

**PLS 304 – Introduction to Public Policy Analysis**  
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**Topic: Cost-Benefit Analysis**

▪ **Some Basic Terms and Concepts**

- *Efficiency* is measured in economic terms and focuses on ensuring that the benefits to be gained in the use of resources (costs) are maximized. For example, dollars cost/unit of output.
  - *Cost/benefit analysis* is a common tool for measuring efficiency.
  - Evaluating costs and benefits is central to policy analysis because efficiency is a way of justifying government action on the basis of economic concepts
  - Alternatively, when the costs are greater than the benefits, the possible alternative uses of labor, capital, and materials are foregone, depriving society of their value
- *Benefit-cost analysis* is the systematic analysis of the value of the benefits and costs of an alternative. It is a way to compare the efficiency of alternative courses of action that may have different goals and objectives.
  - The ratio of benefits to costs is a measure of efficiency. In general, you would not proceed unless the ratio of benefits to costs is greater than 1.
  - All cost-benefit techniques are generally designed to assist a decisionmaker in choosing among alternative policies or projects. It is simply a more sophisticated and systematic way of looking at the advantages and disadvantages or pros and cons of a project
  - Steps in cost-benefit analysis
    - Define the goals of the project:
    - Identification of some feasible alternatives
    - Make an exhaustive list of all benefits and costs in monetary terms
    - Estimate and express benefits and costs in monetary terms
    - Forecast future streams of costs and benefits when needed
    - Choose the alternative with the largest benefit in comparison to the cost using some decision criterion –  $b-c$  ratio  $> 1$  or greatest net benefits
  - Fundamental principles are:
    - When considering a single project, accept it if its benefits are greater than the costs
    - When considering alternative projects, choose the one that gives you the highest benefits in relation to costs

▪ **Key Elements in Preparing a Benefit-Cost Analysis**

- Determine boundaries for the analysis
  - Must determine what to include and exclude. An examination of the goal(s) of the project may help in this regard. This includes the geographic area covered by the analysis as well as the individuals/groups included.
  - When conducting a c-b analysis for a public entity you typically include positive and negative externalities. However, if you are conducting the analysis for a private entity you might not include them since they are neither rewarded for their inclusion nor punished for their exclusion.

- *Standing* refers to who is to be considered when costs and benefits are computed. In other words, who has a right to be included in the set of individuals or groups whose changes in utility or welfare are counted.
  - Determining the boundaries of a cost-benefit analysis will often influence the results
  - For example, if we are doing a c-b analysis for a new bridge over the Cape Fear River, what should the geographic area be for the analysis?
  - It is really a contextual decision and when there is doubt, you should do the analysis in a variety of ways with different definitions on standing (i.e., perform a sensitivity analysis)
- Measure all of the applicable costs and benefits. This includes direct and indirect costs and benefits.
  - This is not always easy, particularly when they must be expressed in dollar terms. In many cases determining what benefits and costs are important enough to include is a judgment call.
    - Try to make as exhaustive a list as possible
  - *Direct costs/benefits*: those that are closely related to the main objectives of the project
    - These include: Immediate and controllable costs/benefits; out of pocket costs; revenue streams resulting from the project; opportunity costs of the forgone benefits attached to options not chosen; cost savings from elimination of inefficiencies.
  - *Indirect costs and benefits*: the costs associated with impacts or consequences of a policy, program, or project on the surrounding community (Externalities/Spillovers) but they do not show up in the ledger of the project
    - These by products of a project or program are often more difficult to measure.
    - They include: intended and unintended opportunity costs and risks; Second order savings and costs resulting from the program/project; externalities attributable to the project; and multiplier effects.
    - For example, building a new parking garage has costs in materials and operation and maintenance (direct cost). After its construction it might also increase traffic in surrounding neighborhoods (indirect cost)
    - In practice, it is not always easy to distinguish between direct and indirect costs. A key is what was the legislative intent of the policy or program
  - *Opportunity cost*: the resources diverted from other uses to make a given policy, program, or project possible. In other words, the difference between the value of goods and services in a proposed project and their value if they were used in some alternative way. They include monetarizable and nonmonetarizable and tangible and intangible costs
  - *Sunk costs*: they are costs associated with resources already built or paid for. They don't get included in the analysis. For example, if you propose expanding a bridge, you don't include the cost of the bridge already built.
  - *Side-payment exclusions* are the transactions associated with programs or projects that involve no net benefit or cost. They don't get included in the analysis.

- For example, a cost-benefit analysis typically excludes the sale of land whose value is enhanced or diminished because of a project because you would otherwise be counting the value twice.
- Pitfalls when dealing with costs and benefits
  - Ignoring costs all together or counting only a portion of total program costs or benefits
  - Ignoring costs and benefits if they fall to people or governments outside the client's concern
  - Is a dollar of cost or benefit equal regardless of its origin or impact? In other words, should a dollar of impact on one group be compared equally with a dollar of impact on another group – aggregation problem
  - Focusing on monetarizable costs and ignoring those that are harder to measure
- Analysis should be sure to include all of the tangible and intangible costs and benefits
  - *Monetarizable costs and benefits*: they can be counted in monetary – dollar – terms since their value can be judged in the marketplace
  - *Tangible costs and benefits*: those that can be measured in some type of recognizable unit – they can be counted. For example, money, goods, and services.
  - *Intangible costs or benefits*: those that cannot be measured in recognized units. Examples include: pain and suffering; loss of confidence; changes in public attitudes; aesthetic values; air or water quality; reduced or increased risks
    - Often have to impute these values using various techniques
      - Contingent valuation methods essentially use interviews or questionnaires designed to allow the analyst to estimate the dollar value of these intangible benefits or costs. Willingness to pay, travel cost, and hedonic cost pricing methods are often used to estimate these contingent values.
      - *Shadow prices*: a method of establishing costs/benefits when market prices are unavailable or distorted. You can establish the price by looking at another context that is viewed as competitive.
    - Various techniques are used to estimate the value of a human life
      - Use face value of life insurance – how much is the life insured for?
      - Discounted future earnings – what would they have earned in the future?
- *Time* is important.
  - Choice of a time horizon: The relative desirability of a project is intrinsically connected to when a project ends. Accordingly, you need to define the timeframe for your analysis – 5, 10, 15 years etc.
    - The timeframe is important because you can different results using different periods to allow benefits or costs to accrue.
    - May face costs in the near-term with benefits stretching into the future. Accordingly, you need to adjust future costs and benefits to present by adjusting their value in ways that allow you to compare them.
  - You also need to account for the fact that a dollar today is worth more than a dollar at some point in the future.
    - *Discount rates*: a rate estimated to calculate the time preference for money so that analysts can determine future values in today's dollars.
    - Key feature is that a dollar today is worth more than getting a dollar tomorrow

- Discount rate (or factor) adjusts future dollars to current dollars.
- The choice of rate has a profound impact on the results.
- Present value = Future value/(1 + r)<sup>n</sup> where r = discount rate; n = time period
- There is little mention in the literature about how to choose the appropriate discount rate and many justifications can be given. The problem is that the results of an analysis may be very sensitive to the choice of the discount rate
- Decision Rules. Need a rule for selecting among alternatives or deciding whether to proceed. two common rules are:
  - Greatest net benefit = B - C
  - B/C ratio > 1 (efficiency)
  - Example: Army Corps of Engineers Dredging Project
- Conduct a *sensitivity analysis*
  - The use of a sensitivity analysis can help minimize some of the weaknesses inherent in c-b analysis when calculations are “sensitive” to basic assumptions such as the discount rate, time frame for the analysis, or boundaries of the analysis.
  - You change the assumptions underlying the analysis, estimate a different set of numbers, choose an alternative discount rate and then see if there is a significant change in your outcome
  - If your results are very sensitive, then you should have less confidence in the results then if you reach the same conclusion by varying your incentives
- **Criticisms of cost-benefit analysis**
  - Utilitarian calculation. Concerned only with efficiency.
    - Not concerned about other possible goals like equity and democratic accountability which may be associated with the long-term impacts of the proposed action
  - The question of who bears the costs and who benefits is not addressed
    - C-B analysis assumes that benefits and costs are more or less equally distributed among the population. However, costs and benefits are often imparted on narrow segments of society.
    - Accordingly, the analyst might want to consider the distributional consequences of the alternatives as well
  - The problem of aggregation
    - There are practical and theoretical difficulties associated with value weighting and summing of several measures in an analysis to give an overall composite figure
    - Conventional CBA can make any proposition incomprehensible by misguided quantification and faulty aggregation which attempts to add together disparate factors in a problem like noise, pollution, travel time, capital cost, etc.
  - How are compliance costs going to be measured?
  - Choice of a discount factor can change the results and there is no generally accepted standard for selecting the discount rate
  - Costs may exceed benefits but action is still warranted
    - Action may meet some other criteria such as equity, accountability or help preserve human dignity
  - Should government always choose the cheapest way to gain benefits?
    - If that were the case we would produce all electricity using coal and nuclear power

- How to account for opportunity costs
  - You do not question the objectives. You can determine the lowest cost solution to combined sewer overflow remediation techniques but can't question whether money is better spend on NPS pollution runoff
- **Cost effectiveness analysis**
  - It is an offshoot of c-b analysis
  - *Effectiveness* is measured in dichotomous terms. A program is effective or it isn't. Accordingly, you may search for the cheapest effective alternative but that is not necessarily the most efficient alternative.
    - Effectiveness refers to the likelihood that a policy or program will achieve stated goals and objectives or demonstrated that it achieved them
    - Problem is that many policies and programs have multiple, competing goals and objectives and some may be achieved at the expense of others
  - *Cost-effectiveness analysis* is tool for finding the alternative that accomplishes the specified goal at the lowest cost.
    - *Cost-effectiveness* is appropriate when the goal is to accomplish some task at minimum cost. It seeks to identify alternatives that achieve the objectives but minimizes cost. Any additional benefits beyond those required to accomplish the task are not relevant. Only needs to monetarize costs not benefit
    - It is also appropriate when the concerns about the ability to measure the benefits of a policy action are so significant that c-b analysis is not useful
    - The advantage of cost effectiveness analysis is that it requires no measurements of intangible benefits such as the value of a human life
  - Fundamental principles
    - If the benefits are the same, choose the alternative with the least cost
    - If the costs are the same, choose the alternative with the most benefits
  - Although the process seems simple, it still has all of the same challenges associated with doing a c-b analysis