Engineering Economics & Management

Project Management

16th March 16

Financial Appraisals

Financial Methods

1. **Simple payback method**
   – Calculate time period required to recover the cost of project
   – This decides whether to take the project or not as longer payback periods are not required by any organization

2. **Discounted Cash Flows (DCF)**
   – Method used to calculate the attractiveness of an investment
   – It is calculated by using time value of money method

Simple Payback method

Simple example to understand

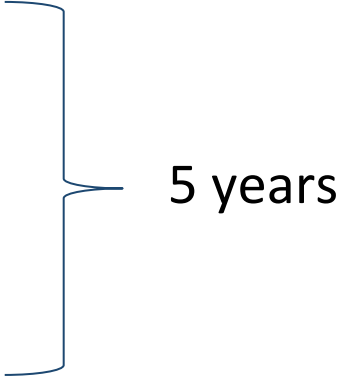If the projects cost 100k and it delivers savings of 20k per year.

Simple Payback method

Simple example to understand

If the projects cost 100k and it delivers savings of 20k per year. Simple payback is 5 years

20k → 1st year
20k → 2nd year
20k → 3rd year   5 years
20k → 4th year
20k → 5th year

Simple example to understand

If the projects cost 310k and it delivers savings of 10k first year and doubles every next year what is payback period?

Calculate?

Simple example to understand

If the projects cost 310k and it delivers savings of 10k first year and doubles every next year what is payback period?

10k → 1st year

20k → 2nd year

40k → 3rd year   310k (5 years)

80k → 4th year

160k → 5th year

Example

A XYZ limited is considering to launch a new project. Estimated values are as follows

- Development costs 125000

- Selling price of each is 100

- Sales expected for 5 years are 100,400,750,1000,1200 units

Calculate the simple payback period?

1st year sales = 100 x 100 = 10,000

2nd year sales = 400 x 100 = 40,000

3rd year sales = 750 x 100 = 75,000

4th year sales = 1000 x 100 = 100,000

5th year sales = 1200 x 100 = 120,000

Example

16th Mar 16

1st year sales = 100 x 100 = 10,000

2nd year sales = 400 x 100 = 40,000   125,000

3rd year sales = 750 x 100 = 75,000

4th year sales = 1000 x 100 = 100,000

5th year sales = 1200 x 100 = 120,000

Simple payback period is 3 years

Sensitivity analysis

If development cost go up 40% calculate payback period?

If sales reduce by 20% in first 3 years calculate payback period?

If sale price is increased 20% for first 2 years & sale unit decrease to 650 for 3rd year, calculate payback period

A XYZ limited is considering to launch a new project. Estimated values are as follows

- Development costs was 125000
- Now development cost increased 40 % so cost is 175000
- Selling price of each is 100
- Sales expected for 5 years are 100,400,750,1000,1200 units

Calculate the simple payback period?

Example

1st year sales = 100 x 100 = 10,000

2nd year sales = 400 x 100 = 40,000

3rd year sales = 750 x 100 = 75,000

4th year sales = 1000 x 100 = 100,000

5th year sales = 1200 x 100 = 120,000

Simple payback period is 3.5 years

125,000 is sale of 3 years still 50,000 less so check next years sale, which is 100,000 so to get 50,000 6 months sales of 4th is enough

Sensitivity analysis

If development cost go up 40% calculate payback period?

3.5 Years

If sales reduce by 20% in first 3 years calculate payback period?

If sale price is increased 20% for first 2 years & sale unit decrease to 650 for 3rd year, calculate payback period

A XYZ limited is considering to launch a new project. Estimated values are as follows

- Development costs was 125000

- Selling price of each is 100

- Sales expected for 5 years are 100,400,750,1000,1200 units

- Sales reduced 20% for first 3 years

- New sale unit for 5 years are 80,320,600,1000,1200 units

Calculate the simple payback period?

1st year sales = 80 x 100 = 8,000

2nd year sales = 320 x 100 = 32,000

3rd year sales = 600 x 100 = 60,000

4th year sales = 1000 x 100 = 100,000

5th year sales = 1200 x 100 = 120,000

Simple payback period is 3.25 years

100,000 is sale of 3 years still 25,000 less so check next years sale, which is 100,000 so to get 25,000 3 months sales of 4th is enough

Sensitivity analysis

If development cost go up 40% calculate payback period?

3.5 Years

If sales reduce by 20% in first 3 years calculate payback period?

3.25 Years

If sale price is increased 20% for first 2 years & sale unit decrease to 650 for 3rd year, calculate payback period

A XYZ limited is considering to launch a new project. Estimated values are as follows

- Development costs was 125000

- Selling price of each is 100

- Sale price for first 2 years increased so price of each for first 2 years is 120

- Sale unit for 3rd year decrease to 650

- Sales expected for 5 years are 100,400,650,1000,1200 units

Calculate the simple payback period?

1st year sales = 100 x 120 = 12,000

2nd year sales = 400 x 120 = 48,000   125,000

3rd year sales = 650 x 100 = 65,000

4th year sales = 1000 x 100 = 100,000

5th year sales = 1200 x 100 = 120,000

Simple payback period is 3 years

If development cost go up 40% calculate payback period?

3.5 Years

If sales reduce by 20% in first 3 years calculate payback period?

3.25 Years

If sale price is increased 20% for first 2 years & sale unit decrease to 650 for 3rd year, calculate payback period

3 Years

Discounted Cash Flows

Simple example to understand

If the project investment is 100k and company is expecting 110k in a year. The value of 110k will be around 100k in a year to come. This is concept of time value of money.

Simply 100 rupees today has not same value of 100 rupees in 1 year time. It will be somewhere like 90 or 85 rupees.

If you invest 100 rupee today and you get 100 back in one year, your investment is not returned. This is concept of discounted cash flow and time value of money which help you to calculate the real value of your investment.

Present Value Factor (PVF)

If the project investment is 100k and company is expecting 110k in a year. The value of 110k will be around 100k in a year to come. The factor that reduces 110k of next year to 100k value is called Present Value Factor.

To calculate PVF for one year

PVF = Current value / Future value

PVF = 100 / 110 = 0.91

You multiply the PVF with your income to understand the right value of income at that present time.

PVF for 1 year

PVF = Current value / Future value

General formula for PVF

$$PVF = \frac{1}{(1+i)^n}$$

i = Investment return after inflation

If its 10 % i = 0.1 if its 15% i = 0.15

n = year no

Always round up to 2 digits

Present Value Factor (PVF)

A company spent 75k in one year on development, leading to benefits of 30k, 35k and 35k in the three years after the launch. The company can achieve an investment return of 20% after inflation

Period	Year	Cash Flow	PVF	Present value
1	0	-75000	1.00	-75000
2	1	30000	0.83	24900
3	2	35000	0.69	24150
4	3	35000	0.58	20300
Total	-	25000	-	-5650

XYZ limited spent 125k in equal amounts over two years developing a new product, launched after the two years. It will sell for 1k. Sales are expected of 100, 400, 750, 1100, 1200 units after launch. The company can achieve an investment return of 15% on capital after inflation.

Calculate simple payback period and also payback period according to discounted cash flow

Thankyou