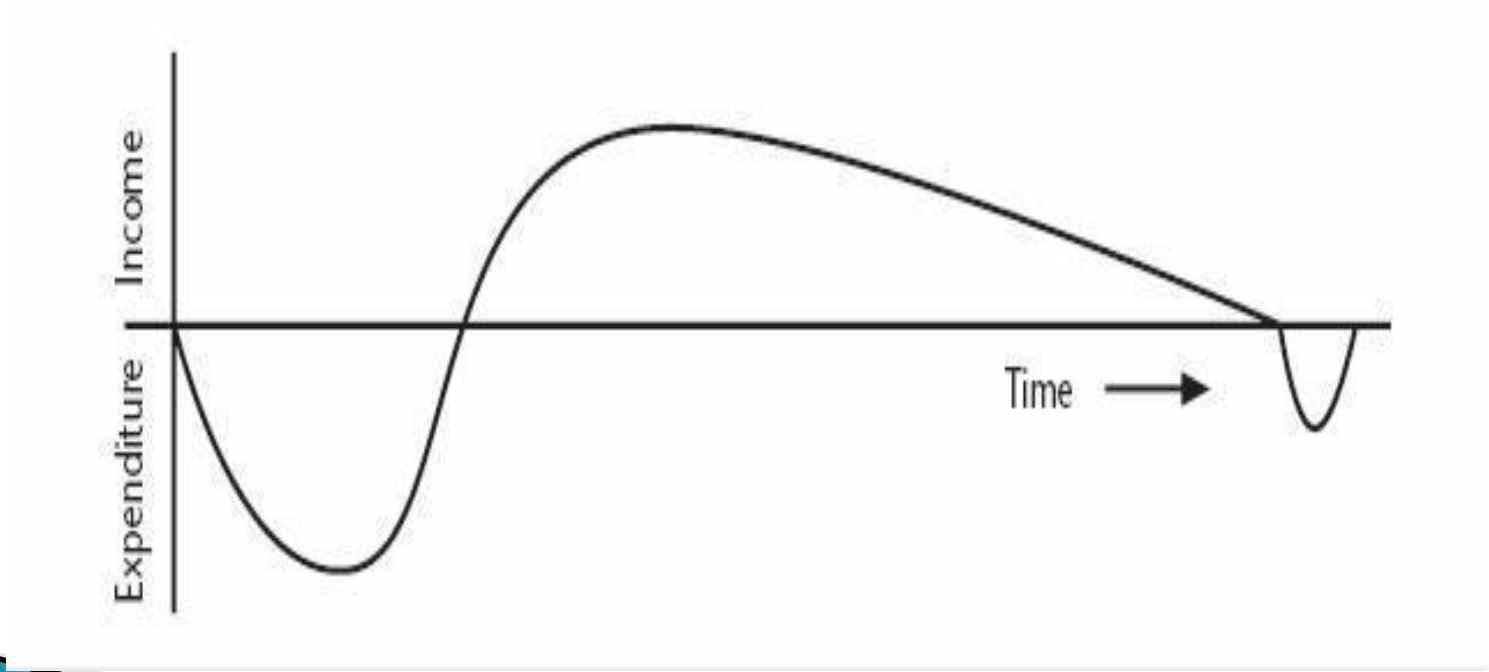
Cost-Benefit Analysis

Cost–Benefit Analysis

- Cost/benefit analysis, comparing
  - Expected costs
  - Expected benefits
- Issues
  - Estimating costs
  - Estimating benefits
- Use of financial models to evaluate

Cash Flow Forecasting

- Indicates when expenditure and income will take place



Cash Flow Forecasting

Cash Flow Analysis

- Typically there are outgoing payments initially and then incoming payments
- There might be additional costs at the end of the project life
- Cash flow considerations
  - Is initial funding for the project available?
  - Is timing of incoming/outgoing cash flow in line with financial plans?
  - If cash flow is critical, forecasting should be done quarterly or monthly
- Risky/expensive projects might be funded using venture capital

Example of Cash Flow Forecasts

Year	*Project 1*	*Project 2*	*Project 3*	*Project 4*
0	-100,000	-1,000,000	-100,000	-120,000
1	10,000	200,000	30,000	30,000
2	10,000	200,000	30,000	30,000
3	10,000	200,000	30,000	30,000
4	20,000	200,000	30,000	30,000
5	100,000	300,000	30,000	75,000
Net Profit	50,000	100,000	50,000	75,000

Cost–Benefit Evaluation Techniques

- Costs and benefits have to be expressed using the same scale to be comparable
- Usually expressed in payments at certain times (cash flow table)
- Payments at different points in time are not comparable based only on the amount

Cost–Benefit Evaluation Techniques

- Time of payment should be considered
- Techniques
  - Net profit
  - Payback period
  - Return on investment
  - Net present value

Net Profit

- Difference between total cost and total income
- Pros: Easy to calculate
- Cons
  - Does not show profit relative to size investment (e.g., consider Project 2)
  - Does not consider timing of payments (e.g., compare Projects 1 and 3)
- Not very useful other than for quick rough evaluations

Payback Period

- Time taken to break even (To cover the invested amount)
- Pros
  - Easy to calculate
  - Gives some idea of cash flow impact
- Cons: Ignores overall profitability
- Not very useful by itself, but a good measure for cash flow impact

Return On Investment

- Also known as the *accounting rate of return* (ARR)
- Provides a way of comparing the net profitability to the investment required
- The common formula
  - ROI = (average annual profit/total investment) X 100

Return On Investment

- Pros: Easy to calculate
- Cons
  - Does not consider the timing of payments
  - Misleading: does not consider bank interest rates
- Not very useful other than for "back of envelope" evaluations

Net Present Value

- A project evaluation technique that takes into account the profitability of a project and the timing of the cash flows that are produced
- Sum of all incoming and outgoing payments, discounted using an interest rate, to a fixed point in time (the present)

Net Present Value

- Present value = (value in year t)/(1+r)^t
  - r is the discount rate
  - t is the number of years into the future that the cash flow occurs

Net Present Value

- (1+r)^t is known as discount factor
- In the case of 10% rate and one year
  - Discount factor = 1/(1+0.10) =0.9091
- In the case of 10% rate and two years
  - Discount factor = 1/(1.10 x 1.10) =0.8294

Net Present Value

Year	Cash Flow	Discount Factor (10%)	Discounted Cash Flow
0	-100,000	1	-100,000
1	10,000	0.9091	9,091
2	10,000	0.8264	8,264
3	10,000	0.7513	7,513
4	20,000	0.683	13,660
5	100,000	0.6209	62,090
		NPV	618

Net Present Value

- Pros
  - Takes into account profitability
  - Considers timing of payments
  - Considers economic situation through discount rate
- Cons: Discount rate can be difficult to choose
- Standard measure to compare different options

Example 1

A company projecting revenue of 40 lacs in first year and the revenue is going to increase @10 lacs every year for the next 3 years in succession, after which revenue decreases by 15 lacs in the fifth year and thus will be closed after 5 years.

The fixed initial investment for the project is 150 lacs and working capital requirement is 30 lacs.

Compute these for the project :

a) Payback Period

b) ROI

c) NPV assuming 12.5% discount rate

SOLUTION

Payback period

= time taken to pay back the total investment of 180 Lac

= 3 + (30/70) years = **3.43 years**

Average Annual Profit = Net Profit ÷ Project duration

= 95 lacs ÷ 5 = 19 lacs.

Hence, the ROI = (average annual profit / total investment) * 100

= (19/180) * 100 = **10.55 %**

Calculation of NPV :

Year	Cash flow	Discount factor @12.5%	Discounted cash flow
0	-180 L	1.0000	-180 L
1	40 L	0.8889	35.556 L
2	50 L	0.7901	39.505 L
3	60 L	0.7023	42.138 L
4	70 L	0.6243	43.701 L
5	55 L	0.5549	30.5195 L
Net Profit :	RS 95 Lacs	**NPV :**	**Rs 11.4195 L**

Example 2

Year	*Project 1*	*Project 2*	*Project 3*	*Project 4*
0	−100,000	−1,000,000	−100,000	−120,000
1	10,000	200,000	30,000	30,000
2	10,000	200,000	30,000	30,000
3	10,000	200,000	30,000	30,000
4	20,000	200,000	30,000	30,000
5	100,000	300,000	30,000	75,000
Net profit	50,000	100,000	50,000	75,000