times (0.5) + \frac{800}{2000} \times (0.50) + \frac{460}{2000} \times (0.39) + \frac{40 \times (0.1)}{2000} = 0.491$$

$$AD = \frac{700}{2000} \times (0.5) + \frac{960}{2000} \times (0.60) + \frac{340}{2000} \times (0.1) = 0.509$$

$$BD = \frac{800}{2000} \times (0.56) + \frac{960}{2000} \times (0.66) + \frac{240}{2000} \times (0.1) = 0.553$$

$$CE = \frac{1300}{2000} \times (0.58) + \frac{460}{2000} \times (0.39) + \frac{240}{2000} \times (0.1) = 0.479$$

$$DE = \frac{960700}{2000} \times (0.66) + \frac{460}{2000} \times (0.39) + \frac{580}{2000} \times (0.1) = 0.436$$

N/B: Using the weighted EPVI approach, the best project combination is BD. However, project combination AC gives us the highest total NPV of ₦1, 110,000. Thus, the optimal solution is to select project A and C with a total NPV of ₦1, 110,000.

3.6. Observation

Weighted EVPI has to be used with caution in a situation where projects are indivisible, as it can produce an incorrect ranking. Thus, in a situation where projects are indivisible, the recommended approach is to select project on the basis of the total NPV of possible project combinations. It is not necessary to calculate the weighted EPVI except if the examiner ask for it.

4.0 Conclusion

Though capital rationing has few disadvantages, it is still followed widely in selecting investment projects. A company should decide on following capital rationing after studying the implications in detail.

5.0 Summary

In a multi period capital rationing the optimal combination of a project can be found through linear programme.

In a situation where there is capital rationing, project selection techniques need modification. Capital rationing is a situation where a company is unable to accept all projects with a positive NPV due to shortage of funds. Capital rationing can be self-imposed (called soft rationing or externally imposed called hard rationing).

6.0 Tutor Marked Assignment

Emuesiri Ltd is a highly geared company that wishes to expand its operation. Six possible capital investments have been identified. But the company only has access to a total of N620,000. The projects are not divisible and may not be postponed until a future period. After the projects end it is unlikely that similar investment opportunity will occur.

Expected Net Cash inflow (including salvage value).

Project	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Initial Outlay
A	70,000	70,000	70,000	70,000	70,000	246,000
B	75,000	87,000	64,000	-	-	180,000
C	48,000	48,000	63,000	73,000	-	175,000
D	62,000	62,000	62,000	62,000	-	180,000
E	40,000	50,000	60,000	70,000	40,000	180,000
F	35,000	82,000	82,000	-	-	180,000

Project A and E are mutually exclusive.

All projects are believed to be of similar risk to the company's existing capital investment. Any surplus fund may be invested in the money market to earn a return of 9% per year. The money market may be assumed to be an efficient market. Emuesiri Ltd. Cost of capital is 12% a year.

Required:

- Calculate the expected Net Present Value for each of the six projects.
- Calculate the expected profitability index associated with each of the six projects.
- Rank the projects according to both of their investment appraisal method.
- Give reasoned advice to Emuesiri Ltd recommending which projects should be selected.

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MODULE FOUR: CAPITAL STRUCTURE DECISION

UNIT 1: CONCEPT OF CAPITAL STRUCTURE

UNIT 2: FINANCIAL STRUCTURE AND CAPITAL STRUCTURE

UNIT 3: THEORIES OF CAPITAL STRUCTURE

UNIT 4: PLANNING THE CAPITAL STRUCTURE

UNIT 1: CONCEPT OF CAPITAL STRUCTURE

CONTENT

1.0 Introduction

2.0 Objectives

3.0 Main Content

3.1 Concept of Capital

3.2 capital structure

4.0 Conclusion

5.0 Summary

6.0 Tutor Marked Assignment

7.0 References

1.0 INTRODUCTION

For any business to be initiated, the resource called capital is importantly considered: Generally, it is referred to as funds used to set up and run a business. It could also be referred to as unit of ownership any investor invests in a business.

Generally, every source of capital available to a financial manager is known as what could lead to the success or failure of any business and so the financial manager is faced with the issue of appropriately deciding which choice or combination of choices to be selected.

2.0 OBJECTIVES

After completing the study of this chapter, you should be able

1. To define and understand the concepts of capital and capital structure.
2. To understand the basic approaches to the concept of capital.
3. To be able to justify what made up the capital

3.0 MAIN CONTENTS

3.1 CONCEPT OF CAPITAL

There are two possible approaches to the concept of capital. One of them is the 'fund' concept while the other is the 'asset' concept of capital. According to the fund concept, the capital of the firm is the sum total of the funds that have been employed for its operation. It corresponds to the idea of total capital employed by the firm and may also be described as 'financial capital'. The fund concept recognizes the separate entity of a firm and consider capital from the liability side of the balance sheet.

Accountants generally prefer, to take only the funds originally brought by the owner along with the funds that have been subsequently ploughed back into the firm out of the retained profits. From this standpoint, capital represents the sum of share capital, and reserves and surplus. Funds contributed by the creditor (both long term and short term) are excluded on the ground that they are claims by parties external to the firm, and are devoid of certain rights and privileges enjoyed by the proprietor or shareholder. But a firm has a separate entity.

The basic character of all the funds, whether contributed by the owner or by the creditor is to generate business income. So, long-term borrowings should also be included in the composition of capital. Hence, capital represents the aggregate of share capital, reserves and surplus, and long-term debt.

According -to the 'asset' concept, capital means money invested in fixed assets and current assets. In both the cases, the asset may be comprising either tangibles or intangibles including fictitious assets. To an accountant, an asset is a capitalized expenditure and represents claims to services, it need not always be associated with a material object having a tangible, existence. Further, though assets in general should possess value, all assets may not have value in exchange. Thus, insofar as the intangible assets satisfy these criteria, there is no constraint on

the part of the accountant to the inclusion of intangibles among assets. Fictitious assets, such as debit balance of profit and loss account, balance of securities discount account, are however, to be treated more as deduction- from relevant liabilities than assets by themselves. Viewed from this angle, funds represent aggregate of fixed assets (net of depreciation), intangible assets, investments and current assets.

3.2 CAPITAL STRUCTURE

The term 'structure' is taken from engineering science. It connotes the arrangements of the various parts of a building or some other construction. It is common knowledge that corporate enterprises raise their capital from diverse sources such as the issue of shares, debentures, long-term loans, short-term loans and ploughing back of profits. Accordingly, in the procurement of capital from diverse sources, as also in the subsequent commitment of the said capital to various assets, certain proportions or combinations of various elements have to be maintained.

This arrangement of capital is called **Capital Structure**. There are certain objectives for maintaining a desired capital structure, such as minimization of the cost of capital and maximization of the value of the share, etc.

Capital structure includes equity capital comprising retained earnings and long-term debt capital. Short-term liabilities are excluded from the formulation of capital structure.

4.0 CONCLUSION:

From the above contest, ones can easily understand and define capital structure and what made up the capital structure which includes equity capital comprising retained earnings and long term debt capital. Short term liabilities are excluded from the formulation of capital structure.

5.0 SUMMARY

Capital means different things from different perspective. Fund and Assets approach. Fund approach defined capital as total sum of money employed for its operation. While capital approach defined it as money invested in fixed and current asset.

6.0 TUTOR MARKED ASSIGNMENT

1. Define capital with respect to two main approaches.
2. What do you understand by capital structure?
- 3 Define the following terms
 - i. Venture capital
 - ii. Implicit costs of capital
 - iii. Explicit costs of capital

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UNIT 2: FINANCIAL STRUCTURE AND CAPITAL STRUCTURE

CONTENT

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main Content
 - 3.1 Distinctions between Capital Structure and Financial Structure
 - 3.2 Variables Affecting Capital Supply
 - 3.3 Classification of Capital Structure
 - 3.3.1. According to Nature
 - 3.3.2. According to sources
 - 3.3.3. According to Ownership
 - 3.3.4. According to Cost Behaviour
- 4.0 Conclusion
- 5.0 Summary
- 6.0 Tutor Marked Assignment
- 7.0 References

1.0. INTRODUCTION

This section of the unit tried to identify those factors that differentiated the financial structure from capital structure and how capital structures are being classified.

2.0. OBJECTIVES

At the end of this unit, one should be able to:

1. The differences between capital structure and financial structure.
2. The various variables that affect capital structure.
3. To classify capital structure into sources.
4. Be able to explain how various forms capital structure are being classified

MAIN CONTENT

3.0. MAIN CONTENT

3.0.1. Distinction between Capital Structure and Financial Structure.

Sometimes, a distinction is drawn between 'financial structure' and 'capital structure' of a firm. The sum of various means of raising funds comprises the financial structure of a firm. That is, financial structure comprises net worth and all liabilities (long term and short term).

When short-term borrowings are omitted from the list, the remaining claims represent the capital structure. Thus, the distinction between the two depends on the treatment of short-term borrowing. However, when a broad view of the matter is adopted to include short-term liabilities as one of the components of the capital structure (that is, net worth plus all liabilities), there is no distinction between the terms financial structure and capital structure.

3.1. VARIABLES AFFECTING CAPITAL SUPPLY

The decisions of a financial manager to choose a particular form of capital supply available to him that will be suitable for the firm is often mainly affected by the following:

- (1) Relative costs
- (2) Prevailing market conditions
- (3) Control level to be relinquished
- (4) Duration
- (5) Risks involved

They will be considered in relation to the financial manager's influence

- (1) **Relative Costs:** These simply refer to on them the implicit costs or explicit costs that will be incurred while sourcing, obtaining and repaying borrowed capital. All these factor have to be considered by a financial manager in relation to what the capital sourced is going to reproduce for the company. They can be controlled by the financial manager.
- (2) **Prevailing Market Condition:** This factor mainly refers to the interest rates that are prevailing in the market for capital depending on the forces of supply and demand for capital. These are dependent on the savings of businesses, government and individual in relation to the money creating activities of banking system. They are exogenous in nature and are not in the control of the financial manager.
- (3) **Controlled Leveled to be Relinquished:** in this aspect, the financial manager will have to follow the business owner's choice in whether or not the ownership structure be

altered thereby leading to control being relinquished. This is the case which arises in whether or not the capital should be permanent capital or long-term capital. Example deciding whether or not reserves should be re invested (No Control Relinquished) or whether or not bonds or preference shares should be issued (Control Relinquished).

- (4) **Duration:** this is a very big important factor to be considered as time can be crucial in investments. The financial manager will be faced with choosing the right capital source with the right timeline that could suit the capital finance need of the business at a particular time.
- (5) **Risks Involved:** Risk inherent in a particular capital option and the firm's market would definitely influence the choice of capital to be available when financing a business at a particular time. They are usually gauged by analyzing the current ratios among many others. Financial risk such as hearing fixed charges on bonds could also be a deciding factor.

Other factors that may affect the supply of capital involve; security, marketability, legal form of business, dividend pay-out, record of the firm, legal form of business and eligibility of securities for institutional investment.

3.2. Classification of Capital Structure

It has already been pointed out that firms acquire their capital from various sources in order to invest them in different types (If assets. Thus, a capital structure has a double-edged manifestation-one edge being the finance structure depending on the source, and the other edge being the asset structure depending on the nature of investment.

There have been various classification of capital structure on different characteristics or bases. These are discussed in the following section.

3.2.1. According to Nature

A capital structure may be either: (i) simple, or (ii) complex. A simple structure comprises a single source, e.g. equity share capital including retained earnings. But as soon as a firm finances capital from more than one source that is not of an identical or allied nature, it is called a complex structure.

Illustration:

- (a) Simple structure:

(i) Balance Sheet as on...

	₹	₹
Equity share capital	100	Fixed assets 70
Retained earnings		Current assets 30
Preference share capital	100	100
(ii)	Balance Sheet as on...	

	₹	₹
Equity share capital	80	Fixed assets 70
Retained earnings	20	Current assets 30
Preference share capital	100	100
(b) Complex structure		
(i)	Balance Sheet as on...	

	₹	₹
Equity share capital	90	Fixed assets 70
Current liabilities	100	Current assets 30
	100	100
(ii)	Balance Sheet as on...	

	₹	₹
Equity share capital	70	Fixed assets 70
Retained earnings	10	Current assets 30
Preference share capital	20	
	100	100
(iii)	Balance Sheet as on...	

	₹	₹
Equity share capital	40	Fixed assets 70
Retained earnings	10	Current assets 30
Preference share capital	20	
Debenture on long-term loan	30	
	100	100
(iv)	Balance Sheet as on...	

	₹	₹
Equity share capital	40	Fixed assets 70
Retained earnings	10	Current assets 30
Preference share capital	20	
Debenture and long-term loan	20	
Current liabilities	10	
	100	100

The above classification of capital into 'simple' and 'complex' is possible when it is considered

on the basis of the fund concept. A similar classification is not possible in the case of the asset concept of fund as the existence of any firm with only one type of asset is a rarity.

Even if a firm starts with a simple structure, it is likely to be converted into a complex one over time because a sustained simple structure presupposes that all future expansions, in addition to normal growth, are financed either by retained earnings or externally by equity issues only. These are unlikely to happen because of the interplay of many factors, some of which may remain outside the control of management.

3.2.2. According to Sources

It may be broadly classified into: (i) internal capital, and (ii) external capital. Internal capital includes the following:

- Share capital through bonus issue
- Capital reserve
- Reserves and surplus (including balance of profit and loss appropriation account) .

External capital comprises the following:

- Share capital (excluding bonus shares)
- Share premium
- Forfeited shares
- Debentures
- Long-term and short-term liabilities

3.2.3. According to Ownership

Capital may also be classified according to ownership, e.g. ownership capital and creditorship or debt capital. Ownership capital consists of:

- Equity share capital
- Retained earnings

Creditorship or debt capital includes the following: .

- Debentures
- Long-term loans
- Current liabilities

In the above classification, the concept of preference share capital poses a problem.

There are two approaches regarding its treatment. According to one view, it is considered as a part of ownership capital, and should, therefore, be added to equity share capital in order to arrive at the total ownership capital. According to the other view, preference share should be added to debt capital as, like other debt capital, it enjoys a fixed rate of income and also a

priority over equity in respect of both payment of income and return of capital. There are reasons to justify both the approaches. Accordingly, preference share capital may be treated as a part of either ownership capital or debt capital.

3.2.4. According to Cost Behaviour

Capital is not cost free. So, classification is also possible according to the cost behaviour of various sources of capital such as fixed cost capital, i.e. the rate of dividend or interest remaining fixed, and variable cost capital, i.e. when the dividend rate varies.

The fixed cost capital includes:

- Preference share capital
- Debentures
- Long-term debt capital

The variable cost capital comprises:

- Equity share capital (when no uniform rate of dividend is maintained)
- Short-term liabilities (when such cost is measurable)

In any case, the study of capital structure, whether in its broad outline or in detail, depends on the proportional or percentage contribution to the total capital of a firm. At any given point of time, such percentage contributions cannot be the same in firms of different types within a particular industry, or in those of different industries but of a particular type.

4.0. CONCLUSION

The study of capital structure, whether in its broad outline or in detail, depends on the proportional or percentage contribution to the total capital of a firm. At any given point of time, such percentage contributions cannot be the same in firms of different types within a particular industry, or in those of different industries but of a particular type.

5.0 SUMMARY

The distinction between capital structure and financial structure has been made clear as financial structure focus mainly on short term projects and finance while capital structure based its assumptions on long term projects and finance. And also the various variables that affect capital structure were defined and described

6.0 TUTOR MARKED ASSIGNMENTS

1. Differentiate between capital structures and financial structures and list those variables that affect capital structure.
2. Classify capital structure into forms and explain them. .
3. Evaluate the various type of shares we have
4. What is lease?
5. Explain the terms:
 - (a) Lease
 - (b) Bonds
 - (c) Debentures
 - (d) Commercial papers
 - (e) Trade credit

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UNIT 3: THEORIES OF CAPITAL STRUCTURE

CONTENT

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main Content
 - 3.1 Assumptions
 - 3.2 Net Income Approach
 - 3.3 Net Operating Income Approach
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 - 3.5 Modigliani – Miller (M-M) Hypothesis
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 - 3.5.4. Criticism of (M-M) Hypothesis
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1.0. INTRODUCTION

The key question with which we are concerned is whether a firm can affect its total valuation (debt plus equity) and its cost of capital by changing its financing mix. That is, what happens to the total valuation of the firm and to its cost of capital when the ratio of debt to total capital, or the degree of leverage, is varied?

2.0. OBJECTIVES

At the end of this unit one should be able to:

1. Those theories of capital structure
2. Be able to calculate capital structure using the formulas provided in the context
3. To make decisions with the results of the calculations

3.0. MAIN CONTENT

1.1 Assumptions

In the discussion relating to the conceptual aspects of capital structure, we are concerned with three different rates of return.

The first is

$$k_d = \frac{1}{D} = \frac{\text{Annual interest charges}}{\text{Market value of debt outstanding}}$$

Or

$$D = \frac{1}{k_d}$$

In the above equation k_d is the yield on the firm's debt, assuming that the debt is perpetual.

The second rate of return which is

$$k_e = \frac{E}{S} = \frac{\text{Earnings available to equity shareholder}}{\text{Market value of equity outstanding}}$$

$$(E = EBIT - I - D_p)$$

$$S = \frac{E}{k_e}$$

In the case of our assumptions of a firm whose earnings are not expected to grow and that has a 100% dividend-payout ratio, the earnings/price ratio represents the market rate of discount that equates the present value of the stream of expected future dividends with the current market price of the share.

The third or the final rate of return is

$$k_o = \frac{O}{V} = \frac{\text{Net operating income}}{\text{Total market value of the firm}}$$

$$(O = EBIT)$$

Or

$$V = \frac{O}{k_o}$$

Where $V = D + S$. Here, k_o is the overall capitalization rate for the firm. It is defined as the weighted average cost of capital, and may be expressed as:

$$k_o = k_d \left(\frac{D}{V} \right) + k_e \left(\frac{S}{V} \right)$$

We want to know what happens to k_d , k_e and k_o when the degree of leverage, as denoted by the ratio D/V , increases. We are also concerned with the total value of the firm. The firm's total value, V , is the aggregate of the debt value, D , and equity value, S , that is

$$V = D + S$$

$$V = \frac{1}{k_d} + \frac{E}{k_e}$$

A number of theories explain the relationship between cost of capital, capital structure and value of the firm. These are as follows:

1. Net income approach
2. Net operating income approach
3. Traditional approach
4. Modigliani-Miller hypothesis

The two extreme boundaries of the valuation of the earnings of a firm are the 'Net Income (NI) approach' and the 'net operating income (NOI) approach'. According to the NI approach, the firm is able to increase its total valuation, V , and lower its cost of capital, k ; as it increases the degree of leverage, D/V . The NOI approach implies that the total valuation of the firm is unaffected by its capital structure. This approach is purely definitional, that is, no behavioural or economic meaning is attached to it. Modigliani and Miller offered behavioural support for the independence of the total valuation¹ and the cost of the capital of the firm from its capital structure. The traditional approach assumes that there is an optimal capital structure and that the firm can increase its total value through the judicious use of leverage.

Before discussing these theories, we have to refer to the underlying assumptions.

1.2 Assumptions

In order to focus on the key issues, we begin with several simplifying assumptions:

I. The firm finances from two sources only: equity and debt.

1. There is no corporate tax. This assumption is removed later on.

2. All earnings are paid out as dividends, that is, there is no retention.
3. The firm's assets (or aggregate capital consisting of debt and equity) are not growing, and, hence, its operating income (EBIT) is expected to remain constant in the future.
4. The firm can change its capital structure, or degree of leverage, either by issuing shares to retire debt or by raising more debt to 'redeem' the shares.
5. The firm's business risk is taken as being constant over time and is independent of its capital structure and financial risk.
6. Investors have the same subjective probability distribution of the expected future operating income or EBIT for a given firm.
7. The firm has a perpetual life.

1.3 Net Income Approach

Durand² identified the two extreme capital structure theories—the net income approach and the net operating income approach.

As previously mentioned, according to the NI approach, the firm is able to increase its total valuation, V , and lower its cost of capital, k_o , as it increases the degree of leverage, D/V . The optimum capital structure is one at which the cost of capital is the lowest and the value of the firm is the greatest. At that structure, the market price per share is maximized.

The significance of the NI approach is that a firm can lower its cost of capital continually by the use of debt capital, and, thus, increase its total valuation. Reduction in the cost of capital with more- and more use of debt capital and, hence increase in the value of the firm will be possible when .

1. The cost of debt (k_d) is less than the cost of equity (k_e) and it remains constant: or
2. The firm's risk perception is not changed, i.e. it does not become increasingly more risky in the minds of investors and creditors, as the degree of leverage is increased.

So, the NI approach makes the above two assumptions. In addition, we have already assumed that there will not be any corporate tax.

Assume that a firm's EBIT is ₦15,000. The cost of equity, k_e is 15% and the cost of debt, k_d is 10%. Its total capital amounts to N 100,000. Assuming that the firm can have the following alternative degrees of leverage, calculate the cost of capital and value of the firm for each alternative leverage using the NI approach:

Leverage (debt to total capital): 0%, 20%, 50%, 80% and 100%

	Degree of leverage (debt to total capital)				
	0	0.2	0.5	0.8	
	₦	₦	₦	₦	₦
Equity capital	100,000	80,000	50,000	20,000	NIL
Debt capital	-	20,000	50,000	80,000	100,000
Total	100,000	100,000	100,000	100,000	100,000
EBIT	15,000	15,000	15,000	15,000	15,000
Interest (I)	Nil	2,000	5,000	8,000	10,000
Earnings to equity (O) (EBIT- I)	15,000	13,000	10,000	7,000	5,000
Market value of debt ($1/K_d$) (D)	Nil	20,000	50,000	80,000	100,000
Market value of equity (O/k_e) (S)	100,000	86,667	66,667	46,667	33,333
Total value of the firm (V) ($D + S$)	100,000	106,667	116,667	126,667	133,333

k_d	10%	10%	10%	10%	10%
k_e	15%	15%	15%	15%	15%
k_o	15%	14%	12.5%	11%	10%
(see Workings)					

The costs of debt and equity are 10% and 15%, respectively, and are assumed to be constant at varying levels of the debt-equity mixed under the NI approach. The above table shows that with an increase in the proportion of debt capital, the overall cost of capital, k_o , declines, and the value of the firm, V , also increases. Thus, when the firm uses 100% debt capital, the cost of capital, k_o , is minimum and the value of the firm, V , is also maximum.

Workings

The average cost of capital at different financing plans is computed by using the formula

$$k_o = \left(\frac{D}{V}\right) k_d + \left(\frac{S}{V}\right) k_e$$

as follows:

- When financial leverage is 0:
 $k_o = 0 \times 10 + 1 \times 15 = 15\%$
- When financial leverage is 0.2:
 $k_o = 0.2 \times 10 + 0.8 \times 15 = 14\%$

3. When financial leverage is 0.5:
 $k_o = 0.5 \times 10 + 0.5 \times 15 = 12.5\%$
4. When financial leverage is 0.8:
 $k_o = 0.8 \times 10 + 0.2 \times 15 = 11\%$
5. When financial leverage is 1:
 $k_o = 1 \times 10 + 0 \times 15 = 10\%$

The NI approach can be illustrated graphically as in Figure 4.1. We use the relevant data from Illustration 4.1. The degree of leverage, debt to total capital, is plotted along the x axis while the cost of capital (k_d , k_e , and k_o) is on the y axis. The graph shows that as the proportion of cheaper debt capital in the capital structure is increased, the weighted average cost of capital, k_o , decreases and, gradually, approaches the cost of debt, k_d . The optimal capital structure is corresponding to the minimum cost of capital, k_o , when the financial leverage is one, i.e. with the maximum use of debt capital. At this level, the value of the firm is also maximum. But can a company operate with 100% debt capital and zero equity capital? Thus, NI is not based on logical foundation.

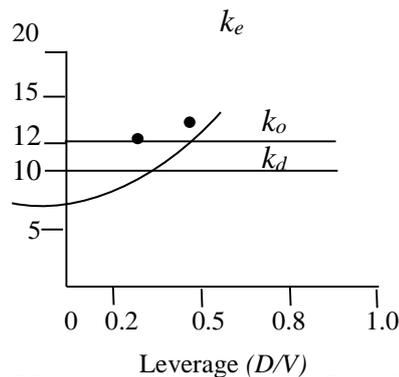


Figure 4.1 Effect of leverage on the cost of capital (NOI approach).

1.4 NET OPERATING INCOME APPROACH (NOI)

If there is an increase in debt value of the firm remains constant and the cost of equity increase.

Example 1:

Jossy company's EBIT is ₦750,000. The Company has 9% 900,000 debentures in issue. The Cost of Capital is 12%, what will be the Value of the firm and cost of equity.

Solution

D	=	900,000	
INT	=	9% of 9000,000	= 81,000
Ko	=	0.12%	

$$V = ?$$

$$K_e = ?$$

To get the value of the firm

$$\text{Since } K_o = \frac{NOI}{V}$$

Then V will be made the subject of formula

$$V = \frac{NOI}{K_o}$$

$$V = \frac{750,000}{0.12} = 6,250,000$$

$$K_e = \frac{PAI}{E}$$

$$\text{Since } E = \frac{PAI}{K_e} = K_e \text{ being the subject of formula}$$

To get E

$$V = D + E$$

$$E = V - D = 6,250,000 - 900,000 = 5,350,000$$

$$\text{PBIT} \quad 750,000$$

$$\text{INT} \quad (81,000)$$

$$\text{PAT} \quad \underline{669,000}$$

$$K_e = \frac{669,000}{5,350,000} = 0.125 = 12.5\%$$

Example 2:

If debt increases to N950,000

$$NOI = 750,000$$

$$D = 950,000$$

$$INT = 9\% \text{ of } 950 = 855,000$$

$$K_o = 0.12$$

$$V = ?$$

$$K_e = ?$$

With the full knowledge from Net Income Approach that $K_o = \frac{NOI}{V}$

$$V = \frac{NOI}{K_o} = \frac{750,000}{0.12} = 6,250,000$$

$$E = \frac{PAI}{K_e}$$

$$\text{Since } E = \frac{PAI}{K_e} = K_e \text{ become the subject of formula}$$

To get E

$$V = D + E$$

$$E = V - D = 6,250,000 - 5,300,000$$

$$\text{PBIT} \quad \quad \quad 750,000$$

$$\text{INT} \quad \quad \quad \underline{(85,500)}$$

$$\text{PAT} \quad \quad \quad \underline{664,500}$$

$$K_e = \frac{664,500}{5,300,000} = 0.1254 = 12.54\%$$

Based on NOI APPROACH

The value of the firm remains constant and the cost of equity increases.

Example 3:

A company has debt worth of ₦300,000 issued at 12% with a Net Operating Income of ₦700,000. Cost of capital is 19.3% what is the overall value of the firm and the cost of equity.

$$V = \frac{PAI}{K_e} = \frac{700,000}{0.193} = 3,626,943$$

$$K_e = PAI$$

$$V = D + E$$

$$E = V - D = 3,626,943$$

$$\text{PBIT} \quad \quad \quad 700,000$$

$$\text{INT} \quad \quad \quad \underline{(36,500)}$$

$$\text{PAT} \quad \quad \quad \underline{664,500}$$

$$K_e = \frac{664,000}{3,626,943} = 0.199 = 19.9\%$$

Example 4:

Debt Increase to 400,000

Since V remains the same

V will be 3626943

$$K_e = \frac{PAI}{E} = \frac{700,000 - 480,000}{3,626,000} = \frac{652,000}{3,226,943}$$

$$= 0.202$$

$$= 20.2\%$$

Formula of M & M Theory

NO TAX	TAX
UNLEVERED FIRM	UNLEVERED FIRM
$V_u = \frac{NOI}{K_u}$	$V_u = \frac{NOI(1-t)}{K_u}$
$K_e = K_u + (K_u - K_d) \frac{d}{E}$	$K_e = K_u + (K_u - K_d) (1 - tax) \frac{d}{E}$
LEVERED FIRM	LEVERED FIRM
$V_L = V_u$	$V_L = V_u (1 + tb)$
$K_e = K_o$	$K_d = \frac{Int\ on\ debt}{debt}$

$$\text{Market price par share} = \frac{E_L}{\text{Number of shares}}$$

1.5 Traditional Approach

The traditional approach lies midway between the NI approach and the NOI approach. It is, in fact, a compromise between the two and is also known as the intermediate approach. There are considerable differences of opinion among the followers of the traditional approach. But all of them are in substantial agreement, that the judicious use of debt capital reduces the overall cost of capital and increases the value of the firm. The capital structure that gives the highest value to the firm and the lowest cost of capital is the optimum one. We examine the traditional approach from the point of view of two groups.

According to one variant of the traditional approach, the use of debt capital increases the value of the firm and reduces the cost of capital up to a certain point. Beyond that, the increase in equity more than offsets the use of cheaper debt capital in the capital structure, and the average cost of capital begins to rise. There is a further rise in the average cost of capital when the cost of debt also begins to rise. The optimum capital structure is the point at which the overall cost of capital is the minimum or value of the firm maximum.

Illustration

Total Investment	₹100,000
EBIT	₹15,000

Cost of equity:

Up to ₦50,000	15%
Beyond this level, but up to ₦80,000	18%
Between ₦80,001 and ₦100,000	20%
Cost of debt: up to ₦50,000	10%
Above this level but up to ₦80,000	13%
Above ₦80,000 but up to ₦100,000	15%

Assuming the following leverage, calculate the cost of capital and value of the firm for each level of the alternative plans and recommend the optimum capital structure.

Leverage, (%): 0, 20, 50, 80 and 100. (Debt to total capital)

Leverage (D/V)
Particular

$k_d(\%)$	-	10	10	13	15
$k_e(\%)$	20	18	15	15	-
$k_o \left[k_d \left(\frac{D}{V} \right) + k_e \left(\frac{S}{V} \right) \right]$	20	16.4	12.5	13.4	15
EBIT (₦)	15,000	15,000	15,000	15,000	15,000
Interest on debt (I) ($k_d \times D$) (₦)	Nil	2,000	5,000	10,400	15,000
Earnings to equity (EBIT-I) (₦)	15,000	13,000	10,000	4,600	Nil
Value of debt [I/k_d] (₦)	Nil	20,000	50,000	80,000	100,000
Value of equity (S) (EBT/ k_e) (₦)	75,000	72,222	66,667	30,667	-
Total value of the firm [V] ($D + S$) (₦)	75,000	92,222	116,667	110,667	100,000

This table 4.1 shows that the cost of capital is lowest (12.5%) and the value of the Firm is the highest (₦116,667), when the debt-equity combination is 1:1, i.e. N. 50,000 debt and N. 50,000 equity in the above case. Therefore, the optimum capital structure, in this case, would be ₦50,000 equity capital and N. 50,000 debt capital to maximize the value of the firm or to minimize the overall cost of capital.

The approach of the traditional theory can also be shown (Figure 4.2) using the data from the previous illustration. Here, the average cost curve is U-shaped. There is a point at which the cost of capital would be minimized. Solomon defines this point as that precise point where the rising marginal cost of borrowing is equal to the average cost of capital. This is denoted by the letter x in the graph. A perpendicular drawn to the x-axis indicates the optimum capital

structure, i.e. debt 50%, equity 50%.

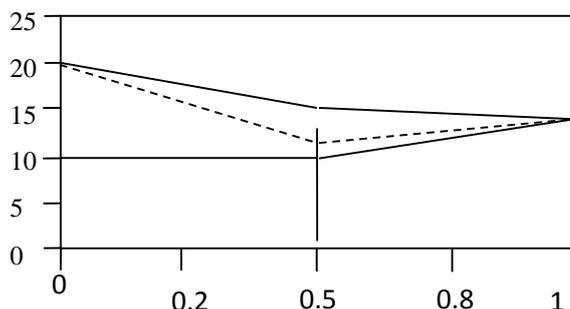


Figure 4.2 Effect of leverage on cost of capital (traditional approach).

Thus, the traditional position implies that the cost of capital is not independent of the capital structure of the firm, and that there is an optimum capital structure. For degrees of leverage before that point, the marginal real cost of debt exceeds that of equity. At the optimum structure, the marginal real cost of debt is same as the marginal real cost of equity in equilibrium.

There are others who hold a slightly different view about the manner in which the cost of capital reacts to changes in the capital structure. In this interpretation of the traditional view, Solomon is of the opinion that there is a definite impact on a firm's total market value as the leverage is increased. But he divides this impact into three distinct stages as the leverage is increased from zero. These stages are described in the following sections.

Stage I

In the first stage, the following are discernible:

- a) The cost of debt (k_d) remains constant or rises only slightly; and
- b) The cost of equity (k_e) remains constant or rises as debt is added but does not rise fast enough to offset the benefit of cheaper capital.

As a result, the market value of the firm increases and the average cost of capital decreases. In short, in this stage, the market value of the firm increases or the average cost of capital decreases as the leverage increases.

Stage II

Once the firm has reached a certain degree of leverage, the addition of debt will have an insignificant impact on the cost of capital or the value of the firm. As a consequence, k_o or V remains relatively constant within a range. In fact, there is a range of capital structure in which k is minimized and V is maximized.

Stage III

After a critical point, the addition of debt to a firm's capital structure causes an increase in the cost of capital, k_o and a decrease in the value of the firm, V . This is because both the cost of debt, k_d and the cost of equity, k_e rise at an abnormal rate owing to a high degree of financial risk.

The above concepts are illustrated in Figure 4.3. It is pertinent to note that the cost of capital curve, k_m is saucer-shaped rather than U-shaped as we have seen earlier. In the case of the saucer-shaped curve, there is an optimum range over a range of leverage. (This is not true in the case of U-shaped cost curve.) This suggests that there is 'a range of capital structures in which the value of the firm is maximized and the cost of capital is minimized. In this range, changes in leverage have a negligible effect on the cost of capital or the value of the firm.

1.6 Modigliani-Miller (M-M) Hypothesis

Modigliani and Miller³ have developed a theoretical argument which supports the net operating

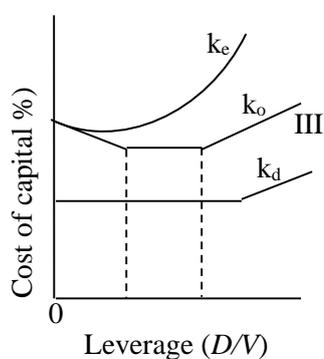


Figure 4.3 Effect of leverage on cost of capital (traditional approach-a variation).

Income approach. They argue that, in the absence of corporate tax, the cost of capital and the market value of the firm remain invariant to the changes in the capital structure or the degree of leverage.

1.6.1 ASSUMPTIONS

The Modigliani-Miller hypothesis is based on certain assumptions relating to the capital Market, behaviour of investors, actions of the firm and tax environment. They are as follows:

1. Capital markets are perfect. This implies, among other things, that:
 - (a) There are no transaction costs, and
 - (b) Individual investor can borrow at the same rate of interest as corporations:
2. All present and prospective investor have identical estimates of each firm's average future EBIT, that is, investor have homogeneous expectations.
3. All firms can be classified into homogeneous risk classes. As the firms in a given risk class are equally risky, their expected future earnings are capitalized at the same rate. Thus, all firms in a given risk class have the same expected and required rates of return.
4. The dividend payout ratio is 100%, that is, firms distribute all net earnings to the shareholder.
5. There is no corporate tax. This assumption is removed later on.

On the basis of the above assumptions, Modigliani and Miller developed two propositions, proposition I and proposition II, which are discussed now.

Proposition I: This is identical to the NOI hypothesis. According to M-M hypothesis, the total market value of the firm, V , and its cost of capital, k_o are independent of its capital structure. The total market value of the firm is established by capitalizing the net operating income (NOI = EBIT) at a rate appropriate for the firm's risk class.

$$V = \frac{EBIT}{k_o}$$

Or
$$k_o = k_d \left(\frac{D}{V} \right) + k_e \left(\frac{S}{V} \right)$$

Earnings before interest and tax is calculated before interest and is, therefore, independent of capital structure or leverage. The cost of capital, k_o , is equal to the capitalization rate of a pure

equity stream of its class and is independent of the capital structure. If EBIT and k_o are both independent of the capital structure, V must also be a constant and independent of the capital structure or leverage.

The cost of capital curve, k_o as hypothesized by M-M, is shown in Figure 4.4. As in the NOI approach, the cost of capital, k_o , is constant irrespective of change in the capital structure.

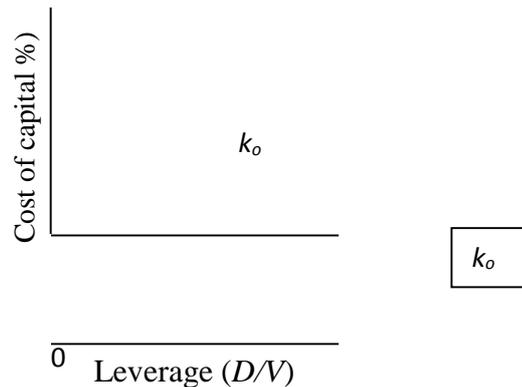


Figure 4.4 Effect of leverage on the cost of capital (M-M. hypothesis: proposition I)

Proposition II: Modigliani and Miller argue that the cost of equity, k_e , is equal to a constant average cost of capital, k_o , plus a risk premium that depends on the degree of leverage that is:

$$k_e = k_o + \text{Risk premium}$$

The premium for financial risk equals the difference between the pure equity capitalization rate, k_o and the cost of debt, k_d , times the ratio D/S , that is

$$k_e = k_o + (k_o - k_d)(D/S) \quad (9.12)$$

In short, proposition II states that the firm's cost of equity, k_e , increases in a manner to offset exactly the use of cheaper debt capital. In other words, as the firm's use of debt increases, its cost of equity also rises.

Proposition II of M-M hypothesis implies a linear relationship between k_e and debt- equity ratio, D/S .

3.5.2 Interpretation of M-M hypothesis

When propositions I and II are combined, M-M hypothesis implies that though debt is less expensive than equity, the inclusion of more debt in the capital structure of a firm will not increase its value because the benefits of cheaper debt capital are exactly offset by the increase in the cost of equity. Thus, a firm cannot change its total value, V , or its weighted average cost of capital, k_o , by leverage. Consequently, the financing decision does not matter from the standpoint of the objective of maximizing the market price per share. One capital structure is as suitable as the other. In other words, the value of the firm is completely unaffected by its capital structure.

3.5.3 Proof of M-M hypothesis

The proof is based on the arbitrage or switching process. M-M argue that if two firms differ only (i) in the way they are financed, and (ii) in their total market values, investor will sell shares of the overvalued firm and buy the shares of the undervalued firm. This process will be continued till the two firms have the same market value. When this equality is reached, the NOI conditions will be fulfilled and the value of the firms and their average cost of capital will be equal. Thus, V and k_o are independent of the capital structure.

Illustration: (Arbitrage Process)

A and B are identical firms in every respect except in terms of capital structure. There are no taxes and capital markets are assumed to be perfect. Their relevant particular are as follows:

	Firm A	Firm B
	(Un levered)	(Levered)
Equity capital (₦ 100 per share)	₦ 400,000	₦ 100,090
12% debentures	Nil	300,000
Total capital	400,000	400,000
Net operating income (EBIT)	₦ 100,000	₦ 100,000
Equity capitalization rate (k_e)	15%	16%

According to the traditional position, firm B may have a higher total value and lower average cost of capital than firm A. The valuation of the two firms is given here:

	Firm A	Firm B
O Net operating income	100,000	100,000

I	Interest on debt	-	36,000
$O-I$	Earnings available to equity shareholders	100,000	64,000
k_e	Equity capitalization rate (k_e)	0.15	0.16
S	Market value of equity $[(O-I)/k_e]$	666,667	400,000
D	Market value of debt (I/k_d)	-	300,000
V	Total value of the firm ($S + D$)	666,667	700,000
k_o	Cost of capital (O/V) (%)	14.99	14.29
	Leverage (D/V)	0	0.75

Thus, the value of the levered firm, B, exceeds that of the unlevered firm, A, and M-M argue that this situation cannot continue as arbitrage will drive the total values of the two firms together.

Suppose, you are a rational investor and own 10% shares worth N. 40,000 (market value) in firm B. According to M-M, you can increase your total returns without increasing your financial risk by:

1. Selling the shares in firm B for N. 40,000;
2. Borrowing an amount equal to 10% of B's debt (N. 30,000) at 12%; and
3. Buying 10% of A's shares for N. 66,667.

Notice that you receive N. 70,000 from the sale of shares (N. 40,000) plus borrowing (N. 30,000), and spend N. 66,667 on A's shares, so you have an uncommitted fund of N. 3,333 (i.e. N. 70,000 - 66,667). Now consider your income position:

			₹	₹
Old income	16% of B's	₹40,000		6,400
New income	15% of A's	₹ 66,667	10,000	
Less	12% on	₹ 30,000	3,600	
Net new income				6,400

Thus, your income from investment is exactly the same as before, but you have N. 3,333 left over for investment elsewhere, so your total return will rise. But the risk is the same as before—you have simply substituted personal, or 'home-made', leverage for corporate leverage.

According to M-M, the action of a number of investors undertaking similar arbitrage transactions will tend to drive up the price of firm A shares, and lower its k_e , drive down the price of firm B, and increase its k^e . This arbitrage process will continue until there is no further opportunity for reducing one's investment outlay and achieving the same rupee return.

At this equilibrium the total value of the two firms must be the same. As a result, their average costs of capital, k_o must also be same:

The important thing is the presence of rational investor in the market who are willing to substitute personal, or 'home-made', leverage for corporate leverage.

3.5.4 Criticisms of the M-M hypothesis

It may be noted that M-M drew their conclusions on the basis of certain assumptions.

Therefore, those who disagree with M-M hypothesis that the value of the firm is independent of its leverage or capital structure, attack their assumptions as being unrealistic. Following are some of the main objections to M-M hypothesis:

1. Although it is assumed that there are no transactions costs, yet such costs do exist and may retard the arbitrage process.
2. Firms and individuals are assumed to borrow at the same rate. This does not hold well in reality. Because of holding of more assets and credit reputation, a firm will generally be in a better position to borrow than an individual. Therefore, the cost of borrowing could be higher for the individual than for the firm.
3. It is implied in the M-M hypothesis that personal and corporate leverage are perfect substitutes. But firms may have limited liability as against the unlimited liability of individuals. This eventuality places the firms and the individuals on a different footing in the capital market. In the event of the liquidation of a levered firm, all investor would lose to the extent of their original investment in shares. But if an individual engages in arbitrage transactions, he or she not only faces the possibility of losing the holdings in the unlevered firm, but also may be liable to return the amount of his or her personal loan. Consequently, the creation of personal leverage and investment in the unlevered firm is more risky than direct investment.
4. Sometimes; institutional restrictions may also retard the arbitrage process. It is true that institutional investor dominate capital market today. Still most institutional investor are not allowed to engage in home-made leverage.

Critics of M-M hypothesis, thus, argue that the underlying assumptions of M-M are not Valid and that in the real world situation, the value of the firm and the cost of capital are functions of financial leverage-they cannot remain invariant to changes in the capital structure or the degree of leverage as advocated by M-M.

3.5.5. Modigliani and Miller hypothesis with corporate taxes

With the introduction of corporate taxes, M-M change their position. They now recognize that the value of the firm will increase or the cost of capital will decrease with an increase in the leverage as the interest on debt is a deductible expense. Between two firms, levered and Unlevered, the former firm will have a higher value for the same reason. More specifically, the value of the levered firm, L will exceed that of the unlevered firm, U , by an amount equal to C_s debt multiplied by the tax rate, that is,

$$V_L = V_U + tD$$

where,

V_L	=	Value of the levered firm
V_u	=	Value of the unlevered firm
t	=	Corporate tax rate
D	=	Amount of debt in L

The proof of the above equation is as follows:

Two firms are considered identical in all respects except their capital structure. Assume that firm U (unlevered) finances by equity only while firm L (levered) employs debt. EBIT are identical in each firm. Under these assumptions, the operating cash flows (CF) available to investor for firms U and L are computed as follows:

$$CF_u = \text{EBIT} (1 - t)$$

and

$$CF_L = (\text{EBIT} - I) (1 - t) + I$$

or

$$\begin{aligned} CF_L &= (\text{EBIT} - k_d D) (1 - t) + k_d D \\ &= \text{EBIT} - k_d D - \text{EBIT} (t) + t k_d D + k_d D \\ &= \text{EBIT} - \text{EBIT} (t) + t k_d D \\ &= \text{EBIT} (1 - t) + t k_d D \end{aligned}$$

where,

EBIT	=	Earnings before interest and taxes
I	=	Interest on debt capital = $k_d D$
D	=	Amount of debt in L
t	=	Corporate tax rate

It may be mentioned that in equation (9 15), the first term to the right of the equation sign, i.e. $(\text{EBIT}-I)$ represents the income available to the shareholders; the term ' I ' or ' $k_d D$ ' provides debt capital CF_L is, thus, the total income available to all investors (equity plus debt).

Firm U does not use debt capital. Its value V_u may, therefore, be determined by discounting its net earnings after tax $\text{EBIT} (1-t)$, by its equity capitalization rate or cost of equity, k_e , which is

$$V_u = \frac{\text{EBIT} (1-t)}{K_e}$$

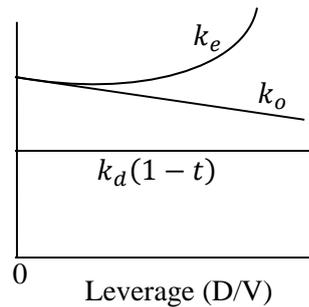
The value of the levered firm is determine by capitalizing⁴ both parts of its after-tax earnings. Thus,

$$V_L \frac{EBIT(1-t)}{K_e} + \frac{tk_dD}{K_d} = \frac{EBIT(1-t)}{K_e} = tD +$$

Therefore, $V_L = V_u + tD$ as $V_u = \frac{EBIT(1-t)}{K_e}$

$$V_u \frac{EBIT(1-t)}{K_e}$$

Hence, M-M hypothesis states that the value of a levered firm is equal to its value without leverage plus the present value of the interest tax shelter, which is equal to the tax rate times the value of the debt



Although, according to the M-M hypothesis, there may be 100% use of debt to maximize the firm's value, in reality, however, neither the firms employ a very large amount of debt nor are the creditor ready to lend to highly levered firm. It should be emphasized that the extensive use of debt capital would expose a firm to bankruptcy because it may be difficult for the firm to meet the payments of interest and principal on time.

4.0 CONCLUSION

Thus, the use of too much debt may increase the cost of capital owing to increased financial risk and reduce the value of the firm. Accordingly, the optimum capital structure takes into account a desired combination of debt and equity. M-M also suggest that firms will adopt a 'target debt ratio' so as to violate the limits of leverage imposed by creditor.

5.0 SUMMARY

Having seen the theories that explain the relationship between cost of capital, capital structures and value of the firm using the net income, net operating income, traditional and M-M hypothesis, and reasonable decisions will be made based on their recommendations.

6.0. TUTOR MARKED ASSIGNMENT

A company's total investment in assets is N. 10,000,000. It has 100,000 shares of N. 100 each. Its expected rate of return on investment is 30% and the cost of capital is 18%. The company has a policy of retaining 25% of its profits. Determine the value of the firm Gordon's model

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UNIT 4: PLANNING THE CAPITAL STRUCTURE

CONTENT

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main Content
 - 3.1 Factor for Capital Structure Planning
 - 3.1.1. Financial Leverage
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1.0. INTRODUCTION

Planning the capital structure means selecting a desired debt-equity combination in advance. The initial capital structure is determined at the time the firm is promoted. So, this structure should be designed very carefully. The initial structure changes when financing takes place from time to time for new investment. When a desired level is achieved, the same should preferably be maintained over a period unless it is decided to effect a change due to changes in the variables.

While planning the capital structure, the interest of the ordinary shareholder is given due weight age. This is done by setting the firm's objective to maximize, in the long run, the market price of equity shares.

The Finance Manager or the Board of Director may be required to determine the appropriate capital structure of their particular firm. In some firms, the investment decisions are few and far between. In that case, the Finance Manager may not have to confront the problem at all. In other cases, wherein investment proposals are taken up very often, the Finance Manager, while arranging the finance, faces the problem of arranging it from the desired sources in an appropriate mix.

Planning of capital structure, therefore, depends on the particular need of a firm, When a Finance Manager has to play this role, and the question arises as to how best he or she can tackle the problem. With this end in view, he or she has to consider a number of factor, which are mention in the following section. No one particular factor should, however, dominates his or decision-making approach as none of the factor is completely satisfactory in itself. Taken collectively, the factor provide the Finance Manager with sufficient information for making a rational decision.

2.0. OBJECTIVES

At the end of this unit one should be able to:

- 1.0 understand what planning of capital structure is all about
- 2.0 state the importance of planning the capital structure and discuss its contribution factor
- 3.0 State the general trends of capital structure for private sector and public sector companies.

3.0. MAIN CONTENT

3.1. Factor for Capital Structure Planning

While planning the capital structure of a firm, the following important factor have to be taken into account:

1. Financial leverage
2. Operating leverage
3. EBIT-EPS analysis
4. Cost of capital

5. Cash flow analysis
6. Flexibility
7. Control
8. Legal constraint
9. Industry standard
10. Other factor

3.1.1. Financial leverage

It refers to the use of fixed income securities in the capital structure of a firm. The use of debt capital increases the earnings on equity as long as the return on the firm's investment exceeds the explicit cost of financing the investment. So, in taking advantage of financial leverage, that is, the firm's ability to use fixed financial charges to magnify the effects of changes in EBIT on the firm's EPS, the Financial Manager should take advantage of more and more debt capital. In fact according to financial leverage analysis, a firm should try to use the maximum amount of debt capital to increase the ROE when other factor held constant.

But, in reality, a firm cannot use the maximum amount of debt for various reasons. One of such reason is the norm to be observed by the firms while raising capital from the capital market. One such norm is the maintenance of desire debt-equity relation. When firms required to maintain a given debt-equity ratio, it has no option to deviate from the norm prescribed by the controlling authority or the financial institution. In India the norm is 1: 1 for the public sector firms and 2:1 for private sector firms (with a deviation in some cases). Second assuming that no norm is imposed on a firm, does a firm opt for the maximum amount of debt? It may be sate that the higher the financial leverage, the greater is the financial risk. Therefore, the use of more and more debt capita will expose a firm to more financial risk which will have an adverse impact on the cost of debt and equity. Consequently, beyond a point of leverage, the weighted average cost may go up. Therefore, the Financial Manager has to take into account other factors as well along with financial leverage.

This is the first-stage leverage that depends on the operating fixed costs of the firm. If a higher percentage of a firm's total costs are fixed operating costs, the firm is said to have a higher degree of operating leverage. It measures the operating risk of a firm. Operating risk is the variability of operating profit or EBIT.

There is some relation between operating and financial leverages. In other words, if the operating risk is very high, financial risk should be kept low, On the contrary, a firm with a low operating leverage may afford to have a high financial leverage. If a firm has both the leverages at a high level, it will be a very risky proposition because the combined effect of two is a multiple of the two leverages. Therefore, there should be a desired combination the two leverages. This is the way in which the operating leverage also comes into the picture of the capital structure decision of a firm.

3.1.2. EBIT-EPS Analysis

This is another important tool for examining the effect of leverage by analyzing the relationship between EBIT and EPS. The firm will measure the effect on EPS at varying levels of EBIT under alternative financing plans. The choice of a particular financing plan will depend on the relative value of the EPS with alternative financing plans with an assumed EBIT level. In other words, the financing plans that will give the maximum value of EPS should be selected as the most desirable mix. On the other hand, at varying levels of EBIT, one has to examine the variability of EPS under different financing plans. In theory, with increasing EBIT, shareholder will gain most in the case of financing with the maximum amount of debt alternative. In other words, the greater the level of EBIT, the more beneficial it is to employ debt in the capital structure of a firm. The EPS analysis has certain limitations of its own. Its application may also be objected to on the ground that it is an important performance criterion but not a decision criterion.

3.1.3. Cost of Capital

The cost of equity, k_e , is generally greater than that of debt, k_d . One reason for this is the tax advantage attached to the debt capital. The impact of a particular financing decision should be measured in terms of the overall cost of capital. The combination of debt and equity should be such that it minimizes the overall cost of capital or maximizes the value of the firm. Increasing financial leverage leads to a reduction in the overall cost of capital as long as the rate of return from the investment exceeds the explicit cost of financing the investment. But due to the use of more and more debt capital, the financial risk increases, which leads to an increase in the cost of equity and debt. This has the effect of raising the weighted average cost of capital of the firm beyond a point or the range of debt-equity combination. Accordingly, financing decision based on financial leverage analysis may not always lead to optimum capital structure.

The cost of capital then becomes an important variable in this decision area. According to one school of thought, the optimum capital structure is one in which the overall cost of capital is minimum. It may also be defined as one in which ‘the marginal real cost of each available methods of financing is the same’.

While considering the appropriate capital Structure, it is extremely important to analyze the solvency position, which is determined by the cash flow ability of the firm to meet its fixed charges. The amount of fixed charges (fixed operating cost and interest on debt capital) depends on the nature of operation, extent of automation, level of activity, etc. on the one hand, and on the amount of debt capital in the capital Structure, on the other hand. Other things remaining constant, an increase in the use of debt capital results in an increase in the amount of uncertainty that the firm has to face while meeting its fixed charges. Therefore, before assuming additional fixed financial charges arising from an increase in the debt capital, the firm should analyze its expected future cash flows as fixed charges must be met with cash. It may be mentioned here that the inability of the firm to meet its fixed charges may result in financial insolvency.

Cash flow analysis can be- very useful in this respect. Thus, the greater and more stable the expected future cash flows of the firm, the higher is the proportion of debt that may be used by the firm. On the contrary, firms whose cash flows are unstable and unpredictable will find it more risky to employ fixed-charged securities in the capital structure.

The ratio of net cash flows to fixed charges may serve as a guide for selecting a proper balance between debt and equity. This ratio indicates the number of times the fixed charges are covered by the expected net cash flows, and is also known as the coverage ratio. From past experience, a firm may also set a limit of expected coverage, such as 5:1 or 6:1, so that there is a margin of safety to allow for an anticipated decline in .cash flows. The advantage of fixing such a limit is that no new debt capital will be added in the capital structure unless the net cash flows for debt servicing are in excess of some multiple of debt service requirement.

3.1.4. Flexibility

In this context, flexibility implies the firm’s capacity to adapt its capital structure to the changing needs. Normally, debt capital is more flexible than the equity source because it can be redeemed when the conditions are favourable. Flexibility means that a firm can substitute one form of finance with other and vice-vice, to economize the use of funds. This may be in

the form of substitution of debt with equity or of 'old debt' with 'new debt'. But equity does not enjoy this benefit of flexibility as shares cannot be redeemed except on buy-back or liquidation. Preference shares can be redeemed under certain circumstances. Normally, all the debt sources enjoy this benefit of flexibility provided such terms are incorporated in the loan agreement. Thus, in order to ensure greater flexibility in the capital structure of a firm, it is desirable to have more and more amount of debt capital. But the presence of debt capital does not itself empower the firm to redeem capital at discretion.

If the firm anticipates profitable operations leading to generation of funds 'internally', then it may incorporate in the loan agreement the 'redemption clause' for retirement of debt before the maturity date. Such a clause also has an advantage, when interest rates are expected to fall in the future so that it becomes more profitable to substitute 'old costly debt' with 'new cheaper debt'. It may be mentioned here that the incorporation of such a clause in the agreement may increase the cost of debt capital. The additional cost in this respect should be compared with the anticipated future savings in cost and then only a decision may be made by the management.

When the need for capital is seasonal or cyclical, a firm should finance more from short-term sources than from long-term sources because it is relatively easy to repay short-term loans than long-term ones.

Flexibility also includes the firm's debt capacity in reserve. In other words, a firm should not use its maximum borrowing capacity but keep available some unused capacity to raise funds in future when circumstances demand so.

3.1.5. Control

Ordinary or equity shareholders have voting rights. They are the owner of the firm and can exercise control over its overall affair. Preference shareholders do not have the voting right except under special circumstances. So, from the viewpoint of control, it is desirable that more and more of debt capital be used. Equity can be issued in the form of 'rights issues' so that the original control is not diluted. While raising capital from outside, 'new issues' become more relevant than 'rights issues'. So, between equity (new issues) and debt, the latter should be given preference in order to avoid loss of control. But the use of a higher dose of debt capital does not necessarily mean that the firm will have complete freedom of action in its day-to-day management and financial matter.

The provider of debt capital would introduce a lot of restrictions in the loan agreement to protect their interest. Sometimes, there is a provision to nominate director(s) in the Board to oversee the activities of the firm. The presence of such a clause would undoubtedly curtail the freedom of action of the firm. The use of too much debt will also increase financial risk and may, ultimately, lead to bankruptcy, which means a complete loss of control. Therefore, the firm should not adopt a very conservative attitude in this respect. On the contrary, it should try to select an appropriate mix of debt and equity for the overall profitability of the firm.

3.1.6. Industry Standard

While planning the capital structure, the firm has to evaluate the capital structures of other firms belonging to the same risk class, on the one hand, and that of the industry as a whole, on the other hand. If the firm adopts a capital structure significantly out of line with that of similar units in the same industry, it may not be acceptable to the investor. Also investment analysts and creditor tend to evaluate firms in terms of the standard of the industry concerned. The capital structure position of the firm vis-a-vis the industry position may be determined empirically. The shareholder, in general, may not mind the firm operating within a 10% or 15% range of the industry's average capital structure. But if the firm decides to adopt a capital structure that is noticeably out of line in either direction, then it should be able to justify its position in the capital market.

3.1.7. Other factor

The firm should also take into consideration certain other general factor such as the nature and size of the firm, and market conditions. The very nature of the firm may have an influence on its capital structure decision. For example, public utility firms, which carry out their entire day-to-day transactions almost on a cash basis, may undertake more financial risk and therefore, go in for more and more debt. In contrast, firms required to make heavy investments in fixed assets and, consequently, having a high operating leverage, may prefer a low degree of financial risk and adopt their capital structures accordingly. Similarly, the size of the firm greatly influences the availability of funds from different sources.

The general economic conditions may also influence the nature of the capital structure. Firms with stable sales and better growth prospects can employ more debt capital in their capital structures than those with unstable sales and lesser or no growth prospect. The growth also depends on the general economic conditions. Another important factor to be considered is the firm's marketability. It denotes the ability of the firm to sell or market a particular type of

security during a specified period of time. Marketability is greatly influenced by the conditions prevailing in the capital market. Many firms in India have experienced that favourable public response to issues of shares of firms is mostly confined to well-established concerns. Issues brought out by new concerns or comparatively less established companies continue to be unattractive even if the projects are considered viable.

Preference shares also do not appear to be attractive in the present Indian condition. Among the various sources of debt, debenture involves a long drawn procedure and is yet to gain popularity in the Indian capital market. However, convertible debentures have been very popular in the recent past owing mainly to the option available for conversion into equities.

There are long-term institutional loans which are given only on the fulfillment of certain terms and conditions. One of them is the maintenance of stated debt-equity ratio, 2:1, 1:1 or the like. So, while planning the capital structure, these entire factor should be given due consideration. The Finance Manager may not be able to suggest an optimum capital structure, but he or she should be able to guide the firm towards its ultimate goal. In short, various methods of analysis may be used-none completely satisfactory in itself, but, taken collectively, they give us enough information to help us make a rational decision.

4.0 CONCLUSION

Capital decisions form a crucial part in the formation and the sources of a company. It is the lifeline of any firm. The financial manager's main objective is deciding the right choice or combination of capital options available that will lead to the growth of the firm.

5.0 SUMMARY

Capital use in financing a business could be long-term or short-term, permanent or temporary and sourced through internal or external sources.

Also, the term supply of capital are classified into three broad categories

- (1) Life term firm of maturity or duration
- (2) In term of control options
- (3) The cost of capital to the firm

There are various factors that affect the supply of capital. They include relative costs of capital, control level of relinquished prevailing, market conditions, duration, risks among other.

6.0. TUTOR MARKED ASSIGNMENT

PROBLEM 1: Value of firm under Gordon's model

A company's total investment in assets is N. 10,000,000. It has 100,000 shares of N. 100 each. Its expected rate of return on investment is 30% and the cost of capital is 18%. The company has a policy of retaining 25% of its profits. Determine the value of the firm Gordon's model

Solution

$$P_o = \frac{E_1(1-b)}{K-br} = \frac{\text{N}(1-0.25)}{0.18-0.25 \times 0.30} = \text{N}214.28571$$

Where

E_1	=	Earnings per share	
K	=	Cost of capital	
r	=	Expected rate of return	
b	=	Retention ratio	
V	=	$nP_o = 100,000 \times \text{N} 214,8571 =$	$\text{N}21,428,571$
ROI	=	$\text{N} 10,000,000 \times 0.30 =$	$\text{N} 3,000,000$

Therefore,

$$E_1 = \frac{3,000,000}{1,000,000} = \text{N}30$$

$$r = 0.30. \quad k = 0.18, \quad b = 0.25$$

PROBLEM 2: Optimum debt-equity mix

When considering the most desirable capital structure of a company, the following estimate of the cost of debt and equity capital (after tax) have been made at various levels of the debt-equity mix:

Debt as percentage of total capital employed	Cost of debt (%)	Cost of equity (%)
0	5.0	12.0
10	5.0	12.0
20	5.0	12.5
30	5.5	13.0

40	6.0	14.0
50	6.5	16.0
60	7.0	20.0

You are required to determine the optimal debt-equity mix for the company by calculating the composite cost of capital.

Solution

The optimal debt-equity mix for the company will be that points where the weighted average cost of capital would be minimized. Therefore, we first calculate the weighted average cost of capital for each alternative mix by using the formula.

$$K_o = K_d w_1 + K_e w_2$$

Where

- K_o = Weighted average cost of capital
- K_d = Cost of debt
- K_e = Cost of equity
- W_1 = proportion of debt to total capital employed
- W_2 = Proportion of equity to total capital employed

K_d (%)	K_e (%)	W_1	W_2 ($1 - w_1$)	$K_d W_1$	$K_e W_2$ (%)	K_o ($K_d W_1 + K_e W_2$) (%)
5.0	12.0	Nil	1.0	Nil	12.0	12.00
5.0	12.0	0.1	0.9	0.5	10.8	11.30
5.0	12.5	0.2	0.8	1.0	10.0	11.00
5.5	13.0	0.3	0.7	1.65	9.1	10.75
6.0	14.0	0.4	0.6	2.40	9.1	10.80
6.5	16.0	0.5	0.5	3.25	8.4	11.25
5.0	12.0	0.6	0.4	4.20	8.0	12.20

It appears from this table that the cost of capital is minimized when the debt-equity mix is 30% and 70%, respectively. Therefore, the optimum debt-equity mix for the company is:

1. Debt 30%
2. Equity 70%.

PROBLEM 3: M-M hypothesis: equilibrium value of firm

The following costs of values of Ab Ltd. (unlevered) and CD Ltd. (levered) according to the traditional approach:

		<i>AB Ltd.</i>	<i>CD Ltd.</i>
<i>O</i>	Net operating income (EBIT) (₦)	10,000	10,000
<i>I</i>	Interest on debt (₦)	-	3,600
<i>O-I</i>	Earnings to equity (₦)	10,000	6,400
k_e	Equity capitalization rate	15%	16%
<i>S</i>	Market value of equity($O-1K_e$) (₦)	66,667	40,000
<i>D</i>	Market value of debt (₦)	-	30,000
<i>V</i>	Total value of the firm ($S + D$) (₦)	66,667	70,000
K_o	Average cost of capital	15%	14.3%
<i>D/S</i>	Debt/equity ratio	0	0.75

Compute the equilibrium value for AB Ltd. and CD Ltd. using M-M hypotheses assuming that: (i) there are no taxes and (ii) the equilibrium value if the cost of capital is 14.5%.

Solution

Particular		AB Ltd.	CD Ltd
<i>O</i>	Net operating income (N.)	10,000	10,000
<i>I</i>	Interest on debt (N.)	–	3,600
<i>O – I</i>	Earnings available to equity (N.)	10,000	6,400
K_o	Average cost of capital	0.145	0,145
<i>V</i>	Value of the firm (O/K_o) (N.)	68,966	68,966
<i>D</i>	Market value of debt (N.)	–	30,000
<i>S</i>	Market value of equity ($V - D$) (N.)	68,966	38,966
K_o	Cost of equity ($O- \text{₦}$)	14.50%	16.43%

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