

DIPLOMA IN LAW ENFORCEMENT

DLE 2163: SECURITY RISK MANAGEMENT

Chapter 12

Management of Risk:

Cost Benefit Analysis



security

LEARNING OUTCOMES

Upon completion of the syllabus topics, students should be able to:

1. Identify the importance of risk management.
2. Demonstrate comprehension of various aspects of risk management.
3. Apply risk management techniques to risk management issues.
4. Demonstrate risk management skills in work.

Topic 12

COST BENEFIT ANALYSIS

Introduction

- Cost–benefit analysis (CBA), is a systematic approach to estimate the strengths and weaknesses of alternatives (for example in transactions, activities, functional business requirements or projects investments).
- It is used to determine options that provide the best approach to achieve benefits while preserving savings.

Introduction...cont .

- The CBA is also defined as a systematic process for calculating and comparing benefits and costs of a decision, policy (with particular regard to government policy) or (in general) project.



Purpose of CBA

CBA has two (2) main purposes:

- 1) To determine if an investment/decision is sound (justification/feasibility) – verifying whether its benefits outweigh the costs, and by how much?
- 2) To provide a basis for comparing projects – which involves comparing the total expected cost of each option against its total expected benefits.

Use of CBA in Public Decisions

- CBA is most commonly used for public decisions, policy proposals, programs and projects. Example for biggest projects such as to build dams, bridges, hospitals, recreational parks, libraries, and anything else the government might fund.
- CBA can be used to rank alternative projects as well as evaluating the social value of one particular project.

Cost - Benefit Analysis

- Cost-benefit analysis (CBA) is the implicit or explicit assessment of the benefits and costs (example; pros and cons or advantages and disadvantages) associated with a particular choice.
- Benefits and costs may be monetary (pecuniary) or non-monetary (non-pecuniary, “psychic”).

CBA Process

The following is a list of steps that comprise a generic cost–benefit analysis.

- Define the goals and objectives of the project/activities.
- List alternative projects/programs.
- List stakeholders.
- Select measurement and measure all cost/benefit elements.

CBA Process...cont .

- Predict outcome of cost and benefits over relevant time period.
- Convert all costs and benefits into a common currency.
- Apply discount rate.
- Calculate net present value of project options.
- Perform sensitivity analysis.
- Adopt recommended choice.

CBA Evaluation

CBA attempts to measure the positive or negative consequences of a project, which may include:

1. Effects on users or participants.
2. Effects on non-users or non-participants.
3. Externality effects.
4. Option value or other social benefits.

Time and discounting

- CBA usually tries to put all relevant costs and benefits on a common temporal footing using time value of money calculations.
- This is often done by converting the future expected streams of costs and benefits into a present value amount using a discount rate.

Time and discounting...cont.

- The choice of discount rate is subjective. A smaller rate values future generations equally with the current generation.
- Larger rates (e.g. a market rate of return) reflects humans' attraction to time inconsistency – valuing money that they receive today more than money they get in the future.
- The choice makes a large difference in assessing interventions with long-term effects.

Risk and uncertainty

- Risk associated with project outcomes is usually handled using probability theory.
- Particular consideration is often given to risk aversion – the preference for avoiding loss over achieving gain.
- Expected return calculations do not account for the detrimental effect of uncertainty.

Risk and uncertainty...cont.

- Uncertainty in CBA parameters (as opposed to risk of project failure etc.) can be evaluated using a sensitivity analysis, which shows how results respond to parameter changes.
- Alternatively a more formal risk analysis can be undertaken using Monte Carlo simulations.

Theory of Cost-Benefit Analysis

Public Policy Objective: Choose the level of output of a good or service to maximize net social benefits (NSB).

$$\text{NSB} = \text{TSB} - \text{TSC}$$

where;

TSB = total social benefits

TSC = total social costs

Present Value

- Future, as well as present, benefits and costs must be included in the analysis.
- But costs and benefits that accrue in the future are worth less than costs and benefits today.
- Economic agents and society as a whole will maximize the present value of expected net benefits.

Present Value Worksheet

\$100 invested today at an annual interest rate (r) of 4% will be worth \$104 in 1 year.

Present value (PV) of \$104 next year when $r=.04$ is \$100.

That is, \$104 tomorrow is worth \$100 today.

$$PV = F/(1 + r),$$

where F is a fixed sum of money to be received next year.

Value of life

Does society view life as infinitely valuable?

Benefits



Value of Life

- Many public programs and projects involve the prevention of loss of life: dams, maintaining roads, traffic signs, provision of health care, employment of fire-fighters and etc.
- How do economists value a life saved (death averted) in the cost-benefit calculus?

1. Human Capital Approach

Value of life = present value of lifetime earnings
(= lifetime productivity in competition)

- Represents productivity gains from extending life (benefit side)

OR

- Productivity losses from early death (cost side)
- For society as a whole, represents a loss in national output due to mortality.

Problems with human capital approach:

- People who are not working for pay (e.g., homemakers, students, retirees) are valued at 0! (Even for the employed, time away from the job is valued at 0.)
- Implies that people with higher wages have higher social value.
- Does not account for labor market imperfections, e.g., discrimination.

2. Willingness-to-pay (WTP) Approach

Value of life is estimated from the amounts that people are WTP to reduce the probability of dying.

Advantages:

- Measures total value of life (not just labor market value).
- Includes foregone earnings and nonmarket value of life.

Disadvantages:

- Estimates vary widely.
- Price may be less than true WTP, value will be understated.