**Question:**

Assuming monetary benefits of an information system at $85,000 per year, one-time costs of $75,000, recurring costs of $35,000 per year, a discount rate of 12 percent, and a five-year time horizon, calculate the net present value of these costs and benefits of an information system. Also calculate the overall return on investment of the project and then present a break-even analysis. At what point does breakeven occur?

## Economic feasibility analysis for an Information System

**Given data:**

Monetary Benefits of IS = $85,000 per year.
One-time costs = $75,000
Recurring costs = $35,000 per year.
Discount rate = 12%.
Time Period = 5 years.

The solution given below shows the Present Value calculations of all costs and benefits, Break-Even Analysis, Overall Return on Investment for this problem using the above data.

1. Net Present Values (NPV) of all Benefits and Costs
2. Overall Return on Investment (ROI)
3. Break-Even Analysis (BEA)

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1. **Net present value of Benefits and Costs:**

Present Value of Benefits or Costs can be calculated using the below formula:

$$PV_n = Y \times \frac{1}{(1+i)^n}$$

Here, $PV_n$ is the present value of $Y$ dollars $n$ years from now, and $i$ is the discount rate.

**Present Value (PV) calculations for Benefits:**

Benefits start from year 1, so the calculation of PV from year 1 onwards.

$$PV_1 = 85{,}000 \times \frac{1}{(1+.12)^1} = 85{,}000 \times 0.8929 = 75{,}897$$

$$PV_2 = 85{,}000 \times \frac{1}{(1+.12)^2} = 85{,}000 \times 0.7972 = 67{,}762$$

$$PV_3 = 85,000 \times \frac{1}{(1+.12)^3} = 85,000 \times 0.7118 = 60,503$$

$$PV_4 = 85,000 \times \frac{1}{(1+.12)^4} = 85,000 \times 0.6355 = 54,018$$

$$PV_5 = 85,000 \times \frac{1}{(1+.12)^5} = 85,000 \times 0.5674 = 48,229$$

**Net Present Value of Benefits:** The net value of benefit will be the sum of overall benefits and will be calculated using following formulae:

$$NPV = PV_1 + PV_2 + PV_3 + PV_4 + PV_5$$
$$= 75,897 + 67,762 + 60,503 + 54,018 + 48,229$$
$$= 306,408$$

**Present Value (PV) calculations for Costs:** Here, the one-time cost ($75,000) is treated as cost occurring in year 0 (now).

$$PV_0 = 75,000 \times \frac{1}{(1+.12)^0} = 75,000 \times 1 = 75,000$$

Recurring cost ($35,000) happens every year starting at year 1.

$$PV_1 = 35,000 \times \frac{1}{(1+.12)^1} = 35,000 \times 0.8929 = 31,252$$

$$PV_2 = 35,000 \times \frac{1}{(1+.12)^2} = 35,000 \times 0.7972 = 27,902$$

$$PV_3 = 35,000 \times \frac{1}{(1+.12)^3} = 35,000 \times 0.7118 = 24,913$$

$$PV_4 = 35,000 \times \frac{1}{(1+.12)^4} = 35,000 \times 0.6355 = 22,243$$

$$PV_5 = 35,000 \times \frac{1}{(1+.12)^5} = 35,000 \times 0.5674 = 19,859$$

**Net Present Value of Costs**,

$$NPV = PV_0 + PV_1 + PV_2 + PV_3 + PV_4 + PV_5$$
$$= 75,000 + 31,252 + 27,902 + 24,913 + 22,243 + 19,859$$
$$= 201,168$$

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2. **Overall Return on Investment (ROI)**

$$Overall\ ROI = (Overall\ NPV / NPV\ of\ All\ COSTS)$$

$$Overall\ \text{NPV} = (NPV\ of\ All\ Benefits - NPV\ of\ All\ COSTS)$$
$$= 306,408 - 201,168$$
$$= 105,240$$

From the above calculation, *Overall NPV* is 105,240 and

*NPV of All COSTS* is 201,168.
Therefore, the overall

$$ROI = 105{,}240/201{,}168$$
$$= 0.5231448$$

3. **Break-Even Analysis (BEA)**

This analysis is carried out by first determining the NPV of cash flows on yearly basis.