EVALUATION OF THE BENEFITS IN THE COST-BENEFIT ANALYSIS FOR ENVIRONMENTAL AND ENERGY INVESTMENT PROJECTS

GABRIEL ADRIAN SUSTER[1], NICOLETA MATEOC SÎRB[1], ANDREI ZAGONI SZABO[1], GHEORGE SEBASTIAN SÂRB[2], AURORA VENIG[2]
[1]Faculty of Agricultural Management - University of Agricultural Sciences and Veterinary Medicine of Banat Timisoara, Romania
[2]Faculty of Environmental Protection, University of Oradea

Abstract: *The evaluation of the benefits is important to calculate specific indicators of financial analysis as well as economic analysis.This thesis was performed in order to achieve a minimum set of benefits that should be considered when designing a CBA, including:*

- *working principles regarding the use of revenues in financial analysis, the use of the benefits in economic analysis and the need to avoid double taxation of benefits;*
- *an algorithm for benefits calculating;*
- *minimum benefits that must be included in cost-benefit analysis of energy and environmental investment projects, financed by Structural Funds.*

Key words*: energy, cost-benefit analysis, benefits, monetization.*

INTRODUCTION

Cost-benefit analysis (CBA) represents the main financial tool used to form an documented opinion and for taking decisions regarding the financing of energy and environmental biotechnology investment projects from EU financial resources.

The major advantage of cost-benefit analysis stems from its methodology that brings together, in a monetary form, costs and benefits of a project, regardless of the type of effects that are produces: non - monetary effects or significant macroeconomic effects. In economic and financial sense we can define the term "benefit" as an effect or result of a desirable and measurable actions, investments, projects, resources or technologies, containing inclusively additional revenues, reduced costs and also social, positive and environmental externalities.

MATERIALS AND METHODS

BENEFITS OF FINANCIAL ANALYSIS : Benefits in the financial analysis are revenues primarily through the sale of goods or services produced by the project, incomes from operation of infrastructure.

Income relates only to amounts receivable are recognized as income in the accounting records at the effective time of their obtaining . All other types of income that are not preceded by a bill or will not be followed by a bill are considered. In addition, receipts that can not be recognized as revenue will be ignored.

The level of revenue is derived from projections made in accordance with national law and practice, the monetization using current rules set out in regulations. Revenues are recorded separately by type defaults legislation. Therefore, revenue received directly from customers (beneficiaries of the goods and services sold) will be recorded separately from potential subsidies, transfers or grants from the state budget.

Revenues do not include value added tax (VAT). Where, for large infrastructure projects, operating activity is not carried out by the facility owner, the income to be taken into account are obtained by the infrastructure owner.

BENEFITS OF ECONOMIC ANALYSIS: Benefits in economic analysis are income from the operation of infrastructure and external benefits. Operating income are the incomes derived from financial analysis calculated by applying a conversion factor to each outcome. External benefits are the monetary value of planned noncommercial impacts identified in conjunction with the project.

The conversion factor used to determine the benefits to be based on various methods, depending on the market. In this case, the most relevant is the marginal cost. If the conversion factor can not be determined is recommended to use a standard conversion factor equal to one.

Special attention should be given to benefits which must have a monetary equivalent. There are several approaches for these benefits.

AVOIDANCE OF DOUBLE COUNTING BENEFITS: When assessing the benefits, the methodology shall establish categories of impact generated by the project. There are times when one impact can be measured in two or more ways. In these situations, the benefits of double counting should be avoided in order not to distort the results of cost-benefit analysis.

Double counting is generally a problem when we are using several methods to assess various components of a whole suite of changes in services.

A frequently encountered error regarding double counting is where the benefits of investment transferred by the operators to end users are reported as benefits in both cases.

Avoiding double counting does not mean that an action can not generate multiple effects. However, to avoid double counting is required to obtain accurate and robust results.

INFRASTRUCTURE INVESTMENT ENVIRONMENT: In financial analysis, the benefits must be covered by revenues collected from fees earned from services rendered. The market environment is generally characterized by monopoly. Under these conditions of market failure, the prices that will be considered in the financial analysis will be established (and are expected to be established) by local authorities.

To assess a project, the question arises on the number of people who actually paid for these resources, the question becomes increasingly important because the market prices of natural resources affects their behavior and use of resources by them. The more price is low, the impulse to exploit natural resources will be higher while some high prices

encourage conservation.

In the economic analysis, the benefits will include two major components. First, revenues identified in the financial analysis will be corrected by the conversion factor.

Secondly, the positive externalities resulting from compliance with EU environmental standards (improving quality of life, health, medical conditions, etc..) will be monetized. The second component must be more consistent through multiple valences of social benefits.

ENERGY INVESTMENT : In financial analysis, the benefits must be covered by revenues collected from fees earned from the provision of goods or services produced in the companies that benefit from financial support. The market of these businesses is generally characterized by strong competition, which generates realistic market prices to be taken into account in the CBA.

Projects related to energy efficiency and security of supply, in the context of climate change helps to reduce energy intensity by implementing new technologies to increase productivity, especially for industrial users as well as intense use of renewable energy sources.

Increasing energy efficiency through investment in machinery, equipment, expansion and modernization of electricity / oil / gas plants networks contribute to environmental improvement and sustainable development of the region.

CALCULATION OF BENEFITS: Minimum benefits described in the previous section must be estimated through monetization of each relevant factor that could contribute to that benefit. The indicators are different for each type of benefit, and the methodology can be adapted to particular situations.

Estimating benefits is usually done by combining information from multiple sources and by extrapolating the context in which similar effects were taken into account.

The data used for monetization benefits must be obtained from different sources. To avoid erroneous calculation of indicators, using documents and credible statistics is essential. The data should be more recent and preferably primary rather than secondary and tertiary.

RESEARCH RESULTS

CALCULATION ALGORITHM : Benefits monetization is an estimate currency of all the results generated by the investment project. It is important to evaluate at least two categories of beneficiaries: direct beneficiaries and society.

Cost reduction can be analyzed in terms of marginal costs, representing the value of the benefits to contributors as a result of cost reduction. Monetization is the most complex stage is mainly a statistical procedure to quantify. Benefits assessment is not a simple issue

as many items can be converted into monetary terms by using approximations that distorts the exact result.

Table 1

Minimum necessary benefits to be quantified for environmental and energy investment projects.

Type of Investment	Benefit	Financial Analysis	Economic Analysis
MINIMUM BENEFITS TO BE QUANTIFIED FOR ENVIRONMENTAL PROJECTS			
Projects related to water and wastewater systems	Benefits from improved access to safe drinking water		YES
	Benefits from improving the quality of bathing waters and other surface waters		YES
	Reducing the cost of natural resources for clients		YES
	Reducing the cost of natural resources for the operator		YES
	Revenue from environmental services (if applicable)	YES	YES
Projects relating to solid waste	Reducing the cost of natural resources		YES
	Reducing the negative aspects odors and direct health risk		YES
	Reduction of greenhouse gas		YES
	Reducing direct risks to health		YES
	Revenue from environmental services (if applicable)	YES	YES
Projects relating to district heating plants	Reduction of sulfur dioxide, nitrogen oxides, dust, heavy metals		YES
	Benefits resulting from improved air quality		YES
	Revenue from environmental services (if applicable)	YES	YES
Natural risk prevention projects	Benefits of protecting property from flooding		YES
	Benefits from flood protection to agricultural production		YES
	Benefits from expanding coastal zone for tourists		YES
	Revenue from environmental services (if applicable)	YES	YES
MINIMUM BENEFITS TO BE QUANTIFIED IN PROJECTS RELATED TO INCREASING ENERGY EFFICIENCY AND SECURITY OF SUPPLY IN THE FIGHT AGAINST CLIMATE CHANGE			
Investment projects in	Benefits from improved quality of life		YES

energy sector	**Benefits from the reduction of pollutants**		**YES**
	Revenue from sale of goods and services (if applicable)	**YES**	**YES**

In our research we met several approaches, each of which has advantages and disadvantages.

- options market method is used when recipients make purchases at market prices indicating that the goods purchased are at least as beneficial as the money they spend.

Consumers will increase their consumption to the point where the benefit of an additional unit (marginal benefit) equals the marginal cost of the unit, market price. Therefore, for any consumer who buys a property, the marginal benefit equals the market price.

- willingness to pay – (WTP) measures the direct and indirect benefits and provides a method of assessing individuals' preferences by asking them how much they are willing to pay for a particular outcome.

- a human capital approach is based on calculating the value of life as actual incomes received during his career. In the human capital approach, the benefits are productivity gains from extension of lifetime.

Monetization of benefits must provide a value for each category of person described above. The total monetized value is obtained by summing the individual values of Benefits.

A the appropriate cost-benefit analysis is to determine the long-term benefits of various alternative policy programs. Investments are designed to generate benefits measured over periods of time (usually decades) and, consequently, the monetization of benefits must take into account of this period of time.

Validation of Benefits calculation must be carried out if in which are available studies, in comparison with obtained values for similar cases. Values should not be identical, but must be correlated. This correlation should take into account the differences in macroeconomic indicators, region, natural conditions, culture etc.

CONCLUSIONS

Benefits and its monetization constitutes a basic requirement for any cost-benefit analysis.

In practice, the monetization of benefits is very difficult in some cases. It is therefore necessary to establish basic rules about the main categories of benefits that must be considered in the analysis to achieve a qualitative cost-benefit analysis.

Minimum standards for benefits helps to homogenize cost-benefit analysis and provide conditions for quality work. These minimum benefits should be included in each cost-benefit analysis performed for an investment, but must be supplemented with other specific benefits.

This document is based on numerous theoretical and practical cost-benefit analysis.

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