Software Project Management

Lecture 7

Cost Benefit Analysis

Introduction

- Cost benefit Analysis
- Example

Cost benefit analysis (CBA)

You need to:

- Identify all the costs which could be:
  - Development costs
  - Set-up
  - Operational costs
- Identify the value of benefits
- Check benefits are greater than costs

Net profit

Year	Cash-flow
0	-100,000
1	10,000
2	10,000
3	10,000
4	20,000
5	100,000
Net profit	50,000

- 'Year 0' represents all the costs before system is operation
- 'Cash-flow' is value of income less outgoing
- Net profit value of all the cash-flows for the lifetime of the application

Pay back period

This is the time it takes to start generating a surplus of income over outgoings. What would it be below?

Year	Cash-flow	Accumulated
0	-100,000	-100,000
1	10,000	-90,000
2	10,000	-80,000
3	10,000	-70,000
4	20,000	-50,000
5	100,000	50,000

Return on investment (ROI)

$$ROI = \frac{\text{Average annual profit}}{\text{Total investment}} \times 100$$

In the previous example

- average annual profit
  = 50,000/5
  = 10,000
- ROI = 10,000/100,000 X 100 = 10%

Net present value

Would you rather I gave you £100 today or in 12 months time?

If I gave you £100 now you *could* put it in savings account and get interest on it.

If the interest rate was 10% how much would I have to invest now to get £100 in a year's time?

This figure is the *net present value* of £100 in one year's time

Discount factor

Discount factor = $1/(1+r)^t$

r is the interest rate (e.g. 10% is 0.10)

t is the number of years

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

Applying discount factors

Year	Cash-flow	Discount factor	Discounted cash flow
0	-100,000	1.0000	-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	0.6830	13,660
5	100,000	0.6209	62,090
		NPV	618

Internal rate of return

- Internal rate of return (IRR) is the discount rate that would produce an NPV of 0 for the project
- Can be used to compare different investment opportunities
- There is a Microsoft Excel function which can be used to calculate

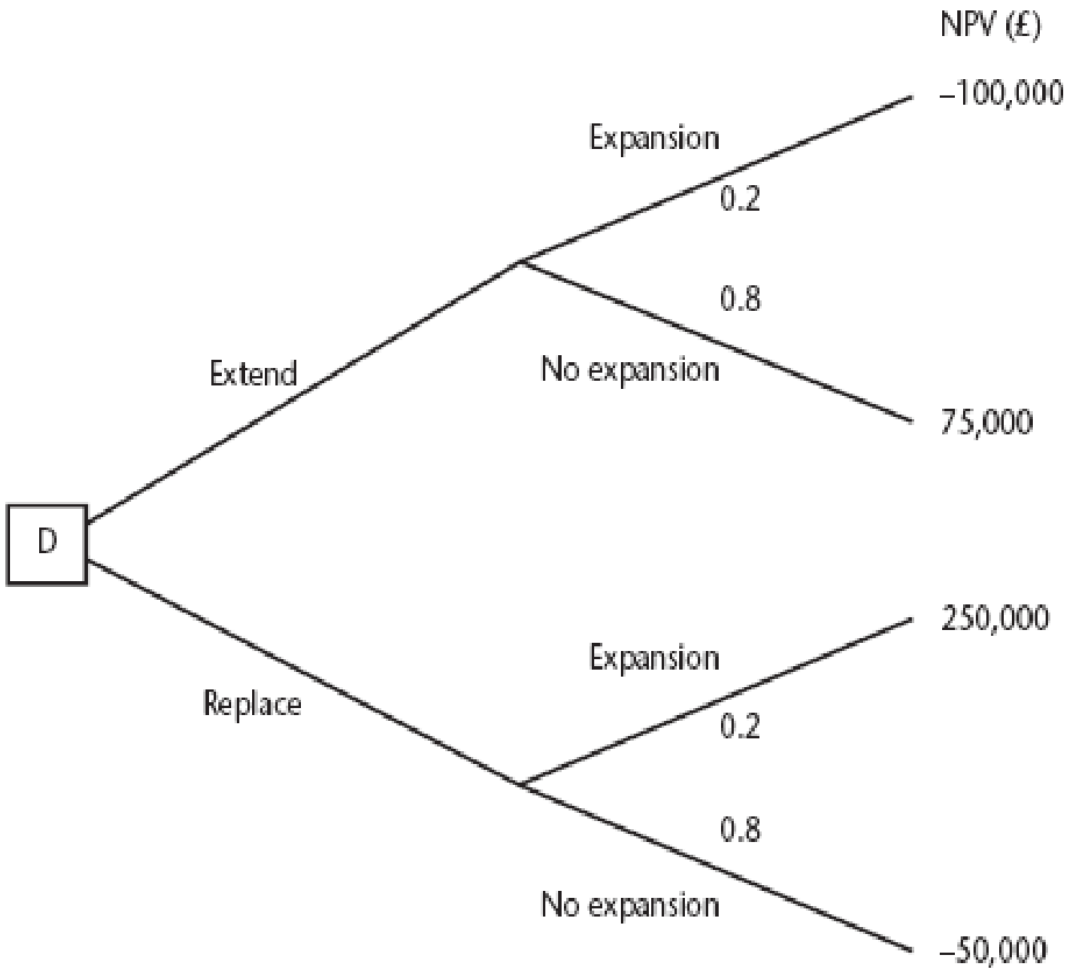
Dealing with uncertainty: Risk evaluation

- project A might appear to give a better return than B but could be riskier
- Could draw up draw a project risk matrix for each project to assess risks – see next overhead
- For riskier projects could use higher discount rates

Example of a project risk matrix

Risk	*Importance*	*Likelihood*
Software never completed or delivered	H	—
Project cancelled after design stage	H	—
Software delivered late	M	M
Development budget exceeded ≤ 20%	L	M
Development budget exceeded > 20%	M	L
Maintenance costs higher than estimated	L	L
Response time targets not met	L	H

Decision trees



Remember!

- A project may fail not through poor management but because it should never have been started
- A project may make a profit, but it may be possible to do something else that makes even more profit
- A real problem is that it is often not possible to express benefits in accurate financial terms
- Projects with the highest potential returns are often the most risky

Applications

- Cost-benefit analysis is a prescriptive technique. It has an explicit normative basis and is performed for the purpose of informing policy makers about what they ought to do. It is based on welfare economics and requires all policy impacts to be stated in monetary terms.
- Some people find the very idea of assigning a monetary value to lifesaving or to quality of life, which is an essential element of cost-benefit analysis, meaningless and ethically wrong. Human life, it is argued, is not a commodity that can be traded against other goods. It should therefore not carry a price tag. However, the purpose of assigning a monetary value to human life is not to engage in trading in the usual sense of that term.

Research

- **Applying Cost Benefit Analysis to Nutrition Education Programs: Focus on the Virginia Expanded Food and Nutrition Education Program**
- Introduction :

  In attempts to make public programs more cost effective, it is critical to develop and apply new techniques to evaluate Extension programs. Indeed, one of the major challenges facing Extension evaluators is the need to provide concise, meaningful evaluation information to decision-makers. Nutrition education has been a base program of the Cooperative Extension System since its inception. While knowledge gain, and to a more limited extent the behavior changes of participants have been measured, good measures of the cost savings that accrue as a result of participation in these education programs are not available. Procedures that quantitatively compare a program's costs to its benefits are inherently popular and useful. Cost benefit and effectiveness analysis represent economic analysis procedures that can be useful in addressing this need.

Reference Link : http://pubs.ext.vt.edu/490/490-403/490-403.html