Capital Budgeting ~~Techniques~~ Techniques

- Traditional or Non-discounted
  1. Accounting or Average Rate of Return Method (ARR)
  2. Pay-back Period Method
- Modern or Discounted Cash Flow
  3. Net Present Value Method (NPV)
  4. Internal Rate of Return Method (IRR)
  5. Profitability Index (PI) Method
  6. Discounted Pay-back Period Method

1. Accounting or Average Rate of Return Method (ARR)

This method is one of the traditional methods for evaluating the project proposals. Average rate of return means the average rate of profit taken for considering the project evaluation.

Merits :-

i) It is easy to calculate and simple to understand.
ii) It is based on the accounting information rather than cash inflow.
iii) It is not based on the time value of money.
iv) It considers the total benefits associated with the project.

Demerits

i) It ignores the time value of money.
ii) It ignores the reinvestment potential of a project.
iii) Different methods are used for accounting profits calculation. So, it leads to some difficulties in the calculation of the project.

Formulae –

$$\text{Average Rate of Return (ARR)} = \frac{\text{Average Annual Profit (after tax)}}{\text{Avg. Investment (over the life of the project)}} \times 100$$

where,

i) $\text{Avg. Annual Profit} = \frac{\text{Total Profit after depreciation and tax}}{\text{Project life (in years)}}$

ii) $\text{Avg. Investment} = \left(\frac{\text{Initial Cost} + \text{Installation Expenses} - \text{Salvage Value}}{2}\right)$

$+ \text{Salvage Value} + \text{Additional Net Working Capital}$

Decision Criteria

i) For a single project if ARR is more than the predetermined or minimum required rate of return, the project will be accepted. If not it would be rejected.

ii) If there are alternative proposals, the project having the highest ARR will be selected.

Illustration 7.

Alpha Company is considering the purchase of one of the following machines, whose relevant data are as given below :

	Machine A	Machine B
Original cost	₹ 1,00,000	₹ 1,00,000
Estimated life	3 years	3 years
Earnings (after tax) :		
Year 1	30,000	20,000
Year 2	50,000	80,000
Year 3	40,000	40,000

The firm follows the straight line method of depreciation ; the estimated salvage value of both the types of machines is zero. Determine the ARR of both the machines.

Solution :

Calculation of Average Rate of Return (ARR)

$$\text{ARR} = \frac{\text{Average Annual Profit (after tax)}}{\text{Average Investment}} \times 100$$

$$\text{Where, Average Annual Profit (after tax)} = \frac{\text{Total profit after tax of the whole life of the machine}}{\text{Life of the machine (in years)}}$$

$$\text{For Machine A} = \frac{₹(30,000+50,000+40,000)}{3} = ₹\ 40,000$$

$$\text{For Machine B} = \frac{₹(20,000+80,000+40,000)}{3} = ₹\ 46,667$$

$$\text{Average Investment} = \frac{(\text{Initial Cost} + \text{Installation Expenses} - \text{Salvage Value})}{2} + \text{Salvage Value} + \text{Additional Net Working Capital}$$

$$\text{For Machine A} = \frac{(₹\ 1,00,000 - 0)}{2} + 0 = ₹\ 50,000$$

$$\text{For Machine B} = \frac{(₹\ 1,00,000 - 0)}{2} + 0 = ₹\ 50,000$$

Therefore, ARR —

$$\text{For Machine A} = \frac{₹40,000}{₹50,000} \times 100 = 80\%$$

$$\text{For Machine B} = \frac{₹46,667}{₹50,000} \times 100 = 93{\cdot}33\% \text{ (approximately)}$$

Illustration 8.

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

	Machine A	Machine B
Cost (₹)	56,125	56,125
Annual estimated income after depreciation and income tax (₹) :		
Ist year	3,375	11,375
IInd year	5,375	9,375
IIIrd year	7,375	7,375
IVth year	9,375	5,375
Vth year	11,375	3,375
	36,875	36,875
Estimated life in years	5	5
Additional investment in net working capital (₹)	4,000	5,000
Estimated salvage Value (₹)	3,000	3,000
Average income-tax rate (%)	35	35
Depreciation has been charged on straight line basis.		

[C.S. Final, Adapted]

[Delhi University, M.Com., Adapted]

Solution :

Calculation of Average Rate of Return (ARR)

$$\text{ARR} = \frac{\text{Average Annual Profit (after tax)}}{\text{Average Investment}} \times 100$$

$$\text{Where, Average Annual Profit (after tax)} = \frac{\text{Total profit after tax of whole life of the machine}}{\text{Life of the machine (in years)}}$$

$$\text{For Machine A} = \frac{₹\,36,875}{5} = ₹\,7,375$$

$$\text{For Machine B} = \frac{₹\,36,875}{5} = ₹\,7,375$$

$$\text{Average Investment} = \frac{(\text{Initial Cost} + \text{Installation Expenses} - \text{Salvage Value})}{2} + \text{Salvage Value} + \text{Additional Net Working Capital}$$

$$\text{For Machine A} = \frac{₹(56,125-3,000)}{2} + ₹\,3,000 + ₹\,4,000$$

$$= ₹\,26,562{\cdot}50 + ₹\,7,000 = ₹\,33,562{\cdot}50$$

$$\text{For Machine B} = \frac{₹(56,125-3,000)}{2} + ₹\,3,000 + ₹\,5,000$$

$$= ₹\,26,562{\cdot}50 + ₹\,8,000 = ₹\,34,562{\cdot}50$$

Therefore ARR —

$$\text{For Machine A} = \frac{₹\,7,375}{₹\,33,562{\cdot}50} \times 100 = 21{\cdot}97\% \text{ (approximately)}$$

$$\text{For Machine B} = \frac{₹\,7,375}{₹\,34,562{\cdot}50} \times 100 = 21{\cdot}34\% \text{ (approximately)}$$