Financial management

UNIT -6

CAPITAL BUDGETING - I

Concept of capital budgeting and its importance

The term capital budgeting refers to expenditure on capital assets. No business can be performed without creating some assets and only through these assets the process of production can take place, i.e. the inputs can be converted into outputs.

Spending money on capital assets is a very important decision that a finance manager is required to make. Capital investment expenditure may be on Plant, Machinery Equipment, Land, Buildings, Roads, and Bridges etc. Although spending money on anything is important and prudence must be exercised in all such matters, but spending money on capital assets is especially more important and the finance manager is, therefore, required to be much more cautious in making such a decision, for the following reasons;

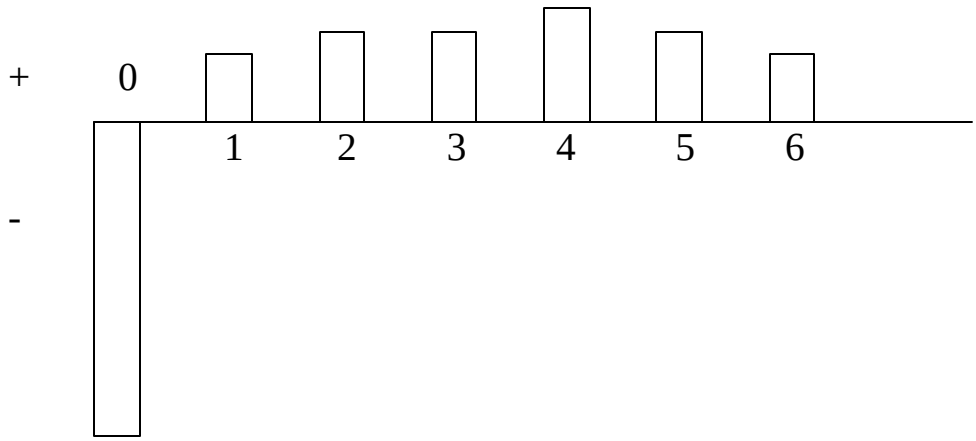
(i) It involves substantially higher amounts than for other routine expenses.

(ii) The decision is irreversible, i.e. it is not possible to withdraw your steps easily, once you have taken few steps in this regard.

(iii) It has long term impact on the affairs of a company and it, infact, determines the future of a company.

Any expenditure is done on a capital asset has a long term prospective. We spend today, to gain some advantage in future. This expenditure of a capital nature may be on construction/ purchase of a plant, machinery, equipment, etc. Each such expenditure involves a big outflow of funds initially, compensated by small but recurring doses of inflow of funds in future for some time. The nature of inflows and outflows can be depicted in the following exhibit.

Cash flows in a Project



The essence of the capital budgeting decision making is to determine whether the initial expenditure of funds is duly compensated by the inflows of funds occurring in future. If greater values can be assigned to the inflow of funds than the

present expenditure, then that capital investment proposal must be accepted because that will add to the wealth of the company.

Nature And Types Of Capital Budgeting Decision

The capital budgeting decision is a decision on an expenditure of capital nature (as against revenue expenditure) which is intended to create physical assets. The assets are is turn expected to reap benefits to the company for years to come. The expenditure on monetary assets (like purchase of Bonds, Shares, Treasury bills, Debentures etc.) is not to be treated as a capital budgeting expenditure. Only investment in physical assets is appraised in capital budgeting while investment in monetary and financial assets is appraised under portfolio analysis.

The capital budgeting expenditure may also be called an expenditure on a project – big or small. Thus the financial appraisal of a project is also a capital budgeting decision. The investment done on physical assets may be of the following types:

1. **New Projects**- The new projects mean expenditure on creation of new assets. For example, setting up an entirely new factory, a new building, a new plant, a new bridge etc. these projects are generally of a big size and take a relatively longer time for its completion and for the returns to flow in.

2. **Expansion Projects**- Wherever an existing capital asset needs expansion of capacities like setting up more machines in an existing factory or expanding the building of a factory or constructing a new facility etc., this will be called an 'expansion project'. This type of project is relatively of a smaller size and gives the returns faster.

3. **Renewal / Renovation Projects**- Whenever a new factory has been set up, after some years some machines or part of it become technically obsolete and need replacement in order to remain competitive. In such a situation the old machinery is disposed off and new machinery is installed in its place. Fundamentally it is also a project like the above ones, with the only difference that the disposal of old machines will fetch some price which must be accounted for, when we take the cost of the new machine.

4. **Exploration Projects**-Exploration projects are those projects when some new resources are to be discovered. The expenditure incurred on e.g. oil exploration may be called a project of this kind. This expenditure is also a capital budgeting expenditure, where we spend money now to reap benefits in future, with the only difference that there is far greater uncertainty about finding the resource for which the expenditure is to be incurred.

5. **Research and Development (R & D) Projects**- R & D projects are those projects in which present expenditure is being incurred in the hope of getting a new product, a new raw material, a new design or an improvement in the exiting ones. These projects are typically of a higher uncertainty than the above ones, because when we are undertaking a research project, we are neither sure of the time duration, nor of the expenditure, nor of the end result. Many R & D projects take a pretty long time in its completion with a high degree of uncertainty of end result.

6. **Projects for the Compliance of Certain Statutory Requirements**- There are some projects which are not undertaken explicitly for business prospects, but are nevertheless undertaken in compliance of legal requirements. These projects may be for ensuring certain safety requirements, e.g. installing fire fighting equipment or modification in existing structures for the safety of workers, or may be for controlling pollution from the factory e.g. an effluent treatment plant. Although no direct business profit seems to be coming but still no responsible company can ignore these projects. Sometimes or the other the law will take its course with immense cost to the company in terms of penalties and even closures. The case of Supreme Court ordering the closure the closure of all polluting factories around Taj Mahal is not a very old one.

Capital budgeting process

The entire capital budgeting process can be sub divided into several phases. It starts from the idea generation to project execution and involves several specialists. It is not merely the financial analyst, but a team of experts is needed in the whole process. It can be divided into the following phases;

1. Generation of Investment Ideas: - The whole process starts with generation of investment ideas. Somebody sees a business opportunity for future and starts exploring it. It can be called the entrepreneurial function. Generally the entrepreneur/ owner of a firm or top executives of corporate enterprises identify the business opportunity and then ask their subordinates to explore its viability.

2. **Estimating Cash Flows: -** After an idea has been identified the next step is to crystallize it. For this purpose a team of engineers, marketing and financial experts work on the proposal. They estimate the cost of the whole project including cost of land / building, machinery, and equipment; its installation, the expected life of the plant; the expected output, the cost of operation, the revenue generation for different years and also requirements of working capital.

3. **Evaluating Cash Flow: -** **A**fter an estimate of above variables has been prepared, there is need to evaluate it. The evaluation will be for its certainty as well as for adjusting its value for different years. This is mostly done by the financial analyst with inputs from the marketing expert.

4. **Selecting a Project: -** After the evaluation of the cash flows, the decision to accept or reject a project; or selecting a project from amongst alternatives is taken on the basis of some decision criteria. This is done by the owner / entrepreneur on the basis of evaluation done by the financial analysist. The advantages or disadvantages of decision criteria are also taken into account in selecting the decision criteria and making the final decision.

5. Execution and Monitoring: - After a decision to undertake a project has been taken, the process of its implementation starts. This again involves a team of engineers, financial experts, marketing experts under the leadership of the owner / entrepreneur. Proper monitoring of the implementation process is very important to avoid time and cost overruns, because this will adversely affect the whole exercise of estimation and evaluation of cash flows and make it go awry. Thus, it can be seen that the whole process of capital budgeting is a long and exhaustive process. Although other experts are involved, the key role of financial experts can not be overlooked

and anybody who is studying financial management must study this particular aspect also.

Activity -

1. list a company or a public sector organization and find out the different types of projects undertaken by them in the last five years

2. Also find out the process of their decision making and the experts involved in the whole process.

Methods of Appraising Investment Proposals

An Overview

It has already been pointed out in earlier pages that every investment proposal involves cash flows- large initial outflows followed by small but recurring inflows. The crux of the whole process is to asses whether the value of inflows is greater then the outflows or not. If a greater value can be assigned to the inflows/returns than the outflows/expenditure the proposal may be treated as profitable and therefore, acceptable. There are several methods to judge this. They may be divided into two categories-

1. Methods based on the assumption of certainty of cash flows.
2. Methods which take in to consideration uncertainty of cash flows.

Methods based on the assumption of certainty of cash flows are those methods which assume that whatever cashflows that have been estimated will be certain and no changes are expected in them. They may be further subdivided into two categories-

Simple methods:- Simple methods are those methods which are simple to calculate and do not involve elaborate calculation and discounting of cash flows. They are as follows;

a) Payback-period and
b) Accounting / Average Rate of Return (ARR)

Scientific Methods:- Scientific Methods are those methods which take into calculation the time value of money and, therefore, undertake discounting of cash flows... They are

a) Net Present Value (NPV)
b) Internal Rate of Return (IRR) and
c) Benefit-Cost (B-C) Ratio or Profitability Index (PI)

Methods which take into consideration uncertainty of cash flow are more realistic because any future directed estimate has an element of uncertainty. Therefore, a realistic method should be one which also considers this uncertainty. The following methods help us reduce the risk of uncertainty.

a) Conservative Estimates
b) Certainty Equivalent Coefficient
c) Risk- adjusted Discount Rate

d) Probability Distribution of uncertainty

e) Sensitivity Analysis etc.

Although the above methods help us overcome the risk in capital budgeting, but it must be understood that there role is only partial. In fact, no method can eliminate risk; we can only reduce it by improving our methodology.

Requirements of a good method

The previous section has shown us various methods, which may be used for investment decision making. In fact, each method has its own advantages as well as shortcomings. Given below are the requirements of a good method of investment decision making.

1. It should be based on cash-flows rather than on profits or expenditure.
2. Cash flows to be covered over the entire expected life of the asset rather than few years only.
3. It should give the absolute value of gain or loss.
4. It should consider time value of money.
5. It should indicate relative profitability between different alternatives so that a ranking can be made between different proposals.
6. It should indicate the degree of risk and the chances of getting profit or loss in a given situation.

There is probably no method which will posses all the above attributes but different methods do posses some of them. As we get introduced to different methods in this and the next unit, we will be able to assess the suitability of a method /methods for different situations.

Principles of Cash Flows Estimation

In this part we are going to see, how a capital budgeting decision is to be made and what are the principles that must be observed in order to make an estimation of cash flows in a scientific manner. As pointed out in previous section all estimates of receipts and payments should be based on cash flow rather than on revenue and expenditure or profit and loss. The reason is that cash flows are very certain amounts and are not subject to different interpretation by different people. Accrual principle is considered better for the purpose of accounting, (probably because it calculates profit or loss for a given year), but for a long term investment decision making cash principle will be better. Every payment of cash, for whatever purpose, is an outflow, while every receipt of cash, for whatever reason is an inflow. Any non cash expenditure (like depreciation) will not be accounted for because it does not involve any cash outflow. The following principle should be adhered to in estimating cash-flows in respect of a project.

1. All calculation of cash flows should be done on incremental basis rather than on aggregate basis. If any inflow is in addition to the exiting inflows, it should be accounted for otherwise not. If a machine costs Rs. 1,00,000 and it replaces an old machine which has fetched Rs. 20,000, then the cash outflow should be taken as only Rs. 80,000, even if the cost of machine is Rs. 1,00,000.
2. Cash flow should be taken on 'After-tax' basis. Each income of a company is subject to corporate income tax. So the amount of tax is cash outflow even if we may not consider it as expenditure. Hence, if we have to find out net cash inflow the amount of tax paid should be subtracted and 'cash flow after tax '(CFATs) should be calculated.
3. Sunk- costs should be ignored. The costs which have already been incurred and which are non recoverable should not be taken into account while calculating cash outflows for a period. This is because no net cash flows are taking place on account of a particular decision (since they have already been incurred and can not be recouped).
4. Calculation of cash flows should also take into account the opportunity cost even if no actual cash inflow or outflow takes place. For example, if we are using our own premises for a particular project, then possible rental should be taken as the cash outflow while making our calculations.

This is because in making our decision we are foregoing this income and this should be regarded as a cost.

5. A very important aspect of cash flow calculation is that cash flows on account of interest payments are not to be considered while making the calculation of cash flows. This may look odd, because the interest payment is an actual outflow and ignoring it may appear to be incorrect. However, it must be understood that the discounting of cash flows for their time value automatically takes into account the interest cost of any investment. Therefore, subtracting interest payment and then discounting it for time value will lead to double counting. Rate of interest is a compensation for time value of money and when we discount some cash flows for their time value at the given rate of interest, there is no need to subtract interest payments separately.
6. Cash needs for working capital should be treated as a cash outflow at the time of commencement of a project and should be treated as inflows when that cash is released at the time of closure or termination of project. Increases or decreases of working capital should be treated as outflows and inflows respectively as and when they take place.

CALCULATION OF CASH FLOWS AFTER TAX- AN ILLUSTRATION (6.1)

A company desires to make an investment of Rs. 1,00,000 in a new machinery. Additional installation and transportation cost is Rs. 20,000. The machine has a life of 5 years after which it is expected to fetch Rs. 10,000 as a scrap value. The machine is expected to generate an output of 2000 units p.a.in the first 2 years and 3000 units p.a. for the next 3 years. The product is expected to fetch Rs. 15 in the first 3 years and Rs. 18 in the last 2 years. The additional cost of operating a machine is expected to be Rs. 5,000 annually for the first three years and Rs. 8000 annually thereafter.

Calculate 'cash flows after tax' (CFATs) for the above proposal on the assumption of straight line depreciation and tax rate 40%.

Calculation of depreciation.

Cost of machinery		Rs1,00,000
Add: - Transportation and Installation cost		Rs.20,000

Less:-Scrap value	Rs.	10,000

Total amount to be depreciated	=	1,10,000

$$\text{Annual depreciation} = \frac{\text{Amount to be depreciated}}{\text{Life of the machinery}}$$

$$= \frac{1,10,000}{5} = \text{Rs. } 22,000$$

Calculation of CFATs

S.N.	Year	1	2	3	4	5
1.	Output (units)	2000	2000	3000	3000	3000
2.	Price (Rs.)	15	15	15	18	18
3.	Revenue (Rs.)	30,000	30,000	45,000	54,000	54,000
4.	Operating Expenses (Rs.)	5,000	5,000	5,000	8,000	8,000
5.	Depreciation	22,000	22,000	22,000	22,000	22,000
6.	Profit Before tax (PBT) [3-(4+5)]	3,000	3,000	18,000	24,000	24,000
7.	Tax 40%	1,200	1,200	7,200	9,600	9,600
8.	Profit after tax (PAT) (6-7)	1,800	1,800	10,800	14,400	14,400
9.	**CFAT [8+5]**	**23,800**	**23,800**	**32,800**	**36,400**	**36,400**
10.	**Scrap value**					**10,000**

As it has already been pointed out that cash flows calculation should not take into account non cash expenses, therefore CFAT can also be calculated by subtracting only the cash outflows for the revenue. For example for year 1

and 2 it will be 30,000 - (5000+1200) = 23,800, for third year it will be Rs. 45,000 - (5000+7200) = 32,800 and so on.

It can be seen from the above table that although depreciation does not affect cash flows directly, because it is a non cash expense but it, nevertheless affects cash flows, because depreciation will affect profit and profit will affect tax. Thus, the amount of depreciation will have bearing on CFATs. The amount of annual depreciation is dependent on the method of depreciation followed. The straight line method followed above is for the sake of simplicity only. Alternative methods will lead to alternative figures of annual depreciation.

The Income Tax law in India permits the use of Diminishing Balances Method only for calculating permissible depreciation amounts for calculating tax liability. The Law permits depreciation rates as follows. The different types of assets have been divided into 21 categories; each category is called a block. The types of assets and permissible depreciation rates are as follows.

Block	Types of assets	Rate of Depreciation
1.	Residential Buildings	5%
2.	Office, Factory Buildings	10%
3.	Hotel Buildings	20%
4.	New Buildings acquired before march 31,1999 and before April 1,2002	40%

5.	Temporary Erection and Wooden structures	100%
6.	Furnitures	10%
7.	Furnitures used in Hotels, Restaurants Cinema houses, schools etc.	15%
8.	Plant and Machinery	25%
9.	Motor vehicles, ships, launches	20%
10.	Buses, lorries taxies	40%
11.	Plant and machinery, containers made of glass or plastics	50%
12.	Computers and new commercial vehicles acquired in replacement of condemned vehicles of 15 years of age	60%
13.	Air/ water pollution control equipment, recycle and resources recovery equipment etc.	100%
14.	Ships being vessals operative on inland waters other than speed boats	10%
15.	Know-how acquired after March 31,1998	25%
16.	Patents acquired after March 31,1998	25%
17.	Copyrights acquired after March 31,1998	25%
18.	Trademarks acquired after March 31,1998	25%
19.	Licenses acquired after March 31,1998	25%
20.	Franchises acquired after March 31,1998	25%
21.	Other business and economical rights acquired after March 31,1998	25%

METHODS OF CAPITAL BUDGETING

As indicated in the previous section, we now discuss different methods of making an investment decision.

ACCOUNTING RATE OF RETURN

The Accounting Rate of Return also called the Average Rate of Return (ARR) is the average of the rate of return for different years for the whole life of an asset. It is a ratio between the Net Profit After Tax and the amount of initial investment made in the project.

$$ARR = \frac{\text{Average PAT}}{\text{Initial Investment}}$$

Illustration (6.2):- A company wishes to make an investment of Rs. 50,000 in a machine. The machine has a life of 5 years. The profit after tax on account of this machine for next five years is Rs. 7,500; Rs. 8,200; Rs. 7,900; Rs. 8,900 and Rs. 6,500 respectively. Calculate the ARR for this investment purpose.

$$ARR = \frac{(7,500+8,200+7,900+8,900+6,500)/5}{50,000} \times 100$$

$$= \frac{(39,000/5)}{50,000} \times 100$$

$$= \frac{7800}{50,000} \times 100 = 15.6\%$$

Another view about ARR is that since we take average of the PAT for calculating ARR we should also use average level of investment for the project. In such a situation the equation for calculating ARR should be modified as follows.

$$ARR = \frac{\text{Average Profit After Tax}}{\text{Average Investment}}$$

Average Investment would be found by taking the average book value for each year. The following Illustration will explain this:

Illustration (6.3) A company decided to make an investment in a new project which costs Rs. 1,00,000. The working life of the project is expected to be 5 years after which it is expected to be sold for a scrap value of Rs. 10,000. The company's incremental PAT is expected to be Rs.6,000, Rs.7,000, Rs.8,000, Rs. 7,500 and Rs. 6,500 for the next 5 years. Assuming depreciation on a straight line basis and tax rate 40%, find out the ARR.

$$\text{Annual Depreciation} = \frac{1,00,000 - 10,000}{5}$$

$$= \frac{90,000}{5} = 18,000$$

Calculation of Book value for each year

Year / (Rs.)	1	2	3	4	5	Average
Book value of machine						
Beginning	1,00,000	82,000	64,000	46,000	28,000	-
Ending	82,000,	64,000	46,000	28,000	10,000	-
Average	91,000	73,000	55,000	37,000	19,000	55,000
PAT	6,000	7,000	8,000	7500	6,500	7,000

$$\text{ARR} = \frac{7,000}{55,000} \times 100 = 12.72\%$$

If we calculate ARR on the basis of initial investment then

$$\text{ARR} = \frac{7,000}{1,00,000} \times 100 = 7\ \%$$

Average investment can be also found by the following formula

$$\text{Average investment} = \frac{[\text{Initial value} + \text{Scrap Value}]}{2}$$

$$= \frac{1,00,000 + 10,000}{2}$$

$$= 55,000$$

Thus we find a wide gap between the two concepts. It may be further noted that some authors prefers to

calculate ARR on the basis of EBIT (Earnings Before Interest and Tax) and not PAT (Profit After Tax).

Acceptance & Ranking Rule:-

When we adopt ARR as the decision criteria, then the acceptance rule is that the calculated ARR should be greater than some specified rate. We will reject those proposals which have an ARR lower than this specified rate. So far as ranking of projects is concerned, the project with a higher ARR should be ranked higher than other project which has a lower ARR.

Evaluation of ARR Method:-

The ARR method is a relatively simple method involving the calculation of averages. It is also based on easily understood accounting information like EBIT/PAT, depreciation, investment etc. However, when it is evaluated for its suitability as a investment criteria for making long term investment decisions, we find it deficient in several respects. Firstly, it is ill defined; we do not know whether to use EBIT or PAT; Initial Investment or Average Investment. Each variable will give different values of ARR. Moreover, accounting information itself is not very certain and subject to great manipulation; Thirdly the average of income, whether EBIT or PAT ignores time value of money and hence not suitable for scientific decision making, and lastly the bench mark rate,

against which the calculated ARR will be compared is arbitrary and there is no scientific basis for deciding it.

PAYBACK PERIOD

The Payback- period is the time duration required to recover the initial cash outflows. This method is based on cash flows and not on accounting data like the ARR. Ordinary people not well versed in appraisal techniques, often use very simple technique to judge the profitability of any investment proposal. They think in terms of initial expenditure (outflow) and the time duration in which this amount can be recovered. Suppose somebody spent Rs.50,000 on any project and expects that within 3 year he can get back this amount, then the payback period is 3 years. Payback period of any proposal can be calculated as follows;

If the cash inflows are uniform then

$$\text{Payback period} = \frac{\text{Initial cash outflow}}{\text{Annual cash inflows}}$$

If the cash inflows are not uniform then

Payback period = time period in which the cumulative cash flows are equal to initial inflows.

Illustration: - (6.4) A company is considering a proposal to spend Rs. 1,00,000 on a new proposal. The cash inflows are

expected as follows. Year 1, Rs. 20,000, year 2, Rs. 30,000, year 3, 33,000, year 4, 40,000, year 5, Rs. 40,000. The payback period in this case would be calculated as follows.

Year	Cash inflows (Rs.)	Cumulative cash inflows (Rs.)
1	20,000	20,000
2	30,000	50,000
3	30,000	80,000
4	40,000	1,20,000
5	40,000	1,60,000

The cumulative column shows that Rs.1,00,000 cumulative figure comes between year 3 and 4. Fourth year adds Rs. 40,000, whereas only Rs. 20,000 needs to be added in Rs. 80,000 to make it equal to Rs. 1,00,000 (the initial investment). Assuming a uniform collection rate Rs. 20,000 can be recovered in ½ year, i.e. in 6 months. So the payback period is

$$3+ \frac{20,0000}{40,000} = =3 \frac{1}{2} \text{ years}$$

or three years and six months.

Acceptance Rule and Ranking Rule: - If the calculated payback is less than any predicted value then an investment proposal is acceptable, otherwise it will be rejected. So far as

ranking is concerned, the lower the value of the payback the higher will be the ranking of any investment proposal.

Evaluation of payback method: -

It is a simple method in concept and understanding. That is why even lay men can understand and use it with ease. Moreover, since its emphasis is on early recovery of investment, it automatically takes care of risk. Projects with smaller payback are considered safer and secure as compared to the projects with longer payback.

The payback method, however, suffers from serious drawbacks. Firstly it takes into account only early cash flows which determine the payback and ignores those which come later. This may be often leading to wrong conclusions.

Illustration (6.5):-There are two alternative projects X and Y with the following pattern of cash flows.

Cash flows

Year	Project X	Project Y
0	-50,000	-50,000
1	15,000	10,000
2	20,000	15,000
3	30,000	20,000
4	20,000	30,000
5	0	40,000
6	0	30,000

If we calculate the payback for the above projects it is 2 ½ years for X and 3 1/6 years for Y. Project X will appear to be a better project. However, a comprehensive analysis of projects would show the project Y is a superior project with greater value of inflows.

Secondly, payback method ignores time value of money. It is a simple summation of inflows without adjusting for their time period.

Illustration (6.6):-

Cash flows

Year	Project X	Project Y
0	-60,000	-60,000
1	10,000	30,000
2	20,000	20,000
3	30,000	10,000

The payback for the above two projects is 3 years, but if we analyze the timings of cash flows we find that project Y is superior because the higher cash flows are occurring initially and will have a higher value if time value of money is taken into consideration.

Thirdly, Payback period is considered only a measure of capital recovery and it is not a perfect measure for profitability.

In spite of these limitations of the payback method, it is still widely used in modern project appraisal mainly because of its simplicity and ease of calculation. However, it is used only for a preliminary screening and not for final decision making. For example, a financial institution may

decide that it will consider the projects only if they have a payback of upto 4 years. In such a case the projects with a payback less than 4 years will be considered but a final decision would be based on more scientific methods (discussed in the next unit) and not merely on payback period.

DISCOUNTED PAYBACK

The concept of discounted cashflows for calculating payback period has emerged in recent years. It is suggested by some authors that in order to overcome the limitation of payback that it does not use time value of money, we may use the discounted cashflows in order to calculate the payback period. Obviously the discounted payback will be longer than the simple payback period.

Illustration (6.7) A company is considering a project with an initial outflow of Rs. 1,00,000, the cash inflows from the project are expected to be as follows. Find out the payback period by traditional method as well as by discounted method @ 10% rate of discount.

Year	Cash flows(Rs.)
1	20,000
2	30,000
3	30,000
4	40,000
5	30,000
6	20,000

Solution

Year	Cash flows	Cumulative	Discounted	Discounted

	Rs.	Cash Flows Rs.	Cash Flows Rs.	Cumulative Cash Flows Rs.
1	20,000	20,000	18182	18182
2	30,000	50,000	24793	42975
3	30,000	80,000	22539	65514
4	40,000	1,20,000	27321	92835
5	30,000	1,50,000	18628	1,11,463
6	20,000	1,70,000	11289	1,22,752

The traditional payback is

$$3 + \frac{1,00,000 - 80,000}{1,20,000 - 80,000} = 3 + \frac{20,000}{40,000} = 3.5 \text{ years}$$

The discounted payback is

$$4 + \frac{1,00,000 - 92,385}{1,11,463 - 92385} = 4 + \frac{7165}{18628} = 4.38 \text{ years}$$

The discounted payback considers the time value of money but simply for this reason it does not become a superior technique because it will still retain other limitations of payback method. Moreover, it is not in consonance with the traditional view of payback and hence is not very popular.

Key Words

Capital Budgeting Decision: - It is a decision regarding a proposed expenditure of capital nature, which is intended to create physical assets.

Cash Flows: - It is a cash transaction. A receipt of cash is called an inflow and a payment is called an outflow.

CFAT (Cash Flow After Tax): - It is the cash receipt or payment after tax. It is the net value of cash flow.

Scrap Value: - It is the value which may be received from the sale of assets after the project period is over. It is treated as the additional cash inflow in the terminal year of the project.

Opportunity Cost: - It is the possible earning that can be made from a resource from its alternative use.

Depreciation: - It is the reduction in the value of a physical asset due to its wear and tear. It is treated as a non cash expense.

Working Capital: - It is the money needed to keep a machine working. It is used for the purchase of raw material, payment of wages and other sundry expenses; it is, therefore, needed only till the machine, plant or equipment is working. Once they stop work there is no need for the working capital and this is called release of working capital.

Self Assessment Questions:-

1. What is a Capital Budgeting Decision? What is its importance?

2. What are the different types of projects? And what is the distinguishing feature of each type of project? Which project do you think involves highest risk and why?
3. Projects are not always for certain future benefits, they may be undertaken to avoid certain penalties in future.' Discuss this statement.
4. What is Capital Budgeting Process, and who are the specialists, whose services may be needed to make a decision. ?
5. "A capital budgeting decision is not an individual's work, it is a team work." Analyse this statement.
6. What are the requirements of a good method of capital budgeting decision making? Give an overview of different methods.
7. Why do we use a cashflow analysis instead of a profit analysis in a capital budgeting decision? What are the general principles of cash flow estimation?
8. "Interest payment is not accounted for in capital budgeting decision, even though it involves cash flows," Why?
9. What is an ARR and how is this to be calculated?
10. What is a payback and what is its importance?
11. Calculate CFATs (Cash flows after taxes) in the following example.

(a)	Initial investment	Rs.2,00,000
(b)	Additional cost of installation & Transport	Rs.50,000
(c)	Life	6 years
(d)	Scrap Value	Rs.40,000

The projected output, the price, the operating expenses are as follows.

Year	Output (Units)	Price per unit (Rs.)	Operating expenses (Rs.)
1	2,000	22	8,000
2	3,000	22	12,000
3	4,000	25	20,000
4	5,000	25	25,000
5	4,000	25	25,000
6	4,000	30	30,000

Assume straight line depreciation and a tax rate of 40%.

12. Calculate ARR in the above example on the basis of initial investment and average investment.
13. Calculate pay back period on a traditional basis and also on a discounted cashflow basis assuming a discount rate of 8%.
14. Given below are two investment proposals with earning before Depreciation and tax.

	Project X	Project Y
Initial investment (Rs.)	50, 000	60,000
Life	4 yrs	5 yrs
Additional sales revenue (Rs.)	20,000 p.a	18,000 p.a
Additional expenses (Rs.)	5,000	4,000 p.a
Tax rate	40%	40%

Evaluate them on the basis of payback and ARR. Which one is a superior project on each basis?

Solutions

11. Annual Depreciation = $\frac{2,00,000 + 50,000 - 40,000}{6} = 35,000$

Calculation of CFATs

Year	1	2	3	4	5	6
Output units	2,000	3,000	4,000	5,000	4,000	4,000
Price	22	22	25	25	25	30
TR	44,000	66,000	1,00,000	1,25,000	1,00,000	1,20,000
Expenses	8,000	12,000	20,000	25,000	25,000	30,000
Depreciation	35,000	35,000	35,000	35,000	35,000	35,000
PBT	1,000	19,000	45,000	65,000	40,000	55,000
Tax @ 40%	400	7,600	18,000	26,000	16,000	22,000
PAT	600	11,400	27,000	39,000	24,000	33,000
CFATs	**35,600**	**46,400**	**62,000**	**74,000**	**59,000**	**68,000**

12.

$$ARR = \frac{\text{Average PAT}}{\text{Initial Investment}} \times 100 = \frac{(1,35,000/6)}{2,50,000} \times 100$$

$$= \frac{22,500}{2,50,000} \times 100 = 9\%$$

$$ARR = \frac{\text{Average PAT}}{\text{Average Investment}} = \frac{22,500}{(2,50,000 + 40,000)/2} = 15.52\%$$

13. **Payback Calculation**

Year	CFATs (Rs.)	Cumulative CFATs (Rs.)	Discounted CFATs (Rs.)	Cumulative Discounted CFATs(Rs.)
1	35,600	35,600	32,962.96	32,962.96
2	46,400	82,000	39,780.52	72,748.43
3	62,000	1,44,000	49,218.07	1,21,961.55
4	74,000	2,18,000	54,391.77	1,76,353.32
5	59,000	2,77,000	40,155.17	2,16,508.49
6	62,000	3,39,000	39,069.88	2,55,598.37

Payback Period, $= 4 + \frac{32,000}{59,000} = 4.54$ years

Payback Period (discounted) = $5 + \frac{33,491.51}{39069.88} = 5.86$ years

14.

	Project X	Project Y
Initial Investment	50,000	60,000
Annual Depreciation	12,500	12,000
PBIT	15,000	14,000
Tax	6,000	5,600
PAT	9,000	8,400
CFAT	21,500	20,400
Payback	$\frac{50,000}{21,500} = 2.33$	$\frac{60,000}{20,400} = 2.94$
ARR	$\frac{9,000}{25,000} \times 100$	$\frac{8,400}{30,000} \times 100$
	= 36%	= 28%

Project X is superior on the basis of both payback as well as ARR.