

# **CAPITAL BUDGETING**

# INTRODUCTION

Capital budgeting decision may be defined as the firm's decision to invest its current funds most efficiently in the long term assets in anticipation of an expected flow of benefits over a series of years.

These decisions are also known as investment decisions.

Features of Investment decisions are as follows:

- The exchange of current funds for future benefits.
- The funds are invested in long term assets.
- The future benefits will occur to the firm over a series of years.

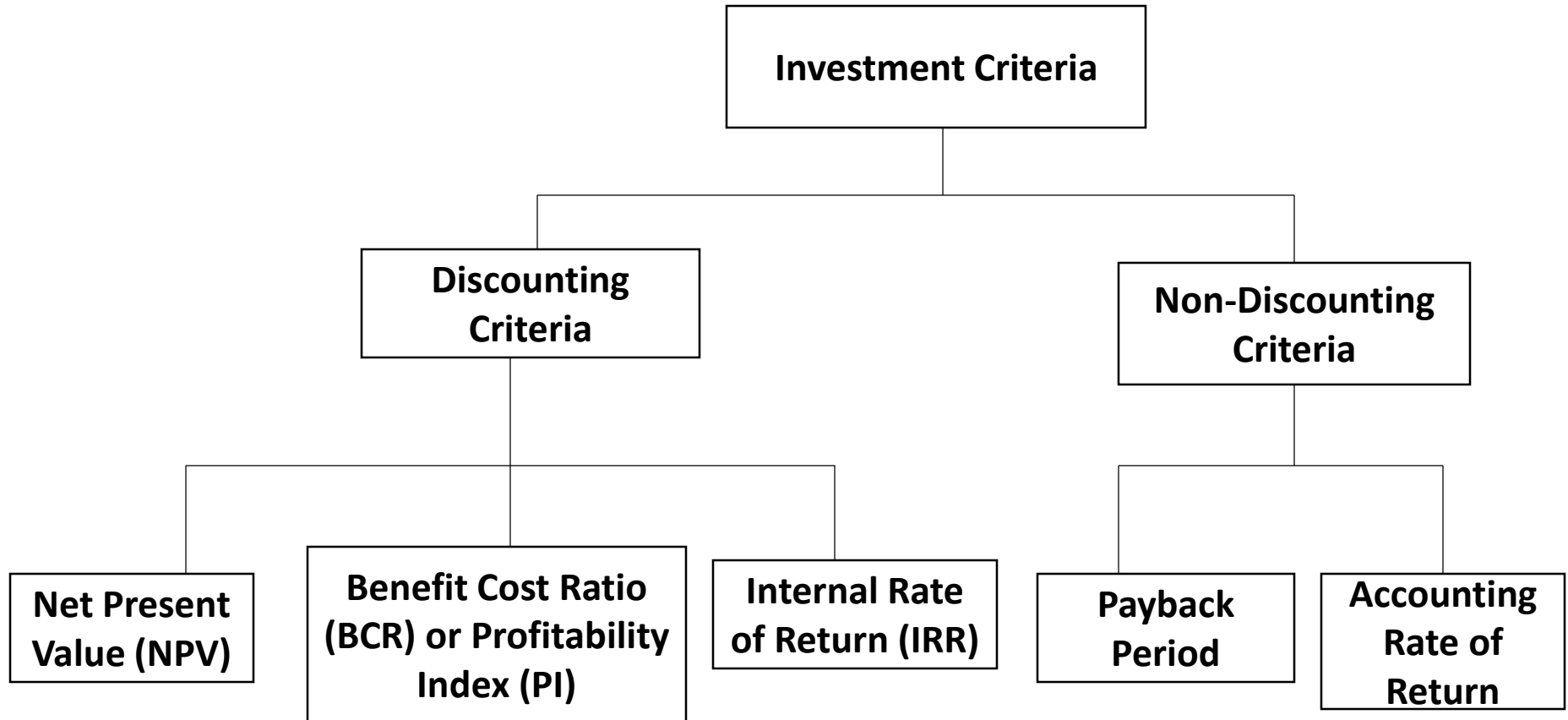
# CAPITAL EXPENDITURES AND THEIR IMPORTANCE

- ❑ The basic characteristics of a capital expenditure (also referred to as a capital investment or just project) is that it involves a current outlay (or current and future outlays) of funds in the expectation of receiving a stream of benefits in future
  
- ❑ Importance stems from
  - Long-term consequences
  - Substantial outlays
  - Difficulty in reversing

## **CAPITAL BUDGETING PROCESS**

- Identification of Potential Investment Opportunities
- Assembling of Investment Proposals
- Decision Making
- Preparation of Capital Budget and Appropriations
- Implementation
- Performance Review

# *Investment Criteria - Classification*



# Pay Back Period (PBP)

- Payback period is the length of time required to recover the initial cash outlay on the project.
- PBP tries to answer the question: How many years will it take for the cash inflows to pay the original cost of investment?

Year	Cash Flows (in Rs.)
0	(2,50,000)
1	80,000
2	90,000
3	45,000
4	35,000
5	40,000

- PBP in the above example would be *4 years* as the end of 4<sup>th</sup> year the total of all cash inflows is equal to the initial outlay.
- If the annual cash inflow of a project is a constant sum

$$\text{PBP} = (\text{Initial Outlay}) \div (\text{Annual Cash Inflow})$$

- A project requires an initial outlay of Rs. 50,00,000 which generates a constant annual cash inflow of Rs. 12,00,000. Then,

$$\text{PBP} = 50,00,000 \div 12,00,000 = 4.17 \text{ years}$$

## *Pay Back Period (PBP)*

According to payback criterion, the shorter the payback period, the more desirable the project. Firms using PBP specifies the maximum acceptable PBP.

*PBP ≤ Benchmark PBP = Accept the Project*

*PBP > Benchmark PBP = Reject the Project*

### *Merits:*

- It is simple, both in *concept* and *application*. It does not involve any tedious calculations and has few hidden assumptions.
- It is a rough and ready method for dealing with risks.
- A sensible criterion if the firm is pressed with the problem of *liquidity*.

### *Limitations:*

- It fails to consider the *time value of money*, since projected cash flows are simply added towards determining PBP.
- It ignores cash flows *beyond the payback period*. This leads to discrimination against projects which generate substantial cash inflows in later years.
- It is a measure of *capital recovery*, not *profitability*.

# *Discounted Pay Back Period*

- Overcomes an inherent shortcoming of PBP criterion by factoring in time value of money into the analysis.

Year	0	1	2	3	4	5
Cash Flows	-10,000	3,000	3,000	4,000	4,000	5,000

<i>Year</i>	<i>Cash Flows (in Rs.)</i>	<i>Discount Factor @10%</i>	<i>Present Value (in Rs.)</i>	<i>Cumulative Discounted Cash Flows (in Rs.)</i>
0	(10,000)	-	-	-
1	3,000	0.909	2,727	2,727
2	3,000	0.826	2,478	5,205
3	4,000	0.751	3,004	8,209
4	4,000	0.683	2,732	10,941
5	5,000	0.621	3,105	14,046

- Discounted PBP of above project =

$$\text{Lower Year} + \left[ \frac{(\text{Outlay} - \text{CCF}_{LL})}{(\text{CCF}_{UL} - \text{CCF}_{LL})} \right]$$

$$3 + \left[ \frac{(10,000 - 8,209)}{(10,941 - 8,209)} \right] = 3.6 \text{ years}$$



# Accounting Rate of Return

- An accounting oriented criterion of investment appraisal. It is also referred to as '*Average Rate of Return*'.

**Profit after Tax ÷ Book value of Investments**

- Numerator represents average annual post-tax profit over the life of the investment/project, while the denominator is the average book value of fixed assets committed to the project.

	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>Average</b>
<b>Book value of inv (Rs.)</b>	90,000	80,000	70,000	60,000	50,000	70,000
<b>Profit after Tax (Rs.)</b>	20,000	22,000	24,000	26,000	28,000	24,000

$$\text{Accounting Rate of Return} = 24,000 \div 70,000 = 0.342 = 34.2\%$$

## **PROS:**

- Simple.
- Based on accounting information businessmen are familiar with.
- Considers benefits over the entire project life.

## **CONS:**

- Based on accounting profit, not cash flow.
- Does not take into account the time value of money.

## NET PRESENT VALUE

The net present value of a project is the sum of the present value of all the cash flows associated with it. The cash flows are discounted at an appropriate discount rate (cost of capital)

$$\text{NPV} = \sum C_t / (1+r)^t - \text{Initial Outlay}$$

$C_t$  = Cash flow at the end of year  $t$ ;

$r$  = Discount Rate or Cost of Capital

' $r$ ' reflects the risk of the project

### Naveen Enterprise's Capital Project ( Cost of Capital=15%)

Year	Cash flow	Discount factor	Present value
0	-100.00	1.000	-100.00
1	34.00	0.870	29.58
2	32.50	0.756	24.57
3	31.37	0.658	20.64
4	30.53	0.572	17.46
5	79.90	0.497	39.71
			Sum = 31.96

### Decision Rule:

NPV is a **positive** value = **Accept** the project

NPV is a **negative** value = **Reject** the project

NPV is exactly **zero** = Matter of **indifference (Either Accept or Reject)**

*Between two independent projects having positive NPVs, the project with greater NPV will be preferred by the organization.*

# *Properties of NPV*

- Net Present Values are additive.
- Intermediate cash flows are invested at the cost of capital.
- NPV calculation permits time varying discount rates.
- NPV of a conventional project decreases as the discount rate increases.

## Pros:

- Reflects the time value of money
- Considers entire cash flow stream of the project.
- In sync with financial objectives of stockholder wealth maximization.
- NPVs are additive in nature enabling estimating NPV of a multi project package. This eliminates chances of accepting poor projects combined with another good project.

## Cons:

- Is an absolute measure and not a relative hence does not factor in the scale of investment.
- NPV rule does not consider the life of the project. In case of mutually exclusive projects of differing lives, it is biased in favor of longer-term project.

# Benefit Cost Ratio or Profitability Index

- Benefit Cost Ratio (BCR) relates benefits offered by a project in terms of cash inflows with the initial cost incurred.
- It represents ratio of the sum of present values of all cash inflows and initial project outlay.

$$BCR = PVB \div \text{Initial Outlay}$$

*PVB: Present Value of Benefits*

$$\text{Net BCR (NBCR)} = BCR - 1$$

## Decision Rule

<i>BCR</i>	<i>NBCR</i>	<i>Decision</i>
> 1	> 0	Accept
= 1	= 0	Indifferent
< 1	< 0	Reject

$$BCR = \frac{\frac{25,000}{(1.12)} + \frac{40,000}{(1.12)^2} + \frac{40,000}{(1.12)^3} + \frac{50,000}{(1.12)^4}}{100,000} = 1.145 \quad \text{NBCR} = BCR - 1 = 0.145$$

# Internal Rate of Return (IRR)

- *Internal Rate of Return* of a project is the discount rate ( $r$ ) which makes its NPV equal to zero.
- It is the *discount rate* which *equates the present value of future cash flows with the initial investment*.
- Value of ' $r$ ' in the following equation is IRR.

$$\sum C_t / (1+r)^t - \text{Investment} = 0$$

$C_t$  = Cash flow at the end of year  $t$

$r$  = Internal Rate of Return (or the discount rate)

## NPV

- Assumes that the discount rate (cost of capital) is known.
- Calculates the net present value, given the discount rate.

## IRR

- Assumes that the net present value is zero.
- Figures out the discount rate that makes net present value zero.

# *Merits and Limitations of IRR*

## *Merits*

- Easier to think in terms of *rates of returns* rather than *absolute rupee values*.
- Easy interpretation by all stakeholders of the project.
- Non-requirement of prior knowledge of *discount rate*, unlike NPV calculation.

## *Limitations*

- Non-conventional Cash Flows.
- Mutually Exclusive Projects.
- Lending vs. Borrowing.
- Differences between short-term and long-term interest rates