Part – III
Financial Management

Chapter–7

Financial Management

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LEARNING OBJECTIVES

In this chapter we will study:

Defining Financial Management

Functions of Financial Management or Role of Finance Manager

Financial Management and Management Accounting

Objective of Financial Management

Scope of Financial Management

Basic Financial Concepts

- Indian Financial System

- Difference Between Short-term Decision and Long-term Decision

- Time Value of Money Concept along with some practical application

Capital Budgeting Decision

- Introduction

- Characteristics of Capital Budgeting Decision

- Difficulties Associated with Capital Budgeting Decision

- Sources of Financing Capital Budgeting Decision

- Capital Budgeting Evaluation Techniques

- Application of Evaluation Techniques in the Context of Information Technology

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7.1 DEFINING FINANCIAL MANAGEMENT

Financial management is concerned with management of fund. It may be defined as "acquisition of fund at optimum cost and its utilization with minimum financial risk."

## 7.2 FUNCTIONS OF FINANCIAL MANAGEMENT OR ROLE OF FINANCE MANAGER

Finance function has three broad categories:

1. Financial planning followed by implementation of financial decisions *viz.*
   - Financing decision
   - Investment decision
   - Dividend decision
2. Financial Analysis
3. Financial Control

1. Financial Planning

- Planning means deciding in advance. Thus financial planning is the act of deciding in advance the activities related to financial decisions necessary to achieve the objectives of financial management.
- In other words, financial planning is the process of determining the financial objectives, procedures and strategies, programmes and policies and budgets to deal with the activities related to financial decisions of an organization.
- Thus financial planning provides framework within which financial decisions take place.
- Financial decisions refer to financing decision (procurement of fund), investment decision (utilization of fund) and dividend decision (distribution of fund).
- Financial planning *i.e.* planning for financing, investment and dividend decision must confront with (*i.e.* take into account) external environment (industry level and country level factors) and internal environment (organizational level factors). Factors like risk or uncertainty, inflation, liquidity, taxation etc. are some examples in this regard.
- Capitalization, financial forecasting and budgeting are important tools for financial planning which helps in planning financing and investment decisions.
- Capitalization refers to planning of financing decision, which means estimation of total fund requirement to run the concerned organization.
- Financial forecasting includes preparation of projected income statement, projected balance sheet, projected fund flow statement etc.
- Budgeting includes preparation of budgets and installation of proper budgetary control system.
- Financial planning leads to implementation of financial decisions *viz.* financing decision, investment decision and dividend decision.

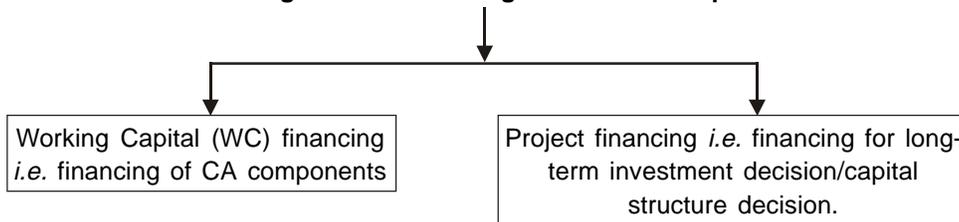**Financial planning as framework for financial decisions confront with external and internal factors**
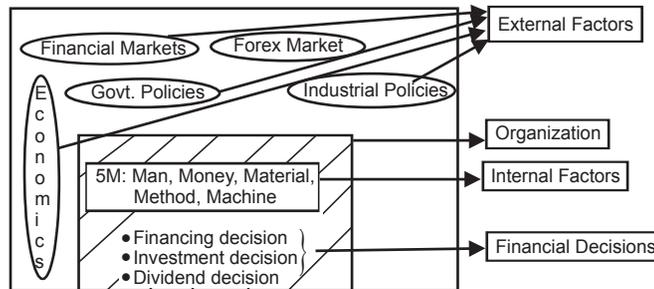
- **Financial Decisions**

Business decisions are of two types *viz.* short-term decision, also known as working capital decision and long-term decision, also known as capital budgeting decision/project decision capital expenditure decision and therefore financing decision and investment must be viewed in the light of these decisions.

Following is a brief description of financial decisions *viz.* Financing decision, Investment decision and Dividend decision:

❑ **Financing decision: (procurement of fund)**

Financing decision is categorized into two parts:

| Working Capital (WC) financing *i.e.* financing of CA components | Project financing *i.e.* financing for long-term investment decision/capital structure decision. |

Both category of financing decision require following three key points to take into consideration:

  (*i*) Sources

 (*ii*) Sources mix
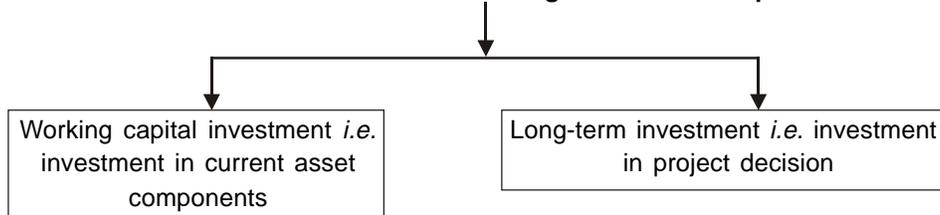
(*iii*) Cost and other consequences

Sources: A finance manager has to identify the various sources available to him through which he can raise the fund. It is the financial system which facilitates financing decision in identifying/procuring short-term as well as long-term sources of finance (for details refer to Financial Market/Financial System).

Sources mix: He has to decide the composition of each source in total capital.

Cost and other consequences: A finance manager while raising fund must take into consideration the cost and other consequences associated with each source.

❑ **Investment decision: (Application of fund)**

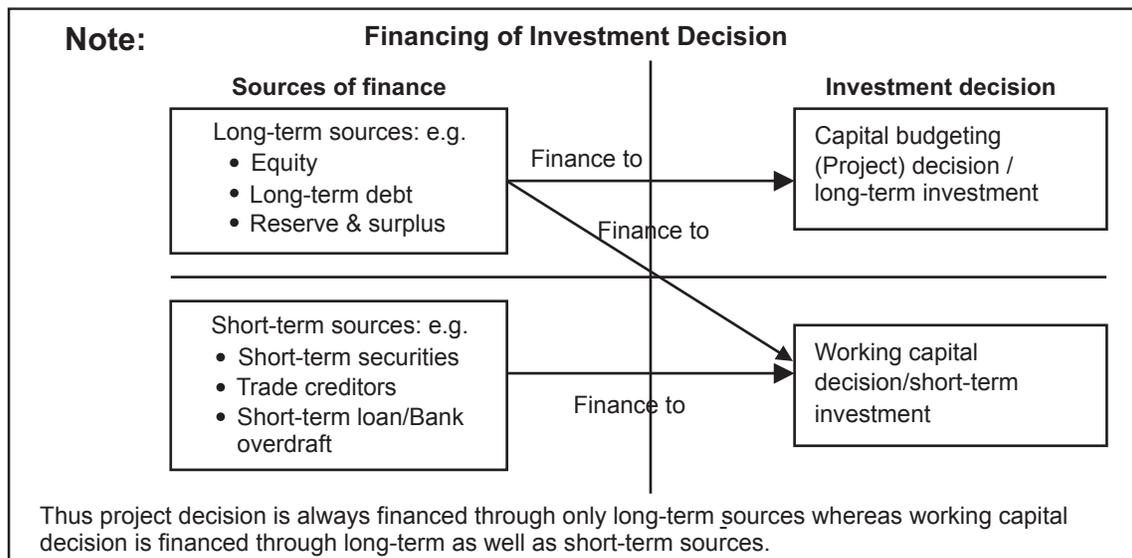**Investment decision is also categorized into two parts:**

Working capital investment *i.e.* investment in current asset components	Long-term investment *i.e.* investment in project decision

Both categories of investment decision require following three key points to take into consideration:

(*i*) Assets

(*ii*) Assets mix

(*iii*) Profitability

Assets: Assets means resources to the organization. A finance manager has to identify what are the various assets required to maintain for smooth functioning of concerned organization.

Assets mix: He has to decide the composition of each asset in total assets.

Profitability: A finance manager while investing fund must take into consideration the profitability associated with each asset. Profitability means ability to earn profit.

Note:

Financing of Investment Decision

Sources of finance

Investment decision

Long-term sources: e.g.
- Equity
- Long-term debt
- Reserve & surplus

Finance to

Finance to

Capital budgeting (Project) decision / long-term investment

Short-term sources: e.g.
- Short-term securities
- Trade creditors
- Short-term loan/Bank overdraft

Finance to

Working capital decision/short-term investment

Thus project decision is always financed through only long-term sources whereas working capital decision is financed through long-term as well as short-term sources.

❑ **Dividend decision: (Distribution of fund)**

A finance manager has to decide what percentage of profit he has to distribute as dividend among shareholders and how much to retain for further requirement. This aspect of financial management is dealt under dividend policy.

2. Financial Analysis

- Financial analysis refers to study of financial health from different interested groups' (management, employee, government, suppliers, lenders, investors etc.) point of view.

- Financial health means ability to serve above-mentioned groups.
- Ratio Analysis, Cost-Volume-Profit (CVP), Fund Flow/Cash Flow Analysis are popular tools for financial analysis which in turn further helps in financial planning for subsequent periods.

3. Financial Control

- Financial control refers to comparison of actual activities related to financial decisions with planned activities.
- In other words, it is reviewing financial performances as per planning schedule in order to meet the set financial objective.
- Budgetary control system, variance analysis are some popular tools, which help in controlling activities related to financial decisions.

Apart from above-mentioned categories of finance function, finance department is also responsible for support services. They are,

- Finance department has to make available the fund to other functional departments whenever they need money in time.
- Finance department under financing activity has to negotiate with the lenders to acquire the fund at optimum cost.
- Finance department keeps an eye on stock market as stock market prices reflects performance of the concerned organization.

7.3 FINANCIAL MANAGEMENT AND MANAGEMENT ACCOUNTING

Management accounting provides tools for financial planning, analysis and control mentioned above and hence management accountant is of great help to financial management for financial decisions *viz.* Financing, Investment and Dividend decisions.
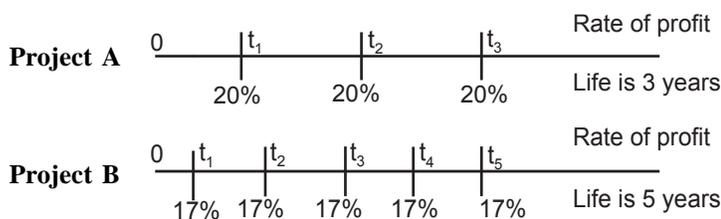
7.4 OBJECTIVE OF FINANCIAL MANAGEMENT

Traditional approach

Traditionally the basic objective of financial management was profit maximization but later on this was overruled by shareholders' (owners) wealth maximization. Presently wealth maximization is the real objective of financial management. Profit maximization was overruled by wealth maximization because of following limitations:

- **It is vague:** Objective of profit maximization does not clarify what exactly it means *e.g.* which profits are to be maximized—short run or long run, rate of profit or the amount of profit.
- **It ignores timing:** The concept of profit maximization does not help in making a choice between projects giving different benefits spread over a period of time.

Illustration:

Project A

0 — t_1 — t_2 — t_3 Rate of profit

20% 20% 20% Life is 3 years

Project B

0 — t_1 — t_2 — t_3 — t_4 — t_5 Rate of profit

17% 17% 17% 17% 17% Life is 5 years

Clearly the person who wants to stay will select project B, which is contrary to the concept of profit maximization.

- **It ignores qualitative aspect:** The person who wants to expand his market will procure qualitative input material which will incur substantial cost, which in turn will bring down margin and hence profit. Thus the quality aspect is contrary to the concept of profit maximization.

Wealth maximization

- Shareholders' wealth maximization is the real objective of financial management because it helps the management in financial decisions *viz.* Financing decision, Investment management and dividend decision.
- Shareholders' wealth maximization is also referred as firm's value maximization.
- Shareholders' wealth maximization *i.e.* value maximization is also goal of the firm.

There are two approaches to accomplish wealth maximization:

(*i*) Risk vs Return Approach

(*ii*) Liquidity vs Profitability Approach

Risk vs Return Approach:

Logically, Risk ∝ Return

According to this approach –

(*a*) A finance manager has to minimize risk for given level of return.

(*b*) A finance manager has to maximize return for given degree of risk.

In other words, in order to maximize shareholders' wealth a finance manager has to find out trade-off point between risk and return (which means level of operation at which risk and return are optimized) while taking financial decisions.

Illustration:

A firm has determined the following expected rate of return keeping in view the degree of risk involved in the proposals under consideration.

Degree of Risk	Expected return
Low	25%
Medium low	29%
Medium	33%
Medium high	41%
High	49%

The firm has the following proposal with it,

High Degree Risk	Expected rate of return
X	45%
Y	32%
Medium Degree Risk	
P	22%
Q	36%

Question: Which of the above proposals the firm can accept?

Answer: Out of the proposals in high-risk category, none of the proposals can be accepted since they are all giving return below the required rate of return, which is 49%.

Out of the medium degree risk proposals, the firm can accept only proposal Q, which is giving 36% return. Proposal P has to be rejected since it is giving only 22% return as compared to 29% which is minimum return required from such category of proposals.

Liquidity vs Profitability Approach:

Logically,

$$\text{Liquidity} \propto \frac{1}{\text{Profitability}}$$

i.e. increase in liquidity results in decrease in profitability.

Thus, according to this approach**,**

A finance manager has to manage conflict between liquidity and profitability in order to maximize 'shareholders' wealth while taking financial decisions *viz.* Financing, Investment and Dividend decision.

In other words, he has to make financial decisions in such a manner that the liquidity should be just adequate *i.e.* neither more nor less to enhance profitability, which in turn will increase value of the firm.

Illustration:

In case the management in anticipation of increase in raw material prices, decides to purchase raw material more than the requirement then this decision will certainly lead to profitability but this may endanger the liquidity (because fund will get blocked in the form of excess raw material stock) and therefore a very careful estimate of liquidity and profitability is required to manage the conflict between the two.

Similarly, the firm by allowing liberal credit policy may be in a position to push up its sales and hence profitability but this may endanger liquidity (because funds will get blocked in form of receivables), which may lower the value of the firm.

Summarizing above two approaches, we conclude,

$$\text{Risk} \propto \text{Profitability} \propto \frac{1}{\text{Liquidity}}$$

Thus the objective of finance manager is to manage risk, return (profitability) and liquidity while taking financial decisions in order to maximize shareholders' wealth/value of the firm. This can be done through proper Assets and Funds management.
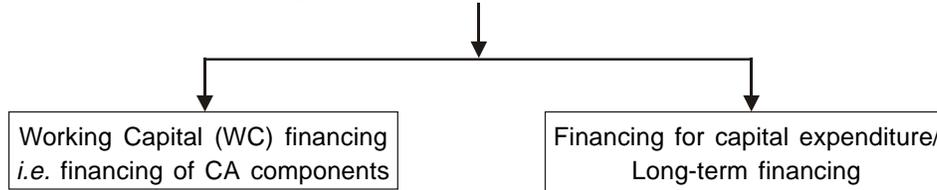
7.5 SCOPE OF FINANCIAL MANAGEMENT

The major activity of financial management is to take financial decisions *viz.* Financing decision (Procurement of fund), Investment decision (Application of fund) and Dividend decision (Distribution of fund) in order to accomplish goal of the firm *i.e.* to maximize shareholder's (owner's) wealth.

Again, since financial decisions especially financing and investment decisions are very necessary and crucial activities of every aspect of life, it therefore, can be concluded that the scope (area) of financial management is very wide and is spread over all the entities of society *viz.* individuals, organizations and government to carry on their activities. A brief description of Financing and Investment decisions are as follows:

❑ **Financing decision: (procurement of fund)**

Financing decision is categorized into two parts:

Working Capital (WC) financing *i.e.* financing of CA components	Financing for capital expenditure/ Long-term financing

Both category of financing decision require the following three key points to take into consideration:

(*i*) Sources

(*ii*) Sources mix

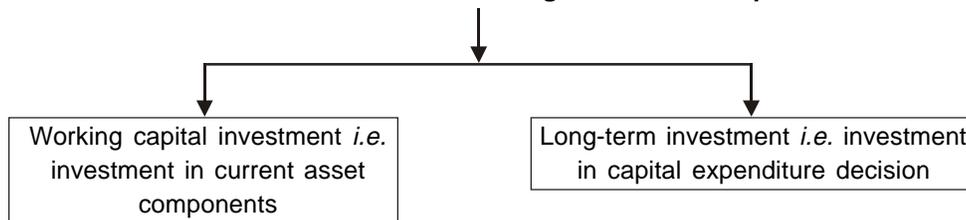(*iii*) Cost and other consequences

Sources: One has to identify what are the various sources available to him through which he can raise the fund.

Sources mix: He has to decide the composition of each source in total capital.

Cost and other consequences: Cost and other consequences associated with each source must be taken into consideration while raising fund.

❑ **Investment decision: (Application of fund)**

Investment decision is also categorized into two parts:

Working capital investment *i.e.* investment in current asset components	Long-term investment *i.e.* investment in capital expenditure decision

Both category of investment decisions require following three key points to take into consideration:

(*i*) Assets

(*ii*) Assets mix

(*iii*) Profitability

Assets: Assets means resources to the organization. One has to identify what are various assets required to maintain for the smooth functioning of concerned entity.

Assets mix: He has to decide the composition of each asset in total assets.

Profitability: The profitability associated with each asset must be taken into consideration while investing fund. Profitability means ability to earn profit.

7.6 BASIC FINANCIAL CONCEPTS
7.6.1 Indian Financial System

- **Financial system** of any country represents the organizational setup for financial market.

PLAYERS OF FINANCIAL MARKET
**(Components of Financial System)**
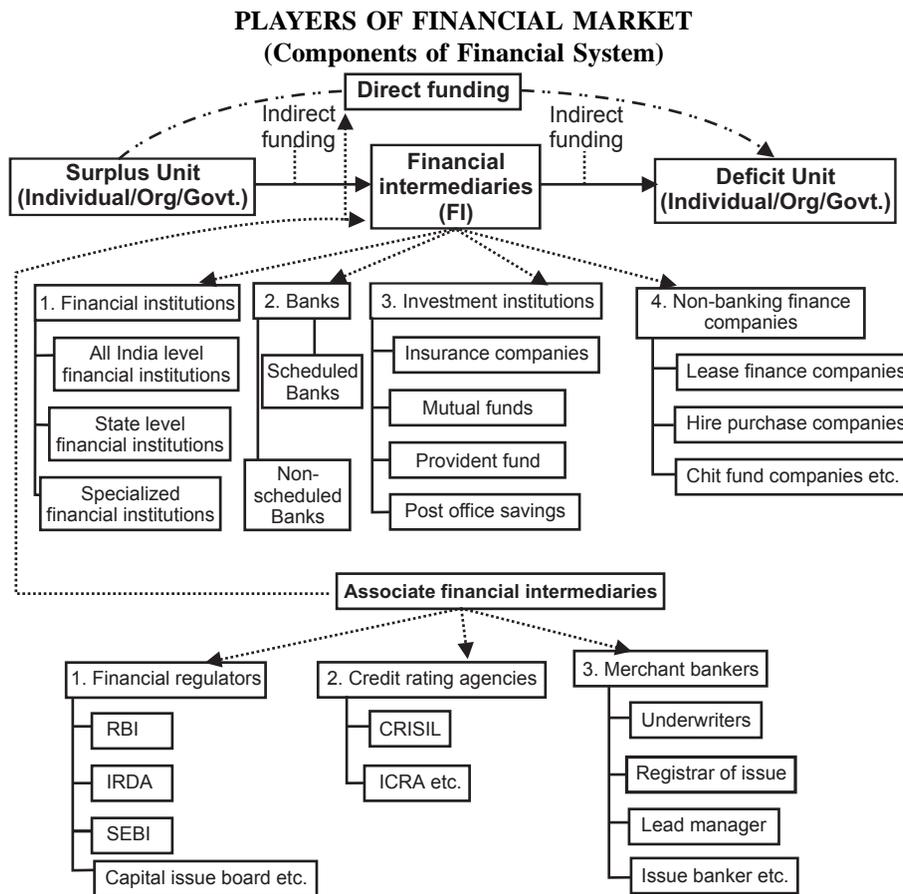
- **Financial market** like any other market is the market, which facilitates mobilization of fund between buyer of the fund (Deficit unit) and seller of the fund (Surplus unit) either directly with the help of associate financial intermediaries or indirectly *i.e.* through Financial Intermediaries (FI) alongwith associate financial intermediaries using financial products or fund itself. In other words, financial market facilitates funding requirement of deficit unit.
- **Associate financial intermediaries** are those intermediaries, which advise/assist financial intermediaries, buyer of the fund (deficit unit) and seller of the fund (surplus unit) in mobilization of fund on the basis of fee/commission.
- Merchant bankers, credit rating agencies and financial regulators are examples of associate financial intermediaries.
- **Merchant bankers** provide a blend of financial services on the basis of fee/commission. Underwriter, Lead manager/Co-manager, registrar, book building runner, issue banker are some roles performed by merchant bankers.

- Thus deficit unit, surplus unit and financial intermediaries alongwith associate financial intermediaries are **players of financial market**.
- Products offered in financial market are known as **financial products/instruments**. Broadly, there are two categories of products *viz.* long-term instruments or capital market instruments and short-term instruments or money market instruments. For the purpose of liquidity, financial instruments are traded at secondary markets *e.g.* stock exchanges are secondary market for capital market instruments.
- Institutions, which are engaged in rating of financial products on the basis of risk and return, are termed as **credit rating agencies**. The objective of such institutions is to help the players of financial market in decision-making process.
- Services offered by financial intermediaries and associate financial intermediaries are termed as **financial services**. There are three categories of financial services *viz.* Fund based services, asset based services and fee/advisory based services.
- Institutions, which regulate financial market means, those institutions which provides guidelines for mobilization of fund, and are termed as **financial regulators**. RBI, IRDA, BIFR, FIPB, SEBI and Capital issue board are examples of financial regulators. Thus financial regulators help in smooth functioning of entire financial system. The objective of financial regulator is to protect the interest of each player of the financial market.

In a nutshell financial markets, financial instruments, financial services alongwith associate financial intermediaries like merchant bankers, credit rating agencies and financial regulators all taken together constitute the **financial system** of concerned economy.

The ultimate objective of financial system is to stimulate productive investment leading to overall economic growth, as productive investment is directly proportional to economic growth. See the following diagram.
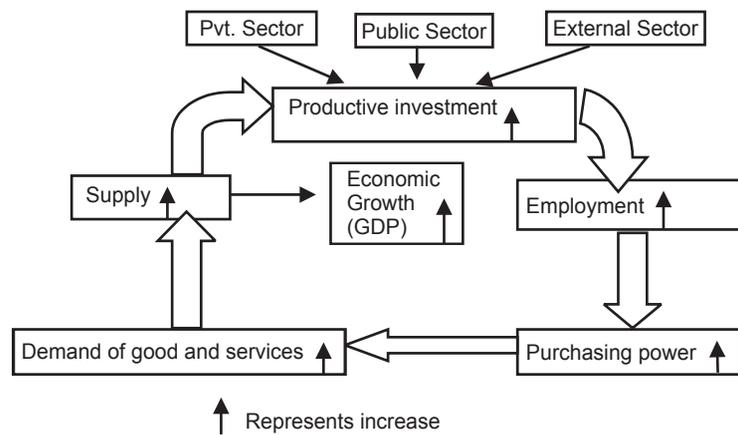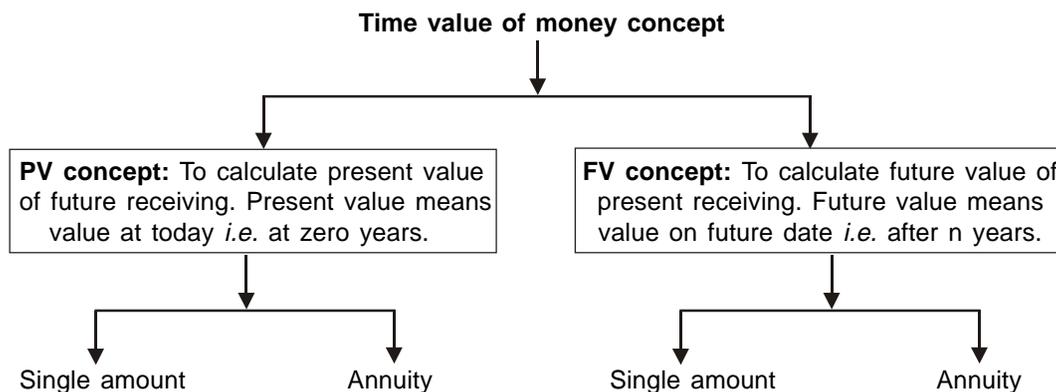
7.6.2 Difference Between S.T. Decision and L.T. Decision

Difference between S.T. decision and L.T. decision are as follows:

S.T. Decision (W.C. decision)	*L.T. Decision (Capital Budgeting decision)*
(i) Does not involve substantial capital outlay.	(i) Involve substantial capital outlay.
(ii) W.C. decision is financed through short-term sources as well as long-term sources *e.g.* operating profit, which is part of reserve and surplus (internal fund).	(ii) Capital Budgeting Decision is financed through only long-term sources.
(iii) Reversible in nature.	(iii) Irreversible in nature.
S.T. Decision (W.C. decision)	*L.T. Decision (Capital Budgeting decision)*
(iv) Short-term effect *i.e.* benefits are realized immediately/within short-period (Revenue nature).	(iv) Long-term effect *i.e.* benefits are realized over a period of time *i.e.* up to the life of the project (Capital nature).
(v) S.T. decisions involve no time lag between cost and benefits and hence time value of money concept is not required for Cost-Benefit analysis.	(v) L.T. decisions involve time lag between cost and benefits and hence time value of money concept is required for Cost-Benefit analysis.

7.6.3 Time Value of Money Concept Along with Some Practical Applications

- According to this concept, the value of money changes with change in time. In other words, a rupee received today is more valuable than a rupee received one year hence
- There are two aspects of time value of money concept:
  1. Present Value concept (PV concept)
  2. Future or Compounding Value concept (FV concept)

Time value of money concept

PV concept: To calculate present value of future receiving. Present value means value at today *i.e.* at zero years.

FV concept: To calculate future value of present receiving. Future value means value on future date *i.e.* after n years.

Single amount   Annuity   Single amount   Annuity

Note: Annuity means series of constant cash flows starting from first year to nth year (say up to 5th year, 10 years etc.).

Present Value (PV) of single amount

Let the single amount 'A' is due to receive after nth year and the required rate of return/rate of interest/discount rate is r%, then

PV of single amount will be: $\boxed{\text{PV (A)} = \text{A} \times \text{PVIF (r\%, n}^{\text{th}}\text{ year)}}$

Where, PVIF (r%, n$^{\text{th}}$ year) is present value interest factor at r%, n$^{\text{th}}$ year. It can be taken from present value interest factor table.

Mathematically, $\boxed{\text{PVIF (r\%, n}^{\text{th}}\text{ year)} = 1/(1 + r)^{n}}$

Illustration 1:

Suppose Mr. X deposits Rs. 10000 in Syndicate bank. Calculate in how many years it will become double, in case the rate of interest offered by Syndicate bank is 8%.

Solution: According to question,

Let in 'n' years Rs. 10000 grows to Rs. 20000 at 8% interest rate.

Then it can be presented as,

PV (20000) = 10000

$\Rightarrow$ 20000 × PVIF (8%, n years) = 100000

$\Rightarrow$ PVIF (8%, n years) = 0.5

$\Rightarrow$ n = 9 years (approx.)

(Because as per PV table PVIF (8%, 9 years) = 0.5)

Illustration 2:

Suppose Mr. X deposits Rs. 10000 in Syndicate bank. Calculate rate of interest offered by Syndicate bank in case deposit becomes double in just five years.

Solution: According to question,

Let at r% interest rate Rs. 10000 grows to Rs. 20000 in 5 years.

Then it can be presented as,

PV (20000) = 10000

$\Rightarrow$ 20000 × PVIF (r%, 5 years) = 100000

$\Rightarrow$ PVIF (r%, 5 years) = 0.5

Now as per PV table,

PVIF (14%, 5 years) = 0.519 and

PVIF (15%, 5 years) = 0.497

Again, since 0.5 is between 0.519 and 0.497, therefore 'r' will be between 14% and 15%.

Calculation of exact value of 'r':

0.022 change is equivalent to 1% change

$\therefore$ 0.019 change is equivalent to $\left(\dfrac{1}{0.022} \times 0.019 \right)$ % change

= 0.86 % change

Again, since when 'r' increases PV (benefits) decreases.

$\therefore$ To decrease 0.519 by 0.019, 'r' should be increased by 0.86% from 14%

Thus   r = 14% + 0.86%

$\therefore$ $\boxed{\textbf{r = 14.86\%}}$

Present Value (PV) of single amount for shorter discounting period:
Let the single amount 'A' is due to receive after n^{th} year and the required rate of return/rate of interest/ discount rate is r% and 'm' is number of times per year discounting is done, then

PV of single amount will be: $\boxed{\text{PV (A) = A} \times \text{PVIF \{(r/m)\%, (m*n)}^{th} \text{ year\}}}$

Where, PVIF {(r/m)%, (m*n) th year} is present value interest factor at (r/m)%,(m*n)th year. It can be taken from present value interest factor table.

Mathematically, $\boxed{\text{PVIF \{(r/m)\%, (m*n)}^{th} \text{ year\} = 1/(1 + r/m)}^{mn}}$

Note:
- **When discounting is done monthly, value of 'm' will be 12**
- **When discounting is done quarterly, value of 'm' will be 4**
- **When discounting is done six monthly (*i.e.* semi-annually), value of 'm' will be 2**

Illustration:
Consider a cash flow of Rs. 10000 is to be received by Mr. X at the end of four years. Determine present value in case discount rate is 12% and discounting is done quarterly (m = 4).

Solution:

$\qquad$ PV (A) = A $\times$ PVIF {(r/m)%, (m*n)th year}

$\Rightarrow \qquad$ PV (10000) = 10000 $\times$ PVIF {(12/4)%, (4*4)th year}

$\Rightarrow \qquad$ PV (10000) = 10000 $\times$ PVIF (3%,16 years)

$\Rightarrow \qquad$ PV (10000) = 10000 $\times$ 0.623

$\Rightarrow \qquad$ PV (10000) = Rs. 6,230

Present Value (PV) of Annuity
Let the amount of annuity is 'A' and it is receivable up to n^{th} year. Again let the required rate of return/ rate of interest/discount rate is r%, then

PV of Annuity will be: $\boxed{\text{PV (Annuity) = A} \times \text{PVIFA (r\%, n}^{th} \text{ year)}}$

Where, PVIFA (r%, nth year) is present value interest factor for annuity at r%, nth year. It can be taken from present value interest factor for annuity table.

Mathematically, $\boxed{\text{PVIFA (r\%, n}^{th} \text{ year)} = \sum_{t=1}^{n} 1/(1+r)^{t}}$

Illustration:
Mr. X received Rs. 5,00,000 as gratuity after retirement. He deposited the same with State Bank of India (SBI). How much money can he withdraw each year upto 30 years so that the amount at the end of 30 years becomes zero. The rate of interest offered by SBI is 7%.

Solution:
Let the amount withdrawn each year is 'A'

$\qquad \therefore$ According to question,

$\qquad\qquad$ PV (annuity) = 500000

$\Rightarrow$ A $\times$ PVIFA (7%, 30 years) = 500000

$\Rightarrow$ A $\times$ 12.409 = 500000   (As per present value interest factor for annuity table, PVIFA,

                       PVIFA (7%,30 years) = 12.409)

$\therefore$ A $= \dfrac{500000}{12.409}$

$\therefore$ A = Rs. 40293.335

Thus Mr. X can withdraw Rs. 40293.335 annually up to next 30 years.

Future Value (FV) of Single Amount

Let the single amount 'A' is received today and the required rate of return/rate of interest/discount rate is r% then,

FV of single amount after n years will be: $\boxed{\text{FV (A) = A } \times \text{ FVIF (r\%, n}^{th}\text{ year)}}$

Where, FVIF (r%, nth year) is future value interest factor at r%, nth year. It can be taken from future value interest factor table.

Mathematically, $\boxed{\text{FVIF (r\%, n}^{th}\text{ year) = (1 + r)}^{n}}$

Illustration:

Suppose an insurance company offers Rs. 10000 after 8 years against a deposit of Rs. 5000 made today. Would you accept the offer in case rate of return required by you is a minimum 12%?

Solution:

Compare the future value of Rs. 5000 at required rate with Rs. 10000.

If FV (5000) < 10000 then accept the offer otherwise reject it.

Again FV(5000) = 5000 $\times$ FVIF (12%, 8 years)

                  = 5000 $\times$ 2.476 (As per FV table, FVIF (12%, 8 years) = 2.476)

                  = 12380 > 10000

Thus since the amount offered by insurance company after 8 years is less than the expected future value, it therefore, can not be accepted.

Future Value (FV) of single amount for shorter compounding period

Let the single amount 'A' is received today and the required rate of return/rate of interest/discount rate is r% and 'm' is number of times per year compounding is done then,

FV of single amount after n years will be: $\boxed{\text{FV (A) = A } \times \text{ FVIF \{(r/m)\%, (m*n)}^{th}\text{ year\}}}$

Where, FVIF {(r/m)%, (m*n)th year} is future value interest factor at (r/m)%,(m*n)th year. It can be taken from future value interest factor table.

Mathematically, $\boxed{\text{FVIF \{(r/m)\%, (m*n)}^{th}\text{ year\} = (1 + r/m)}^{mn}}$

Illustration:

Consider a cash flow of Rs. 10000 is received today by Mr. X. Determine future value at the end of four years in case required rate of return is 12% and compounding is done quarterly (m = 4).

Solution:

         FV (A) = A $\times$ FVIF {(r/m)%, (m*n)th year}

$\Rightarrow$ FV (10000) = 10000 $\times$ FVIF {(12/4)%, (4*4)th year}

$\Rightarrow$ FV (10000) = 10000 $\times$ FVIF (3%,16 years)

$\Rightarrow$ FV (10000) = 10000 $\times$ 1.605

$\Rightarrow$ FV (10000) = Rs. 16050

Note:
- **When compounding is done monthly, value of 'm' will be 12**
- **When compounding is done quarterly, value of 'm' will be 4**
- **When compounding is done six monthly (*i.e.* semi-annually), value of 'm' will be 2**

Future Value (FV) of Annuity

Let the amount of annuity is 'A' and it is receivable up to nth year. Again let the required rate of return/ rate of interest/discount rate is r% then,

FV of annuity after n years will be: $\boxed{\text{FV (Annuity) = A} \times \text{FVIFA (r\%, n}^{th}\text{ year)}}$

Where, FVIFA (r%, nth year) is future value interest factor for annuity at r%, nth year. It can be taken from future value interest factor for annuity table.

Mathematically, $\boxed{\text{FVIFA (r\%, n}^{th}\text{ year)} = \sum_{t=1}^{n} (1+r)^t}$

Illustration:

Suppose you deposit Rs. 5000 every year up to 10 years in PPF account then what would be the value after 15 years if the current rate of interest on PPF account is 8% and it is expected to continue for next 15 years.

Solution:

The regular deposited money will grow by future value annuity factor for first 10 years and thereafter up to next 5 years it will grow by future value interest factor.

Thus,

Terminal value at the end of 15th year *i.e.* Future Value at the end of 15 years

= FV of {FV of Rs. 5000 deposited each year for first 10 years} for next 5 years

= FV {FV (Annuity) for 10 years} for 5 years

= {5000 $\times$ FVIFA (8%, 10 years)} $\times$ FVIF (8%, 5 years)

= {5000 $\times$ 14.487} $\times$ 1.469 (As per future value interest factor for annuity table,
                         FVIFA (8%, 10 years) = 14.487 and as per future value
                         interest factor table, FVIF (8%, 5 years) = 1.469)

= {72435} $\times$ 1.469

= 106407.015

Thus terminal value at the end of 15th year = Rs. 106407.015

7.7 CAPITAL BUDGETING DECISION

7.7.1 Introduction

1. Capital budgeting is the process of planning for purchases of long-term assets.
2. In other words, Capital Budgeting is a process of undertaking Project Decision/Capital Investment Decision/Long-term Investment Decision or Capital Expenditure Decision.

3. Capital Budgeting process includes following stages:
   - Planning
   - Analysis
     - ❑ Market Analysis
     - ❑ Technical Analysis
     - ❑ Financial Analysis
     - ❑ Economic Analysis and
     - ❑ Ecological Analysis
   - Selection
   - Implementation
   - Review
4. Capital budgeting decision is very complex decision among all the financial decisions undertaken by an organization because of following characteristics and difficulties associated with it.

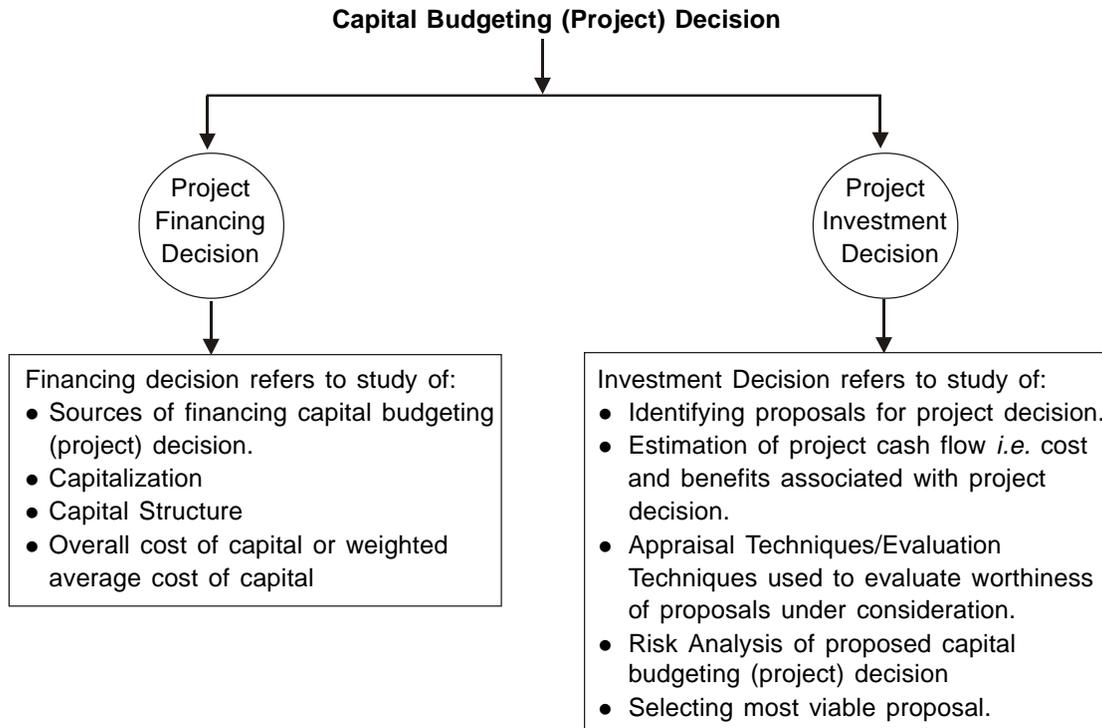### 7.7.2 Characteristics of Capital Budgeting Decision

Following are important characteristics of Capital Budgeting Decision:
- **Substantial investment:** As compared to working capital decision, Capital Budgeting Decision requires substantial investment.
- **Long-term effect:** Capital budgeting decision provides long-term effect *i.e.* up to the life of the project.
- **Irreversibility:** Capital Budgeting Decision once taken cannot be reversed otherwise it will involve substantial cost.

7.7.3 Difficulties associated with Capital Budgeting Decision

Following are difficulties associated with capital budgeting decision:
- **Uncertainty regarding expected benefits:** In capital budgeting decision, investment is made today whereas benefits are received in future and since future is always uncertain, expected benefits therefore remain in uncertainty.
- **Measurement problem:** Because of uncertainties associated with future due to change in external factors like technological, political, social and economical etc., it becomes difficult to measure cost and benefits associated with capital budgeting decision.
- **Problems in equating Cost and Benefits:** In capital budgeting decisions, cost and benefits are spread over a long period of time. This creates difficulty in estimating discount rates and hence in equating cost and benefits.
5. There are two aspects of Capital Budgeting Decision *viz.* Financing Decision and Investment Decision.
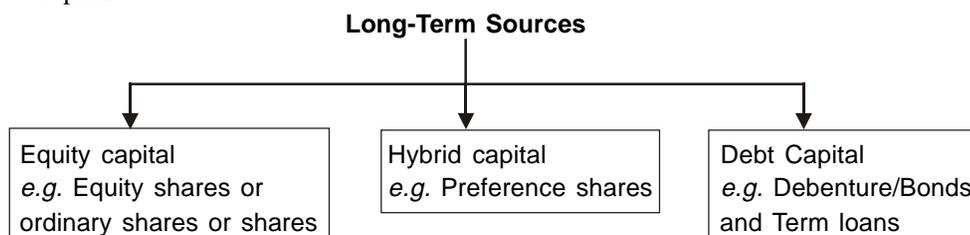
Capital Budgeting (Project) Decision

```
                    Capital Budgeting (Project) Decision
                                    |
              +---------------------+---------------------+
              |                                           |
       ( Project                                    ( Project
         Financing                                    Investment
         Decision )                                   Decision )
              |                                           |
```

Financing decision refers to study of:	Investment Decision refers to study of:
• Sources of financing capital budgeting (project) decision. • Capitalization • Capital Structure • Overall cost of capital or weighted average cost of capital	• Identifying proposals for project decision. • Estimation of project cash flow *i.e.* cost and benefits associated with project decision. • Appraisal Techniques/Evaluation Techniques used to evaluate worthiness of proposals under consideration. • Risk Analysis of proposed capital budgeting (project) decision • Selecting most viable proposal.

- Financing decision results into cost of capital (denoted by Ko) whereas investment decision results into Internal Rate of Return (IRR).
- Cost of capital of Financing decision acts as benchmark for investment decision. In other words, for capital budgeting decision to be financially viable cost of capital (Ko) must be lesser than Internal Rate of Return (IRR).
- Financing decision and Investment decision both go side by side, without one other is meaningless.
- After selecting most viable proposal among those under appraisal (evaluation), fund is raised according to planning of financing decision and thereafter project implementation starts.

7.7.4 Sources of financing Capital Budgeting Decision/Project Finance

Capital budgeting decisions are financed using long-term sources. The various types of long-term sources are categorized into:

- Equity Capital
- Hybrid Capital
- Debt Capital

Long-Term Sources

Equity capital *e.g.* Equity shares or ordinary shares or shares	Hybrid capital *e.g.* Preference shares	Debt Capital *e.g.* Debenture/Bonds and Term loans

Shares: Shares represent ownership securities.

- In case of joint stock companies, owner's capital is divided into very small fractions say Rs. 5/-, Rs. 10/-, Rs. 20/- etc. Each fraction is termed as shares.
- The person (natural or legal) who purchases/subscribes to these shares are known as 'shareholders'.
- Whatever shareholders receives against their investment is known as dividend. This may be in form of cash or kind.
- Shareholders act as part owner to the concerned organization because they possess voting right. The extent of ownership depends upon the extent of share holding. Voting right means right to vote, which in turn means right to elect board of directors, which constitutes apex body of concerned organization.

Debentures: Debentures represent creditorship securities.

- In case of joint stock companies, a part of debt capital is divided into very small fractions say Rs. 5/-, Rs. 10/-, Rs. 20/- etc. Each fraction is termed as Debentures.
- The person (natural or legal) who purchases/subscribes these debentures are known as debenture holders.
- Debenture holders receive interest against their investment.
- Debenture holders act as creditors to the organization concerned because they have legal right to receive interest and principal repayment at the end of maturity, depending upon the nature of debenture.

Preference Shares: Preference Shares represent hybrid securities. The term hybrid means dual and thus Preference Shareholders possess dual characteristics. In other words, sometimes they behave like ownership securities and sometimes they behave like creditorship securities.

- In case of joint stock companies, a part of total capital is divided into very small fractions say Rs. 5/-, Rs. 10/-, Rs. 20/- etc. Each fraction is termed as Preference shares.
- The person (natural or legal) who purchases/subscribes these Preference shares are known as Preference shareholders.
- Whatever Preference shareholders receives against their investment is known as Preference dividend. The rate of preference dividend remains fixed and thus Preference share behaves like debt (creditorship) securities. The term preference means preference over equity shareholder.
- Unlike equity shareholders, preference shareholders do not act as part owner to the concerned organization because they do not possess voting right. However, under section 84 of Companies Act, in case the organization defaults in paying preference dividend up to three years, then Preference Shareholders will automatically get voting right and hence will interfere in the controlling of concerned organization and thus Preference Shareholders start behaving like equity (ownership) shareholders.

Difference between Equity shares, Preference shares and Debentures/Bonds

S. no.	Point of difference	Equity shares	Preference shares	Debentures/Bonds
1	**Control**	Have control over organization because of voting right.	Do not have control over organization except u/s 84 of Companies Act.	Do not have control over organization.
2	**Maturity**	Do not have maturity period. Equity capital	May or may not have maturity period depending	Usually Debentures/Bonds have maturity period.

Contd...

S. no.	Point of difference	Equity shares	Preference shares	Debentures/Bonds
		permanently remains with the organization.	upon type of preference share (redeemable or irredeemable).	
3	**Claim on Income**	Have residual claim. Thus all the risk is borne by equity shareholders.	Have preference over equity shares.	Have first claim on income.
4	**Claim on Asset**	Have residual claim. Thus all the risk is borne by equity shareholders.	Have preference over equity shares.	Have first claim on Asset.

Difference between Debentures and Bonds

Technically there is no difference between Debentures and Bonds as both are debt instruments. However the difference between two is due to practice in the financial market. They are,

- Generally, public sector organizations issue their debt instruments in the name of bonds whereas private sector organizations issue their debt instruments in the name of debentures. *e.g.* Railway Bonds, RBI bonds etc.
- Generally the unit size of bonds is very high as compared to debentures and therefore bonds are normally secured whereas debentures are unsecured. *e.g.* the unit size of bonds come in lakhs but again there are bonds of Rs. 100 prevailing in market but again Rs. 5 or Rs. 10 sized bonds do not exist.
- Generally bonds are not convertible whereas debentures are convertible. Convertible debentures are those debentures, which convert into pre-specified number of shares after certain time.

7.8 ADVANTAGES AND DISADVANTAGES OF EQUITY SHARES, PREFERENCE SHARES AND DEBENTURES

7.8.1 Advantages of Equity Shares

Company's Point of View

- **No legal obligation:** In case of equity shares, there is no legal obligation regarding payment of dividend.
- **Permanent source of finance:** Equity capital permanently remains with the organization. It is never paid except under liquidation.
- **Suitable source of finance:** A company whose expected future earnings are not stable or which deals in products with highly elastic demand or which does not have sufficient fixed assets to offer as security to debenture holders can use this source of raising funds to its benefit because of risk sharing capabilities.

Investor's or Shareholder's Point of View

- **Ownership:** Equity shareholders are the real owners of the organization (company) because they have voting rights. In other words, only equity shareholders have right to elect board of directors alongwith Managing Director, which is the apex body of any organization.

- **Risk-return trade off:** Since all the risk is borne by equity shareholders, they get the rewards by way of increased dividends (in case of huge residual income) leading to appreciation in the value of shares.

7.8.2 Disadvantages of Equity Shares
Company's Point of View

- **Trading on equity:** In case only equity shares are issued, the company cannot take the advantage of trading of equity, which is against the firm's objective of maximizing shareholder's wealth.
- **No maturity:** Equity shares do not have maturity period. In other words, equity capital permanently remains with the organization.
- **Over capitalization:** As equity capital cannot be redeemed, there is a danger of over capitalization.
- **Interference in functioning of management:** Because of voting right, equity shareholders can interfere in the management and hence can put obstacles in fair functioning of management.
- **Speculation:** Possibility of speculation goes up during prosperous periods because of higher dividends to be paid leading to increase in the value of shares in the market.

Investor's or Shareholder's Point of View

- **No fixed/stable income:** Investors, who are risk-averse and wish to earn fixed income, have no attraction for such shares.
- **Residual claim on income:** Equity shareholders have residual claim on income. In other words, they are paid after preference shareholders and debenture holders. Thus all the risk is borne by equity shareholders.
- **Residual claim on Asset:** Equity shareholders have residual claim on asset in case of liquidation. Thus again all the risk is borne by equity shareholders.
- **No maturity:** Equity capital do not have maturity period, they permanently remain with the organization.

7.8.3 Advantages or Merits of Preference Shares
Company's Point of View

- **No legal obligation:** There is no legal obligation regarding payment of preference dividend. Preference dividend is payable only out of distributable profits at the discretion of the management. Hence, a company does not face legal action if it does not pay dividend.
- **Long-term source:** Preference shares provide a long-term capital for the company.
- **No interference in management:** Preference shareholders do not carry voting power and hence do not interfere in the management of concerned organization except under section 84 of Companies Act.
- **Trading on equity:** In case of preference shares, fixed rate of dividend is paid. This enables a company to adopt trading on equity *i.e.* to increase rate of earnings on equity shares after paying a lower fixed rate of dividend on preference shares.
- **No security:** As no specific assets are pledged against preferred stock, the mortgageable assets of the company are conserved.

Investor's or Shareholder's Point of View

- **Stable income:** It earns a fixed rate of dividend.
- **Preferential right against assets:** It has preference over equity shares regarding claim on assets for repayment of capital at the time of liquidation.

- **Preferential right against income:** It provides preferential rights regarding payment of dividends.
- **Safety of interest:** Preference shares although carry no voting rights, but in case the organization defaults in paying dividend up to three years, then according to section 84 of Companies Act they automatically get voting right and hence behaves like equity shares.

7.8.4 Disadvantages of Preference Shares

Company's Point of View

- **High cost of capital:** It is an expensive source of finance as compared to debt because generally the investors expect a higher rate of dividend on preference shares as compared to the rate of interest on debentures.
- **Fixed burden:** Cumulative preference shares become a permanent burden so far as the payment of dividend is concerned.
- **Loss of credit worthiness:** Although there is no legal obligation of a company to pay dividend on preference shares, but frequent delays or non-payment of preference dividend adversely affect the credit worthiness of the firm.
- **No tax advantage:** Preference share dividend is not a deductible expense while calculating tax whereas interest on debt capital is a deductible expense.
- **Disadvantage to equity shareholders:** In some cases, *i.e.* in case the organization defaults in paying dividend up to three years, then according to section 84 of Companies Act they automatically get voting right and hence the control of the company in the hands of equity shareholders may get diluted.

Shareholder's Point of view

- **Dependency on management:** As the preference shareholders, ordinarily, do not have any voting rights, they remain at the mercy of the management for the payment of dividend and redemption of their capital.
- **Low income:** The rate of dividend on preference shares is usually lower as compared to the equity shares.
- **Claim on asset:** Preference shareholders do not have any charge on the assets of the company, while debentures usually provide a charge on all the assets of the company.
- **Market price:** The market prices of preference shares fluctuate much more than that of debentures.

7.8.5 Advantages of Debentures

Company's Point of View

- **Long-term source:** Debentures provide long-term funds to a company.
- **Low rate of interest:** The rate of interest payable on debentures is, usually, lower than the rate of dividend paid on share.
- **Tax advantage:** The interest on debentures is a tax-deductible expense. This lowers effective cost of debentures (debt capital) as compared to ownership securities where dividend is not a tax-deductible expense.
- **No interference in management:** Debt financing does not result into dilution of control because debenture holders do not have any voting rights.
- **Trading on equity:** A company can trade on equity by mixing debentures in its capital structure and thereby increase its earnings per share.
- **Remedy for over capitalization:** In the case of over capitalization the company can redeem the debentures to balance its capital structure.

- **Flexibility in capital structure:** Debentures provide flexibility in the capital structure of a company as the same can be redeemed as and when the company has surplus funds and desires to do so.
- **A boon during depression period:** Even during depression, when the stock market sentiment is very low, a company may be able to raise funds through issue of debentures or bonds because of certainty of income and low risk to investors.

Investor's or Shareholder's Point of View

- **Fixed and stable income:** Debentures provide a fixed, regular and stable source of income to its investors.
- **Safe investment:** It is a comparatively safer investment because debenture holders have either a specific or a floating charge on all the assets of the company and enjoy the status of a superior creditor in the event of liquidation of the company.
- **Convertibility**: In case of convertible debentures, debenture holders have option to convert debentures into shares.
- **Liquidity:** A debenture is usually a more liquid investment and an investor can sell or mortgage his instrument to obtain loans from financial institutions.
- **Security:** Various provisions of the debenture trust deed and the guidelines issued by the Securities and Exchange Board of India in this regard protect the interest of debenture holders.

7.8.6 Disadvantage of Debentures

Company's Point of View

- **Fixed obligation:** The fixed interest charges and repayment of principal amount on maturity are legal obligations of the company. These have to be paid even when there are no profits. Hence, it is a permanent burden on the company.
- **Cost of equity capital:** The use of debt financing usually increases the risk perception of investors in the firm. This enhanced financial risk increases the cost of equity capital.
- **Cost of debenture:** Cost of rising finance through debenture is also high because of high stamp duty.
- **Unsuitable source of finance**: A company whose expected future earnings are not stable or which deals in products with highly elastic demand or which does not have sufficient fixed assets to offer as security to debenture holders cannot use this source of raising funds to its benefit.
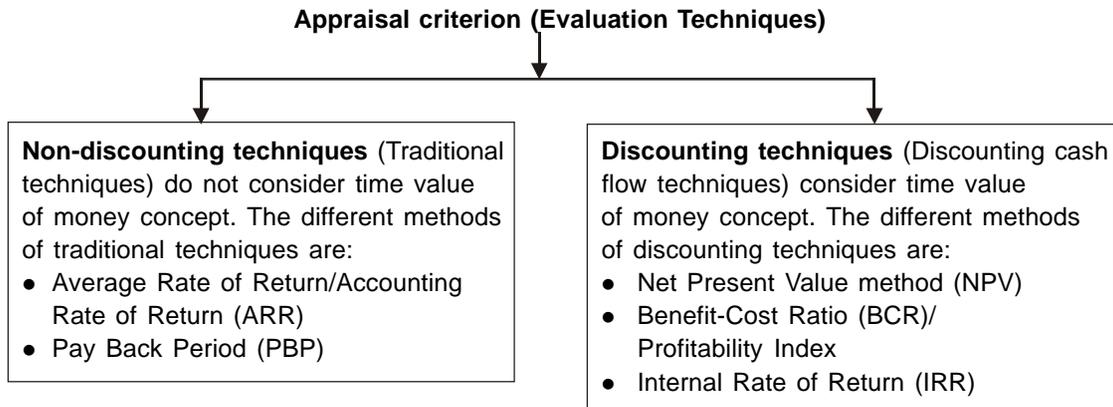
Investor's or Shareholder's Point of View

- **Control:** Debentures do not carry any voting rights and hence its holders do not have any controlling power over the management of the company.
- **Fixed income:** Debenture holders are merely creditors and not the owners of the company. They do not have any claim on the surplus assets and profits of the company beyond the fixed interest and their principal amount.
- **Tax liability:** Interest on debentures is fully taxable while shareholders may avoid tax by way of stock dividend (bonus shares) in place of cash dividend.
- **Market price:** The prices of debentures in the market fluctuate with the changes in the interest rates.
- **Uncertainty about redemption** also restricts certain investors from investing in such securities.

Capital Budgeting Evaluation Techniques/Project Appraisal Techniques

Evaluation Techniques are used to evaluate worthiness of proposals under consideration.

There are two categories of evaluation techniques *viz.*

1. Non-discounting techniques
2. Discounting techniques

Appraisal criterion (Evaluation Techniques)

| **Non-discounting techniques** (Traditional techniques) do not consider time value of money concept. The different methods of traditional techniques are:
• Average Rate of Return/Accounting Rate of Return (ARR)
• Pay Back Period (PBP) | **Discounting techniques** (Discounting cash flow techniques) consider time value of money concept. The different methods of discounting techniques are:
• Net Present Value method (NPV)
• Benefit-Cost Ratio (BCR)/ Profitability Index
• Internal Rate of Return (IRR) |

The details of above mentioned methods are as follows:

Average Rate of Return/Accounting Rate of Return (ARR)

Average rate of return also known as accounting rate of return is defined as average cash inflows (Benefits) against unit investment.

Thus,
$$\text{ARR} = \frac{\text{Average Cash Inflows (Benefits)}}{\text{Initial Investment}} \times 100$$

Decision rule

1. If ARR > Target rate** - Accept the proposal (project)
2. If ARR < Target rate   - Reject the proposal (project)
3. If ARR = Target rate   - Further analysis is required

(**Target rate is the minimum rate of return targeted by management. It acts as benchmark for those involved in capital budgeting decision.)

Illustration:

Let the cash flows associated with a project under consideration is as follows: (Assuming life of the project is five years)

Year	Cash-flows (Rs.)	
0	(1,00,000)	→ Initial investment (cash outflows/cost)
1	20,000	
2	30,000	
3	30,000	Cash inflows (Benefits)
4	20,000	
5	40,000	

Then

Average cash inflows = (20,000 + 30,000 + 30,000 + 20,000 + 40,000)/5 = Rs. 28,000

Therefore
$$\text{ARR} = \frac{28,000}{1,00,000} \times 100$$

$$\boxed{\text{ARR} = 28\%}$$

Advantages of Average Rate of Return (ARR) Method
The Average Rate of Return method has the following advantages:
- It is very simple to understand and easy to calculate.
- It uses the entire earnings of a project in calculating rate of return and not only the earnings up to pay-back period and hence gives a better view of profitability as compared to pay-back period method.
- As this method is based upon accounting concept of profits, it can be readily calculated from the data taken from financial statements.

Disadvantage of Average Rate of Return (ARR) Method
In spite of so many advantages, it suffers from the following drawbacks;
- Like pay-back period method this method also ignores the time value of money concept as the profits earned at different points of time are given equal weight by averaging the profits.
- It does not take into consideration the cash flows, which are more important than the accounting profits.
- This method cannot be applied to a situation where investment in a project is to be made in parts.

Pay Back Period (PBP)
It is the time length required to cover initial investment.

Decision rule:
1. If PBP > Target period** - Accept the proposal (project)
2. If PBP < Target period   - Reject the proposal (project)
3. If PBP = Target period   - Further analysis is required

(**Target period is the minimum period targeted by management to cover initial investment. It acts as benchmark for those involved in capital budgeting decision.)

Illustration:
Let the cash flows associated with a project under consideration be as follows: (Assuming life of the project is five years)

Year	Cash-flows (Rs.)	
0	(1,00,000)	→ Initial investment (cash outflows/cost)
1	20,000	
2	30,000	
3	30,000	Cash inflows (Benefits)
4	20,000	
5	40,000	

Thus $1,00,000 = (20,000 + 30,000 + 30,000 + 20,000)$
                    $= (1 + 1 + 1 + 1)$ years

Therefore   **PBP = 4 years**

Advantages of Pay-Back Period (PBP) method

The Pay-Back Period (PBP) method has the following advantages:

- It is simple to understand and easy to calculate.
- This method is cost effective compared to other methods of capital budgeting, as it requires lesser time and labour.
- This method is effective for short-term projects under consideration because in this method, time value of money concept is usually not taken into consideration.
- In this method, a project with a shorter pay-back period is preferred to the one having a longer pay-back period. It, therefore, reduces the loss through obsolescence and is more suited to developing countries like India, which are in the process of development and have quick obsolescence.
- Due to its short-term approach, this method is particularly suited to a firm which has shortage of cash or whose liquidity position is not particularly good or which has acquired term loan with short maturity (less than five years).

Disadvantage of Pay-Back Period (PBP) Method

In spite of so many advantages, it suffers from the following drawbacks:

- It calculates time period and does not take into account the entire cash inflows and hence this method cannot assess the true profitability of the project.
- It does not take into consideration the time value of money concept. In other words, it treats all cash flows as equal (in terms of unit purchasing power) though they occur in different periods.
- It does not take into consideration the cost of capital, which is a very important factor in making sound investment decisions.
- It may be difficult to determine the minimum acceptable pay-back period; it is usually, a subjective decision.

Net Present Value (NPV)

- It represents residual net benefits in present value term available to owners (shareholders) *i.e.* net benefits after meeting their opportunity cost or Required Rate of Return (RRR).
- NPV is directly linked with the organization's objective of shareholders' wealth maximization. That is why NPV is taken as best appraisal criterion.
- In other words, higher the NPV, higher will be the 'shareholders' wealth maximization.

Thus, $\boxed{\textbf{NPV = PV (Benefits) – I (Initial investment)}}$

Where, PV (Benefits) is the present value of benefits (cash inflows) calculated using weighted average cost of capital (also known as overall cost of capital (Ko) as discount rate (%).

i.e., $$\textbf{PV (Benefits)} = \sum_{t=1}^{n} \textbf{Ct} \times \textbf{PVIF (Ko\%, t}^{\textbf{th}}\textbf{year)}$$

Where, PVIF (Ko%, t^{th} year) is Present Value Interest Factor at Ko%, t^{th} year. It can be taken from Present Value Interest Factor (PVIF) table and 'Ct' is the cash inflows (benefits) at the end of tth year.

Mathematically, $$\textbf{NPV} = \sum_{t=1}^{n} \textbf{Ct} / (\textbf{1} + \textbf{Ko})^{\textbf{t}} - \textbf{I}$$

Decision rule
1. If NPV > 0 - Accept the proposal (project)
2. If NPV < 0 - Reject the proposal (project)
3. If NPV = 0 - Further analysis is required

Illustration:
Let the cash flows associated with a project under consideration is as follows: (Assuming life of the project is five years and weighted average cost of capital, Ko, is 10%)

Year	Cash-flows (Rs.)	
0	(1,00,000)	→ Initial investment (cash outflows/cost)
1	20,000 (C_1)	
2	30,000 (C_2)	
3	30,000 (C_3)	Cash inflows (Benefits)
4	20,000 (C_4)	
5	40,000 (C_5)	

Then, $$\textbf{NPV} = \sum_{t=1}^{n} \textbf{Ct} \times \textbf{PVIF (Ko\%, t}^{th}\textbf{year)} - \textbf{1}$$

NPV = {C_1 × PVIF (Ko%, 1st year) + C_2 × PVIF (Ko%, 2nd year) + C_3 × PVIF (Ko%, 3rd year) + C_4 × PVIF (Ko%, 4th year) + C_5 × PVIF (Ko%, 5th year)} – I

= {20000 × PVIF (10%, 1st year) + 30000 × PVIF (10%, 2nd year) + 30000 × PVIF (10%, 3rd year) + 20000 × PVIF (10%, 4th year) + 40000 × PVIF (10%, 5th year)} – 100000

= {20000 × 0.909 + 30000 × 0.826 + 30000 × 0.751 + 20000 × 0.683 + 40000 × 0.621} – 100000

= {18180 + 24780 + 22530 + 13660 + 24840} – 100000

NPV = Rs. 3990

Advantages of the Net Present Value (NPV) Method
The Net Present Value (NPV) method has the following advantages:
- It takes into consideration time value of money concept and is suitable to be applied for projects under consideration with uniform cash outflows (Investments) and uneven cash inflows (Benefits).
- It takes into account the earnings over the entire life of the project and thus it evaluates true profitability of the investment proposal.
- NPV is directly linked with the organization's objective of 'shareholders' wealth maximization. In other words, higher the NPV, higher will be the 'shareholders' wealth maximization *i.e.* why NPV is taken as best appraisal criterion.

Disadvantages of the Net Present Value (NPV) Method
In spite of so many advantages, it suffers from the following drawbacks:
- As compared to the traditional methods, the net present value method is more difficult to understand and to calculate.

- It may not give good results while comparing projects with unequal lives as the project having higher net present value but realized in a longer life span may not be as desirable as a project having something lesser net present value achieved in a much shorter span of life.
- In the same way as above, it may not give good result while comparing project with unequal investment of funds.
- Because of uncertainty involved in future earning and long-term effect it becomes difficult to determine an appropriate discount rate used to calculate present value and hence NPV.

Benefit–Cost Ratio (BCR)/Profitability Index (PI)
- It represents the present value of residual benefits available to owners (shareholders) against unit investment *i.e.* benefits after meeting their opportunity cost or Required Rate of Return (RRR).
- BCR is directly linked with the organization's profitability *i.e.* (Return on Investment).
- In other words, higher the BCR, higher will be the profitability, which in turn will lead to shareholders' wealth maximization.

Thus, $\boxed{\textbf{BCR = PV (Benefits)} \div \textbf{I (Initial investment)}}$

Where, PV (Benefits) is present value of benefits (cash inflows) calculated using weighted average cost of capital (also known as overall cost of capital (Ko) as discount rate (%).

i.e., $$\textbf{PV (Benefits)} = \sum_{t=1}^{n} \textbf{Ct} \times \textbf{PVIF (Ko\%, t}^{\textbf{th}} \textbf{ year)}$$

Where, PVIF (Ko%, t^{th} year) is Present Value Interest Factor at Ko%, t^{th} year. It can be taken from Present Value Interest Factor (PVIF) table and 'Ct' is the cash inflows (benefits) at the end of tth year.

Mathematically, $\boxed{\textbf{BCR} = \sum_{t=1}^{n} \textbf{Ct}/(\textbf{1}+\textbf{Ko})^{\textbf{t}} \div \textbf{I}}$

Decision rule:
1. If BCR > 1 - Accept the proposal (project)
2. If BCR < 1 - Reject the proposal (project)
3. If BCR = 1 - Further analysis is required

Illustration:
Let the cash flows associated with a project under consideration is as follows: (Assuming life of the project is five years and weighted average cost of capital, Ko, is 10%)

Year	Cash-flows (Rs.)	
0	(1,00,000)	⟶ Initial investment (cash outflows/cost)
1	20,000 (C₁)	
2	30,000 (C₂)	
3	30,000 (C₃)	Cash inflows (Benefits)
4	20,000 (C₄)	
5	40,000 (C₅)	

Then, $\boxed{\textbf{BCR} = \sum_{t=1}^{n} \textbf{Ct} \times \textbf{PVIF (Ko\%, t}^{\textbf{th}} \textbf{ year)} \div \textbf{I}}$

BCR $= \{C_1 \times$ PVIF (Ko%, 1st year) $+ C_2 \times$ PVIF (Ko%, 2nd year) $+ C_3 \times$ PVIF (Ko%, 3rd year) $+ C_4 \times$ PVIF (Ko%, 4th year) $+ C_5 \times$ PVIF (Ko%, 5th year)$\} \div$ I

$= \{20000 \times$ PVIF (10%, 1st year) $+ 30000 \times$ PVIF (10%, 2nd year) $+ 30000 \times$ PVIF (10%, 3rd year) $+ 20000 \times$ PVIF (10%, 4th year) $+ 40000 \times$ PVIF (10%, 5th year)$\} \div 100000$

$= \{20000 \times 0.909 + 30000 \times 0.826 + 30000 \times 0.751 + 20000 \times 0.683 + 40000 \times 0.621\} \div 100000$

$= \{18180 + 24780 + 22530 + 13660 + 24840\} \div 100000$

BCR $= \dfrac{103990}{100000}$, **BCR = 1.04 (Approx.)**

7.8.7 Advantages of Benefit–Cost Ratio (BCR) Method
The Benefit–Cost ratio method has the following advantages
- Like the net present value method, it takes into account the time value of money concept and is suitable to be applied for comparing projects with unequal investment of funds as it measures present value of benefits against unit investment.
- It considers the profitability of the project for its entire economic life and hence evaluates true profitability.
- It helps in ranking of various proposals under consideration due to its presentation in terms of present value of benefit per unit investment.
- This method is also compatible with the objective of shareholder's wealth maximization and is considered to be a more reliable technique of capital budgeting.

Disadvantages of Benefit–Cost Ratio (BCR) Method
In spite of so many advantages, it suffers from the following drawbacks:
- It is difficult to understand and is the most difficult method of evaluation of investment proposals.
- Because of uncertainty involved in future earnings and long-term effect it becomes difficult to determine an appropriate discount rate used to calculate present value of benefits and hence BCR.
- The results of BCR method and IRR method may differ when the projects under evaluation differ in their size (initial investment), life and timings of each cash flow.

Internal Rate of Return (IRR)
- It is that rate at which present value of benefits equals the initial investment. In other words, it is that discount rate at which NPV equals zero.
- IRR represents Return on Investment in terms of percentage.
- IRR is popular appraisal criterion for capital budgeting decision.
- IRR is calculated through hit and trial method.

Let at r%,	**NPV = 0** *i.e.* **PV (Benefits) = I (Initial investment)**

Then, **IRR = r%**

Thus, at IRR = r%,

$$\textbf{PV (Benefits)} = \sum_{t=1}^{n} \textbf{Ct} \times \textbf{PVIF}(\textbf{r\%}, \textbf{t}^{\textbf{th}} \textbf{ year}) = \textbf{I (Initial investment)}$$

Where, PVIF (r%, t^{th} year) is Present Value Interest Factor at r%, t^{th} year. It can be taken from Present Value Interest Factor (PVIF) table and 'Ct' is the cash inflows (benefits) at the end of tth year.

Decision rule
1. If IRR > Ko - Accept the proposal (project)
2. If IRR < Ko - Reject the proposal (project)
3. If IRR = Ko - Further analysis is required

Illustration:
Let the cash flows associated with a project under consideration is as follows: (Assuming life of the project is five years and weighted average cost of capital, Ko, is 10%)

Year	Cash-flows (Rs.)	
0	(1,00,000)	→ Initial investment (cash outflows/cost)
1	20,000 (C_1)	
2	30,000 (C_2)	
3	30,000 (C_3)	Cash inflows (Benefits)
4	20,000 (C_4)	
5	40,000 (C_5)	

Then, at IRR = r%,

$$\textbf{NPV = 0} \; i.e. \; \textbf{PV (Benefits)} \left\{ \sum_{t=1}^{n} \textbf{Ct} \times \textbf{PVIF} \, (\textbf{r\%}, \textbf{t}^{th} \, \textbf{year}) \right\} = \textbf{I}$$

At r = 15%,
PV (Benefits) = {C_1 × PVIF (r%, 1st year) + C_2 × PVIF (r%, 2nd year) + C_3 × PVIF (r%, 3rd year) + C_4 × PVIF (r%, 4th year) + C_5 × PVIF (r%, 5th year)}
= {20000 × PVIF (15%, 1st year) + 30000 × PVIF (15%, 2nd year) + 30000 × PVIF (15%, 3rd year) + 20000 × PVIF (15%, 4th year) + 40000 × PVIF (15%, 5th year)}
= {20000 × 0.870 + 30000 × 0.756 + 30000 × 0.658 + 20000 × 0.572 + 40000 × 0.497}
= 17400 + 22680 + 19740 + 11440 + 19880
PV (Benefits) = 91140

At r = 10%,
PV (Benefits) = {C_1 × PVIF (Ko%, 1st year) + C_2 × PVIF (Ko%, 2nd year) + C_3 × PVIF (Ko%, 3rd year) + C_4 × PVIF (Ko%, 4th year) + C_5 × PVIF (Ko%, 5th year)}
= {20000 × PVIF (10%, 1st year) + 30000 × PVIF (10%, 2nd year) + 30000 × PVIF (10%, 3rd year) + 20000 × PVIF (10%, 4th year) + 40000 × PVIF (10%, 5th year)}
= {20000 × 0.909 + 30000 × 0.826 + 30000 × 0.751 + 20000 × 0.683 + 40000 × 0.621}
= {18180 + 24780 + 22530 + 13660 + 24840}
PV (Benefits) = 103990

Thus 'r' lies between 10% and 15%. Following is the calculation of exact value of 'r':
Rs. 12850 change is equivalent to 5% change.

$\therefore$ Rs. 1 change is equivalent to $\left(\dfrac{5}{12850}\right)\%$ change

$\therefore$ Rs. 3990 change is equivalent to $\left(\dfrac{5}{12850}\times 3990\right)\%$ change

= 1.55 % change

Again, since when 'r' increases PV (benefits) decreases.

$\therefore$ To decrease 103990 by 3990, 'r' should be increased by 1.55% from 10%

Thus r = 10% + 1.55%

i.e. $\boxed{\text{r = IRR = 11.55\%}}$

Thus according to definition of IRR,

At IRR = 11.55%, PV(Benefits) = I = Rs. 1,00,000

Advantages of Internal Rate of Return (IRR) Method

The internal rate of return method has the following advantages:

- Like the net present value method, it takes into account the time value of money concept and is suitable to be applied for comparing projects with unequal investment of funds.
- It considers the profitability of the project for its entire economic life and hence evaluates true profitability.
- The determination of cost of capital is not a pre-requisite for the use of this method and hence it is better than net present value method where the cost of capital cannot be determined easily.
- It helps in ranking of various proposals under consideration due to its presentation in terms of percentage rate of return.
- This method is also compatible with the objective of shareholder's wealth maximization and is considered to be a more reliable technique of capital budgeting.

Disadvantages of Internal Rate of Return (IRR) Method

In spite of so many advantages, it suffers from the following drawbacks:

- It is difficult to understand and is the most difficult method of evaluation of investment proposals.
- This method is based upon the assumption that the earning are reinvested at the internal rate of return for the remaining life of the project, which is not a justified assumption particularly when the average rate of return earned by the firm is not close to the internal rate of return, In this sense, net present value method seems to be better as it assumes that the earnings are reinvested at the rate of firm's cost of capital (Ko).
- The results of NPV method and IRR method may differ when the projects under evaluation differ in their size (initial investment), life and timings of each cash flow.
- This method is not useful if investment (cash outflows) occurs at different points of time as in that situation IRR takes more than one value misleading sound investment decision.

Application of Evaluation Techniques in the Context of Information Technology (IT)

- IT professionals are supposed to deliver IT solutions. Developing software is a part of IT solution *i.e.* proposed automation.
- The IT solution team comprises of following members:

Team member	Job profile
Director (Project)	His main job is to deal with customer and to convince the customer on the basis of feasibility analysis of proposed automation.
Project leaders/managers	Their job is to critically evaluate the system designed by system analyst taking into account the requirements/expectations of customer from proposed automation.
System analyst	The job of system analyst is to analyse the existing system and designing of automated system for customer in terms of DFD* and ER** diagram taking into account the requirements of customer.
Senior programmer	The job of senior programmer is to design the structure using appropriate language/package.
Junior programmer	Jr. Programmer is concerned with the coding aspect using appropriate language/package

* Data Flow Diagram

** Entity Relation

- In the process of automation *i.e.* providing IT solution the different types of cost and benefits associated with proposed automation are as follows:
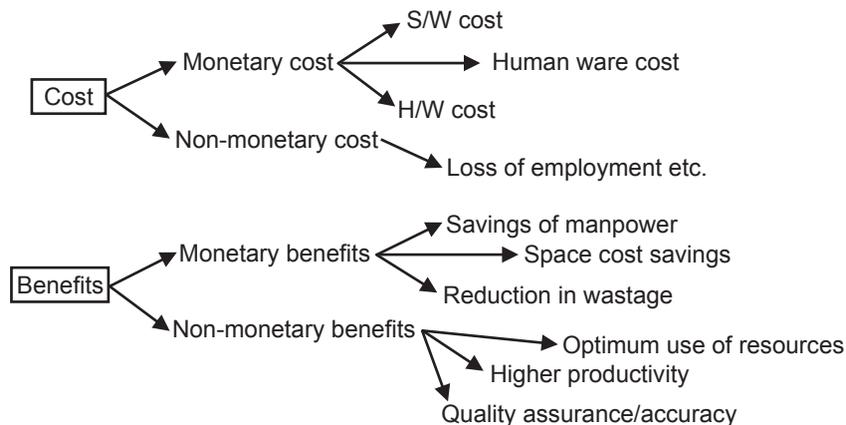
- Feasibility analysis refers to Cost and Benefits analysis associated with proposed automation.
- Social Cost and Benefits analysis refers to study of non-monetary cost and benefits analysis.
- The techniques used for cost and benefit analysis are termed as appraisal/evaluation techniques also referred as appraisal criterion.

Exercises

Q. 1. Define Financial Management. Briefly describe functions of Financial Management.

Q. 2. Describe role of finance manager.

Q. 3. "Profit maximization vs. Wealth maximization". Comment

Q. 4. Wealth maximization is the real objective of Financial Management as it helps in financial decisions. Explain this statement.

Q. 5. Describe scope of Financial Management.

Q. 6. Briefly describe Indian Financial System.

Q. 7. Differentiate between short-term investment decision and long-term investment decision.

Q. 8. Explain time value of money concept with suitable example.

Q. 9. Through illustration show how present value concept or future value concept helps in long-term investment decision.

Q. 10. The present age of Mr. X is 30 years. Mr. X will retire at the age of 60 years. Calculate how much amount Mr. X should deposit in his PPF Account, maintained continuously for two terms so that he can withdraw Rs. 20,000 per month (or Rs. 2,40,000 per annum) for next 30 years after retirement. Assume that the rate of interest offered on PPF account is 8% during service period; also assume that Mr. X will invest the entire sum of post retirement in fixed income scheme offering 8% rate of interest. Currently the term for PPF account is 15 years.

Q. 11. Define capital budgeting and write down steps involved in capital budgeting process.

Q. 12. What are characteristics and difficulties associated with capital budgeting decision?

Q. 13. Briefly describe sources of financing capital budgeting decision.

Q. 14. Differentiate between equity shares, preference shares and debentures/bonds.

Q. 15. Briefly describe advantages and disadvantages of equity shares, preference shares and debentures.

Q. 16. Differentiate between non-discounting and discounting techniques. Also describe examples of non-discounting and discounting techniques.

Q. 17. Write short note on advantages and disadvantages of appraisal techniques.

Q. 18. Explain how evaluation techniques are useful in the context of Information Technology (IT).