EU Funded Projects: from Financial to Economic Analysis

Andreea Lorena RADU[1]
Maria CARACOTA DIMITRIU[2]

ABSTRACT
Investment projects represent the basis of economic and social development of our country. The investment is a cost that will most influence the future, but it is necessary that this influence should be not only positive, but also should exceed the investment efforts. There could be different sources of financing the investment, but lately, European grants are more and more accessed by various economic agents or institutions. To obtain European financing, the project must fulfill certain conditions and must follow certain economic, social and environmental indicators. Also, for some financing lines, is required the economic analysis preparation, in order to demonstrate that the project benefits to society are important and cover the investments efforts. Thus, economic analysis studies the project influence on macro-economic or regional level, and evaluates its contribution to the welfare of the region or local community. The present paper aims to analyze the most important and available theoretical resources and to provide practical examples for carrying out the economic analysis. In conclusion, economic analysis is an useful tool for each project evaluation, but the biggest barriers to its development are the lack of valid data and the reduced Romanian experience. Under these conditions, input data can be incorrectly estimated, resulting illusory and subjective project data. For a proper projects selection based on indicators of economic assessment, it must be developed a national, complete and complex guide.

KEYWORDS: *Cost-benefit analysis, European funds, externalities, investments, shadow prices*

JEL Classification: O22

Introduction

European funds, available for our country as EU member state, represent a great opportunity in obtaining specific funding for different areas, both public institutions and economic agents being eligible. The European funds sustain the infrastructure and local economy development, being an European Union instrument of action for economic and social disparities elimination, between regions and between countries, in order to achieve economic and social cohesion.

[1] *Andreea Lorena RADU*, The Bucharest Academy of Economic Studies, Romania,
E-mail andreea_16_lorena@yahoo.com
[2] *Maria CARACOTA DIMITRIU*, The Bucharest Academy of Economic Studies, Romania,
E-mail maria.caracota@gmail.com

To obtain EU funds is necessary an investment project preparation, that should demonstrate and present the candidate's current status but also the future traceability of the funds obtained after the project submission. Thus, each financing line has a specific Applicant's Guide, which includes eligibility criteria, selection criteria, evaluation indicators, the administrative structure of the funding application file and also other important information for the applicant. Most guides require specific limits framing of economic and financial indicators, resulting from the cost-benefit analysis, as an eligibility condition.

In order to ensure the efficient use of public funds is necessary that the project requesting European funding demonstrate in a realistic way, the viability, the competitive and adaptation ability and the future economic and financial performance of the applicant. The cost-benefit analysis provides information on the financial and economic activity at micro and macroeconomic levels.

The cost-benefit analysis is an important tool for every actor involved in the project: on the one hand, the public decision maker who wishes to identify those initiatives for economic and social benefits growth, and on the other hand, for the applicants and consultancy companies that assist them, in order to demonstrate the feasibility of the proposed projects that will sustain and develop the economic activity. Also, there can be involved banking and financial institutions for loans to sustain the applicant's co-financing part, which are interested in cost-benefit analysis to obtain the certainty of a normal conditions loan process.

The cost-benefit analysis is directed to facilitate the more efficiently distribution of society's resources, being a quantitative method of estimation for the necessity and opportunity of a project, and it is based on the future costs and benefits calculation.

According to the standard economic and technical documentation structure for an investment project, nationally regulated by GD 28/2008, the cost-benefit analysis includes: investment objectives identification and definition, including the reference period specification, the options analysis, the financial analysis, including financial performance indicators: cumulated cashflows, Financial Net Present Value (FNPV), Financial Internal Rate of Return (FIRR) and Benefit/Cost ratio, the economic analysis, including indicators like: economic net present value, economic internal rate of return and cost-benefit ratio, the sensitivity analysis and the risk analysis.

The authors Dimitriu and Caracota (2004), claim that the economic value of an investment, from the institution/organization's point of view, is influenced by the investment project cash flows. There are three types of cash flows: initial investment costs, operating cash flows and cash flows at end of the project's life. Different economic criteria are used in comparing financial investment alternatives, such as simple financial evaluation methods, which do not take into account the time value of money (static approach) or discount methods, that take into account the time factor (dynamic approach). Dynamic approaches are considered better as they include the time value of money and other important factors.

According to Vasilescu (2009) and Vasilescu & Cicea (2004), the project's economic evaluation requires economic efficiency computation and analysis, which corresponds to a causal relationship between the effort and the effect gained. "In the economic field, the efficiency notion is complex because it requires taking into account not only the economic aspect, but also the social, environmental, political, strategic and other aspects."

The economic analysis estimates and totals the money equivalent of social present and future costs and benefits, from the citizens' viewpoint, in order to decide if the project is positive for the society. The concepts underlying the cost-benefit analysis have been defined since 1848, in the works of the French engineer Jules Dupuint and British economist Alfred Marshall. Later, these concepts are developed in practice within the Federal Navigation Act of 1936, requesting to U.S. teams of engineers to implement projects for sewage systems improving only when total benefits exceed the project costs. In these circumstances, the engineers have developed systematic methods for measuring such benefits and costs, without assistance from the economists. Only in the 1950s, economists have tried to find a rigorous set of methods for costs and benefits measuring and decision about whether to implement a certain public investment project (Mosteanu & Iacob, 2007).

At national level, the Authority for the Coordination of Structural Instruments (ACIS) of the Ministry of Economy and Finance, developed in 2008 a document entitled "Ghid naţional pentru analiza cost – beneficiu a proiectelor finanţate din instrumentele structurale" ("National Guidelines for cost - benefit analysis in projects financed from structural instruments"), with help from JASPERS advisers and relevant Management authorities and the Directorate General for Regional Policy - European Commission (EC), which attempts to harmonize the national and the EC previsions. The guide provides relevant, but insufficient information, and advice on the purpose and how to achieve the cost-benefit analysis for those involved in preparing, comparing and selecting investment projects to obtain structural funds financing.

Another important work is "De la Phare la fondurile structurale: Programarea şi implementarea asistenţei de pre-aderare pentru PHARE CES şi tranziţia spre Fondurile Structurale - modul A 2.1 Instruire pentru analiza economică si financiară si evaluarea riscurilor" (Duplouy & Ciobanu, 2005), which offers a range of additional information concerning preparation of cost-benefit analysis.

At European level, is famous "Working Document no. 4, The New Programming Period 2007-2013: Guidance on the methodology for carrying out cost-benefit analysis" (EC, 2006), which establishes basic principles and clarifies the most important confusions that can be made.

Based on this work was developed the "Guide to Cost-Benefit Analysis of Investment Projects - Structural Funds, Cohesion Fund and Instrument for Pre-Accession" (EC, 2008), which is, currently, the best guide explaining calculation methodology and providing economic analysis examples for several activity sectors.

The cost-benefit analysis has both advantages and disadvantages (Ghinea & Negoita, 2008), including:

- Strengths: it allows to express an opinion on economic and social value of the project or project version, it supports projects and options prioritizing, it supports economic benefits and costs identification, even if not immediately financial quantifiable;
- Weaknesses: it is based on costs and benefits rather than on the institution policy objectives, often it cannot be realistically because of the data and statistics insufficiency, it requires high expertise, it can involve the manipulation risk, particularly if it is used for projects with long-term intangible and qualitative benefits.

1. Projects Appraisal

The cost-benefit analysis is developed to estimate the socio-economic impact of the proposed investment project by identifying and quantifying the monetary and non-monetary investment effects. The projects evaluation methodology follows the market economy principles, hence for each project, evaluation should contain "two analysis: the economic analysis, for the national economy, and the financial analysis, for the economic agent" (Vasilescu, 2009).

The financial analysis objective is the project financial performance estimation during a certain period, called the reference period. This type of analysis "refers to financial support and long-term sustainability, financial performance indicators and the EU assistance necessary volume justification" (ACIS, 2008).

The financial analysis features, found in most financing programs, refer to the development of at least two types of investment options ("do nothing" option; "do something" option, with a maximum/medium/zero grant financial support), within which the future revenues and expenses are estimated, resulting cash flows from the investment activity and the operating activity. It is also common to predict the organization's financial annual statements (balance sheet, profit and loss account), and the most important aspect is represented by the financial evaluation indicators: Financial Net Present Value (FNPV), Financial Internal Rate of Return (FIRR), cost / benefit ratio. An efficient, feasible and profitable project will be characterized by a positive FNPV, a FIRR greater than the discount rate and a subunit cost/benefit ratio; however, in terms of grants, such a project can secure sufficient investment sources and doesn't need financing assistance. A project can obtain European funding if these indicators are currently experiencing disadvantageous values.

On the other hand, economic analysis measures the project economic, social and environmental impacts and evaluates the project from the society's point of view. The economic analysis objective is to demonstrate that the project has a net positive contribution to the economic welfare of the region or country, and therefore deserves to be co-financed by EU funds. The project benefits should exceed the project costs and, more specifically, the present value of the project's economic benefits should exceed the present value of the project's economic costs.

According to GD 28/2008, the economic analysis is required only for major public investment, whose total cost exceeds the equivalent of 25 million Euros for investments in environmental protection, or the equivalent of 50 million Euros for investments in other areas. But some financing lines require economic analysis, even if the specified conditions are not met. Among these, the most important are:

> ➢ Regional Operational Programme: Priority Axis 1 "Support to sustainable development of urban growth poles"; Priority Axis 2 "Improvement of regional and local transport infrastructure"; Priority Axis 3 "Improvement of social infrastructure" – Key Areas of Intervention 3.1, 3.2, 3.4; Priority Axis 4 "Strengthening the regional and local business environment" – KAY 4.1, 4.2; Priority Axis 5 "Sustainable development and promotion of tourism";

> ➢ Sectoral Operational Programme Increase of Economic Competitiveness: Priority Axis 3"ICT for private and public sectors, Priority Axis 4 "Increasing energy efficiency and security of supply, in the context of combating climate change";

> ➢ Sectoral Operational Programme Environment: the entire financing program;

➤ Sectoral Operational Programme Transport: Priority Axis 2 "Modernization and development of the national transport infrastructure outside the TEN-T priority axes aiming at sustainable national transport system" and so on.

The economic analysis development basis is represented by the financial analysis tables. In order to determine economic, social and environmental project performance, certain phases, listed below, should be considered.

1.1. Fiscal Corrections

For the economic analysis preparation, it must be taken into account that the expenditures and revenues structure differs from that of the financial analysis. Thus, "economic analysis does not include the tax effort, taxes, because these, for the national economy, represent revenue and not spending" (Vasilescu, 2009). Market prices generally include taxes and subsidies, even transfer payments, and it is necessary to consider the prices without VAT and other indirect costs, or transfers to individuals (e.g. social security contributions). Fiscal correction is required for those financial prices elements that are not related to the opportunity costs contents of the involved resources (ACIS, 2008).

For example, a fee paid to the state by a beneficiary of EU assistance is offset by fiscal revenues to the government, a subsidy from the government to the investor is again a pure transfer that does not create economic value, but it is an advantage for the beneficiary. Such distortions should be corrected, and the main recommendations of the European Commission (2008) are:
- prices of inputs and outputs must be taken into account net of VAT and other indirect taxes (which are paid for the project, to the Tax Administration, and then redistributed to the consumers as public expenditures);
- commodity prices, including labor, should not include direct taxes (the employer receives a net-of-tax salary, fees are directed to the Government, that pays it back to the employees / retirees and their families, as public services or transfers);
- subsidies from a public entity, that is pure transfer payment, should be omitted.

Also, in some cases, tax / indirect subsidies are intended as a correction for externalities (e.g. taxes on energy prices to discourage negative environmental externalities). Under these conditions, including these charges in project costs can be justified, but the assessment should avoid double counting (e.g. including both energy taxation and environmental external cost estimation in the assessment). A special case is that of public funds transferred to economic agents in exchange for services supplied or goods produced by them (for example, specific grants for schools assisting disabled students) are not to be considered transfer payments and these should be included as income in the economic analysis, but only after checking if the subsidy reflects the social opportunity cost of the service.

1.2. Externalities

The externalities monetisation should be done when external benefits or costs exist, and these are not included in the financial analysis or if they can not be evidenced by using the conversion factors. The most relevant examples are the impact of projects on the environment, whether positive or negative, live saving in case of healthcare investments, time saving in case of transport sector investment. In most cases, the identification and

quantification of these externalities is extremely difficult, and often the monetisation is not possible because long-term effects can occur.

Monetisation of externalities can be done using the willingness-to-pay (WTP) method: estimation of a money value through users' revealed preferences - surveys, questionnaires - or stated preferences - observed statistical summary, compared to other similar behaviors observed in other markets.

Currently, in Romania, there are no national regulations on the type of externalities that should be taken into account for different sectors, but general examples and methodology principles are available. Thus, ACIS (2008) provides general examples of positive externalities (improved life quality following a positive impact on the environment - through improved population health or area attractiveness increase, risk and accidents number reduction from investment projects in transport, reducing greenhouse gas emissions and fine particles from investment in energy) and negative (on the environment: the landscape destruction, loss of property value and land area due to adverse effects on environment such as noise or odor, the impact of temporary construction, increased emissions due to increased transport activity induced by the project).

It is considered that there are externalities for each proposed project, and they depend on the characteristics of the project. ACIS (2008) recommends limiting the externalities analysis, keeping those for which an estimate is realistic or possible, and the other externalities identified can be included in the multi-criteria analysis.

EC (2008) provides more detailed explanations on the externalities, especially on their monetisation. The "willingness-to-pay" method allows estimating a monetary value via user preferences, disclosed or reported. If this method is not possible or relevant, long-run marginal cost (LRMC) can be the default accounting rule. Usually WTP is higher than LRMC in empirical estimates, and sometimes an average of the two is appropriate.

Table 1. Externalities quantification

Sector	Non-market impact	Impact assessment
Transport	Savings in travel and waiting time	The value of working time savings is the opportunity cost of the time to the employer, equal to the marginal cost of labor
Healthcare	Life expectancy / quality of life	Quality-adjusted life year (QALY) is the most commonly used measure of health benefit. Tools such as the EuroQol instrument allow the estimation of the number of QALYs gained by the recipients of the project
	Prevention of fatalities/injuries	The WTP for a reduction in the risk of death or serious injury
Environment	Landscape	The Environmental Landscape Feature (ELF) model constitutes a first attempt at a benefits transfer tool for appraising environmental policies. The model provides estimates of the WTP for some features (e.g. heather moorland, rough grazing, field margins and hedgerows) on an area basis, and estimates of their diminishing marginal utility.

Sector	Non-market impact	Impact assessment
	Noise	Noise is measured in Noise Exposure Forecast (NEFs); one NEF is equal to a mean exposure over time to one decibel of noise. The sensitivity of real estate prices to changes in noise level is measured by the noise depreciation sensitivity index.

Source: EC (2008), p. 55

If these effects do not occur on the targeted users of the project, but on third persons / institutions, they are externalities. Positive externalities, or benefits, will be classed as income and the negative ones, or costs, in the category of expenses. EC (2008) provides examples of externalities:

- Positive externalities:
  - o Advantages in terms of reduction of risk of accidents in a congested urban area as an effect of a project for the re-location of a manufacturing plant;
  - o Individuals consuming vaccine against the influenza virus. Those who do not vaccinate themselves receive the benefit of a reduced prevalence of the virus in the community;
  - o Damming of rivers for electricity. The damming not only provides for flood mitigation for those living downstream but also provides an area for enjoying water-based recreational activities for free;
- Negative externalities:
  - o Water pollution by industries that adds poisons to the water, which harm plants, animals, and humans;
  - o The unregulated harvesting of one fishing company in the Mediterranean Sea depletes the stock of available fish for the other companies and overfishing may result;
  - o When car owners freely use roads, they impose congestion costs on all other users and harmful emissions to pedestrians.

Another method for quantifying the externalities, if long-term effects occur, consists in including estimated shadow prices from other projects or programs.

In the same context, it must be analyzed the indirect effects, defined as quantity or price's changes occurring in secondary markets. These effects should not be included in the evaluation of the project's costs and benefits whenever an appropriate shadow price has been given in the primary markets, because they are irrelevant in a general equilibrium setting, as they are already captured by shadow prices. However, there are situations when it is required to include them in the project, depend upon the existence of distortions such as taxes, subsidies, monopolistic rents and externalities. In partial equilibrium setting, indirect effects occurring in distorted secondary markets should be included in the cost-benefit analysis, because, it is only in this kind of market that they may represent important costs or benefits to society (e.g. if a government intervention generates changes in the quantities exchanged in secondary markets).

EC (2008) offers examples of errors identified in the projects:

➢ "Double counting of benefits. In considering the value of an irrigation project, both the increase in the value of the land and the present value of the increase in income from farming are counted as benefits. Only one of them should be counted because one could either sell the land or keep it and get the gains as a stream of income;

➢ Counting secondary benefits. If a road is constructed, one might count the additional commerce along the road as a benefit. Problem: under equilibrium conditions in competitive markets the new road may be displacing commercial activity elsewhere, so the net gain to society may be small or zero. People forget to count the lost benefits elsewhere (e.g. for newly generated traffic)."

1.3. The Conversion Factor

According to authors Duplouy and Ciobanu (2005), is necessary to determine the conversion factors that will enable the market prices transformation into "shadow" prices. The use of these factors is due to the fact that entry and exit prices are not reflecting their social value, because of the market distortion (monopoly, trade barriers and others). Thus, in case of an agricultural project depending upon water supply at a very low tariff, heavily subsidised by the public sector, or an energy-intensive project that depends upon the electricity supply under a regulated tariffs regime, when such rates are different from the long-term marginal costs, prices are distorted and it is necessary to use "shadow" prices that can better reflect the social opportunity costs of resources.

For this reason, conversion factors are used, either as standard conversion factor (SCF - for non-tradable items, with a low share in total, such as electricity, fuels, other forms of energy, local products and materials) or as specific conversion factor (CF - for non-tradable major items).

Tradable goods are defined as goods that can be considered for international trade; CIF (import) or FOB prices (export) will be used. Non-tradable goods are items that can not be exported or imported (e.g. local suppliers), non-skilled labor, land expropriations and maintenance costs.

In terms of wage distortion, one should be careful and consistent in carrying out its assessment for the social costs of labor. For economic analysis, it is important to check if the project involves jobs reduction in other sectors, or those jobs that would otherwise disappear are still kept (e.g. renovation and modernization of an existing factory); at the same time, employment influence can vary depending on target groups.

ACIS (2008) promotes a different treatment approach for project costs, included in several categories:

▪ tradable goods / services, that can be quantified based on international prices. This category includes most of the project costs and don't require a specific conversion because it is considered that market prices reflect economic prices;

▪ items / products that can not be exported and should be internal acquired (e.g. internal transport and construction, some raw materials, water and energy consumption). To convert these prices it can be used the Standard Conversion Factor (SCF), based on the average gap between domestic and international prices (e.g. FOB and CIF border prices) due to trade tariffs and barriers. But when considered that these costs have a small share in total project costs and that about 70% of Romania's trade is conducted within the EU and, by definition, is not subject to commercial rates, SCF=1, unless otherwise justified;

▪ skilled labor force is considered insufficient and properly expressed in terms of opportunity costs. Thus, conversion is not required;

▪ non-skilled labor force is considered surplus (in the unemployment context) and is not economically appropriate expressed. Correction is done by multiplying the monetary cost of non-skilled labor force by the shadow wage rate (SWR), calculated using the formula:

$$SWR = (1-u) * (1-t), \tag{1}$$

where *u* is the regional unemployment rate and *t* is the rate of social security contributions and taxes included in the relevant labor costs.

Thus, the marginal wage (MW) is calculated as follows:

$$MW = FW * (1-u) * (1-t), \tag{2}$$

where *FW* is the financial wage (or market wage) and the shadow wage rate is the ratio of MW and FW.

This approach is correct in terms of a high rate of involuntary unemployment. However, if an investment project already has a favorable internal rate of return on investment before labor costs adjustments, it is considered that there is no need to consume time and effort for the detailed shadow wage estimation. However, in some cases its impact on labor employment may require careful consideration when the project may result in loss of jobs in other sectors, when the gross benefits on labor employment may overestimate the impact, when one of the objectives is to retain jobs that otherwise would be lost or when the project refers to certain labor groups (e.g. young, long-term unemployed) and it should be taken into account the different impacts on target groups.

♦ land acquisition - the land used in the project is taken into account, even if no financial cost has intervened in the project (e.g. if the land was available without charge from the project's beneficiary). It is necessary to adjust the net product that could have been obtained on the site if it had not been used for the project. If the land was purchased at market value, a conversion factor equal to 1 is applied because it is considered that the market value reflects the present value of the future achievements. Otherwise, adjustments to reflect economic costs will be calculated separately for each case;

♦ financial transfers: indirect taxes (e.g. VAT), grants and simple financial transfers included in the market price, used in estimating project's costs, must be removed to achieve economic analysis, less if they don't involve double registration.

In conclusion, in projects financed from structural funds in Romania, the conversion factors to be used, according to the specific category of cost, are presented below:

Table 2. Conversion factors used in Romania

Cost category	Conversion factor
Tradable items	1
Non-tradable items	1, unless otherwise justified
Skilled labor force	1
Non-skilled labor force	SWR = (1-u) * (1-t)
Land acquisition	1, unless otherwise justified
Financial transfers	0

Source: ACIS (2008), p. 16

A more complex and complete approach in terms of achieving economic analysis is presented by the Directorate General Regional Policy of the European Commission (2008). The paper says that the price distortion due to inefficient markets and inadequate public service charges, are more common in less developed countries, where market opening is limited and the Government's tariff policy is constrained by political and managerial issues. It is believed that for some important parameters of economic analysis, in the macroeconomic sense, it is necessary that each State to share the calculation methodology, or to provide values for these parameters, as a result of their own calculations.

Standard conversion factor can be calculated using the formula:

$$SFC = (M + X) / [(M + Tm) + (X - Tx)], \qquad (3)$$

where M - total imports, X - total exports, Tm - import taxes, Tx - export taxes.

But the calculation may be more complicated if there are non-tariff barriers and other distortions in international trade, such as restrictions on foreign trade between the EU and non-EU countries, different tax systems or special regulations.

Also, we must distinguish between non-tradable goods (e.g. local transport services), which take into account the marginal cost, and tradable goods (agricultural crops, energy services) valued at border prices (CIF for imports and FOB for exports).

EC (2008) provides examples of calculating the conversion factor (CF) for specific sectors:
- Land. Assume the SCF is 0.8. Government provides the land at a price reduced by 50% compared with market prices. So the market price is double the current one. The selling price should be doubled to reflect the domestic market and, as there is no specific conversion factor, the conversion factor to turn market price into border price is the standard conversion factor. Land conversion factor is:

$$CF = 2*0.8 = 1.60; \qquad (5)$$

- Building. The total cost consists of 30% of non-skilled workforce (CF of non-skilled workforce is 0.48), 40% of imported material cost with import tariffs of 23% and sales of 10% (FC 0.75), 20% of local materials (SCF=0.8), 10% of profits (CF=0). Conversion factor will be set:

$$CF = (0.3*0.48) + (0.4*0.75) + (0.2*0.8) + (0.1*0) = 0.60; \qquad (6)$$

- Machinery. Imported without taxes and tariffs (CF=1);
- Stock of raw material. Only one traded material is supposed to be used; the item is not subject to taxes and the market price is equal to the FOB price. CF=1;
- Output. The project produces two outputs: A, imported and B, a non-traded intermediate item. To protect domestic firms, the government has imposed an import tax of 33% on item A. The CF for A is:

$$CF_A = 100 / 133 = 0.75 \qquad (7)$$

For item B, as there is no specific conversion factor, SCF_B=0.8;
- Raw materials: CF = 1;
- Electricity. There is a tariff that covers only 40% of the marginal supply cost of electricity. There is no disaggregation of cost components and it assumed that the difference between international and domestic prices for each cost component used to produce a marginal unit of electricity is equal to the difference between all traded items considered in the SCF. In this case,

$$CF = 1 / 0.4 * 0.8 = 2; \qquad (8)$$

- Skilled labor force. The market is not distorted. Market wage reflects the opportunity cost for the economy;
- Non-skilled labor force. Supply exceeds demand but there is a minimum wage of €5 per hour. Nevertheless in this sector the last employed workers come from the rural sector, where the wage is only €3 per hour. Only 60% of non-skilled workforce wages reflect the opportunity cost. The SCF is used to turn the opportunity cost of non-skilled work into a border price.

$$CF = 0.6 * 0.8 = 0.48. \qquad (9)$$

A good practice example is that of the Italian Ministry for Transport, which has developed a set of conversion factors for major railway projects:

Table 3. Conversion factors in major railway projects in Italy

Category	Conversion Factor
Equipments	0.909
Labor force	0.348
Freights	0.833
Expropriations	1
Administrative costs	0.833
Maintenance	0.909
Extraordinary maintenance	0.909

Source: EC (2008), p. 52

In the same context, employment is seen as very important in certain projects, especially infrastructure projects, because wages can be an indicator of social opportunity cost of labor distortion due to labor market imperfections. In such a case, it is needed a nominal wages correction and the marginal wage use. Examples of wages distortion are met in the private sector, when costs of labor for the private company may be less than the social opportunity cost because the State offers special subsidies to employment in some areas; when there may be legislation fixing a minimum legal wage, even if under heavy unemployment there may be people willing to work for less; when there are informal or illegal sectors with no formal wage or income, but with a positive opportunity cost of labor. Usually, in an economy characterized by the existence of unemployment, opportunity cost is lower than real wages. In these circumstances, it can be used the "shadow wage", which is specific to each region in part because labor is less mobile than capital. Shadow wage can be determined as a weighted average of the shadow wage for skilled and unskilled workers previously employed in similar activities, which can be approximated to the market wage, the shadow wage for unskilled workers drawn to the project from unemployment, assumed to be equal to or not less than the value of unemployment benefits, and the shadow wage for unskilled workers drawn to the project from informal activities, equal to the value of the output forgone in these activities.

1.4. Social discounting

The discounting is the process of comparing, in present time, the future values of input and output flows using a discount rate, meaning multiplying the future value by a coefficient that decreases over time (ACIS, 2008).

In order to determine the evaluation indicators, as well as in financial analysis, it is necessary to establish a discount rate to ensure comparability of financial flows generated

both during the project implementation, and operation and maintenance period. But the discount rate for economic analysis is different from that used for financial analysis, considering that it should highlight the future social perspective of benefits and costs towards the current one. Thus, the social discount rate is used, representing the opportunity cost of public funds for the society. This social rate is different from the financial discount rate because of several reasons: capital market imperfections, the theoretical and social concerns of a larger welfare of future generations than that of the private companies, different preferences of organizations about the investment horizon (short-term vision or long term vision).

The value of the social discount rate was regulated by the European Commission to 5.5% for Member States benefiting from the Cohesion policy (including Romania), respectively, 3.5% for the other Member States - for the 2007-2013 period, but each state has the opportunity to propose another value, based on strong justification. Romania accepted the value of 5.5% and consequently, this value is used in every project financed by European funds, which require preparation of an economic analysis, according to ACIS Guide (2008).

Obtaining these values for the social discount rate, by the European Commission, is based on estimates of long-term growth potential and other parameters, detailed in Annex B to the "Guide to Cost-Benefit Analysis of Investment Projects - Structural Funds, Cohesion Fund and Instrument for Pre-Accession" (EC, 2008). Thus, EC presents three main theoretical approaches, rumored in the academic literature:

   a)   The traditional approach: marginal public investment should have the same benefit as a private one, for projects replacement;
   b)   The approach based on the long-term growth in economy;
   c)   The approach for specific very long-term projects that promotes the use of variable rates over time, which might decrease, favoring its impact on future generations.

Each approach has both advantages and disadvantages, but in practice it is customary to use a standard reference rate to reflect the profitability goals taken into account at the moment of project proposal.

However, the latter approach is preferred by professionals, because it refers to a social rate of time preference for benefits, taking into account expectations for revenue growth, consumption or expenditure. A generally accepted formula approximating this rate is presented below:

$$r = e*g + p, \tag{10}$$

where *e* is the elasticity of marginal social welfare with respect to public expenditure, *g* is the growth rate of public expenditure, *p* is a rate of pure time preference.

For example, if we assume that the value of public spending to subsidize the poor (the biggest value of social spending) is increasing by an annual real rate equal to the average per capita consumption of 2%, the value of social elasticity to this type of expenditure is between 1 and 2, and the pure inter-temporal preference is about 1%, then the real social rate will be included in the range 3% - 5%.

Interpretation of the formula (10) in terms of consumption, implies that *g* would be the growth rate of consumption, *e* – the elasticity of marginal utility with respect to consumption, *p* - the inter-temporal preference rate. Thus, the first component of the new formula is an utilitarian preference and the second (p) is a pure temporal preference, which reflects the consumer's impatience or the present value attributed to a future marginal

utility. The first component measures the utility reduction of a marginal monetary unit caused by increases in real income, which reflects that in a developing economy where future consumption will be plentiful compared to the present level, individuals will require more compensation for postponing consumption. The social rate of time preference is the minimum return required for giving up some of the individuals' current consumption in exchange for additional consumption in the future.

All the values in the formula are country specific: the consumption growth rate depends on the GDP, the elasticity of marginal utility is influenced by individual preferences and social inter-temporal preference rate is influenced by life expectancy. Analyzing these rates for several countries, we can see that the growth rate is the basis of obtaining different social discount rates, concluding that a higher discount rate for less developed countries and regions will reflect the need to invest in projects that are more socially profitable in order to achieve a higher growth rate.

1.5. Economic evaluation indicators

As the financial analysis, the economic analysis requires specific indicators calculation, of which the most important are the Economic Internal Rate of Return (EIRR), Economic Net Present Value (ENPV) and Benefit / Cost ratio (B / C ratio). The calculation methodology is similar to the financial one, but it has to be done after the completion of all described phases, and generally, the economic evaluation indicators are more favorable than the financial ones, because of shadow prices and externalities.

ENPV is considered to be the most important social indicator of the cost-benefit analysis and should be used as the main reference of economic performance in evaluating the project. Although EIRR and B / C ratios are also significant, being independent of the project, they can sometimes involve problems (e.g. EIRR can record multiple values or may be indefinite, and B / C ratio can be influenced by a given debit, resulting a benefit or a costs reduction). Generally, a project with a lower EIRR than the discount rate and a negative ENPV, should be rejected, because of the low or negative performance which reveals that valuable social resources are used in a higher quantity than the society's benefits. However, a project with a negative ENPV can be accepted if there are very important non-monetary benefits, well argued and based on relevant data. The project must demonstrate in a realistic way that unquantifiable benefits are higher than the project costs (EC, 2008).

Using the social discount rate, Duplouy & Ciobanu (2005) present a list of values for the EIRR expected to be obtained, depending on the investment, after evaluating a sample of 400 major projects: energy - 12.9%, water and environment - 15.8%, transport - 17.1 %, industry - 18.4%, services - 16.3%.

2. Economic Analysis in EU Funded Projects

In order to show how to develop an economic analysis, we considered two investment projects financed from structural funds, undertaken at the same time, whose beneficiary is a territorial-administrative unit in the urban area. These projects benefit from a financing rate of 98%, trough Regional Operational Programme 2007 -2013: Priority Axis 1 "Support to sustainable development of urban growth poles", and involve streets modernization and a

park rehabilitation and extension, investments that are parts in an integrated project. The implementation covers a period of 36, and 24 months.

2.1. Transport

The first project is in the transport sector and proposes roadway rehabilitation for nine local streets, sidewalks and green spaces associated modernization, and measures to streamline traffic management, with impact on increasing the travel average speed. The streets and boulevards envisaged are important in ensuring socio-economic performance of local activities. The overall objective is to create socio-economic foundations for the activities development within the area of urban action and in the whole city. Reference period considered is 30 years, according to the Order no. 863/2008, of the Ministry of Development, Public Works and Housing.

For the financial analysis, the following aspects were considered:
▪ Income is represented by annual allocations from the local budget, funding from the European Regional Development Fund (ERDF) and from the state budget and the instution's contribution (to the eligible expenses, non-eligible expenses and VAT);
▪ The expenses consist of: maintenance and repairs (including VAT), gross wages and employer payroll taxes, expenditure for the investment (including VAT) and the cost of electricity for traffic lights (including VAT);
▪ The revenues and cost are based on „do something" option (with maximum grant).

Table 4. Revenues and costs – financial analysis

Category	Period (years)			
	1	**2**	**3**	**4 - 30**
REVENUES				
Local budget allocations	250,000	350,000	200,000	300,000
Grant	461,096	20,617,561	11,856,744	0
Own contribution (with VAT)	88,658	5,545,165	3,205,494	0
TOTAL REVENUES	*799,754*	*26,512,726*	*15,262,238*	*300,000*
COSTS				
Maintenance and repairs (with VAT)	0	0	0	50,017
Gross wages	162,052	162,052	162,052	162,052
Employer wage contributions	44,564	44,564	44,564	44,564
Investment (with VAT)	549,754	26,162,726	15,062,238	0
Traffic lights (with VAT)	41,549	41549	41,549	41,549
TOTAL COSTS	*797,919*	*26,410,891*	*15,310,403*	*298,182*

Source: Own calculations

The financial evaluation indicators are:

Table 5. Financial evaluation indicators 1

Discount rate	5.00%	Discount rate	5.00%
Investment (C) (with VAT)	41,774,718	Capital (with VAT)	8,839,317
FNPV/C	-41,699,210	FNPV/K	-8,763,810
FIRR/C	-25.07%	FIRR/K	-20.55%

Source: Own calculations

Table 6. Financial evaluation indicators 2

Cumulated net inflows	41,788,350
Cumulated net outflows	41,712,843
BENEFIT / COST ratio	1.002

Source: Own calculations

For the economic analysis, some adjustments were necessary:

1) The annual allocation from the state budget was not considered income, because it is supported by the state and, at the same time, it is used by default for society's benefit, so these allocations are only money transfers, and can not be economically considered income;

2) The applicant's contribution to eligible and non-eligible costs is not considered economic income as these amounts come from the local budget (by collecting local taxes, etc.). Therefore, these amounts come from the population and finally are used for their benefit, so are only money transfers;

3) The grant from the ERDF and state budget needs a correction factor of 0.819, because it is considered as the only economic income the ERDF funding, of 80.35% of the total eligible costs:

$$CF = 100 / 98 \times 80.35 = 0.819. \tag{11}$$

The 17.65% funding from the state represents only a movement of money and can not be considered economic income;

4) positive externalities, arising from this project were calculated using the following methodology:

In a case of a project proposing road infrastructure rehabilitation and achieving a superior traffic management, the most significant benefit is the circulation time saving. This benefit has a significant impact on the socio-economic activities in the area, because by reducing the transit time, they can be developed more quickly, thus it will generate more income. To monetize the economic benefit arising from this project it is mainly to determine its economic value (lei/saved minute).

Thus, we have considered the following assumptions:

- total length of rehabilitated roads: 10.88 km;
- the average scroll time by car, for the studied route, if the average velocity is about 25 km/h:

Average scroll time$_0$ = 10.88 / 25 x 60 = 26.1 minutes;   (12)

- according to data provided by local public transport company, the average scroll time by bus (analyzing the bus traffic on routes entering the area) is approximately 40 minutes;
- the average scroll cost for the route studied was calculated for each vehicle, if the average fuel consumption is 10% and the average fuel price is 5 lei/l:

Average scroll cost = 10 l/100 km x 5 lei/l x 10.88 km / 100 km = 5.440 lei;   (13)

- the scroll cost for the studied route by bus was considered equal to the price of a travel ticket -1.5 lei.

To estimate the economic value of one minute for the citizens, we make the difference between the scroll cost of the route for each type of vehicle, compared to the difference of their scroll time:

Time economic value = (5.440 – 1.5) / (40 – 26.1) = 0.283 lei/minute.   (14)

In other words, to complete the studied route in a time less than 40 minutes (public transport), citizens of the city pay 0.283 lei for each minute less than this value. Knowing the economic value of one saved minute in scrolling the studied route, the economic income arising from this project can be determined.

According to traffic studies completed for this project, the total number of vehicles crossing the studied route in 24 hours is 9320. The designed velocity for this route is 40-60 km/h. We have considered the average velocity on the studied route, for the reference period (from the fourth year after completion) to 40 km/h. Thus, the average scroll time by vehicles after the project is:

Average scroll time$_1$ = 10.88 / 40 x 60 = 16.32 minutes.   (15)

In conclusion, the income externalities are considered as savings arising from the project, for all vehicles that cross this route each day, expressed in Romanian lei.

Positive externality = (9,320 vehicles/day x 365 days/year x 0.283 lei/minute)
x (26.1 – 16.32 saved minutes) = 9,441,948 lei/year.   (16)

5) maintenance and repairs costs need a conversion factor of 0.80 to reflect their actual value, excluding VAT; VAT payment is not considered an expense because is just a money transfer;

6) Gross wage: conversion factor of 0.675 in order to be processed in net wages. The tax of 16%, the contributions of 10.5%, 5.5%, 0.5% are indirect taxes and therefore are not economic costs;

7) externality costs were calculated using the same mentioned methodology:

These are the monetary expression of the negative impact caused by the project implementation. Estimated average velocity on the studied route, during the construction works, is 20 km/h. Thus:

Average scroll time' = 10.88 / 20 x 60 = 32.64 minutes.   (17)

Economic costs of velocity reduction caused by the construction works of rehabilitation:

Negative externality = (9,320 vehicules/day x 365 days/year x 0.283 lei/minute)

x (26.1 – 32.64 minutes) =-6,296,119 lei/year.   (18)

8)   investments expenses (without VAT) - is the total project cost excluding VAT;

9)   electric energy for traffic lights (without VAT) - is the cost of electricity for traffic lights included in the project, excluding VAT. In this case, we did not apply a conversion factor to the corresponding expenditure from financial analysis, as it could be directly calculated: multiplying 1.5 kW (power consumption associated to a street intersection with traffic lights), by 6 street intersections with traffic lights, by 24 hours a day, by 365 days / year and by 0.425 lei / kWh, resulting 33,507 lei / year electricity costs.

Table 7. Revenues and costs – economic analysis

Category	Conversion Factor	Period (years)			
		1	2	3	4 - 30
REVENUES					
Grant	0.819	377,637	16,885,782	9,710,674	0
Positive externalities	-	0	0	0	9,441,948
TOTAL REVENUES		*377,637*	*16,885,782*	*9,710,674*	*9,441,948*
COSTS					
Maintenance and repairs (without VAT)	0.80	0	0	0	40,013
Gross wages	0.675	109,385	109,385	109,385	109,385
Negative externalities		6,296,119	6,296,119	62,96,119	0
Investment (without VAT)	-	444,695	21,173,476	12,146,966	0
Traffic lights (without VAT)		33,507	33,507	33,507	33,507
TOTAL COSTS		*6,883,706*	*27,612,487*	*18,585,977*	*182,906*

Source: Own calculations

Table 8. Economic evaluation indicators 1

Social discount rate	5.50%
Investment (without VAT)	33,765,137
ENPV	52,460,493
EIRR	11.574%

Source: Own calculations

Table 9. Economic evaluation indicators 1

Cumulated net inflows	135,551,884
Cumulated net outflows	49,326,253
BENEFIT / COST ratio	2.748

Source: Own calculations

After economic analysis completion, we conclude that, although the financial indicators are unfavorable, the project is a real benefit for the city. EIRR is greater than the social discount rate, ENPV is positive and the benefit / cost ratio is 2.748, indicating an important benefit for the society. Thus, the investment project is appropriate for the city socio-economic development.

2.2. Green spaces

The second project involves rehabilitating, expanding and modernizing the local green spaces. Restoring the park as a new concept, taking into account the new realities (the increasing park attendance by all people categories - children, adolescents, adults, elderly), has considered the beneficiary willingness for achieving a long use objective (20-30 years), during which it will be no longer necessary to make new expenditures for users new requests adaptation. Thereby, it will be avoided the frequent situation of park closure for new investments.

The specific objective is to turn the park into a "green lung" of the city, through expansion and reabilitation after a new concept. Noise, air pollution, heavy traffic, neglect of the built environment, lack of appropriate environmental management and lack of strategic planning are elements of the urban environment that can lead to health problems, lower quality and standards of living for the inhabitants of the city. Green spaces act positively on the overall condition of the human body and psychic through their aesthetic function. Thus, there are positively influences in the urban microclimate, helping to reduce air temperature and to increase the relative humidity, to decrese direct or reflected light intensity, to stimulate the air exchange, to oxygen and purify the air. In this way, green space exerts a direct hygiene action on the human body in particular, and the city in general, by supporting economic, social and sustainable development. Thus, the project will contribute to a significant extent the quality of life for the city's inhabitants. The project also creates new 35 jobs, during the execution.

To determine if the mentioned project will have a favorable impact on society and whether the proposed activities will meet the project's general and specific goals, it was prepared the cost-benefit analysis, with a reference period of 30 years, according to the Order no. 863/2008 of the Ministry of Development, Public Works and Housing (sector: water and environment).

For the development of the economic and financial analysis, we used a similar methodology to the first project, the major difference consisting in externalities identification, further analyzed.

First, according to the feasibility study, during the works, the project will create jobs for 35 people. As a result of the project, 35 persons will benefit from additional income for one year. Thus, this income was estimated at:

Positive externality = 35 employees x 800 lei net wage / month x 12 months = 336,000 lei.

(19)

The specific objective of this investment is to turn the park into a "green lung" of the city. The "green lung" refers to a recreation area that, through the presence of green spaces and trees, creates a refreshing microclimate, with a superior air quality. The key activity that will contribute in achieving this objective will be the planting of 300 trees.

It is necessary to determine whether the 300 trees that will be planted after the rehabilitation and expansion of the park, will lead to the creation of a microclimate with purified air.

According to information provided by the public authority, an acre (4047 sqm) of trees can absorb the carbon monoxide produced by 50 cars in 12 hours. Thus, given the green area of 19,500 square meters designed for the park, it will be able to absorb the carbon monoxide produced by 241 cars in 12 hours:

$$\text{Vehicles total number} = 19500 / 4{,}047 \times 50 = 241 \text{ vehicles.} \qquad (20)$$

In other words, if 241 cars would stand in the park area for 12 hours with the engine running, the park trees could absorb the carbon monoxide.

To determine whether this is sufficient, we must compare this data with traffic data in the area. According to traffic studies, the traffic averaged 3211 vehicles per 24 hours, in the park area. We assume that all 3211 vehicles mentioned will stand daily, for 20 minutes near the park, with the engine running, although the stationing time in an intersection is much lower. For 24 hours, this equals 45 vehicles parked with the engine running

Considering the park's ability to absorb the carbon monoxide produced by 241 cars in 12 hours, this is equivalent to the absorption of carbon monoxide produced by 120 cars in 24 hours. Thus, park rehabilitation and expansion (including the planting of 300 trees) will achieve the specific objective of becoming a "green lung" in the city center, considering its future capacity to absorb carbon monoxide, related to the area traffic (120> 45). Even compared to the estimated traffic for 2025: 7171 vehicles per 24 hours, the park will continue to fulfill the role of "green lung" of the city, as taking into account the pessimistic scenario of permanent parking of all 7171 vehicles for 20 minutes with the engine running around the park, which for 24 hours is:

$$\text{Vehicles total number} = 7171 / 24 / 60 \times 20 = 100 \text{ vehicles.} \qquad (21)$$

The park will absorb the carbon monoxide produced by the vehicles in the future (120> 100), while demonstrating the investment sustainability and its contribution to city's sustainable development.

Until now, the only viable alternative for citizens' recreation in an environment, without air pollution, was the forest located about 2 km from the city. Thus, by creating the "green lung" in the city, the projects will offer residents the opportunity to recreate in a healthy and accessible environment, and they no longer will have to walk the 2 km outside the city to recreate. Considering this aspect, we calculated the utility of the time saved by the inhabitants following the renouncing the option to cross the 2 km to recreate.

According to equation (14), it was shown that one minute saved in the process of moving in the city worths 0.283 lei. Taking into account the distance of 2 km from the forest, and average speed in the city (25 km/h), a person will save 4.8 minutes of travel as a result of abandoning the forest option for the park option:

$$\text{Saved time} = 2 / 25 \times 60 = 4.8 \text{ minutes.} \qquad (22)$$

The economic value of time saved by a citizen in this regard will be:

$$\text{Economic value} = 4.8 \times 0.283 = 1.358 \text{ lei.} \qquad (23)$$

There are no official data regarding the number of visits/citizen/year in the park, but the applicant estimates an additional 50,000 person-visits per year.

Thus, the total economic value of time saved by the inhabitants is:

$$\text{Positive externality} = 50000 * 1.358 = 67900 \text{ lei/year.} \qquad (24)$$

The economic analysis demonstrates that the project is appropriate for the city's socio-economic development.

Conclusions

Evaluating a project through cost-benefit analysis requires significant research effort, is time consuming and it can sometimes lead to controversial results. Social cost-benefit analysis, despite the limitations criticized by specialists, represents the most common language available, being valid both for developed economies and developing ones. Lately, many market distortions have been highlighted, and major differences between observed prices over their costs of social opportunity are still reveled in many countries. In this respect, it is necessary to prepare a cost-benefit analysis based on statistical data but also on national regulations provided by each State.

Cost-benefit analysis is a tool used mostly in the last period in Romania, considering that our country is in the first programming period, as EU member state, but national regulatory framework is insufficient. Thus, the level of expertise in this area is reduced and, in most cases, cost-benefit analysis constitutes the most difficult part in the preparation of projects for obtaining European grants.

Although financial analysis is a common matter for those who develop projects and possibly even for the potential beneficiaries, the economic component is an issue that calls for a more comprehensive approach and close attention. To achieve a comprehensive and realistic economic analysis, it is recommended that the applicant should discuss to persons specialized in consultancy and funds management.

Although the methodology for developing the economic analysis is poorly treated by the institutions responsible in our country, and a legal and complete documentation is necessary at national level, in order to provide a common basis for the economic analysis development, the consultants may obtain information and knowledge by studying the documents provided by the European Commission. But even in such situations, we believe that the biggest obstacle in achieving a realistic analysis is the lack, discontinuity and / or difficult access to statistical data for Romania, data that is so needed in forecasting and supporting national sustainable development, both in economically, socially and environmentally directions.

Acknowledgement

References

Authority for the Coordination of Structural Instruments, (2008). *Ghid naţional pentru analiza cost – beneficiu A proiectelor finanţate din instrumentele structurale*, Retrieved February 11, 2011 from http://www.metodologie.ro/Ghid%20ACB% 20RO%20proiect.pdf

Caracota Dimitriu, M. & Caracota, D. (2004). *Evaluarea investitiilor de capital*, Ed. Fundatiei Pro, Bucuresti

Duplouy, J.C. & Ciobanu, A. (2005). *De la Phare la fondurile structurale: Programarea şi implementarea asistenţei de pre-aderare pentru PHARE CES şi tranziţia spre Fondurile Structurale - modul A 2.1 Instruire pentru analiza economică si financiară si evaluarea riscurilor*, Retrieved March 6, 2011 from http://www.productive.ro/dyn_doc/a2-1%20corectat.pdf

European Commission (Directorate-General Regional Policy). (2006). *Working Document No. 4: - The New Programming Period 2007-2013: Guidance on the methodology for carrying out cost-benefit analysis*, Retrieved March 22, 2011 from http://ec.europa.eu/regional_policy/sources/docoffic/2007/ working/wd4_cost_en.pdf

European Commission (Directorate-General Regional Policy), (2008). *Guide to cost-benefit analysis of investment projects - Structural Funds, Cohesion Fund and Instrument for Pre-Accession,* Retrieved October 3, 2010 from http://ec.europa.eu/ regional_policy/sources/docgener/guides/cost/guide2008_en.pdf

Ghinea, A. & Negoiţă, D. (2008). *Analiza cost-beneficiu*, Retrieved April 2, 2011 from http://mdrl.ro/_documente /politici_publice/ informatii_utile/analiza_economica.pdf

Government of Romania, (2008). Governmental Decision no. 28/2008 from 09/01/2008 regarding the approval of the technical and economic documentation content framework for public investment, and the structure and methodology of the general estimate for investments and interventions objectives, published in Romanian Official Monitor, no. 48 from 22nd of January, 2008

Ministry of Development, Public Works and Housing, (2008). Order no. 863/2008 from 02/07/2008 regarding the approval of "Guidelines for certain provisions implementation of Governmental Decision no. 28/2008 from 09/01/2008 regarding the approval of the technical and economic documentation content framework for public investment, and the structure and methodology of the general estimate for investments and interventions objectives", published in Romanian Official Monitor, no. 524 from 11th of July, 2008

Moşteanu, T. & Iacob, M, (2007). Teorii si abordări privind scopul şi principiile analizei cost-beneficiu, International Conference "Politici financiare si monetare in Uniunea Europeana" (Supplement of Theoretical and Applied economics Revue), Asociatia Generala a Economistilor din Romania, Bucuresti, pp 7-13, Retrieved April 4, 2011 from http://www.asociatiaeconomistilor.ro/documente/Conferinta_FABBV_romana.pdf

Vasilescu, I. & Cicea, C. (2004). *Eligibilitatea proiectelor de investiţii*, Proceedings of the international symposium „Alternative Economic Strategies", URSA Gheorghe Cristea, Ed. Era, Bucureşti, pp. 17-26

Vasilescu, I. (2009). *Pregatirea si evaluarea propunerilor de proiect*, EficonPress, Bucureşti