Using cost-benefit analysis in project assessment

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Abstract: - Cost-benefit analysis is a method used for evaluating a policy which quantifies in monetary terms the value of all the consequences of this policy on all society members. Net social benefit expresses the value of this policy. The main purpose of cost-benefit analysis is to help decision-making. More specifically, the objective of cost-benefit analysis is to facilitate a more efficient allocation of resources.

Key-Words: - cost-benefit analysis, ex ante cost-benefit analysis, ex post cost benefit analysis, in media res, investment project, internal rate of return, sustainability analysis, net present value.

1 INTRODUCTION
Cost-benefit analysis is a method whose main purpose is to help decision-making. The difference between social benefits (B) and social costs (C) represents social net benefit (SNB):

\[ \text{SNB} = B - C \]

There are two main types of cost-benefit analysis:
- **ex ante** cost-benefit analysis, which is standard cost-benefit analysis in the usual sense of this term; it is performed when a project is still subject of study, before its starting or implementation.
- **ex post** cost-benefit analysis is carried out at the end of the project. In this moment all the costs are “allocated”, in the sense that all resources have already been used in the project. The value of ex post analysis is more comprehensive, but less direct because it offers information not only for a certain intervention, but also for “cataloging” of such interventions.

Other cost-benefit analysis is developed over the duration of a project, namely **in media res**. Some elements of such studies are similar to those ex ante analysis, while others are similar to ex post analysis.

Ex ante analysis is useful in the resources reallocation decision-making for a certain project being studied. For ongoing projects, a **in media res** can be also useful in decision-making process when the modification of resources reallocation for other uses is justified.

The main phases of cost-benefit analysis are:
- specify the set of alternatives
- identify subjects who will receive the benefits and those who will bear the costs.
- Classify the impacts and select the measuring indicators.
- Quantitative estimation of impacts over the life of the project.
- Monetary evaluation of all impacts.
- Update the value of costs and benefits in order to obtain real values.
- Partially calculation of net present value (NPV) for each alternative.
- Sustainability analysis
- Formulate recommendations based on NPV and sustainability analysis.

2 Cost-benefit analysis of investment projects

In accordance with the type of projects, will be applied the provisions of specific regulations, namely:
2.1 Evaluating process of investment projects includes the following steps:

- **Presenting socio-economic context and project's objectives:** the first step in achieving the evaluation is represented by a qualitative presentation of socio-economic context and objectives expected to be achieved through investments to be achieved, both directly and indirectly. In this first step should be also taken into account the relationship between objectives and priorities set out in the framework of Operational Programme, National Strategic Reference Framework, the coherence and objectives of EU Funds;

- **Project identification:** all project essential characteristics should be included in the evaluation.

- **Project feasibility analysis and alternatives:** feasibility analysis should determine if the local context is favourable for the project (for example, if there are physical, social or mandatory institutional requirements), to estimate the evolution of labour demand, to justify the project implementation (scale, location and so on) compared with alternative proposed sceneries.

- **Financial analysis (fig 2.1.1)** is based on updated cash-flow estimation. EC suggests as a reference financial term, a discount rate of 5%.

In this respect, in accounting should be maintain a clear record of cash inflows and outflows related to:

- Total cost investments;
- Total operating costs and revenues;
- Financial profitability of investment costs: net present value of investment (FNPV/C) and internal rate of return of investment (FRR/C);
- Sources of funding;
- Financial sustainability;
- Financial profitability of domestic capital: net present value of capital (FNPV/K) and internal rate of return of investment (FRR/K): this takes into account the impact of EU subsidy on national (public and private) investors.

The time horizon must be consistent with the economic life of main assets. The residual value must be included in accounting at the end of the year. However, inflation variation and price relative changes should be treated in a coherent way. Generally, the internal rate of return on investment (FRR / C) may be very low or negative for public sector projects, but for private sector the internal rate of return (FRR / K) should normally be positive.

![Diagram](image-url)
but for competitive regions is 3.5%);
- indicators calculation of economic performance economic net present value (ENPV), economic rate of return (ERR) and benefit-cost ratio (B / C).

✓ Risk assessment: project assessment risk is achieved as economic analysis in five steps (fig 2.1.2), as follows:
- sustainability analysis: identification of critical variables, eliminating deterministic dependent variables, elasticity analysis, the choice of critical variables, the scenario analysis;
- assumption of a probability distribution for each critical variable;
- calculating of performance indicators distribution (usually FNPV and ENPV);
- assessment results and acceptable level of risk;
- establishment of some risk reduction measures.

Fig 2.1.2 Project assessment stages

1. Context and project objectives analysis

2. Project identification

3. Project feasibility analysis and alternatives

4. Financial analysis:
   Investment costs
   operating costs and revenues
   Sources of funding
   Financial sustainability
   Financial profitability of domestic capital

If FNPV > 0

The project does not require the financial support of EU (except for investments in accordance with the regulations of state aid)

If FNPV < 0

The project requires UE financial support

5. Economic analysis:
   Correlation with market prices in accounting
   Monetization non-market impact
   Inclusion of additional indirect effects (where relevant)
   Social updating
   Calculation of economic performance indicators

If ENPV < 0

Implementation has a positive effect on society (except for projects with significant non-monetary benefits, such as cultural values, biodiversity, landscape)

If ENPV > 0

6. Risk assessment
   Sensitivity analysis
   Probability distribution of critical variables
   Risk analysis
   Acceptable risk levels assessment
   Risk prevention
3 Project description
Priority axis: 2. Strengthen social and economic cohesion in the border region
Key areas of intervention: 2.1. Supporting cross-border business
Action: 2.1.1. Business infrastructure development

According to Operational Programme, the overall objective is to offer to people and institutions from the cross-border area joint development facilities, which will constitute the key development in the region, aiming at developing businesses according to sustainable development principle. So, it will be incubated under more favorable conditions those companies that conduct research for implementing the most efficient renewable technologies (solar, wind, biogas, renewable resources) or a combination of thereof, depending on the energy potential and the zone specific, transferring the already existing good practice, but also developing new practice as result of research. The entire infrastructure is created within the sustainable development principles set out by the European Commission documents.

The overall objective of the present project is the creation of a joint business infrastructure (new buildings and renovations, insisting on facilities and utilities specific to some business structures). Activities are divided into five packages containing the achievement of a joint business infrastructure, particularly in sustainable development field (renewable energies), conferences, fairs, exhibitions, publications of some business opportunities bulletins and design a strategic plan to improve business infrastructure.

General objective: Improvement of socio-economic conditions and crossborder business development including construction/modernization of business centers.

Specific objective s:
1. Achievement of a pilot center in Timisoara and the modernization of those from Bekescsaba, Szeged.
2. Achievement of a renewable energies market.

Thus, the project through its objectives, activities and proposed results complies with equal opportunities principle and EU provisions of Council Directive no.1000/78/EC of 27th November 2000, in order to apply equal treatment principle and combat the social exclusion risk. The main idea, the whole project is based on is that of respecting equal opportunities and that of “mainstreaming”, in other words valuing gender differences transforming a disadvantage in an opportunity. As for, sustainable development, the project complies with guidelines from framework documents of European Commission, so that in the cost-benefit analysis were determined its specific indicators: B/C, RIR, VAN, but during the project-related conferences were forseen section devoted to environmental protection, as well as dissemination of research-development results, in general, but also from own projects.

Tab 3.1. Project budget - euro -

<table>
<thead>
<tr>
<th>Grant (ER) DF+ state cofinancing</th>
<th>PP1</th>
<th>PP2</th>
<th>PP3</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2700 00</td>
<td>90%</td>
<td>9000 00</td>
<td>9%</td>
<td>540 00</td>
</tr>
<tr>
<td>00 00</td>
<td>0%</td>
<td>00 00</td>
<td>0%</td>
<td>00 00</td>
</tr>
<tr>
<td>Total 3000 00</td>
<td>10%</td>
<td>1000 00</td>
<td>1%</td>
<td>600 00</td>
</tr>
</tbody>
</table>

Tab 3.2. Financial analysis - euro -

<table>
<thead>
<tr>
<th>Project start date</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residual value</td>
<td>354.730.00</td>
</tr>
<tr>
<td>Updated financial rate</td>
<td>5%</td>
</tr>
<tr>
<td>Investment total cost</td>
<td>669.274</td>
</tr>
<tr>
<td>Updated investment cost (DIC)</td>
<td>610.745</td>
</tr>
<tr>
<td>Updated net revenue (DNR)</td>
<td>9.623</td>
</tr>
<tr>
<td>Funding gap ratio: (R=(DIC-DNR)/DIC)</td>
<td>98.42%</td>
</tr>
<tr>
<td>Total eligible expenditures</td>
<td>500.000</td>
</tr>
<tr>
<td>Desicion amount (DA=EC*R)</td>
<td>492.122</td>
</tr>
<tr>
<td>Co-financing project rate (CRpa)</td>
<td>90.00%</td>
</tr>
<tr>
<td>Grant total value (DA*CRpa)</td>
<td>442.909</td>
</tr>
<tr>
<td>Own contribution</td>
<td>49.212</td>
</tr>
<tr>
<td>Financial net present value (FNPV)</td>
<td>-601.122</td>
</tr>
<tr>
<td>Financial rate of return</td>
<td>-9%</td>
</tr>
</tbody>
</table>

4 Conclusions
From cost-benefit analysis result and their recording in accounts the following are come off:

There are differences between accounting interpretation regarding residual value of the building which is represented by the recovered value from the asset out of service at the end of the normal operation and
residual value according to cost-benefit analysis which represents the total value of the building at the end of the 10 year of project monitoring.

According to tab. 3.2 can be noticed that in case of income-generating projects is diminishing financial assistance and increase own contribution value.

On completion it is found that the total expenditure value is higher than that expected in the project, resulting in their sharing of eligible expenses and ineligible costs according to financial reports related to grants.

Considered eligible expenses are those foreseen and approved, but those ineligible are represented by the VAT on the one hand, and financial costs on the other hand, there are additional costs necessary to complete investments, costs bear by the beneficiary, representing own contribution.

References: