Meaning of Capital Budgeting:

Capital budgeting is concerned with designing and carrying through a systematic investment programme. According to Charles T. Horngren, "capital budgeting is a long-term planning for making and financing proposed capital outlays."

According to G.C. Philippatos, "capital budgeting is concerned with the allocation of the firm's scarce financial resources among the available market opportunities. The consideration of investment opportunities involves the comparison of the expected future streams of earnings from a project with the immediate and subsequent stream of expenditure for it."

Thus, the capital budgeting decision may be defined as the firm's decision to invest its current funds most efficiently in long-term activities in anticipation of an expects flow of future benefits over a series of years. Such decisions may consist addition, disposition, modification, mechanization or replacement of any fixed asset.

Type of Capital Budgeting Decisions:

Broadly speaking, capital budgeting decisions are long-term investment decisions. They include the following:

Mechanisation of a Process - A firm may intend to mechanise its existing production process by installing machine. The machine is estimated to cost Rs. 1,50,000 and expected to save operating expenses of Rs. 25,000 per annum for a period of ten years. Thus, it is an investment decision involving cost outlay for Rs. 1,50,000 and an annual saving of Rs. 25,000 for 10 years. The firm would be interested in analysing whether it is worth to install the machine.

Expansion Decisions - Every company wants to expand its existing business. In order to increase the scale of production and sale, the company may think of acquiring new machinery, addition of building, merger or takeover of another business etc. This all would require additional investment which be evaluated in terms of future expected earnings.

Replacement Decisions - A company may contemplate to replace an existing machine with a latest model. The use of new and latest model of machinery may possibly bring down operating costs and increase the production. Such replacement decision will be evaluated in terms of savings in operating costs and increase in annual profits.

Buy or Lease Decisions - Capital budgeting is also helpful in making buying or lease decisions. The fixed assets can be purchased or arranged on lease arrangements. Such decisions create a great different in the demand of capital. Hence, a comparative study can be made with reference to future benefits from these two mutually exclusive alternatives.

Choice of Equipment - A company needs an equipment (plant or machinery) to perform certain process. Now a choice can be made between semi-automatic machine and fully automatic machine. Capital budgeting process helps a lot in such selections.

Product and Process Innovation - The research and development department of a company may suggest that a new product should be manufactured and/or a new process should be introduced. The intrduction of new product and/or a new process will involve heavy capital expenditure and will earn profits also in the

future. So, inflows (i.e. future operating income) will be very useful and the ultimate decision will depend upon the profitability of the product and/or process.

House-Keeping Projects - House-keeping projects are such projects which exert indirect impact on the production. They are finanaced either on account of legal necessity or to boost up the morale and motivation level of the employees, say :

(i)   Health and Safety Projects.
(ii)   Service Department Projects
(iii)   Welfare Projects
(iv)   Education, Training and Development Projects
(v)   Status Projects
(vi)   Research and Development Projects.

The decisions relating to financing of above-mentioned long-term projects are not made on the basis of profitability. They are approved or rejected in terms of their urgency, need, compulsion and desirability. Hence, no profitability analysis is made for them. The capital budgeting decisions exclude decisions regarding current assets. The management and investment problems of current assets are discussed under the head working capital management. The capital budgeting decisions are concerned with only those type of decision areas which have long-term implications for the firm in terms of current expenditure and future benefits. Current expenditure constitutes the outflow of cash and is represented by cost. The future benefits are measured in terms of annual cash inflows. Hence, in capital budgeting, it is the flow of cash outflow and inflow which is important, not the earnings determined in accordance with the accrual concept of accounting.

Importance of Capital Budgeting:

Capital budgeting decisions are among the most crucial and critical business decisions. The selection of the most profitable assortment of capital investment can be considered a key function of management. On the other hand, it is the most important single area of decision-making for the financial executives. Actions taken by management in this area affect the operations of the firm for many years to come. The need and importance of capital budgeting can be numerated as follows :-

Heavy Investment - Almost all the capital expenditure projects involved heavy investment of funds. These funds are accumulated by the firm from various external and internal sources at substantial cost of capital. So their proper planning becomes invitable.

Permanent Commitment of Funds - The funds involved in capital expenditures are not only large but more or less permanently blocked also. Therefore, these are long-term investment decisions. The longer the time, the greater the risk is involved. Hence, a careful planning is essential.

Long-term impact on profitability - The capital expenditure decisions may have a great impact on the profitability of the firm for a very long time. If properly planned, they can increase not only the size, scale and volume of scales but firm growth potentiality also.

Complicacies of Investment Decisions - The long-term investment decisions are more complicated in nature. They entail more risk and uncertainly. Further, the acquistions of capital assets is a continuous process. So the management must be gifted ample prophetic skill to peep into future.

Worth Maximization of Shareholders - Capital budgeting decisions are very important as their impact on the well-being and economic health of the enterprise is far reaching. The main aim of this process is to avoid overinvestment and under-investment in fixed assets. By selecting the most profitable capital project, the management can maximize the worth of equity shareholder's investment.

Process of Capital Budgeting:

Capital budgeting decisions of a firm have a pervasive influence on the entire spectrum of entrepreneurial activities. Hence, they require a complex combination and knowledge of various disciplines for their effective administration, such as, Economics, Finance, Mathematics, and Economic Forecasting, projection Techniques and Techniques of Financial Engineering and Control. In order to combine all these elements, a finance manager must keep in mind the three dimensions of a capital budgeting programme: Policy, Plan and Programme. These three P's constitute a sound capital budgeting programme. However, the important steps involved in the capital budgeting process are: (i) project generation; (ii) project evaluation, (iii) project selection; and (iv) project execution. These steps are necessary, but more may be added to make the process more effective. Joel Dean a famous economist has described the specific elements in an orderly investment programme which are as follows:

Creative Search for Profitable Opportunities - The first stage in the capital expenditure programme should be the conception of a profit making idea. It may be rightly called the origination of investment proposals. The proposals may come from a rank and file worker of any department or from any line executive. To facilitate the origination of such ideas a periodic review and comparision of earnings, costs, procedures and product line should be made by the management on a continuous basis.

Long-range Capital Plans- When a specific proposal is made to management, its consistency with the long-range plans of the company must be verified. It requires the determination of over-all capital budgeting policies beforehand based upon the projections of short and long-rum developments.

Short-range Capital Budget- Once the timelines and priority of a proposal have been established, it should be listed on the one-year capital budget as an indication of its approval.

Measurement of Project Worth- This stage involves the tentative acceptance of the proposal with other competitive projects, within the selection criteria of the company. Small projects under a certain rupee amount could be approved by the departmental head. Larger projects should be ranked according to their profitability. Any one or more tests of profitability may be used for it. For project evaluation, different techniques may be used, such as, payback period, accounting rate of return and discounted cash flow techniques.

Screening and Selection - This stage involves the comparison of the proposal with other projects according to criteria of the firm. This is done either by financial manager or by a capital expenditure planning committee. Such criteria should encompass the supply and cost of capital and the expected returns from alternative investment opportunities. Once the proposal passes this stage, it is authorized for outlays.

Establishing Priorities - Then comes the stage of establishing the priorities. When the accepted projects are put in priority, it facilities their acquisition or construction, avoids costly delays and serious

cost overruns. This stage is also called the ranking of projects. It helps in capital rationing and better utilization of capital.

Final Approval - Once the financial manager has reviewed the projects, he will recommended a detailed programme, both of capital expenditures and of sources of capital to meet them, to the top management. Possibly, the financial manager will present several alternative capital-expenditure budgets to the top management, it will finally approve the capital budget for the firm.

Forms and Procedures - This is a continuous phase that involve the preparation of report for every other phase of the capital expenditure programme of the company.

Retirement and Disposal - This phase marks the end of the cycle in the life of a project. It involves more than the recovery of the original cost plus and adjustment for replacement programmes. The old assets should be sold and realised sale price should be used for replacement financing.

Evaluation - An important step in the process of capital budgeting is an evaluation of the programme after its implementation. The evaluation process answers such questions, say, was the investment greater than anticipated? Were the expected net cash inflows actually realized? Was the proper test of evaluating the profitability of project applied? Management can improve its capital budgeting programme for the future from past experience. Such evaluation has also the advantage of forcing departmental heads to be more realistic in their approach and careful in actual execution of the projects.

Investment Evaluation Criteria

Because of the utmost importance of the capital budgeting decisions, a sound appraisal method should be adopted to measure the economic worth of each investment project. In most business firms, there are more than one investment proposals for a capital project than the firm is capable and willing to finance. Here the problem of ranking them in order of preference arises. Hence, the management has to select the most profitable project or to take up the most profitable project first. As we know that the ultimate goal of financial management is the worth maximization of the firm, hence, in order to achieve this objective, the management must select those projects which deserve first priority in terms of their profitability. For evaluating the comparative profitability of capital projects many methods have been evolved. Each method has its own merits and demerits. However, the method going to be used should, at least, possess the following characteristics:

(a) it should provide a means of distinguishing between acceptable and unacceptable projects.

(b) It should provide clear cut ranking of the projects in order of the profitability or desirability.

(c) It should also solve the problem of choosing among alternative projects.

(d) It should be a criterion which is applicable to any conceivable investment projects.

(e) It should emphasize upon early and bigger cash benefits in comparison to distant and smaller benefits.

(f) In the last but not the least, the method should be suitable according to the nature and size of capital project to be evaluated.

Method of Evaluating Investment Proposals

The various methods which are commonly used for evaluating the relative worth of investment proposals are as follows:

I. Non-discounted Cash flow Techniques (NDCF)

(A) Payback Period Method (PB)

(B) Accounting Rate of Return Method (ARR)

II. Discounted Cash flow Techniques (DCF)

(A) Net Present Value Method (NPV)

(B) Present Value Index Method or Benefit-Cost Ratio Method (BCR) or Profitability Index Method (PI)

(C) Internal Rate of Return Method (IRR)

1. Non-discounted cash flow Techniques (NDCF)

(A) Payback Period Method (PB)

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. This method is based on the principle that every capital expenditure pays itself back over a number of years. It means that it generates income regularly during its estimated economic life. When the total cash inflows from investment equal the total outlay, that period is the payback period of that project. While comparing between two or more projects, the project with lesser payback period will be acceptable.

Calculation or Payback Period - The payback period can be calculated in the following manner:-

(A) In the case of even cash inflows:- If the pattern of annual cash inflow is of conventional character or they are in the form of annuity, the computation of payback period is very simple, as follow :

Payback Period = <u>Initial Investment</u>
Annual Cash Inflow

For example, if an investment of Rs. 10,000 in a machine is expected to produce annual cash inflow of Rs. 2,500 for 6 years, then

Payback Period = <u>Rs. 10,000</u> = 4 yrs.
Rs. 2,500

(b) In the case of uneven cash inflows - When a project's cash flows are not equal, but vary from year to year, i.e., they are of non-conventional nature, the calculation of payback period takes a cumulative form of annual cash inflows. In such a situation, payback period is calculated

by the process of cumulating cash inflows till the time when cumulative cash inflows become equal to the original investment outlay. The following example will illustrate the point.

Illustration: A project requires an investment of Rs. 10,000. Its estimated (121) annual cash inflows have been given below:

Year	Annual Cash Inflows (ACF) (Rs.)	Cumulative Cash inflows (CCF) (Rs.)
1	2,500	2,500
2	3,500	6,000
3	4,000	10,000
4	5,000	15,000
5	3,000	18,000

Thus, Rs. 10,000 is recovered fully in 3rd year, hence, payback period is 3 yrs.

Illustration: A project requires an investment of Rs. 10,000 and its estimated annual cash inflows are as follows:

Year	(ACF) (Rs.)	(CCF) (Rs.)
1	2,000	2,000
2	3,000	5,000
3	4,000	9,000
4	2,000	11,000
5	3,000	14,000

Here, payback period will be $= 3$ years $+ \dfrac{10000 - 9000}{2000} = 3.5$ yrs.

Accept-Reject Criterion - The payback period can be used as a decision criterion to accept or reject investment proposals. If only one independent project is to be evaluated its actual payable period should be compared with a pre-determined (standard) payback, i.e., the payback set up by the management in terms of maximum period during which the initial investment must be recovered. If the actual payback period is less than the standard payback period, the project would be accepted, if not, it would be rejected. Alternatively, the payback can be used as a ranking method also. When mutually exclusive projects are under consideration they may be ranked according to the length of the payback period. Thus, the project having the shortest payback may be assigned rank one, followed in that order so that project with the longest payback would be ranked the lowest.

Demerits of Payback Approach -

Major weakness of this approach is that it completely ignores all cash inflows arising after the payback period. This could be very misleading in capital budgeting decisions. It may be possible that two projects have similar payback period but their post-payback profitability differs significantly.

The following examples will illustrate the point.

	Project A (Rs.)	Project B (Rs.)
Cost of Project	15,000	15,000
Year	Annual Cash Inflows	
1	5,000	4,000
2	6,000	5,000
3	4,000	6,000
4	0	6,000
5	0	4,000
6	0	3,000
Payback period	**3 yrs.**	**3 yrs.**

Thus, project B is certainly advantageous as its post-payback profitability is more in spite of similar payback period of 3 years.

Look at this example also.

	Project x (Rs.)	Project y (Rs.)
Total Investment	10,000	10,000
Year	Annual Cash Inflows	
1	5,000	3,000
2	5,000	4,000
3	2,000	3,000
4	1,000	4,000
5	500	2,000
Payback period	**2 yrs.**	**3 yrs.**

Thus, the payback period for project x is 2 years and for project y it is 3 years. Obviously, project x will be preferable on the basis of payback period. However, if we look beyond the payback period, we see that project x returns only Rs. 3,500 while project y returns Rs. 6,000. Thus, project y should be preferred.

(ii) Earnings per Unit of Money Invested - As per this method, we find out the total net earnings (after taxes) and then divide it by the total investment. This gives us the average rate of return per unit of amount invested in the project, as follows:

Earnings per Unit of Investment = Total Earnings (after taxes)
                                                        Total Outlay of the Project

Higher the earnings per rupee, the project deserves to be selected.

(iii) Average Return on Average Investment - Under this method the percentage of average return on average amount of investment is calculated. To calculate the average investment, the outlay of the project is divided by two. ARR is calculated as follows:

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

The average profits after taxes - Average profits after taxes are found by taking the sum of the expected after-tax profits of the project during its life and dividing the sum by the number of years of its life. In the case of an annuity, the average after-tax profits are equal to any year's profits.

The average investments - Any of the following three formulae may be applied to calculate average investment:

(a) Initial Investment/2

(b) (Initial Investment + Scrap Value)/ 2

be gainfully employed under certain circumstances. In a politically unstable economy, a quick return of investment is a must. Shortest payback period is the only answer to such investments. In case of foreign investments, the firms experiencing sever shortage of liquidity, for assessing short-run and medium term capital projects, the payback period is the only good technique for assessing their profitability. In fact, the payback period is a measure of liquidity of investment rather than their profitability. Thus, the payback period should more appropriately be treated as a constraint to be satisfied than as a profitability measure to be maximized.

(B) Accounting Rate of Return Method (ARR)

This method is also known as Financial Statement Method, Return on Investment Method or Unadjusted Rate of Return Method. It is based on operating earnings computed in the Profit & Loss Account, hence, no separate calculations are necessary to compute annual cash inflows. Finding the average rate of return is a quite popular approach for evaluating proposed capital expenditures. Its appeal stems from the fact that the average rate of return is typically calculated from accounting data (i.e. profits after taxes). According to this method, capital projects are ranked in order of their rate of earnings. Projects which yield the highest earnings are selected and others are ruled out. This return on investment can be expressed in several ways as below:

(i)   Average Rate of Return on Total Investment - This method established the relationship between the average annual profits to total outlay of capital project, as follows:

Average Rate of Return = $\dfrac{\text{Average Profits (after taxes)}}{\text{Total Outlay of the Project}}$ x 100

(c) $\dfrac{\text{Recovered Capital} + \text{Scrap Value}}{2}$

The averaging process outlined above assumes that the firm is using straight line method of depreciation.

Merits of ARR Method

The approach has the following merits:

(1) Like payback method it is also simple and easy to understand.

(2) It is based on the accounting concept of operating income and accounting profit figures are used in analyzing the profitability of alternative capital projects, hence no separate calculations are required.

(3) It takes into consideration the total earnings from the project during its entire economic life.

(4) This approach gives due weight to the profitability of the project.

(5) In investments with extremely long lives, the simple rate of return will be fairly close to the true rate of returns. It is often used by financial analysts to measure current performance of a firm.

Demerits of ARR Method

This method has following demerits:

(1) One apparent disadvantage of this approach is this that its results by different methods are inconsistent.

(2) It is simply an averaging technique which does not take into account the impact of various external factors on overall profits of the firm.

(3) The method ignores the time factor of future cash streams which is crucial in business decisions as the amount of interest and discount is substantially affected by it.

(4) This method does not determine the fair rate of return on investments. It is left at the discreation of the management. Hence, the use of this arbitrary rate of return may cause serious distortions in the selection of profitable projects.

II. Discounted Cash Flow Techniques (DCF)

Although, return on investment has been considered a satisfactory technique of capital budgeting in accounting circles for long. Next came the payback approach which is based on cash flow technique. But the lacuna of the above methods is that they do not take the time factor of the income into account. The earlier receipts are certainly more important than the income to be received in later years. A bird in hand is worth than the two in the bush, is aptly applicable to the management of capital. Accordingly, 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) just as the use of building or an automobile may have a cost (rent). The DCF techniques take care of these both aspects, i.e., time value of money and cost of capital. As a capital project yields returns spread over a number of years, correct assessment of its profitability can be made only if the annual returns of the future years are brought to their present value after applying a discounting rate (i.e. cost of capital or interest rate). Similarly, if the investment is to be made over a number of years, the cash outflows have to be brought down to their present value. Thus these techniques recognize time-adjusted rate of return as well as the cost of capital. The aggregate of future cash flows discounted at a given rate of cost of capital is called the present value of those cash inflows.

The calculation of present value consists of the following steps:

(a) Estimating future cash inflows from the project.

(b) Selecting a discount rate which is commonly known as opportunity cost or cost of capital also.

(c) Discounting those cash inflows with the discount factors or present value factors picked up from the present value tables according to the rate of cost of capital.

There are three methods to judge the profitability of different proposals on the basis of discounted cash flow technique. These are as follows:

(A) Net Present Value Method (NPV)

The calculation of net present value (NPV) of project is one of the most commonly used capital budgeting techniques. This method is also known as Excess Present Value of Net Gain Method. The definition of net present value can be expressed as follows:

NPV = Total Present value of Future Cash inflows - Initial Investment.

The total present value of future cash inflows is calculated with the help of the following formula:

$$P = \frac{S_1}{(1+i)} + \frac{S_2}{(1+i)^2} + \dots\dots\dots + \frac{S_n}{(1+i)^n}$$

Where, P = Present Value of future cash inflows.
 S = Future Value of cash inflows for n years.
 i = Rate of interest
 n = number of years (1, 2, 3,……..)

Based on the above equation, the present value factors tables have been prepared. In these tables, the present value of Re. 1 at different rates of interest has been given. The second type of present value tables provides us the cumulative amount of an annuity of Re. 1 for a given rate of interest. If the annual cash inflows are of even nature, the compound present value factor should be used and if it is of uneven nature, the simple present value factor should be applied. If the NPV is in positive the project should be accepted. If it is in negative, it should be rejected. In mutually exclusive projects, the project with higher NPV should be preferred.

The following example will explain the procedure.

Illustration: Suppose a project costs Rs. 5,000. Its estimated economic life is 2 years. The firm's cost of capital is estimated to be 10%. The estimated cash inflows from the project are Rs. 2,800 p.a. calculate its NPV.

Solution: As the firm's cash inflows are of conventional pattern (i.e. even amount), the compound value factor can be used for calculating their NPV.

	Rs.
Total Present Value = Rs. 2,800 x 1.813	5,272
Less:- Cost of the Project	5,000
Net Present Value	272

Merits of NPV Method

(1) The NPV method takes into consideration the time factor of earnings as well as cost of capital.

(2) It is very easy to calculate, simple to understand and useful for simply "accept" or "reject" type of projects.

(3) It can be applied to both types of cash inflows patterns - even and uneven cash inflows.

(4) The NPV method is generally preferred by economists. If one wishes to maximize profits, the use of NPV always finds the correct decisions.

(5) It takes care of entire earnings.

(6) The concept of the present value of series of cash flows is an important feature in the analysis of different investment potentialities. The net present worth technique analyses the merit of relative capital investments in a nice and exact manner.

Demerits of NPV Method

(1) It involves a good amount of calculations. Hence, it is a complicated method.

(2) The use of this method requires the knowledge of cost of capital. If it is unknown, the method cannot be used.

(3) It leads to confusing and contradictory answers for the ranking of complicated projects.

(4) Keeping in view the substantial difference in time-span and involved risk in various capital projects, the use of one common rate of cost of capital for discounting cash inflows is not desirable.

B. Profitability Index Method

This method is also known as Benefit-Cost Ratio. One major demerit of NPV method is that it cannot be applied to compare those mutually exclusive projects which differ in costs substantially. To compare and evaluate such projects, the profitability index should be calculated. The profitability index is the relationship that exists between the present values of net cash inflows and cost outlays of the projects. It can be calculated in two manners:

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

$$\text{Net BCR} = \frac{\text{Net Present Values of Cash Inflows}}{\text{Initial Investment}}$$

(Where NPV of cash inflows in Total Present value of cash inflows minus initial investment)

These both can be expressed in percentage also. Their expression in percentage helps in comparing the relative profitability of capital projects. The higher the profitability index, the more desirable is the investment.

(B) Internal Rate of Return (IRR) Method

The third DCF technique is the Internal Rate of Return Method which is commonly known as Time-adjusted Rate of Return method also. Like the present value method, the IRR method also considers the time value of money by discounting the annual cash inflows. But present value method can be applied only when the discount rate (i.e. cost of capital) is known to us. On the other hand, in IRR technique we find out that rate of return which will equate the present value of future cash streams to the present cash outlay of the project. It is usually the rate of return that the project earns. "It may be defined as the discount rate (r) which equates the

aggregate present value of the net cash inflows 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 that rate which gives the projects NPV of zero.

Assuming conventional cash inflows, mathematically, the IRR is represented by that rate, r, such that,

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

Here:

C   =   Cost of the Project
ACF   =   Annual Cash Inflows
S   =   Scrap Value of the Project
W   =   Working capital involved and recovered
r   =   estimated rate of interest

Fortunately tabular values of present values of future earnings are readily available. So, usually these tables are used for this purpose.

Computation of IRR

(a) **In the case of even cash inflows** - If the cash inflows are uniform each year then the computation of IRR involves the following two steps:

(i)   Calculate Present Values Factor by applying the following formula:

P.V. Factor = $\frac{\text{Initial Investment}}{\text{Annual Cash Inflow}}$

(ii)   Locate the factor calculated in (i) in the compound Present Value Table on the line corresponding the life span of investment in years. The interest rate of the line of that factor will be the required IRR.

It is to be noted that the present value of cash inflows at this computed rate must be equal to the present value of cash outflows.

Illustration: A project costs Rs. 10,000 and is expected to generate cash inflows of Rs. 1,750 annually for 10 years. Its salvage value is nil. Calculate its IRR

Solution: P.V. Factor = Investment ÷ Annual Cash Inflow
                = 10,000 ÷ 1,750 = 5.714

Locating this factor in the compound present value table on the line corresponding to the 10th year. We find that this factor is most close to the factor in the table at 12%. Hence, the approximate rate of return is 12%.

As the factor given in the table is less than the factor computed above, actual rate will be a bit less than 12%. It can, however, be ascertained by applying the interpolation technique as follows:

$$\text{IRR} = r1 + \frac{V1-V}{V1-V2} (r2 - r1)$$

$$= 10\% + \frac{+6.145 - 5.714}{+6.145 - 5.652} \times (12\% - 10\%)$$

$$= 10\% + 1.74\% = 11.74\%$$

Alternative Formula:

$$IRR = r2 \ \frac{V - V2}{V1 - V2} \ (r2 - r1)$$

$$= 12\% \ \frac{5.714 - 5.650}{6.145 - 5.650} \times (12\% - 10\%)$$

$$= 12\% - \frac{0.064}{0.495} \times 2$$

$$= 12\% - 0.26\% = 11.74\%$$

Where,

r1	=	Lower Rate of return
r2	=	Higher rate of Return
V1	=	PVF at lower rate of return
V2	=	PVF at higher rate of return
V	=	PVF for which IRR to be interpolated

(b) In the case of uneven cash inflows –

Here the computation of IRR involves a trial and error procedure. To find the rate of interest that equates the cash inflows with the cash outflows, we start with an assumed rated and calculate the NPV. This NPV may be more than zero, less than zero or just equal to zero. If more than zero, a higher rate of interest should be tried to calculate NPV. Conversely, when the NPV is less than zero, a lower rate would be used. The procedure will go on till we find the rate which gives zero for the NPV.

Under IRR approach, the calculated IRR (i.e. actual rate) is compared with the required rate of return, also known as the cut-off rate or hurdle rate (i.e. the cost of capital or interest rate on which the funds will be available). If the actual IRR is higher than the cut-off rate, the project is accepted, if lower it is rejected.

If the IRR and cut-off are just equal, the firm will be indifferent as to whether to accept or reject the project.

Illustration: A project requires an initial outlay of Rs. 32,400. Its estimated economic life is 3 years. The cash streams generated by it are expected to be as follows:

Years	Estimated ACF (Rs.)
1	16,000
2	14,000
3	12,000

Computed its IRR. If the cost of capital to the firm is 12% advise the management whether the project should be accepted or rejected.

Solution: To compute IRR, we have to follow the trial and error procedure with various rate of interest. The following table presents the calculations:

Table showing calculations of IRR for unequal cash inflows

Total Present Values at different rate of interest

Year	ACF (Rs.)	DF at 14%	P.V. (Rs.)	DF at 16%	P.V. (Rs.)	DF at 15%	P.V. (Rs.)
1	16,000	0.877	14,032	0.862	13,795	0.870	13,920
2	14,000	0.769	10,766	0.743	10,402	0.756	10,584
3	12,000	0.675	8100	0.641	7,692	0.658	7,896
			32,898		31,886		32,400
Less:- Cost of Project			32,400		32,400		32,400
			+498		-514		0

Since NPV is zero at 15% discount rate, it is its IRR. If the cost of capital is 12%, the project must be accepted as its internal return is 15% while cost of funds is only 12%. The project will contribute 3% to the value of the firm.

Dividend Policy

INTRODUCTION

Once a company makes a profit, it must decide on what to do with those profits. They could continue to retain the profits within the company, or they could pay out the profits to the owners of the firm in the form of **dividends.**

The dividend policy decision involves two questions:

1) What fraction of earnings should be paid out, on average,   over time?

2) What type of dividend policy should the firm follow? I.e. issues such as whether it should maintain steady dividend policy or a policy increasing dividend growth rate etc.

▪   On the other hand Management has to satisfy various stakeholders from the profit. Out of the Stakeholders

Dividend Decision

The Dividend Decision is one of the crucial decisions made by the finance manager relating to the payouts to the shareholders. The payout is the proportion of Earning Per Share given to the shareholders in the form of dividends.

The companies can pay either dividend to the shareholders or retain the earnings within the firm. The amount to be disbursed depends on the preference of the shareholders and the investment opportunities prevailing within the firm.

The optimal dividend decision is when the wealth of shareholders increases with the increase in the value of shares of the company. Therefore, the finance department must consider all the decisions viz. Investment, Financing and Dividend while computing the payouts.

DIVIDEND

- The term dividend refers to that portion of profit (after tax) which is distributed among the owners / shareholders of the firm.

- Dividend may be defined as the return that a shareholder gets from the company, out of its profits, on his shareholdings."

- In other words, dividend is that part of the net earnings of a corporation that is distributed to its stockholders. It is a payment made to the equity shareholders for their investment in the company.

- Dividend is a reward to equity shareholders for their investment in the company.

- It is a basic right of equity shareholders to get dividend from the earnings of a company. Their share should be distributed among the members within the limit of an act and with rational behavior of directors

TYPES OF DIVIDENDS

- Classifications of dividends are based on the form in which they are paid. Following given below are the different types of dividends:

- Cash dividend

- Bonus Shares referred to as stock dividend in USA

- Property dividend

- Interim dividend

- Annual dividend

- Special- dividend

- **Cash dividend:** Companies mostly pay dividends in cash. A Company should have enough cash in its bank account when cash dividends are declared. If it does not have enough bank balance, arrangement should be made to borrow funds. When the Company follows a stable dividend policy, it should prepare a cash budget for the coming period to indicate the necessary funds, which would be needed to meet the regular dividend payments of the company.

- **Bonus Shares :** (OR Stock -dividend in USA) An issue of bonus share is the distribution of shares free of cost to the existing shareholders,

- **Annual dividend:** When annually company declares and pay dividend is defined as annual dividend.

- **Interim dividend:** During the year any time company declares a dividend, it is defined as Interim dividend.

- **Special dividend** : In special circumstances Company declares Special dividends. Generally company declares special dividend in case of abnormal profits.

- **Property dividends:** These dividends are payable in assets of the corporation other than cash. For example, a firm may distribute

Factors affecting Dividend Policy

EXTERNAL FACTORS	INTERNAL FACTORS
General sta...	Desire of Shareholders
Capital Ma...	Financial needs of Company
Legal Restr...	Nature of Earnings
Contractual Restrictions	Desire of Control
Taxation Policy	Liquidity Position

ernal Factors – Dividend Policy

- General state of Economy – in cases of uncertainty, depression in the economy, the mgt. may like to retain the earnings and build up reserves to absorb shocks in the future and preserve liquidity.

- Capital Markets – if a firm has easy access to capital markets to raise funds, it may follow liberal dividend policy and vice versa.

- Legal Restrictions – the mgt. must comply to all legal restrictions such as transfer to reserves etc.

- Contractual Restrictions – lending financial institutions may put restrictions on dividend payments to protect their interests.

- Taxation Policy – consideration of corporate taxes and dividend distribution tax to be paid by the companies.

...rnal Factors – Dividend Policy

- **Desire of Shareholders** – the shareholders, being the owners of the company influence the dividend payout. Their expectation for dividend depicts companies strength, certainty and liquidity.

- **Financial needs of Company** – financial needs of the company may directly conflict with shareholders' desire. Company's vision for future growth and profitability may bypass the dividend expectation.

- **Nature of Earnings** – a firm with a stable income can afford to have higher dividend payout and vice versa

- **Desire of Control** – higher dividend implies liquidity crunch that can be met by new equity issue. New equity dilutes mgt. control.

- **Liquidity Position** – prime importance for dividend payments, company need to maintain its liquidity in business so may decide to distribute less dividend.

Dividend Policy

- Dividends (including interim dividend) are returns given to shareholders out of profits earned by a company.

- Payment of dividends not only depends upon profitability, but also the recommendation of Directors, i.e. known as '*Dividend Policy*'.

- Dividend policy determines the ultimate distribution of the firm's earnings between retention (that is reinvestment) and cash dividend payments of shareholders

- *In dividend policy, it is decided how much profit should be distributed as dividend and how much to be kept as reserve (retained earnings).*

- Shareholders approve the dividend as recommended by the Directors. Dividend rate can be reduced by shareholders, but cannot be increased

dividend policy : significance

- Outflow of cash, pressure on liquidity of the company
- Opportunity cost of the funds distributed
- Dividend payment maximizes shareholders' current wealth while retention facilitates future wealth generation.
- Dividend payment is a sign of goodwill, and a positive impact on investors, and in turn the market price / share.
- Retention leads to faster growth resulting in higher profitability and increase in shareholders' wealth.
- *Harmony between payout & retention – key mgt. decision*

TYPES OF DIVIDEND POLICY

Dividend policies may vary between various firms as every firm sets its own policy for dividend distribution.

A) **Generous or liberal dividend policy:** Firms that follow this policy reward shareholders generously by stepping up dividend over the time.

B) **Stable dividend policy :** According to this policy, the percentage of earnings paid out of dividends remains constant. The dividends will fluctuate with the earnings of the company. Stable rupee (inflation adjusted)

Low regular dividend plus extra dividend policy : As per this policy, a low, regular dividend is maintained and when times are good an extra dividend is paid. Extra dividend is the additional dividend optionally paid by the firm if earnings are higher than normal in a given period. Although the regular portion will be predictable, the total dividend will be unpredictable.

D) Residual dividend policy : Under this policy, dividends are paid out of earnings not needed to finance new acceptable capital projects. The dividends will fluctuate depending on investment opportunities available to the

Multiple dividend increase policy : Some firms follow the policy of very frequent and small dividend increases. The objective is to give shareholders an illusion of movement and growth.

F) Erratic dividend policy : Dividends are paid erratically when the management feels it will not strain the resources of the firm. Interests of the shareholders are not taken care of while making the dividend decisions. It has been observed by various researchers that firms generally prefer to follow a stable or a gradually rising dividend policy.

G) Uniform Cash dividend plus Bonus Policy : Under this policy, the minimum rate of dividend per share is paid in cash plus bonus shares are issued out of accumulated reserves. However bonus shares are not given compulsorily on an annual basis. They may be

Dividend Distribution Theories

Dividend Distribution Theories

❖ Economists & thinkers studied the outcome of dividend on the value of the firm.

❖ Establish a relationship between dividend payment and value of the firm.

❖ The theories put forward provided extreme views.

❖ Dividend and value of firm are related as well as totally unrelated etc.

WALTER MODEL

Dividend distribution

GORDON MODEL

MODIGLIANI MILLER (MM) MODEL
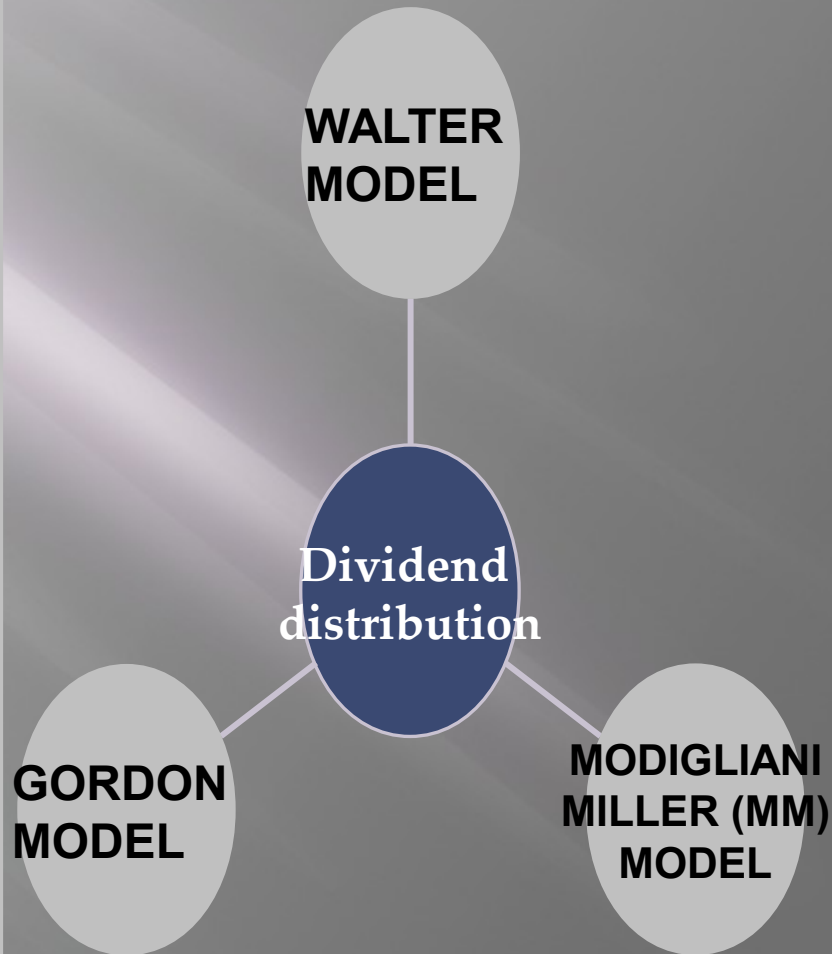
A. **<u>Walter's Model –</u>**

- According to Prof. James Walter, the *<u>choice of dividend policy always affects the value of the firm.</u>*

- The Walter model exhibits a **clear relationship** between the firm's rate of return (*r*), cost of capital (*k*), and dividend policy.

- **Assumptions –**
  - There is only internal financing of investments, i.e. no debts, no equity
  - Rate of return (*r*) and cost of equity (*k*) are always constant
  - Firm has a very long life

- As per the theory, Walter has classified firms into 3 categories, viz. Growth firms (*where r > k*), Normal firms (*where r = k*), and Declining firms (*where r < k*)

Dividend Distribution Theories

- According to Walter model –

  ➢ *Growth firms* earn higher return on their investments ($r > k$) and hence, the firm should *retain its earnings*. These firms maximize value of shareholders since their earnings (r) are greater than shareholders' expectations (k), i.e. **market price will increase.**

  ➢ *Normal firms* earn a return on their investments equal to its cost of capital ($r = k$). In such cases, the dividend policy has *no effect on the value of the firm*, i.e. market **price per share is constant.**

  ➢ *Declining firms* earn lower return on their investments ($r < k$). Value of firm is highest when all its earnings are distributed as dividend, the market price per share being maximum. Investors of such firms like its earnings to be distributed to them, so that they may spend it or earn a higher return elsewhere.

Dividend Distribution Theories

A. **Walter's Model –**

☛ According to Walter model, mathematical formula for calculation of expected market price per share –

$$MP = \frac{D + (r \,/\, k) * (E - D)}{k}$$

Where,

- MP = Market price per share
- D = Dividend per share
- E = Earnings per share
- r = Firm's rate of return
- k = Cost of capital

B. **Gordon's Model –**

☛ Myron Gordon used the dividend capitalization approach to **prove the effect of dividend policy on stock price (value of firm)**

☛ Gordon model verifies the **relation between a firm's dividend policy with the expectation of the shareholders.**

☛ **Assumptions –**

- The firm is an all equity firm, i.e. it has no debt in its capital structure
- There is only internal financing of investments, i.e. no new equity
- Rate of return *(r)* and cost of equity *(k)* are always constant
- Retention ratio *(b)* remains constant, *(retention = 1 – dividend ratio)*
- Cost of capital *(k)* is always greater than growth rate *(g = b*r)*
- Firm has a very long life and perpetual earnings
- Corporate taxes does not exist

B. **<u>Gordon's Model –</u>**

☞ As per Gordon's model, 'the *market value of a share is equal to the present value of an infinite dividend stream to be recd. by the shareholders in the future'*.

☞ Gordon's model assumes that investors are rational and risk-averse. They prefer current dividends and avoid risk in future.

☞ Also known as *"bird-in-hand"* argument. Where a bird in hand is better than two in the bush, **current dividend better than future earnings (which are uncertain)**

☞ Thus, for two firms with same earning power

B. ## **Gordon's Model –**

☛⬜ According to Gordon model, mathematical formula for calculation of expected market price per share –

$$MP = \frac{E\,(1 - b)}{k - br}$$

- MP = Market price per share

- b = retention ratio

- E = Earnings per share

- k = cost of capital

- r = rate of return

ividend Distribution Theories

c. **Modigliani Miller (MM) Approach –**

☛ According to Modigliani and Miller, under a perfect market situation, **the dividend policy of a firm is irrelevant and it does not affect the value of the firm.**

☛ As per MM approach, **value of a firm entirely depends on its earnings,** which are a result of its investment policy.

☛ **Assumptions –**

- **Capital markets are perfect, ease of raising funds**

- Investors are rational, information freely available

- Transaction and floatation costs does not exist

- No individual taxes

- The firm has fixed in investment policy

- **No risk of uncertainty,** hence *'r = k'*

Modigliani Miller (MM) Approach –

☛ According to MM approach, there are 3 situations –

a) <u>Firm has sufficient cash to pay dividends</u> – when dividend is paid, shareholders receive cash and firm's assets are reduced (cash bal). Hence, shareholders gain cash and lose proportional claim on assets. There is just transfer of wealth and value of firm is **unaffected.**

b) <u>Firm issues new shares to pay dividend</u> – Existing sh. holders get cash but their share in total assets reduces. New sh. holders pay cash and receive proportionate claim on assets. Hence value of firm **unaffected.**

c) <u>Firm does not pay dividends</u> – **if a shareholder needs cash, he may sell his shares to satisfy his**

c. Modigliani Miller (MM) Approach –

☛ According to MM approach, the market value of share at the beginning of the period is equal to the present value of dividends paid at the end of period (plus) market price at the end of period. i.e. $P1 = P0 (1 + Ke) - D1$

where,

- $P0$ = prevailing market price (start of period)
- $D1$ = dividend to be recd at end of period
- $P1$ = market price at end of period
- Ke = cost of equity capital

☛ $N1 = \underline{I – (X - ND1)}$ (new shares to be issued for dividend payment) $P1$

☛ Value of firm = $\underline{(N + N1) P1 – (I – E)}$ [N = current shares, N1 = new shares] $1 + Ke$ [I = investment reqd, X = profits]