#### Systems Analysis and Design Course Code: CSE 305 Fall 2022 Semester

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#### The Feasibility Study

- ■The objective of a feasibility study is to find out if an information system project can be done, and if so, how.
- ■A feasibility study should tell management:
  - ✓ Whether the project can be done;
  - ✓ What are alternative solutions?
  - ✓ What are the criteria for choosing among them?
  - ✓ Is there a preferred alternative?
- After a feasibility study, management makes a go/no-go decision.

#### Dimensions of Feasibility

- Operational -- how will the solution work?
- Technical -- is the technology needed available? Can we build it?
- Economic -- return on investment. Should we build it?
- Schedule -- can the system be delivered on time?
- Organizational feasibility: If we build it, will they come?

#### **Economic Feasibility**

- ■The bottom line for many projects!
- ■Economic feasibility amounts to judging whether possible benefits of the project are worthwhile.
- ■As soon as a specific solution has been identified, the analyst can weigh the costs and benefits of each alternative.
- ■This is called *cost-benefit analysis*.

#### Cost/Benefit Analysis

- ■The purpose of a cost/benefit analysis is to answer questions such as:
  - ✓ Is the project justified (benefits outweigh costs)?
  - ✓ Can the project be done, within cost constraints?
  - ✓What is the minimal cost to attain a certain system?

#### Present Value (PV)

The PV calculation takes a future amount of cash and discounts it back to the present day. The formula for this is:

Present Value =  $FV/(1 + r)^n$ 

where FV is the future value, r is the required rate of return, and n is the number of time periods.

Present value, PV =  $\frac{\text{cash value at time period}}{(1+\text{rate of return})^{\text{time period}}}$ 

#### Present Value (PV)

Say that you can either receive \$3,200 today and invest it at a rate of 4% or take a lump sum of \$3,500 in a year. Calculating the PV of \$3,500 can help you make a choice.

Present value = FV/(1 + r)<sup>n</sup>

Present value =  $$3,500/(1 + .04)^{1}$ 

Present value = \$3,365.38

That means you'd need to invest \$3,365.38 today at 4% to get \$3,500 a year later. The \$3,200 today will result in a smaller return. Based on that, you may feel that the lump sum in a year looks more attractive.

#### Present Value (PV)

What is the present value of \$1,000 received in two years if the interest rate is?

(a) 12% per year discounted annually

#### **Solution:**

 $1,000 / (1 + 0.12)^2$ 

**Answer: \$797.19** 

The net present value formula calculates NPV, which is the difference between the present value of cash inflows and the present value of cash outflows, over a period of time.

$$NPV = \int_{i=1}^{n} rac{R}{(1+i)^n} - Initial \, Investment$$

- Here, R is the assumed cash flows of the investment for the ith period
- i is the required rate of return per period.
- n is the total life of the project in months, years, etc.

#### NPV can also be calculated as:

NPV = Present Value of expected cash flows - Present value of cash invested.

Net present value can be calculated using the formula.

NPV = 
$$\frac{R_1}{(1+i)^1} + \frac{R_2}{(1+i)^2} + \frac{R_3}{(1+i)^3} + ...$$
 - Initial Investment

Where  $R_1$  = Net Cash flow in period one,  $R_2$  = Net Cash flow in period two,  $R_3$  = Net Cash flow in period three, and i = the discount rate

Assume that a company buys a machine for \$1000, which generates cash flows of \$600 in year one, \$550 in year two, \$400 in year three, and \$100 in year four. Calculate the net **present values** assuming a discount rate of 15%

- NPV =  $[\$600/(1+15)^1 + \$550/(1+15)^2 + \$400/(1+15)^3 + \$100/(1+15)^4] \$1000$
- NPV = \$257.8

One of your friends needs \$500 now and promised to pay you back \$570 in a year. Is that a fruitful investment when you can invest at 10% elsewhere?

Solution:

Money Invested Now = \$500

Money Received After a Year = \$570

$$So, PV = rac{FV}{(1+r)^n}$$

$$PV = \frac{570}{(1+0.10)^1}$$

$$PV = \frac{570}{1.10^1} = $518.1$$

Therefore, at 10%, the investment is worth \$18.18.

In other words, it states that \$18.18 is better than a 10% investment in today's value of money.

Net Present Value = \$518.18 - \$500 = \$18.18

Mr. XYZ bought a house for \$750,000 and sells it a year later for \$990,000, after deducting any realtor's fees and taxes. Calculate net present value, if the rate of return is 5%. Present value, PV = cash value at time period

#### **Solution:**

Given:

Investment on buying the house = \$750,000

Monet received from sale a year later =

\$990,000

Rate of return = 5% = 0.05Using net present value formula,

\$192,857.143

PV = \$990,000/1.05

(1+rate of return)time period

PV = \$942,857.143

Net Present Value = \$942,857.143 - \$750,000 =

\$192,857.143

Therefore, for 5% rate of return, investment has NPV =

If the rate of return is 5%, what would be the net present value of a box of fruits with the price at \$20,000 and a year later it costs \$45,000.

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Solution: Given,
Current price of box = $20,000
Year later = $45,000
Rate of return = 5\% = 0.05
Using the net present value formula,
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PV = 45000/(1 + 0.05)^{1}
PV = 42857.15 (please check)
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Present value, PV = cash value at time period

Net present value = 42857.15 - 20,000 = 22857.15

(1+rate of return)time period

Therefore, the net present value is \$22857.15

# Cost-Benefit Analysis - Cash Flow

PV Benefits - PV Costs

Total benefits - Total costs

Total costs

Yearly NPV\* - Cumulative NPV

Yearly NPV\*

\*Use the Yearly NPV amount from the first year in which

Add the above amount to the year in which the project

the project has a positive cash flow.

has a positive cash flow.

Calculation	Definition	Formula
Present Value (PV)	The amount of an investment today compared to that same amount in the future,	Amount (1 + interest rate) <sup>n</sup>
	taking into account inflation and time.	n = number of years in future

The present value of benefit less the present

The amount of revenues or cost savings results

The point in time at which the costs of the

project equal the value it has delivered.

value of costs.

from a given investment.

Net Present Value (NPV)

Break-Even Point

Return on Investment (ROI)

The Amount of revenue or cost savings results from a given investment

**Total Costs** 

Return on Investment Analysis: compares the lifetime profitability of alternative solutions. Lifetime benefits - Lifetime costs Lifetime costs

Return on Investment or simply ROI is the calculation of the profit earned on investment. The formula to calculate ROI is as follows –

$$ROI = \frac{Return - Investment}{Investment}$$

A business can measure efficiency through ROI calculation formula. Although there are several formulas to calculate ROI, the two most common methods are listed below.

The First Method is,

ROI = Net Return on Investment (Benefits)/ Cost of Investment \* 100%

Where,

The net return is the amount that a firm receives from its investments. The costs are those expenses that a business incurs during operation during a financial year.

Another formula being,

ROI = (Final Value of Investment – Initial Value of Investment)/ Cost of Investment \* 100%

Where,

A value of an investment is the amount a business puts into its daily operations during a fiscal year.

Suppose, the cost of implementing a program amounts to Tk.30,000 and the savings accumulated in the process is Tk.50,000. The ROI can be ascertained as:

ROI = Tk. (50,000 - 30,000) / Tk.30,000 \*100

= 66.67%

It implies that for every 1 Taka spent, its return on investment is Tk.0.6667.

Another simple example of ROI is, the cost summary of business is Tk.20,000. It includes facilitation fees of Tk.11,000, materials costing Tk.2,000, salaries of staffs amounting Tk.7,000. The total annual benefit results as Tk.60,000. The ROI will be calculated as:

ROI = Tk. (60,000 - 20,000) / Tk.20,000 \* 100

= 200%

It means that for all entire expense of Tk.20,000, its percentage return will be 200%.

#### How is ROI Beneficial for a Business?

In day to day functioning of a business, ROI plays a vital role. It has wide applications due to its numerous benefits, such as:

- a) It assists all business heads, and other top management officials to understand the proper allocation of resources.
- b) ROI guides all investors to take essential decisions by comparing the high-value and low-value investments.
- c) It also helps in exploring and evaluating the potential gains from different opportunities.
- d) It also guides an organisation in calculating its costs and understanding the possible threats of the market.

#### What are The Uses of ROI?

There are multiple uses of ROI in every aspect of an organisation. Some of them are listed below as:

- a) It is an essential financial calculator useful for determining the value of returns of the past and the present.
- b) The ROI is a simple ratio which has a universal application to evaluate the potential of profits.

### Break Even Point (BEP)

#### Calculating your break-even point

To be profitable in business, it is important to know what your break-even point is. Your break-even point is the point at which total revenue equals total costs or expenses. At this point there is no profit or loss — in other words, you 'break even'.

### Break Even Point (BEP)

Use this formula to calculate your break-even point.

Break-even point = fixed costs ÷ gross profit margin

Fixed costs (e.g. \$60,000)

Gross profit margin (e.g. 90%)

Break-even point

\$60,000

90%



\$66,666

#### Or Break Even Point (BEP)

The point in time when the costs of the project equal the value it has delivered

\* Use the yearly NPV amount from the first year in which project has positive cash flow

### Break Even Point (BEP)

