# Software Project Management

Lecture 14

# Evaluating Project

- Each project is evaluated against the following criteria
  - Strategic
  - Technical
  - economic

# Strategic Assessment

- Projects components of programme
- Programme consists of projects that contribute towards same overall organizational goals.
- Project selected on these basis (organizational goals) and tuned to them

# Strategic Assessment

- Strategic assessment requires strategic plan (which includes)
  - Defining organizational objectives
    - Defines programme and programme goal
      - Project assessment
- Large organizations have programme management, programme directives and executives for performing strategic assessment.
- If no programme plan (project evaluated with context of organizational overall business objectives.

# Portfolio Management

- Third party developers must also carry out strategic and operational assessment of project proposal.
- To ensure project consistent with there own strategic plan.
- Is project consistent with the other planned and on going projects in portfolio( in terms of competition with resources, specialization etc)

# Technical Assessment

- Project assessed in terms of specific hardware or software is available.
- Strategic information system plan places limitations on the nature of solutions that might be considered.
  - Effects cost of solution  (cost benefit analysis).

# Economic Assessment

- Assessing the benefits with respect to cost
- Different concepts associated with economic assessment
    - Cost benefit analysis
    - Cash forecasting
    - Cost benefit evaluation techniques (with respect to time, with respect to size of investment)
        - » Net profit
        - » Payback period
        - » Return on investment
        - » Net present value
        - » Internal rate of return

# Cash Forecasting

- Important to forecast cash flows that will take place and there timing.
- Indicates when expenditure and income will take place

# Cost Benefit Analysis

- Most common way of economic assessment
- Two Steps
- Identify all costs and benefits of development and operation of system. (new sales system increasing sales)
- Expressing cost and benefits in common units.

# Cost Benefit Analysis

- Type of Costs
  - Development cost (salaries, employment costs (involved in development)
  - Setup costs (new system & ancillary equipment, file conversion, recruitment, staff training)
  - Operational costs  (cost of operating system once it is installed)
- Easy to measure in monetary terms

# Cost Benefit Analysis

- Types of Benefits
  - Direct benefits (directly from operation of new system e.g. reduction in salary bills)
  - Accessible indirect (secondary benefits e.g. increase of accuracy through use of user friend screen (estimate reduction of errors and hence cost of proposed system)
  - Intangible benefits (long term benefits, difficult to quantify e.g. enhanced job interests can lead to reduced staff turn over and hence lower recruitment costs
- Difficult to express in monetary terms

# Cost Benefit Evaluation Techniques

- Cost benefit analysis with respect to when to time.
- Net Profit
  - Difference between total costs and total income over life of project
  - Takes no account of timing of cash flow (when we will get the profits)

# Cost Benefit Evaluation Techniques

- Payback Period
  - Time taken to break even or pay back initial investment.
  - Mostly project with the shortest time period chosen.
  - Easy to calculate
  - Not sensitive to small forecasting errors.
  - It ignores overall profitability of the project.

# Cost Benefit Evaluation Techniques

- Return on Investment (ROI)
- Compares net profitability to total investment required.
- Formula
- $ROI = \frac{\text{Average Annual Profit}}{\text{Total investment}} * 100$

# Payback Period

1. Pay Back Period
It is defined as the expected no. of years required to cover the original investment
EXAMPLE:

Formula:
Yr before full recovery + uncovered cost at the start of the year

$$\frac{\text{Yr before full recovery + uncovered cost at the start of the year}}{\text{Cash flow during the year}}$$

| Cash Flow | (500) | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 |
|---|---|---|---|---|---|---|---|---|---|
| Year | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |

$$= \frac{3+50}{150}$$

= 3.33 yrs

# Problem with Payback Period

- It ignores the time value of money.

- The **time value of money** is based on the premise that an investor prefers to receive a payment of a fixed amount of money today, rather than an equal amount in the future, all else being equal. In particular, if one received the payment today, one can then earn interest on the money until that specified future date.

# What is Interest Rate?

- The percentage of the principal that is paid as a fee (the interest), over a certain period of time, is called the interest rate.
- An **interest rate** is the price a borrower pays for the use of money he does not own, and the return a lender receives for deferring the use of funds, by lending it to the borrower

# 2. Discounted Payback period

It is defined as the no. of years required to recover the investment from discounted cash flows

(500) 250 250 250
0 1 2 3

If Interest rate 14%=0.14 discounted cash flow is taken out by

Formula

$$DCF = \frac{CF_1}{(1+r)^1} + \frac{CF_2}{(1+r)^2} + \ldots + \frac{CF_n}{(1+r)^n}$$

CF = Cash Flow

r = discount rate (WACC)

| Yr | flows | DCF (discounted cash flow) | flows |
|---|---|---|---|
| 0 | 500 | 1/ (1.14) ^0 | 500 |
| 1 | 250 | 1/ (1.14) ^1 | 219.29 |
| 2 | 250 | 1/ (1.14) ^2 | 192.36 |
| 3 | 250 | 1/ (1.14) ^3 | 168.72 |

# Discounted Payback period

(500) 219.29 192.36 168.72

0 1 2 3

Yr before full recovery + uncovered cost at the start of the year

Cash flow during the year

$= \frac{2 + 88.35}{168.72}$

Discounted payback period = 2.52 yrs

# Present Value

- The **present value of a future amount of income** is:
  Present Value = (Future Value)/(1 + Discount Rate)ª
- where the exponent ª is the number of years in the future that the future value will be received. The discount rate is the same as the interest rate.

# 3. Net Present Value

2. Net present value NPV

It is the present value of an investment projects net cash flow minus projects initial cash flows

FORMULA:

NPV= [CF1/ (1+i) ^1 ……CF1/ (1+i) ^n]

| Yr | flows | DCF (discounted cash flow) | PV (present value) |
|---|---|---|---|
| 0 | 500 | 1/ (1.14) ^0 | 500 |
| 1 | 250 | 1/ (1.14) ^1 | 219.29 |
| 2 | 250 | 1/ (1.14) ^2 | 192.36 |
| 3 | 250 | 1/ (1.14) ^3 | 168.72 |

now, sum of PV = (219.29+192.36+168.72)

= 580.37

NPV=sum of PV – initial cash Outlay

580.37-500

= 80.37

# Contd..

- If NPV positive, the investment should be made (unless an even better investment exists), otherwise it should not.

# 4. Internal Rate of Return

- Internal rate of return is simply the rate of return (%) that the firm earns on it's capital budgeting projects
- IRR is calculated at that percentage discount rate that would produce Zero NPV.
- As such, IRR can be used to rank several prospective projects a firm is considering. Assuming all other factors are equal among the various projects, the project with the highest IRR would probably be considered the best and undertaken first.
- Support provided by Excel and Lotus

# Contd..

- Can be calculated by plotting a series of guesses.
- A discount rate of 8% generates NPV of positive vlaue 7,898
- A discount rate of 12% generates NPV of negative value 5829
- Plotting graph between two the IRR comes to be 10.25 %
- With excel it comes out to be 10.167%

# Economic Project Evaluation

- NPV gives value in currency where as IRR gives percentage.
- NPV and IRR not complete answer to project evaluation.
- Must also take into account the problems of funding the cash flows
  - will we e.g. be able to repay the interest on any borrowed money and pay development staff salaries at the appropriate time.

# Disadvantages

- Does not indicate absolute size of return
- It is possible to find more that one rate that will produce a zero NPV. But in this case take lowest value and ignore others.

# Internal Rate Of Return IRR

Internal rate of return is simply the rate of return (%) that the firm earns on it's capital budgeting projects

EXAMPLE

If NPV = 85209 at say 15% interest

Increase interest rate and we would get negative Interest rate

Calculating at interest rate = 29%

| Year | Flows | DCF 29% | PV |
|---|---|---|---|
| 0 | 25,000 | 1/1.29 ^0 | 25,000 |
| 1 | 100,000 | 1/1.29 ^1 | 77,500 |
| 2 | 100,000 | 1/1.29 ^2 | 60,000 |
| 3 | 100,000 | 1/1.29 ^3 | 46,500 |
| 4 | 100,000 | 1/1.29 ^4 | 36,110 |
| 5 | 100,000 | 1/1.29 ^5 | 27990 |

npv = sum of pv- initial outlays

= 248100- 250,000

= -1900

- IRR =A+ NPVA
- _____ x (B-A)
- NPVA-NPVB
- A=positive rate of return
- NPVA= positive NPV value
- IRR=0.15+85209
- _____ x (0.29-0.15)
- 85209-(-1900)
- = 0.15 +85209
- _____ x0.14
- 87109
- = 0.15+11929.26/87109
- = 0.15+1.1369
- = 0.2869 or 28.69%  29%