

CAPITAL BUDGETING - TRADITIONAL METHODS

OBJECTIVES

After studying this lesson you should be able to

- Explain the meaning of pay back period
- Explain the meaning of Accounting Rate of Return
- Evaluate the projects under pay back period and Accounting Rate of Return.

STRUCTURE

- 8.1 Introduction
- 8.2 Methods of Capital Budgeting
- 8.3 Pay back period
- 8.4 Accounting Rate of Return
- 8.5 Summary
- 8.6 Self Examination Questions
- 8.7 Glossary
- 8.8 Books for Further reading

8.1 INTRODUCTION

In the previous lesson you have studied about the estimation of cash flows which is a prerequisite for evaluating projects. This lesson is devoted to explain the meaning of traditional techniques viz, pay back period and accounting rate of return and their merits and demerits.

8.2 METHODS OF CAPITAL BUDGETING

Broadly, there are two methods by which an investment opportunity or project can be evaluated. These are as follows:

(A) TRADITIONAL METHODS

- (1) Pay back period method
- (2) Accounting Rate of Return or Average rate of return

(B) DISCOUNTED CASH FLOW TECHNIQUES

- (i) Net present value method
- (ii) Profitability Index
- (iii) Internal Rate of Return

This lesson is devoted to explain the traditional methods of evaluating capital budgets and discounted cash flow techniques are explained in the next lesson.

8.3 PAY BACK PERIOD

The basic characteristic of investment is that a current outlay is followed by a stream of future cash inflows for a specified period. A rational investor would like to recoup his initial outlay from the cashflows in the quickest time possible during the economic time of the project.

Pay back period may be defined as number of years required to recoup or recover the initial investment from the generated cashflows. Since different projects have varying pattern and timing of cash flow, the projects will have different pay back period.

DECISION CRITERIA

- (1) In case of Independent projects, the calculated pay back period should be compared with standard set by the company. If the calculated pay back period is less than standard pay back period, the project will be accepted otherwise rejected. For example, the project A pay back period is 3.5 years against standard pay back period set by the company is 4 years. It should be accepted.
2. In case of mutually exclusive projects calculated pay back periods of alternatives compared and the project which has lowest pay back period is accepted.

The pay back period may be calculated by using the following formula.

8.3.1 UNIFORM CASH FLOWS

If the proposed projects cash inflows are uniform the following formula can be used to determine pay back period.

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

Illustration : 1

A project requires an initial investment of Rs.20,000/- with a useful life of 5 years. The projected cash in flows (CFAT) for each year are as flows.

Year	1	2	3	4	5
CFAT Rs.	8,000	8,000	8,000	8,000	8,000

Calculate the pay back period

Solution

Since the cash flows of the project are uniform or similar for all the years, pay back period may be computed by using the following formula.

$$\begin{aligned} \text{Pay back period} &= \frac{\text{Initial Investment}}{\text{Annual Inflow}} \\ &= \frac{20,000}{8,000} = 2.5 \text{ years} \end{aligned}$$

Pay back period always expressed in years.

8.3.2 NON UNIFORM CASH FLOWS

In the above example cash inflows are assumed as uniform. But in practice the annual inflows may be varying. In the case of these non uniform cashflows pay back period can be computed by cumulating the cash flows as follows

Illustration:2

A machine costs Rs. 40,000/- and is expected to generate the following cash flows. Compute the pay back period,

Year	1	2	3	4	5	6	7	8	9	10
CFAT Rs.	6,000	8,000	4,000	10,000	11,000	8,000	6,000	15,000	14,000	18,000

Solution

Since the cash flows are not uniform in the above problem first we have to calculate cumulative cash flows as follows:

Year	CFAT (Rs)	Cumulative CFAT (Rs)
1	6,000	6,000
2	8,000	14,000
3	4,000	18,000
4	10,000	28,000
5	11,000	39,000
6	8,000	47,000
7	6,000	53,000
8	15,000	68,000
9	14,000	82,000
10	18,000	1,00,000

If you observe the above cumulative CFAT the project can give back Rs. 39,000/- by the end of 5th year. But projects initial investment Rs. 40,000/-. To calculate pay back period the following formula may be used.

$$\text{Pay back period} = \text{Base year} + \frac{\text{Required CFAT}}{\text{Next Year CFAT}}$$

$$\begin{aligned} \text{Here the base year is 5 years.} &= 5 \text{ Years} + \frac{1,000}{8,000} \\ &= 5.125 \text{ Years.} \end{aligned}$$

3.3 MERITS OF PAY BACK PERIOD

1. It is easy to compute, communicate and understand, so it has become popular method of evaluation.
2. The Method is very useful in evaluating those projects which involve uncertainty.
3. This method makes it clear that no profit arises till the pay back period is over. This helps the companies in deciding when they should start paying dividends.
4. The management knows the length of time for which funds are locked up.
5. It is useful for ranking the projects which are equally desirable under the other methods of capital budgeting. The project with the shortest pay back period gets first priority in selection.

3.3.4 DEMERITS OF PAY BACK PERIOD

1. The method ignores the returns generated by a project after its pay back period. Projects having long gestation period will never be taken up if this method is followed though they may yield high returns for a long period.
2. The method does not take into account the time value of money
3. Fastness of recovery of investment amounts to over emphasis on liquidity.
4. Pay back is not a profitability measure.

3.4 ACCOUNTING RATE OF RETURN (ARR)

This method is also known as average rate of return as average of the net profit after taxes over the whole of the economic life of the project are taken. Under this method return is expressed as a percentage of capital or investment. Accounting Rate of Return may be calculated according to any of the following methods:

$$(i) \text{ ARR} = \frac{\text{Average net profit after taxes}}{\text{Total Investment}} \times 100$$

$$(ii) \text{ ARR} = \frac{\text{Average net profit after tax}}{\text{Average investment}} \times 100$$

The amount of "Average net profit after taxes" and "Average Investment" are calculated as follows:

$$(a) \text{ Average net profit after taxes} = \frac{\text{Total Net Profit After Taxes}}{\text{No. of Years}}$$

$$(b) \text{ Average Investment} = \left(\frac{\text{Investment-Scrap Value}}{2} \right) + \frac{\text{Additional Net Working Capital} + \text{Scrap Value}}{2}$$

DECISION CRITERIA

1. In case of Independent projects calculated ARR of the project will be compared with standard ARR set by the company. If the calculated ARR is more than standard ARR, it will be accepted otherwise rejected.

- While evaluating mutually exclusive projects calculated ARR of the alternatives will be compared to judge the profitability. The project which have higher rate of return will be accepted.
- In case of capital rationing situation, the projects are ranked and selected. The projects which have higher rate will be given top ranks and selected in order of priority.

Illustration : 3

Determine the average rate of return from the following data of two machines A and B:

	Machine A	Machine B
Original Cost	Rs 56,125-00	Rs 56,125-00
Additional Working Capital	Rs 5,000-00	Rs 6,000-00
Life	5 Years	5 Years
Estimated Salvage Value	Rs 3,000-00	Rs 3,000-00
Tax Rate	55%	55%

Annual Estimated Net Profit after taxes

Year	Machine A	Machine B
	3,375-00	11,375-00
1	5,375-00	9,375-00
2	7,375-00	7,375-00
4	9,375-00	5,375-00
5	11,375-00	3,375-00
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	36,875-00	36,875-00
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Solution

$$ARR = \frac{\text{Average Net Profit after taxes}}{\text{Average Investment}} \times 100$$

Machine : A

$$\begin{aligned} \text{Average net profit after taxes} &= \frac{36,875}{5} \\ &= \text{Rs. } 7,375 \\ \text{Average Investment} &= \frac{56,125 - 3,000 + (5,000 + 3,000)}{2} \\ &= \text{Rs. } 34,562-50 \\ \text{ARR} &= \frac{\text{Rs. } 7,375}{\text{Rs. } 34,562-50} \times 100 = 21.34\% \end{aligned}$$

Machine : B

$$\begin{aligned} \text{Average Net Profit after taxes} &= \frac{36,875}{5} \\ \text{Average Investment} &= \frac{56,125 - 3,000 + (6,000 + 3,000)}{2} \\ &= \text{Rs. } 35,562-50 \end{aligned}$$

$$\text{ARR} = \frac{\text{Rs. 7,375}}{\text{Rs. 34,562-00}} \times 100 = 20.74\%$$

Illustration: 4

A machine costs Rs. 1,00,000 and has no scrap value after 5 years. It is depreciated on straight line basis. The expected net earnings after depreciation and taxes are as follows.

Year	1	2	3	4	5
Net Earnings after taxes	50,000	40,000	60,000	20,000	30,000

Solution

$$\begin{aligned} \text{Average Earnings after tax} &= \frac{50,000 + 40,000 + 60,000 + 20,000 + 30,000 + 2,00,000}{5} \\ &= \frac{2,00,000}{5} = 40,000 \end{aligned}$$

$$\text{Average Investment} = \frac{1,00,000}{2} = 50,000$$

$$\text{ARR} = \frac{40,000}{50,000} \times 100 = 80\%$$

ARR also can be calculated on total Investment

$$\text{ARR} = \frac{40,000}{1,00,000} \times 100 = 40\%$$

8.4.1 ADVANTAGES OF AVERAGE RATE OF RETURN METHOD

1. It is very simple to understand and easy to calculate
2. It uses the entire earnings of a project in calculating rate of return.
3. As this method is based upon accounting concept of profit. It can be readily calculated from financial data.

8.4.2 DISADVANTAGES OF AVERAGE RATE OF RETURN METHOD

1. This method is like pay back period method, ignores the time value of money.
2. It does not take into consideration the cash flows which are more important than the accounting profits.
3. It ignores the timing of returns.
4. This method cannot be applied to a situation where investment in a project is to be made in parts.

SUMMARY

There are two traditional methods of investment evaluation. These are the pay back method and the accounting rate of return method. Pay back period is the length of

the time required by a project to return the investment from the cashflows generated by it. The project with the least pay back period are selected.

Accordingly, rate of return is another method widely used for evaluating the projects. It is calculated as a percentage of investment. The projects with more rate of return will be accepted.

8.6 SELF EXAMINATION QUESTIONS

1. What are the methods of evaluating capital budgeting?
2. What is pay back period? How do you compute?
3. What are the merits and demerits of pay back period?
4. What is accounting rate of return? How do you compute?
5. What are the merits and demerits of accounting rate of return?
6. Calculate the pay back periods of the following projects each requiring a cash outlay of Rs. 1,00,000. Suggest which project is acceptable under pay back period method.

CASHFLOWS

Year	Project A	Project B	Project C
	Rs	Rs	Rs
1	30,000	30,000	10,000
2	30,000	40,000	20,000
3	30,000	20,000	30,000
4	30,000	10,000	40,000
5	30,000	5,000	-

7. There are three investment proposals A, B and C each requiring Rs. 40,000 as investment. The expected cash flows are as follows

Year	Project X	Project Y	Project Z
1	10,000	10,000	7,000
2	12,000	10,000	8,000
3	15,000	10,000	9,000
4	8,000	10,000	10,000
5	9,000	10,000	11,000
6	7,000	10,000	12,000

Suggest which project should be accepted?

8. A project costs Rs. 25,000/- and has a scrap value of Rs. 5,000/- after 5 years. The net profits before depreciation and taxes for the five years period are expected to be Rs. 5,000, Rs. 6,000, Rs. 7,000, Rs. 8,000 and Rs. 10,000. You are required to calculate the accounting rate of return assuming 50% tax rate and depreciation on straight line basis.

9. A company has purchased an asset for Rs. 60,000. Life of the project is 3 years. The earnings after taxes (EAT) are given below:

Year	EAT
1	10,000
2	10,000
3	10,000

Calculate pay back period and average rate of return assuming depreciation to be charged on straight line basis.

10. A company is considering two mutually exclusive projects. Both require an initial outlay of Rs. 20,000 each and have a life of five years. The company's required rate of return is 10 percent and pays tax at a 50 percent rate. The projects will be depreciated on straight line basis. The cash flows before depreciation and taxes expected to be generated by the projects are as follows.

Year	1	2	3	4	5
Project A Rs.	8,000	8,000	8,000	8,000	8,000
Project B Rs.	12,000	6,000	2,000	5,000	5,000

Calculate pay back period and average rate of return for each project.

8.7 GLOSSARY

Pay back period	:	The number of years required to recover initial investment of the project
Average Rate of Return	:	It is the rate of return on investment expressed in percentage.

8.8 BOOKS FOR FURTHER READING

Pandey I.M.,	:	"Financial Management", Vikas Publishers, New Delhi, 7th ed.1995.
Khan & Jain.,	:	"Financial Management", Tata Mac Graw hill, New Delhi, 2ed 1993.
Maheshwari, S.N.	:	"Financial management", Sultan Chand and sons, New Delhi, 1994.