UNIT-II

INVESTMENT DECISION

COST OF CAPITAL

The cost of capital is a very important factor in formulating a firm's capital structure. It is one of the corner stones of the theory of financial management, yet it is very control-company, it is very necessary to consider the cost of each source of capital is in the interest of owners as well as of the contributors i.e., creditors etc. Now-a-days, cost of capital is the major deciding factor of the capital structure. Prior to this development, cost of capital was either ignored or by-basis of capital budgeting decisions or long-term capital investment decision and to evaluate the alternative sources of capital. Different costs are used in different times and for different purposes.

Definition of cost of capital

In general, the cost of capital is the measurement of the sacrifice made by an investor in order to capital formation with a view to get a fair return as his investment as a reward of postponement of his present needs. Thus the cost of capital for an investor is the measurement of disutility of funds in the present as compared to the return expected in future. But from the company's point of view, its meaning is somewhat different. From its point of view the cost of capital is the required rate of return to justify the use of capital so that the expected rate of return can be maintained on equity shares and the market value per share remains unchanged or should not be reduced at least.

(1) "The cost of capital is the minimum required rate of earnings or the cut-off rate of capital expenditures".

- Soloman Ezra.

(2) "The cost of capital represents a cut-off rate for the allocation of capital to investment of projects. It is the rate of return on a project that will leave uncharged the market price of the stock."

- James C. Van Horne.

Importance of cost of capital

The concept of cost of capital is relevant in the following managerial decisions:-

1. In capital budgeting decisions to measure the profitability of the project and adaptability of the investment opportunities.
2. In designing the corporate financial structure to maintain the cost of capital at its low ebb.
3. In deciding about the method of financing – loan or capital.
4. In evaluating the performance of management.
5. In other areas such as dividend decisions, working capital decisions etc.

Classification of Cost of Capital

Cost of capital can be classified as follows:

1. **Explicit cost and implicit cost:** The explicit cost of any source of finance may be defined as the discount rate that equates the present value of the funds received by the firm net of underwriting costs, with the present value of expected cash outflows. These outflows may be interest payment, repayment of principal or dividend. This may be calculated by computing value according to the following equation.

$$I_0 = \frac{C_1}{(1+K)^1} + \frac{C_2}{(1+K)^2} \ldots\ldots\ldots + \frac{C_N}{(1+K)^N}$$

Where : I_0 = Net amount of funds received by the firm at time zero,

C= Outflow in the period concerned,

n=Duration for which the funds are provided, and

K= Explicit cost of capital.

Thus, the explicit cost of capital may be taken as the rate of return of the cash flows of financing opportunity. It is, in other words, the internal rate of return the firm pays for financing.

The implicit cost may be defined as "the rate of return associated with the best investment opportunity for the firm and its shareholders that will be forgone if the project presently under consideration by the firm were accepted." When the earning are retained by company, the implicit cost is the income which the shareholders could have earned if such earnings would have been distributed and invested by them. As a matter of fact explicit costs arise when the funds are raised, while the implicit costs arise whenever they are used. Viewed from this angle, funds raised from any source have implicit costs once they are invested.

2. **Future cost and historical cost:** Future cost refers to the expected cost of funds to finance the project, while historical cost is the cost which has already been incurred for financial a particular project. In financial decision making, the relevant costs are future costs and not the historical costs. However, historical costs are useful in projecting the future costs and providing an appraisal of the past performance when compared with standard or predetermined cost.

3. **Specific cost and combined cost:** The cost of each component of capital (i.e., equity shares, shares, preference shares, debentures, loans, etc) is known as specific cost of capital. In order to determine the average cost of capital of ht firm, it becomes necessary first to consider the costs of specific methods of financing. This concept of cost is useful in those cases where the profitability of a project is judged on the basis of the cost of the specific source from where the project will be financed.

   The composite or combined cost of capital in inclusive of all cost of capital form all sources, i.e., equity shares, preference shares, debentures and other loans. In capital investment decisions, the composite cost of capital will be used as a basis for accepting or rejecting the proposal, even though the company may finance one proposal from one source of financing while another proposal from another source financing. This is because it is overall mix of financial over time; will is important in valuing the firm as an on-going overall enters.

4. **Average cost and marginal cost:** The average cost of capital is the weighted average of the costs of each component of funds employed by the firm. The weights are in proportion of the share of each component of capital in the total capital structure.

The computation of average cost of capital involves the following problems:

(i) It requires measurement of costs of each specific source of capital.

(ii) It requires assigning of appropriate weights to each component of capital.

(iii) It raises questions whether the average cost of capital is at all affected by changes in the composition of the capital. The financial experts differ in their approaches. According to, the traditional approach, the firm's cost of capital depends upon the method and level of financing. While according to the modern approach as propounded by Modigliani and Miller, the firm's total cost of capital is independent of the method and level of financing.

Controversy regarding cost of Capital

The concept of cost of capital has considerable practical utility. However, it should be noted that cost of capital is not only the most important but also the most disputed topic in financial management. There are two important approaches in this regard.

1. **Traditional Approach:** According to this approach, a firm's cost of capital depends upon the method and level of financing or its capital structure. A firm can, therefore, change its overall cost of capital by increasing or decreasing the debt-equity mix. Funds from other sources, such as equity shares and preference shares, also involve cost. But the raising of funds through debentures in cheaper because of the following reasons:

(i) Interest rates usually lower than dividend rates.

(ii) Interest is allowed as an expense resulting in a tax benefit while dividend is not allowed as an expense while computing taxable profits of the company.

The traditionalist theorists argue that the weighted average cost of capital will decrease with every increase in the debt content in the total capital employed. However, the debt content in the total capital employed should be maintained at a proper level because cost of debt is a fixed burden on

the profits of the company. It may have adverse consequences in periods when company has low profitability.

2. **Modigliani and Miller Approach:** According to, this approach, the corporation's total cost of capital is constant and it is independent of the method and level of financial. In other words, according to this approach a change in the debt- equity ratio does not affect the total cost of capital. According to traditional approach, as explained above, the cost of capital is the weighted average and of the debt and the cost of equity. Each change in the debt-equity ratio automatically offsets changes in one with the change in other on account of change in the expectation of equity shareholders. For example, the capital structure of a company is as follows:

9% Debenture	Rs. 1, 00,000
Equity share Capital	Rs. 1, 00,000

The company has at present even-equity ratio. It has been paying dividend at the rate of 12% on equity shares. In case, the debt-equity ratio changes to say, 60% debt and 40% equity, the following consequences will follow:

(i) The debt being cheaper, the overall cost of capital will come down.

(ii) The expectation of the equity shareholders from percent dividend of 12%, will go up because they will find the company more risky.

Thus, the overall cost of capital of the company will not be affected by change in the debt-equity ratio. Modigliani and Miller, therefore, argue that within the same risk class, mere change of debt-equity ratio does not affect the cost of capital. Their following observations need careful consideration.

(i) The total market value of the firm and its cost of capital independent of its capital are structure. The total market value of the firm can be computed by capitalizing the expected stream of operating earnings at a discount rate considered appropriate for its risk class.

(ii) The cut-off rate for investment purposes is completely independent of the way in which investment is financed.

Assumptions under Modigliani-Miller Approach: The Modigliani-Miller Approach is subject to following assumptions:

(i) Perfect capital market- The securities are traded in perfect capital markets. This implies that:

(a) The investors are free to buy or sell securities.

(b) The investors are completely knowledgeable and rational persons. All information and changes in conditions are known to them immediately.

(c) The purchase and sale-of securities involve no costs such as broker's commission, transfer fees, etc.

(d) The investors can borrow against securities without restrictions on the same terms and conditions as the firms can.

(ii) Firms can be grouped in homogeneous risk classes: Firms should be considered to belong to a homogeneous class if thief expected earning have identical risk characteristics. In other words, all firms can be categorized according to the return that they give and a firm in each class is having the same degree of business and financial risk.

(iii) Same expectation- All investors have the same expectation of firm's net operating income (EBIT) which is used for evaluation of

a firm. There is 100% dividend pay out, i.e., firms distribute all of their net canings to the shareholders.

(iv) No corporate taxes- In the original formulation Modigliani and Miller hypothesis assume that there are no corporate taxes. This assumption was removed later.

In conclusion, it may be said that in spite of the correctness of the basic reasoning of Modigliani and Miller, the traditional approach is more realistic on account of the following reasons.

(a) The corporations are subject to income-tax and, therefore, due to tax effect, the cost of debt is lower than cost of equity capital.

(b) The basic assumption of Modigliani and Miller hypothesis that capital markets are perfect is seldom true.

Elements/Components of Cost of Capital

The cost of capital contains the following elements:

1. Cost of Equity (K_E)
2. Cost of retained Earnings (K_R)
3. Cost of Preferred Capital (K_P)
4. Cost of Debt (K_0)

Cost of Equity (K_E)

The funds required for the project are raised from the equity shareholders which are of permanent nature. These funds need not be repayable during the life time of the organisation. Hence it is a permanent source of funds. The equity shareholders are the owners of the company. The main objective of the firm is to maximize the wealth of the equity shareholders. Equity share capital is the risk capital of the company, If the company's business is doing well the ultimate beneficiaries are the equity shareholders who will get the return in the form of dividends from the

company and the capital appreciation for their investment. If the company comes for liquidation due to losses, the ultimate and worst suffers are the equity shareholders. Sometimes they may not get their investment back during the liquidation process.

Profits after taxation, less dividends paid out to the shareholders, are funds that belong to the equity shareholders which have been reinvested in the company and therefore, those retained funds should be included in the category of equity, the cost of retained earnings is discussed separately from cost of equity capital. The cost of equity may be defined as the minimum rate of return that a company must earn on the equity financed portion of an investment project so that market price of the shares remains unchanged. The following methods are used calculation of cost of Equity.

a) **Dividend Yield Method:** The dividend per share is expected on the current market price per share. As per this method, the cost of capital is defined as "the discount rate that equates the present value of all expected future dividends per share with the net proceeds of the sale (or the current market price) of a share." This method is based on the assumption that the market value of shares is directly related to the future dividends on the shares. Another assumption is that the future dividend per share is expected to be constant and the company is expected to earn at least this yield to keep the shareholders content.

$$\mathbf{K_E} = \frac{\mathbf{D_1}}{\mathbf{P_E}}$$

Where $\mathbf{K_E}$ = Cost of Equity

D = Annual dividend per share

P_E = Ex- dividend market price per share

This method emphasis on future dividend expected to be constant. It does not allow for any growth rate. But in reality, a share holder expects the returns from his equity investment to grow overtime. This approach has no relevance to the company.

(b) Dividend Growth Method: Shareholders will normally expect dividend to increase year after year and not to remain constant in perpetuity. In this method, an allowance for future growth in dividends is added to the current dividend yield. It is recognized that the current market price of a share reflects expected future dividends.

$$K_E = \frac{D_1}{P_E} + g$$

Where, D_1 = Current dividend per equity share

P_E = Market price per equity share

g = Growth is expected dividend

Some times the dividend growth model formula for calculation of cost of equity share capital is also written as follows:

$$K_E = \frac{D_0 (1+g)}{P_E} + g$$ **Where,**

D_0 = Last dividend paid per share

g = Constant annual growth rate of dividend

P_E = Ex – dividend market price per share

The dividend growth model is criticized on the following reasons:

(i) The future growth pattern is impossible to predict because it will be inconsistent and uneven.

(ii) Due to uncertainty of future and imperfect information, only historic growth is to used for prediction of future growth. Calculation of only equity cost of capital ignoring the cost of other forms of capital may not be valid.

(iii) The dividend growth depend on the retained earnings of the company and the growth is difficult of assume.

(c) **Price Earning Method:** This method takes into consideration the earnings per share (EPS) and the market price of the share. It is based on the assumption that the investors capitalize the steam of future earnings of the share and the earnings of a share need not be in the form of a share need not be in the form of divided and also it need not be disbursed to the shareholders. It is based on the argument, even if the earnings are not disbursed as dividends, it is kept in the retained earnings and it causes further growth in the earnings of the company as well as the increase in market price of the share. In calculation of cost of equity share capital, the earnings per share are dividend by the current market price.

$$K_E = \frac{E}{M}$$

Where, E = Current earnings per share

M = Market price per share

(2) Cost of Retained Earning (K_R)

The retained earnings is one of the major sources of finance available for the established companies to finance its expansion and diversification

programmes. These are the funds accumulated over years of the company by keeping part of the funds generated without distribution. The equity share holders of the company are entitled to these funds and sometimes, these funds are also taken into account while calculating the cost of equity. But so long as the retained profits are not distributed to the shareholders, the company can use the funds within the company for further profitable investment opportunities.

Hence cost of equity includes retained earnings. But in practice, retained earnings are a slightly cheaper source of capital as compared to the cost of equity capital. Therefore, the cost of retained earnings is treated separately from the cost of equity capital. The cost of retained earnings to the shareholders is basically an opportunity cost of such funds to them. It is equal to the income that they would otherwise obtain by placing these funds in alternative investment. The cost of retained earnings is determined based on the opportunity rate of earnings of equity shareholders which is being forgone continuously. If the retained earnings are distributed to the equity shareholders attract personal taxation of the individual shareholders and therefore, the cost of retained earnings is calculated as follows:

Where, K_R = Cost of retained earnings

T = Tax rate of individuals

K_E = Cost of equity capital

(3) Cost of Preference Shares (K_P)

The cost of preference share capital is the rate of return that must be earned on preference capital financed investments to keep unchanged the earnings available to equity shareholders.

Cost of Irredeemable Preference Shares: The cost of redeemable preference shares is calculated as follows:

$$K_p = \frac{\left[D + \left(\frac{R_V - S_V}{N} \right) \right]}{\left[\frac{R_V - S_V}{N} \right]}$$

Where, K_P = Cost of redeemable preference shares

D = constant annual dividend payment

N = Years of life to redemption of preference shares

R_V = Redeemable value of preference shares at the time of maturity

S_V = Sale out value of preference shares less discount and flotation expenses.

(4) Cost of Debt (K_D)

The capital structure of a firm normally includes the debt component also. Debt may be in the form of debentures, Bonds, term loans from Bank and financial institutions etc. the debt is carried a fixed rate of interest payable to them irrespective of the profitability of the company. Since the coupon rate is fixed, if the firm increases its earnings through debt financing, them after payment of fixed interest charges, more surplus is available for equity shareholders, and hence EPS will increase.

An important point to be remembered hare that, dividend payable to equity shareholders and preference shareholders is an appropriation of profit, whereas the interest payable on debt is a charge against profit.

Therefore, any payment towards interest will reduce the profit and ultimately the company's tax liability would decrease. This phenomenon is called 'Tax shield'.

The tax shield is viewed as a benefit accrues to the company which is geared. To gain the full tax shield the following conditions apply:

The company must be able to show a taxable profit every year to make full advantage of the tax shield. If the company makes loss, the tax shield goes do own and the tax shield goes do own and the cost of borrowing increases.

Cost of Perpetual Debt: The cost perpetual debt (irredeemable debt) is calculated with the following formula:

$$K_D = \frac{I\,(1 - T)}{M}$$

Where, K_D = Cost of debt

I = Annual interest payment

T = Company's effective corporate tax rate

D = Net proceeds of issue of debt

Cost of Redeemable Debt: The cost of redeemable debt is calculated by applying by applying the following formula:

$$K_D = \frac{\left[I + \left(\frac{R_V - S_V}{N} \right) \right] (1 - T)}{\left[\frac{R_V + S_V}{2} \right]}$$

Where, K_D = Cost of debt

I = Annual interest payment

N = Term of maturity period

T = Company's effective tax rate

R_V = Redeemable value of debt at the time of maturity

S_V = Sale value less discount and floatation expenses.

Weighted Average cost of Capital (WACC)

Cost of capital is the overall composite cost of capital and may be defined as the average of the cost of each specific fund. Weighted average cost of capital (WACC) is defined as the weighted average of the cost of various sources of finance, weight being the market value of each source of finance outstanding cost of various sources of finance refers to the return expected by the respective investors.

The CIMA defines the weighted average cost of capital "as the average cost of the company's finance (equity, debentures, bank loans) weighted according to the proportion each element bears to the total pool of capital, weighting is usually bases on market valuations current yields and costs after tax."

The argument in favour of using WACC stems from the concept that investment capital from various sources should be seen as a pool of available capital for all the capital projects of a organization. Hence cost of capital should be weighted average cost of capital. Financing decision, which determines the optional capital mix, is traditionally made without making any reference total acceptance or otherwise of a specific project. Similarly a specific project is evaluated without considering the mode of financial of that project. Traditionally, optimal capital structure is

assumed at a point where weighted average cost of capital WACC is minimum. For project evaluation, this WACC is considered as the minimum rate of return required from project to pay off the expected return of the investors and as such WACC is generally referred to as the required rate of return. Accordingly, the relative worth of a project is determined using this required rate of return as the discounting rate. Thus, WACC gets much importance in both the decisions.

Simple WACC: The simple WACC is calculated without consideration to the impact of tax on cost of capital. The combined cost of equity capital and debt capital is the WACC for a company as whole. It the company is all equity financed, the cost of equity will be the cost of capital. In case of geared companies, the WACC can be stated as follows:

WACC = (Cost of equity x % equity) + (Cost of Debt x % Debt)

WACC is the discount rate that can be used to evaluate the as the company as a whole and provided that they used the same combination of debt and equity to finance the proposed investments, or financed by company reserves.

The weighted average cost of capital of a company is calculated in two capitals.

(i) Based on weight of costs by the book value of the different forms of capital.

(ii) Based on weight of market value of each form of capital.

The market value approach is more realistic for the reasons given below:

(i) The cost of funds invested at market prices is familiar with the investors.

(ii) Investments are generally rated by the reference to their earnings yield, and the company has a responsibility to maintain that yield.

(iii) Historic book value have no relevance in calculation of real cost of capital.

(iv) The market value represents near to the opportunity cost of capital.

WACC after considering tax shields: After taking the tax shields into account, the following formula is applied for calculation of WACC.

$$\mathbf{WACC} = \frac{\mathbf{I\,(1-T)}}{\mathbf{M}} + \mathbf{(1-T)}\,\mathbf{K_D}\,\frac{\mathbf{D}}{\mathbf{D+E}}$$

Where, K_E = Cost of equity capital

K_D = Cost of debt

E = Market value of equity capital

D = Market value of debt

T = Corporate tax rate

The simplified version of the above formula is given below:

WACC = (Cost of Equity x % of Equity)

+ [Cost of Debt (1 – tax rate) x % of Debt]

The percentage of equity and debt represents the gearing of the company. The tax rate is corporate rate of tax payable by the company form profits.

UNIT -II

CAPITAL BUDGETING

The process of capital budgeting

Capital budgeting is a complex process divided into different phases.

- Identification of potential investment opportunities.

- Assembling of proposed investments.
- Decision making.
- Preparation of capital budget and appropriation.
- Implementation.
- Performance review

Identification of potential investment opportunities

The process starts with identification of potential investment opportunity. Development of estimates takes place future sales to form the basis for production target. The information is useful in identifying required investment in plant and equipment.

Assembling of Investment Proposals

Investment proposals identified by the production and other departments are routed several persons so that the proposals can be viewed from different angles.

Decision making

The decision regarding monetary financing of the project upto a specified limit at different executive level are taken in this step.

Preparation of Capital Budget and Appropriation

The projects with large investment require appropriation order. The purpose of this check is mainly to ensure that the funds position of the firm is satisfactory at the time of implementation, and review the project at time of implementation.

Implementation

Different types of investment decisions

The classification of investment plans can be done as under:

- Expansion and Diversification
- Replacement and Modernization

- Mutually exclusive Investments
- Contingent Investments

Expansion and Diversification

A company may add capacity to its, existing product lines, to expand existing operation or to manufacture more.

A company may also desire to manufacture products which it has not manufactured before or the company wants to diversify.

In both the cases the firm makes investment in the expectation of additional revenue.

Replacement and Modernization

The purpose of modernization or replacement is to improve efficiency and reduce costs. The firm decides to replace outdated and obsolete assets with modern equipments to function economically.

Replacement decisions which include modernization and technological improvements expand revenue as well as reduce costs.

Mutually exclusive Investments

The investment decisions which serve the same purpose and compete with each other are mutually exclusive investments. Only one out of many can be undertaken.

Independent Investments

The investments which serve different purpose and do not compete with each other are independent investment plans. Depending on their profitability and availability of funds the company can undertake all investments.

Contingent Investments

When the choice of one investment necessitates under taking one or more other investment plans such project are contingent investment projects for

instance if company decides to open a factory it may have to invest in facilities for employees. The total expenditure is treated as one single investment.

How are decisions under risk and uncertainty taken?

In real world situations the firm is exposed to various degree of risk because of general economic conditions occurring in business. The element of risk is inspirable from business. Risk is the possibility of deviation of actual returns from the expected returns as a result of an investment. In a risk situation the decision maker knows the probabilities of occurrence of particular events or expected outcomes. Probabilities of outcomes can be estimated on the basis of basis of past experience uncertainty exists when the decision maker does not know the probabilities of occurrence of particular events or expected outcomes no historical data is available to make estimations, thus uncertainty exists where the decision maker can guess the odds or chance of each possible outcome occurring. To take decision under situation of risk decision tree analysis proves to be helpful.

Decision tree analysis

Is a graphical method to compare the value of various options or decision alternatives and to arrive at the actual decision alternative to be implemented? In decision tree method the decision maker can visualize the options open to him together with the risk possible outcomes and information needs involved in a problem.

The decision tree analysis consists of following steps:

1. Identifying the problems and alternatives.
2. Delineating the decision tree.
3. Specifying the profanities associated with each of the possible outcomes and determining the monetary value of each combination.

4. Evaluating various decision alternatives.

A decision tree is made of nodes and branches. Each branch leading away from a mode indicates one of the several possible courses of action. Any branch that makes the end of the decision tree is called a 'terminal branch.' Terminal node indicates either a course or an outcome.

MEANING AND DEFINITION OF CAPITAL BUDGETING

Capital expenditure decisions relate to fixed assets or long term investments which yield a return over a period of time.

The term 'capital budgeting' refers to long term planning for making and financing proposed capital outlays. Thus, capital budgeting includes the following two things raising of long term funds their optimum utilization.

Definitions of capital Budgeting are as follows: Charles T. Horngren, "Capital Budgeting is the long term planning for making and financing proposed capital outlays."

R.M. Lynch, "Capital Budgeting consists in planning the development of available (return on investment) of the firm."

Killer and Ferrara, "The capital expenditure Budget represents the plans for the appropriations and expenditures for fixed assets during the budget period.

Need and importance of capital budgeting

(1) **Relatively High Lost –** Almost all the capital projects involve heavy investment of funds. Hence, their efficient budgeting can not be neglected.

(2) **Long run effects –** Capital profits affect the earnings of the business for coming several years. For example, replacement of labour by machine increases the fixed costs of the business.

(3) **Greater uncertainty and risk –** The complicacies of long term investment decision are wider – spread than short term decisions because these decisions affect the operations of the business for many coming years and so their effect can not be precisely estimated immediately and they carry greater uncertainty and risk.

(4) **Permanent commitment –** The funds investment in capital projects are more or less permanently blocked. These investments are of irreversible nature i.e., they can be taken back quickly without any material loss. Hence, a careful planning of capital expenditure is important.

(5) Arrangement of funds – Capital expenditure budget is a well – conceived plan of capital expenditure in future. Thus, capital budgeting facilitates I finding out whether the necessary funds would be provided by internal or external sources. If helps the management in arranging the sizable founds for financing the capital expenditure programme well in advance to ensure their availability at the right time.

(6) Vitally affects profitability and financial position – The financial position and profitability of the concern are immediately and significantly affected by capital investments and the management becomes dependent on future event for the financial flexibility of their concern. Hence, such investments should be very carefully planned.

(7) National Importance – Investment decisions are of national importance too as they affect employment, economic activities and economic growth.

Factors affecting capital investment decisions

Though profitability of the proposal is the important factor that influences the capital expenditure decision but this can not be the sole determinant for

these decisions. In practice there are several other factors which make the profitability base subsidiary or less important. These factors are explained below –

1. **Funds Available –** the availability of funds is a crucial factor that influences the capital budgeting decisions. Sometimes, a more profitable project is not taken up for want of sufficient funds and a lesser profitable project of lower payback period is approved, if the firm is short of funds.

2. **Available technical know how and managerial lap ability –** Before approving a project, the management will have to take into consideration whether their firm has got the necessary technical know now and managerial capability to lay down that project and if not whether it could be acquired.

3. **Availability of Additional funds –** If the management is capable of arranging additional funds in the coming years, then all the funds available at present may be used for the capital projects, if not, working capital needs will have to be arranged out of the funds available with the firm.

4. **Urgency of the project –** Sometimes an investment is made due to urgency to avoid heavy losses. For example, on break-down of machinery, management have to decide to replace it by any available machine suitable for the work without proper (evaluation of its cost and so as to avoid heavy losses) incurred due to stoppage of production process. In such a case, the basis of managerial decision is urgency and not the prodigality.

5. **Future Expectations of Earnings –** The earnings expected on future investment (may also influence current capital investment) decisions. If more profitable investments are possible in future, then at present management would select the project of lower useful life so that the funds invested may be taken back early and could be invested in future in more profitable projects. On the other hand, if there is possibility of rate of return

on investment to go down then long economic life projects would be much better even if rate of return on this project is lower to a short lived project.

6. Fuller Utilization of Funds – The main goal of managerial policy is to maximize the owners wealth. Hence, if the firm has enough funds for investment then a project yielding highest rate of return and requiring lesser outlay may not be approved by the management if no other profitable investment of spare funds is possible. If on other profitable investment of spare funds is possible. In such a situation, it may be appropriate to select then next best project if total funds of the concern could be invested in the project, so that the profits of the firm are maximized.

7. Degree pf Certainty of Net Income – Certainty of income on project also have an effect on the selection of the project. Although future business operations are uncertain, even then the management may select a lower income project in place of a higher but uncertain income project.

8. Intangible Factors – Goodwill of the firm, employees morale and their outlook towards the new project etc are same reasons which have outlook towards the nothing to do with the profitability of investment, even then these can not be ignored. For example employees welfare projects, legal projects etc. these investments benefit the firm indirectly.

9. Maintaining Market Share – Sometimes, the management may take a decision in favour of a project though getting a lower return but necessary to maintain earning capacity and existing market share of the firm.

10. Risk of Obsolescence – In case of rapid technological development, the project with a lesser payback period may be preferred in comparison to one which have higher profitability but longer payback period.

CAPITAL RATIONING

Westen and Brighan define Capital Rationing as “a situation where a constraint id placed on the total size of capital investment during a particular period.”

Firms usually find that there are more acceptable projects than they have the money to undertake. Under such cases, the management adopts the policy of capital rationing. It is the process of distribution of available capital funds over various capital projects according to their ranks and profitability. The basic aim of capital rationing is to select the group of projects that will maximize the owner’s wealth. This is done by selecting the group of acceptable projects that provides the highest overall net present value subject to the budget constraint for the period. For the sake of this purpose, proposals below the cut off point are ranked in descending order of their profitability as per the method of appraisal of investment projects. Then best of these projects are selected keeping in view the budget appropriations for the purpose. It should be kept in mind that all the projects considered must be independent but if there are any mutually exclusive projects, the best of these should be selected and placed in the group of independent projects.

REASONS RESPONSIBLE FOR CAPITAL RATIONING

The reasons responsible for capital rationing are –

1. External Factors
2. Internal Factors

1. **External Factors –** It mainly occurs due to the imperfections of the capital market. Imperfections may be caused by deficiencies is market information, by rigidities that comes in the way of free flow of capital between firms, and by a difference between the way of free flow of capital between firms, and by a difference between the interest at which the firm can obtain capital in the market (i.e., in borrowing rate) and the interest rate

it could earn by lending its own capital to others in the market (i.e., the lending etc). because of these imperfections, the firm is not able to obtain necessary capital to finance its profitable investment opportunities.

2. **Internal Capital Rationing –** It is caused by self – imposed restriction by management. It is quite difficult sometimes of find a rationale for such restrictions. Different types of restrictions can be imposed by the management for it may be decided not to obtain additional capital by incurring debt. This may be the part of the firm's conservative policy. Similarly the management may fix on arbitrary limit to the amounts of funds to be invested by the divisional managers.

Sometimes management resort to capital rationing by requiring a minimum rate of return higher than the cost of capital.

The following are the approaches to project selection under capital rationing –

(i) **The Internal Rate of Return Approach –** This approach includes plotting of IRR's or yields, against total repels on the basis of decreasing yields. By drawing an acceptable project line and then imposing a budget constraint, the group of acceptable projects can be determined.

(ii) **The net Present value Approach –** This approach also emphasizes the group of projects that maximize the firm's owners wealth. It includes ranking projects on the basis of present value of the benefits each project in order to determine the combination of project with the highest overall present value.

(iii) **Integer programming –** It is a quantitative technique for optimizing same objective subject to certain constraints, hence, quite useful in solving capital rationing problem too. Capital rationing problems represent situations of constrained maximization since the basic aim is to

select the group of projects that maximizes the present value cash inflows subject to a budget (or financial) constraint.

However two factors limit the use of these approaches in practice. First, they are costly and second, they assume investment opportunities as know. Also, large companies in reality hardly face the real capital shortage situations. Mostly it occurs on account of the internal constraints imposed by the management for capital purpose.

METHODS OF RANKING CAPITAL INVESTMENT PROPOSALS

The commonly used methods for evaluating the relative worth of investment proposals are as follows –

(A) Traditional Methods

1) Inspection Methods – In this method, capital investment proposals are evaluated and ranked on profitability criterion merely by inspection. It is possible to use this method for the following proposals:

(i) When competing investment proposals have identical investment and cash inflows of time, but in one case cash inflows continue for a longer period than the other cases.

(ii) When two investment proposals have equal aggregate cash inflows but in case cash inflows in the earlier years than these in latter years.

This method in unsuitable in cases where the above conditions are combined with unequal investment outlays. Moreover, this method also does not take into account the time value of money. The only advantage of these methods is that it is simple and does not require an expert to evaluate the capital investment proposals.

(2) Urgency Method – In this method, the projects are selected on the basis of degree of their urgency. The projects can not be delayed and are needed at once are undertaken first. For eg, if there is a breakdown in machinery and it can not be repaired, naturally, management can decide to replace it at once without making any exercise in calculations in order to avoid delay in production.

This method is simple but cannot be applied for long – term projects.

(3) First Year's Performance Method – Under this method, the investment projects are evaluated and ranked on the basis of their performance in the first year of their implementation. This performance can be measured in terms of additional sales or the savings in the expenses or addition to net operating income.

This method is simple and easy to understand and apply. But it is not scientific.

The disadvantages of this method are –

i) It takes into current only the first year's performance and subsequent year's results are ignored.

ii) It also ignores the time value of money.

(4) Payback period Method – This method is also known as pay – off, pay out or recoupment period method. It gives the number of years in which the total investment in a particular capital project pays back itself.

While there is a comperision between two or more projects, the project with lesser payback period will be acceptable.

Calculation of payback period –

(i) In case of even cash inflows –

$$\text{Pay back period} = \frac{\text{Initial investment}}{\text{Annual cash inflow}}$$

(ii) **In case of uneven cash inflows –** In such type of situation PB is calculated process of cumulating cash inflows till the time where cumulative cash inflows become equal to the original investment outlay.

Where, P – Stands for payback period.

E – Stands for number of years immediately proceeding the year of final recovery.

B – Stands for the balance amount still to be recovered.

C – Stands for cash flow during the year of final recovery.

MERITS	DEMERITS
1. Easy to understand and compute and inexpensive to use. 2. Emphasizes Liquidity. 3. Easy and crude way to deal with risk. 4. Uses cash flows information.	1. Ignores the time value of money. 2. Ignores cash flows occurring after the payback period. 3. Not a measure of profitability. 4. No objective way to determine the standard payback. 5. No relation with the wealth maximization principle. 6. Treats each asset individually in isolation with other assets. 7. Overlooks cost of capital.

IMPROVENENTS IN TRADITIONAL APPROACH TO PAYBACK METHOD

(I) Post – Payback Profitability – A major weakness of the tradition payback period method is that in ignores the profitability of post back period. Therefore some experts have suggested that post payback profitability should also be calculated and compared to evaluate the relative profitability of capital projects.

Post Pay - back profitability

= ACF (Working life – Pay back period + Salvage value)

Alternatively,

Post payback profitability = Total ACF – Initial Investment.

Ceteris Paribus (other things being equal) the project with higher post payback profitability will be desirable. If costs of projects differ substantially, Post payback Profitability Index can be computed for it.

$$\text{Post Pay Back profitability Index} = \frac{\text{Post Pay Back Profits}}{\text{Investment}} \times 100$$

(ii) Bail – out Payout period – if risk is the factor in capital budgeting decisions, the bail out payback period can be computed. This factor involves first estimating salvage value of each project at the end of each year and calculating the cumulative cash inflows. Then salvage value is added to the cumulative cash inflows. This aggregate is compared with the initial outlay of the project and when they are equal, that period is said the bail out payback period of the project.

(iii) Pay back Reciprocals – The traditional payback period technique ignores the time factor and rate of earnings an investment. These deficiencies may be removed by computing payback reciprocals.

T. A. Rate of Return or Payback reciprocal

$$= \frac{1}{\text{Payback Period}} \times 100$$

(iv) Discounted Pay – back period - In this method, the amount of annual cash inflows are discounted at a given rate of return and the payback period of the project is calculated with the discounted values of cash inflows.

(v) Accounting Rate of Return Method – This method is also called as Financial Statement Method, return on Investment Method or Unadjusted Rate of Return Method. Under this method, capital projects are ranked according to their rate of earnings. Projects which yield the highest earnings are selected.

$$\text{Average Rate of Return} = \frac{\text{Average Profits (after taxes)}}{\text{Average Investment}} \times 100$$

$$\text{Average Investment} = \frac{\text{Initial Investment + Scrap Value}}{2} \times 100$$

The following are merits and demerits of Average Rate of Return Method –

MERITS	DEMERITS
1. Uses accounting date with which executives are familiar. 2. Easy to understand and calculate. 3. Lives more weight age to future receipts. 4. Uses net earning concept.	1. Ignores the time value of money. 2. Does not use cash flows. 3. No objective may to determine the minimum acceptable rate of return. 4. It can not be used if investment made in parts. 5. No objective way to determine minimum rate of return.

(B) Discounted Cash – Flow Techniques –

A rupee in the hand has more worth than a rupee to be received five year later, because the use of money has a cost (interest). The DCF techniques take care of these both aspects, i.e., time value of money and cost of capital. There are four methods to judge the profitability of proposals on the basis of discounted cash flow technique.

(i) **Net Present Value methods –** The net present value method is based on a comparison of present value of an investment with the present value of the streams of its cash inflows. Present values of investments may be calculated at a discount rate which may be equal of the cost of capital of the firm or the rate of return desired by the firm on its investments.

The total present value of future cash inflows is computed with the help of the following algebraic formula –

$$P = \frac{S}{(1 + i)^n}$$

Where,

P – Stands for value of future sum of money.

S – Stands for future value of a sum of money.

i – Stands for rate of Interest.

n – Stands for number of years.

NPV = Total present value of cash inflows – Investment

If NPV is positive the project is accepted other wise rejected.

MERITS	DEMERITS
1. Considers all cash flows. 2. True measure of profitability. 3. Based on the concept of the time value of money. 4. Satisfied the value addictively principle. (i.e., NPV's of two or more projects can be added.) 5. Consistent with wealth maximization principle.	1. Requires estimates of cash flows which is a slow task. 2. Requires calculated opportunity, cost of capital which poses practical difficulties. 3. Sensitive to discount rates.

(ii) **Profitability Index Method or Benefit –** Lost Ratio Method one of the major disadvantages of NPV method is that it cannot applied to compare those mutually exclusive projects which deferrer costs substantially. To compare and evaluate such projects, profitability index should be computed.

$$\text{(i)}\quad \text{Gross BCR} = \frac{\text{Total Present Values of Cash Inflows}}{\text{Initial Investment}}$$

Net Present Values of Cash Inflows

(ii) Net BCR = $\frac{\text{Net Present Value}}{\text{Initial Investment}}$

The higher the profitability index, the more desirable is investment.

Following are the Merits and Demerits –

MERITS	DEMERITS
1. Considers all cash flows.	**1. Requires estimates of the cash flows which is a slow task.**
2. Recognizes the time value of money.	**2. At times fails to indicate correct choice between mutually exclusive projects.**
3. Relative measure of profitability.	
4. Generally consistent with the wealth maximization principle.	

(iii) Internal Rate of Return Method (IRR) of Time Adjusted Rate of Return (TAR)-"It may be defined as the discount rate which equates the aggregate present value of the net cash inflow with the aggregate present value of cash outflows of a project."

In other words, "IRR is the maximum rate of interest that could be paid for the capital employed over the life of an investment without loss on the project."

Thus, it is the rate which gives the project NPV of zero.

$$C = \frac{ACF_1}{(1+r)^1} + \frac{ACF_2}{(1+r)^2} + \frac{ACF_3}{(1+r)^3} + \frac{ACF_n}{(1+r)^n} + \frac{S+W_n}{(1+r)^n}$$

Where

C = Cost of Project.

ACF = Annual cash inflows

S = Scrap value of the Project

W = Working capital involved and recovered.

r = estimated rate of interest.

Computation of I.R.R.

(a) In the case of even cash inflows-

(i) Calculate present value factor by applying the following formula-

$$\text{P.V. Factor} = \frac{\text{Initial Investment}}{\text{Annual cash inflow}}$$

(ii) Locate the factor calculated in (a) in the compound present value table on the line corresponding the life span of investment in years. The rate of interest on the line of that factor will be the required I.R.R.

The following formula is used for finding the actual I.R.R.

$$\text{I.R.R.} = r_1 + \frac{V_1 - V}{V_1 - V_2}(r_2 - r_1)$$

Where,

r_1 = lower rate of return.

r_2 = higher rate of return.

V_1 = Present value factor at lower rate of return.

V_1 = Present value factor at higher rate of return.

V_1 = Present value factor for which IRR is to be computed.

MERITS	DEMERITS

1. Considers all cash flows.	**1. Requires estimates of the cash flows which is a slow task.**
2. True measure of profitability.	**2. Does not hold the value additivety principle (i.e., IRR's of two or more projects do not add).**
3. Based on the concept of the time value of money.	**3. At times fails to indicate correct choice between mutually exclusive projects.**
4. Generally, consistent with wealth maximization principle.	**4. At times yields multiple rates.**
5. Comparison of projects with different lives and investment outlays.	**5. Relatively different to compute.**
6. Elimination of pre – determined discount rate.	

(iv) Terminal value method – In this method it is assumed that each cash flow is reinvested in another project at a pre – detrained rate of interest, it is also assumed that each cash inflow is re – invested also where immediately until the termination of the project. If the present value of the sum total of the compounded re – invested cash flow is greater than the present value of outflows the proposed project is accepted otherwise not.

MERAITS	DEMERITS
1. Easy to understand and calculate cash inflows unaffected by cost of capital suitable for cash budgeting.	1. Determination of reinvestment rates fails to compare mutually exclusive projects.

(C) Other methods –

(i) Minimum Total cost or unit cost method – Under this method, the capital projects are not evaluated in terms of their profitability but they are selected on the basis of total cost of unit cost. This method is suitable to

consider the alternative machines which have equal production rate. In this approach, that machine is the best which offers the lowest per unit cost.

Comparative study of IRR approach with the NPV approach

IRR and NPV are the two forms of discounted cash flow technique for the appraisal of capital investments. Both accept the significance of time factor, both presumes that cash inflows over the entire life of the project. Hence, it appears that both of them leads to the same conclusion or yield the same decision. But this is not the reality as there are situations where these two approaches give conflicting results. The main differences between the two methods are as follows –

(1) In IRR method a rate of return is determined at which present value of total cash inflows from investment equals the cost of investment whereas under NPV method total present value of cash inflows at the prescribed rate of return is compared with the cost of investment and thereby NPS is founds out.

(2) Under IRR method, minimum required rate of return (or not off rate) is known variable whereas under NPV method, it is a known variable.

(3) The basic presumption of NPV method is that is that intermediate cash inflows are invested at the not off rate, whereas in the case of IRR method, intermediate such flows are presumed to be reinvested at the internal rate of return.

(4) Both methods may produce identical results in case of independent proposals, but the may give contradictory results in terms of acceptance or rejection in case of mutually exclusive projects. The NPV and IRR methods will give a different ranking if the projects under consideration involve different expected lives.

From the point of simplicity NPV method is considered better than IRR method because it does not require slow trial and error procedure and this method can be applied in all situations whether or not the cash inflows are uniform.

THE RISK AND UNCERTAINITY INVOLVED IN CAPITAL BUDGETING

All the techniques of capital budgeting require the estimation of future cash inflows and cash outflows. The future cash flows are estimated based on the following factors –

1. Expected economic life of the project.
2. Salvage value of the asset at the end of the economic life.
3. Capacity of the project.
4. Selling price of the product.
5. Production cost.
6. Depreciation rate.
7. Rate of taxation.
8. Future demand of the product, etc.

But due to uncertainties about the future these estimates can not be exact.

All these elements of uncertainty have to be taken into account in the form of forcible risk while taking a decision on investment proposals. Some allowances for the element of risk have to be provided.

FOLLOWING ARE THE METHODS

(i) Risk Adjusted Discount Rate or Method of Varying Discount Rate –

The simplest method of accounting for risk in capital budgeting is to raise the raise the cut off – rate or the discount factor by certain percentage on account of risk. The project which are more risky and which have greater

variability in expected returns should be discounted at a higher rate as compared to the projects which are less risky and are expected lesser variability in returns.

(ii) **Certainty Equivalent Method –** It is one of another simple method of accounting for risk in capital budgeting is to reduce expected cash flows by certain amounts. It can be employed by multiplying the expected cash flows by certainly equivalent co – efficient as to convert the uncertain cash flows to certain cash flows.

(iii) S**ensitivity Technique -** Where cash inflows are very sensitive under different circumstances, more than one forecast of the future cash inflows may be made. These inflows may be regarded as 'optimistic', 'most likely' and 'Pessimistic'. Further cash inflows may be discounted to fine out the net present value under these three different situations. If the net present values under these three different situations differ widely it implies that there is a great risk in the project and he investor's decision to accept or reject a project will depend upon risk bearing abilities.

(iv) **Probability Technique –** When future estimates at cash inflows have different probabilities the expected monetary values may be calculated by multiplying cash inflow with the probability assigned. The monetary values of the inflows may further be discounted to find out the present values. The project that gives higher net present value may be accepted.

(v) Standard Deviation Method – If the two projects have the same cost and their net present values are also the same, standard deviations of the expected cash inflow of the two projects may be computed to judge the comparative risk of the projects. The project having a higher standard deviation is said to be more risky as compared to the other.

(vi) Coefficient of Variation Method – It is relative measure of dispersion. If the projects have the same cost but different net present values, relative measure, i.e., coefficient of variation should be evaluated to judge the relative position of risk involved.

(vii) **Decision Tree Analysis –** In modern business there are complex investment decisions which in value a sequences of decisions over time. Such sequential decision can be handled by blotting decision trees. A decision tree is a graphic representation of the relationship between a present decision and future events, future decisions and their consequences. The sequence of events is mapped out over time in a format resuming branches of a tree and hence the analysis is known as decision tree analysis.