Clarification Paper no. 5

BENEFITS QUANTIFIED IN THE COST-BENEFIT ANALYSIS OF INVESTMENT PROJECTS FINANCED FROM ERDF AND CF

January 2012

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The document was prepared by experts who supported the implementation of the contract „Development of the capacity for the Cost-Benefit Analysis", project co-financed by ERDF through TAOP

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This document has an informative character.

Project implemented by:

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1. INTRODUCTION

Cost-benefit analysis is the main financial instrument used to provide support for informed judgement and decision making in co-financing major projects from EU financial resources.

The main advantage of Cost-Benefit Analysis arises from its methodology which puts together, in a monetized form, costs and benefits of a project, regardless of the type of effects: non-monetary or significant macroeconomic. Since the expected results of a major investment have predominantly non-monetary effects, these cannot be neglected.

The term "benefit" is used in this paper in its economic and financial sense. Thus, benefit is a desirable and measurable outcome or result from an action, investment, project, resource, or technology. It should include additional revenue generated, cost savings and positive social and environmental externalities (Harrison, 2002, p. 159-160).

Benefits are based on the consumer's willingness to pay for the project (Brent, 2006, p. 37) and externalities emitted by implemented projects. All these should be summed up after they are monetized (Sen, 2000, p. 938).

Benefits' appraisal is important to calculate specific indicators both in financial analysis and economic analysis. These two steps are related to each other, economic analysis basing itself on financial analysis.

In financial analysis the benefits are present in operating activities as revenues obtained after investment was implemented. Revenues are a basic component of the financial analysis, contributing to generate and calculate:

- Financial return on investment – FNPV (C);

- Financial sustainability;

- Financial return on capital – FNPV (K).

It is important to emphasize that not all projects will generate revenues during the implementation. Revenues are specific to those domains where investments will generate fees or will be used for goods/services which are sold to consumers.

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2. SCOPE AND OBJECTIVES

The working paper includes:

- general rules regarding the use of revenues in financial analysis, benefits in the economic analysis and the necessity of avoiding the double counting of benefits;

- the minimum benefits which should be taken into account for the specified investment sectors when preparing the CBA;

- an algorithm for the calculation of benefits.

3. THE CASE

3.1 REVENUES IN FINANCIAL ANALYSIS

Revenues in financial analysis are generated, in first instance, by selling the goods or services produced by the project. The monetary value of each period's revenue will be determined by multiplying the sold quantity (Q) to the medium price of the goods and services at the time of selling (P). Examples of goods and services sold could be: water, medical services, hotel services and so on.

Revenues are referring exclusively on cashable amounts which will be recognized as revenues in books at the time when will be effectively obtained. Other types of revenues which were not preceded by a receipt or will not be followed by a receipt are not taken into account. For example, revenues from exchange rate differences or provisions are omitted. Supplementary, the receipts which could not be booked as revenues are neglected.

The level of revenues is obtained from the forecasts made in accordance with national legislation and practice, monetized using current and expected rules established in legal regulations. Revenues will be recorded separately by types predefined in legislation. Thus, revenues which will be received directly from clients (who are the beneficiaries of sold goods and services) will be recorded separately from eventual subsidies, transfers or public budget grants.

Revenues are not including value added tax (VAT), if applicable. If VAT is collected on issued bills, these amounts will not be taken into account, because they will be paid to the budget after deductions will be made as rules from Fiscal Code are set up.

When in large projects, the operating activities are not accomplished by the owner of the infrastructure, the revenues which should be take into account is those recorded by the owner.

3.2 BENEFITS IN ECONOMIC ANALYSIS

Benefits in economic analysis can be divided into two main categories: operating revenues and external benefits. Operating revenues are obtained from the revenues quantified in the financial analysis by applying a conversion factor to each output. External benefits are represented by the monetized value of non-market impact identified in strong relation with the project.

Conversion factor[1] used to determine benefits should be based on different methods depending on the market. The most relevant in this case is the marginal cost. If conversion factor cannot be determined, it is recommended to use the standard conversion factor which is equal with one.

A special attention should be given to those benefits which cannot be monetarily valued. There are more approaches for these benefits. Methods based on hedonic pricing utilise the fact that some market goods are in fact bundles of characteristics, some of which are intangible goods (or bads). By trading these market goods, consumers are thereby able to express their values for the intangible goods, and these values can be

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[1] For more detailed on how to use the conversion factors, please refer to the Working Paper No 6 "Conversion factors in cost-benefit analysis for preparing investments projects financed by the ERDF and CF"

uncovered through the use of statistical techniques. This process can be hindered, however, by the fact that a market good can have several intangible characteristics, and that these can be collinear. It can also be difficult to measure the intangible characteristics in a meaningful way (OECD, 2006, p. 19).

3.3 AVOIDING DOUBLE COUNTING OF BENEFITS

In assessing benefits, the methodology should establish the categories of impact which the project generates. It is likely to have situations when a single impact could be measured in two or more ways. In these situations, a double counting of benefits should be avoided in order not to distort the results of the cost-benefit analysis. Double-counting is often an issue when several methods are used to value different components of the full suite of changes in services, and it can be minimized by considering whether the same people's values, or the same source of value, are counted in multiple estimates (Wainger and Mazzotta, 2011, p. 17).

A frequently occurring error regarding double counting is when benefits transferred by investment operators to final users are reported as benefits in both cases (Mohring, 1993, p. 413).

Avoiding double counting does not mean that an action cannot generate multiple effects. Nevertheless, avoiding double counting is mandatory for a correct and robust result.

3.4 BENEFITS PER INVESTMENT TYPE

3.4.1 INVESTMENTS IN REGIONAL AND LOCAL TRANSPORT INFRASTRUCTURE

The main objective of transport investment projects is to promote a sustainable transport system, which will facilitate safe, fast and efficient movement of persons and goods with appropriate level of service at European standards.

Transport infrastructure projects have to increase the accessibility and the mobility of population, goods and services, in order to foster sustainable economic development.

In case of regional and local transport investments, the value of financial benefits is surpassed by the value of social benefits. The latter is obtained by summing the monetized value of quite numerous and important benefits from the society's point of view. The positive externalities resulting from transport investment should be focused in three directions: environmental benefits, social benefits, and congestion reduction benefits (Cambridge Systematics, 2002).

Environmental benefits in transport projects are connected in first instance with air quality. Regardless the mean of transport analysed, the pollution created by vehicles, plains, trains, ships etc. affects significantly the environment.

The most complex direction of positive externalities is that of social benefits being subdivided into five components: mobility and access benefits, benefits of alternative travel modes, safety benefits, aesthetic benefits and community cohesion benefits (Cambridge Systematics, 2002). Mobility and access benefits reside from the large possibilities to cross large distances for find better jobs, shop, schools etc. Benefits of alternative travel modes give us the possibility to choose the most suitable mean of transport, improving our

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life's quality. Safety benefits appear when good infrastructure reduces the risk of accidents.   Aesthetic benefits give added value to the infrastructure, especially when architectural and technical achievements are incorporated. Streets and bridges strengthen the community cohesion.

As Cambridge Systematics' working paper suggests, the most important benefit from congestion reduction is for personal time. Personal time saving is more important (at least two times) than commercial time, fuel, safety or environment savings. If we analyse together the two types of savings (personal and commercial), this factor represents by far the main benefit associated to congestion reduction.

For airport improvement projects, the benefits identified by Barrett and Applegate (2011) were: passenger time saving, aircraft operating costs saved, extra aircraft landings, economic multiplier impacts, and reduced noise.

From the point of view of minimal requirements on assessing transport investment projects, we consider that at least one benefit should be calculated in all of three directions mentioned in Cambridge Systematics' study. It is important to establish which indicator is the most relevant for each type of transport investment project. As general indicators, the minimum benefits which should be quantified in transport projects should focus on:

- Benefits from improved quality of breathing air;

- Benefits from improved life quality due the numerous advantages offered for citizens and companies which use transport infrastructure;

- Benefits from reducing time spent in travelling through the elimination of bottlenecks, enlarging communication routs and implementing alternative means of infrastructure.

Financial benefits are represented by different types of charges which could be collected by the administrators of transport infrastructure. These benefits could be: vignettes, bridge fees, charges for overloaded vehicles, track access fees, airport charges etc.

For airport improvement projects Landau et al. (2009, p. 7) warn about the possibility that some elements of productivity benefit could be included in separate estimates of consumer surplus[2] gained from induced travel. The authors exemplify: if the cost of freight transportation drops owing to additional transportation investment, then firms may choose to purchase more transportation to economize on other production costs such as inventories and logistics. To the extent that these decisions are reflected in induced travel on the facility being studied, their inclusion could potentially constitute double-counting of benefits.

In case of intelligent transport systems Newman-Askins et al. (2003, p. 6) warns about the inclusion of long-term changes in land use that result from short-term impacts such as travel time improvements would be double counting.

Harley (2010, p. 13) analyzed the double counting problem in a new metro line development project. In this case he found that fare revenues were double counted. He considered that the user makes a contribution

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[2] An economic measure of consumer satisfaction, which is calculated by analyzing the difference between what consumers are willing to pay for a good or service relative to its market price.

equal to the fare to the operator but that is not an additional net benefit to society, it is already included in the total benefit to the user.

For a highway investment project Kaliski et al. (1999, p. 403) suggest that a solution to eliminate possible double-counting is a global impact reporting of economic impacts associated with the expansion of existing businesses, the attraction of new businesses, and changes in tourist activity.

List no. 01: Minimum benefits which should be quantified in transport infrastructure projects

Type of investment	Benefit	Financial analysis	Economic analysis
Transport infrastructure projects	Benefits from improved quality of breathing air		X
	Benefits from improved life quality		X
	Benefits from reducing time spent in traffic		X
	Revenues from charges (if applicable)	X	X

3.4.2 ENVIRONMENTAL INVESTMENTS

In financial analysis the benefits should be covered by the revenues collected from the charged tariffs on offered services (for example: tariffs for supplied water, tariffs for waste collection etc.). The market of environmental services is usually characterized by monopoly. Under this condition of market failure, the prices which will be taken into account in the financial analysis will be those established (and expected to be established) by local authorities. In project appraisal, the question of how many people actually pay for such resources as assessed in financial analysis is becoming extremely important, because market prices of environmental resources affect people's behaviour, and their use of such resources. The lower the price is, the greater the incentive will be to exploit natural resources. Higher prices encourage conservation (ICRA, 2006 p. 2).

In economic analysis the benefits will have two major components. Firstly, the revenues identified in financial analysis will be corrected with conversion factor. Secondly, there will be monetized the positive externalities arising from the compliance with EU environmental standards (by improving quality of life, sanitary and health conditions, etc.). The second component should be more consistent due the multiple valences of the social benefits.

Water and wastewater projects should contribute to improve the rate of connection of the communities to basic water and wastewater infrastructure, quality of drinking water and reduce the lack of sewerage collection and treatment facilities in some areas.

The economic benefits can be grouped in three main categories which are the minimum benefit requirements:

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- Benefits from improved access to drinking water, which translates into more water of adequate quality sold to the customers, either through increase of the coverage of the water supply service or to the increase in individual consumption due to the improvement of the quality of the service (i.e.: increase of pressure and decrease of service interruptions).

- Benefits from improved quality of bathing and other surface waters, which translates into an improvement in the overall conditions of water bodies in the project area as a result of pollution prevention.

- Resource cost savings:

  o for the customers, which takes place (i) when the customer does no longer need to rely on private wells, private pumps, septic tanks, and does no longer have to buy bottled water;

  o for the operator, through the optimization of the system which allows for a reduced resource depletion through water abstraction as well as a reduction in emissions related to energy savings.

Financial benefits consist from charges applied for the services supplied for consumers (households, businesses, institutions and industry). These charges refer mainly to water supply charges and water effluent charges.

Solid waste projects should solve, at least partially, the pollution of water, soil, and air caused by inadequate waste disposal.

The economic benefits can be grouped in three main categories. These categories cover entirely the minimal requirement regarding benefits in this type of project:

- The resource cost savings are due to (i) the recovery of recyclable products and the production of compost and energy; and (ii) the reduction of the total amount of waste finally going to final disposal, which extends the economic life of the landfills. The quantification of these benefits can be done based on (i) proceeds for the sale of recyclable products, compost and energy (which can be taken for the financial projections or the calculation of the project funding gap and financial profitability indicators); and (ii) when applicable to the project, avoided investment and operating costs at the landfill site (which can be estimated at a certain standard amount per tonne of waste diverted from the landfill).

- The reduction of visual disamenities, odours and direct health risks is due to (i) the elimination of uncontrolled dump sites; and (ii) the avoidance or proper collection and treatment of waste leachate. The quantification of these benefits can be done based on (i) increase in land values in the areas surrounding the rehabilitated dump sites (which can be estimated at a certain amount per hectare of rehabilitated dumpsite); (ii) avoided cleaning costs for not having to treat impact of uncontrolled discharges of leachate and/or the cost to develop alternative water sources when applicable (which can be estimated at a certain standard amount per tonne of waste either diverted from the landfill or properly disposed at the landfill).

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- The reduction of greenhouse gas emissions is due to (i) the avoidance (or proper collection) of methane and carbon dioxide emissions, which typically account for 64% and 34% in volume, respectively, of all gas generated from decomposing waste; and (ii) the emissions saved when the project results in the generation of heat and/or electricity and the alternative source for this heat and/or energy implies the use of fossil fuels. The quantification of these benefits can be done based on estimation of the annual expected reduction in tonnes of methane and carbon dioxide (CO_2) due to the project, transformation of the methane quantities into CO_2-equivalent using a standard conversion factor and monetization of the resulting quantities of CO_2 and CO_2-equivalent using a standard value of EUR per tonne of CO_2.

Urban heating plants projects have to remedy the problem of pollution by reducing emissions of harmful compounds into the air. The values of these harmful compounds should come under the recommended values, offering breathable air to people. The positive effects of a cleaner air could be seen also in local economic parameters which are changing: houses become more expensive due the improved quality of amenities, trade is rejuvenated (Bayer et al., 2008, p. 4). However, health effects dominate the total value of the benefits from reducing environment-related air pollution and generally represent more than 70% of total benefits (Scapecchi, 2008, p. 24).

Starting from these objectives, the minimum economic benefits which should be monetized in CBA are:

- Reduction of polluting elements from the air, especially sulphur dioxide, nitrogen oxides, dust, and/or heavy metal.

- Benefits from improved quality of air which translates into an improvement in the overall conditions of populations' health as a result of pollution prevention.

For **natural risk prevention projects** should focus on preventing flood damages, earthquake damages, drought damages, even hurricane damages. The damages should be counted in number of killed persons, value of destroyed goods, infrastructure, agricultural production. A second issue is related to the seaside where coastline erosion could affect seriously the shore.

The minimum economic benefits of natural risk prevention projects should be related to:

- Benefits from saving goods (including infrastructure and agricultural production) from flood damaging due the protection offered by the dams and other flood management tools.

- Benefits from bigger beach areas for tourists due the measures which assure erosion stopping at Black Sea's shore.

In a case of environmental project, Coughlin et al. (2006, p. 23) find a set of solutions which should be recommended as a best practice. In their particular case, the possibility of double counting occurred when the cost of environmental impact mitigation was included in the avoided cost of new water supply infrastructure. The solution identified: environmental benefits shall consist of only those impacts over and above the mitigation activities that may be required by the initial regulatory environment.

In a new sewage-treatment plant project many benefits can be identifies, such us: the recreation value of the river improves, land values in the neighbourhood increase, and health problems decrease. However, if

all these effects are counted as benefits there is probably double counting. The increase in land values is probably a measure of the other benefits, not an additional benefit (Treasury Board of Canada Secretariat, 1998, p. 20).

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 (Radu and Caracotă Dimitriu, 2011, p. 163).

List no. 02: Minimum benefits which should be quantified in environment projects

Type of investment	Benefit	Financial analysis	Economic analysis
Water and wastewater projects	Benefits from improved access to drinking water		X
	Benefits from improved quality of bathing and other surface waters		X
	Resource cost savings for the customers		X
	Resource cost savings for the operator		X
	Revenues from environmental services (if applicable)	X	X
Solid waste projects	Resource cost savings		X
	Reduction of visual disamenities, odours and direct health risks		X
	Reduction of greenhouse gas emissions		X
	Reduction of direct health risks		X
	Revenues from environmental services (if applicable)	X	X
Urban heating plants projects	Reduction of sulphur dioxide, nitrogen oxides, dust emissions, and/or heavy metal emissions		X
	Benefits from improved quality of air		X
	Revenues from environmental services (if applicable)	X	X
Natural risk prevention projects	Benefits from saving goods from flood damaging		X
	Benefits from saving agricultural production from flood damaging		X
	Benefits from bigger beach areas for tourists		X

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	Revenues from environmental services (if applicable)	X	X

3.4.3 INVESTMENTS IN SOCIAL INFRASTRUCTURE (SOCIAL SERVICES INFRASTRUCTURE, HEALTH AND PUBLIC SAFETY, EDUCATION INFRASTRUCTURE, URBAN INFRASTRUCTURE)

In financial analysis the benefits should be covered by the revenues collected from the charged tariffs on offered services (for example: tariffs for social and medical services offered). In some domain where public institutions offer services the prices are established by the responsible authority (for example: National Healthcare House). In this particular situations, the prices which will be taken into account in the financial analysis will be those established (and expected to be established) by responsible authorities.

In economic analysis the benefits will have two major components. Firstly, the revenues identified in financial analysis will be corrected with the conversion factor. Secondly, the positive externalities arising from the compliance with EU regulations specific to each domain will be monetized. The second component should be more consistent due the multiple valences of the social benefits.

Social infrastructure projects are focusing on creation of premises for better access of the population to essential services, contributing to the achievement of the European objective of economic and social cohesion, by improving infrastructure for health, education, urban infrastructure, social and public safety in emergency situations.

Benefits in social infrastructure projects generate numerous positive effects, but only a few of them are monetized in CBAs. The most monetized outcomes in social projects are special education use, grade retention and transfer payments (Karoly, 2008, p. 78).

The specific objective of rehabilitation, modernization and equipping of health services' infrastructure is the improvement of the quality of medical care assistance and a balanced regional-territorial distribution in order to ensure equal access of the population to health services.

The positive externalities for these projects should be focused on the reduction of rate of illness and mortality. For the economic analysis it will be important to monetize:

- Benefits from reducing hospitalization times, due to the new and modern medical equipment which creates conditions to heel patients more quickly with low incidence of complications;

- Improvement of life quality by offering health services which correspond to the disease and are supplied in time (in case of emergency);

- The costs of medical services could be diminished by using more advanced medical equipment which perform faster and with less consumption, permitting to patients to recover quicker.

The objective of rehabilitation, modernization, development and equipping of social services infrastructure is the improvement of the quality and capacity of social services infrastructure, in order to ensure equal access for all citizens.

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The positive externalities for these projects should be focused on improvement of useful life capacity and independence of social service beneficiaries. For the economic analysis it will be important to monetize:

- Improvement of life quality by offering social services which are adapted to each type of person who benefit from these services;

- Raise of life expectancy by offering continuous social services at a high professional level, especially for those categories of persons which present a high risk;

- Raise of economic benefits for those who belongs to social service beneficiaries as a result of time savings and labour productivity improvement.

The objective of rehabilitation, modernisation, development and equipping of pre-university, university education and continuous vocational training infrastructure is to improve education infrastructure, school equipment, accommodation structures for students and the continuous vocational training centres in order to ensure initial and continuous educational process at European standards and the increased participation of the school population and of the adults in the educational process. Increased participation, resulting in improved skill levels related to the local job market, will also help to address the problem of youth unemployment.

The positive externalities for these projects should be focused on the improvement of the education quality by using modern tools and communication facilities, improvement of school enrolment rate for disadvantaged categories, respectively improvement of the life quality during education years. For the economic analysis it will be important to monetize:

- Improvement of life quality by having access to improved educational infrastructures;

- Raise of employment expectancy by having a stronger educational background and a relevant experience in using modern communication tools (especially IT & C infrastructure). This indicator is difficult to be quantified when it is a significant gap between educational service provision and job enrolment.

Social infrastructure projects generate numerous benefits by improving life quality and possibility of work. If an individual's productivity loss leads to income loss for the individual, and he or she takes this loss of income into account when valuing health states, this means that part of the productivity loss (the income loss) is already included in the analysis. In this case, separate inclusion of the cost of productivity loss would lead to double counting (Davidson, 2009, p. 10).

Financial benefits are fees collected for supplied services and revenues from selling goods (for example: revenues from social services, revenues from fees collected by hospitals, social service providers, schools)

List no. 03: Minimum benefits which should be quantified in social infrastructure projects

Type of investment	Benefit	Financial analysis	Economic analysis
Social infrastructure	Benefits from reducing hospitalization times		X

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projects	Improvement of life quality		X
	Raise of life expectancy		X
	Benefits for persons which belong to social service beneficiaries		X
	Improvement of life quality		X
	Benefits from raising employment expectancy		X
	Revenues from services (if applicable)	X	X

3.4.4 INVESTMENTS IN THE DEVELOPMENT OF REGIONAL AND LOCAL BUSINESSES (BUSINESS DEVELOPMENT SUPPORT STRUCTURES, REHABILITATION OF DISUSED INDUSTRIAL SITES, SUPPORT FOR MICRO)

In financial analysis the benefits should be covered by the revenues collected from the charged tariffs on offered services. In economic analysis the benefits will have two major components. Firstly, the revenues identified in financial analysis will be corrected with conversion factor. Secondly, the positive externalities arising from the compliance with EU regulations specific to each domain will be monetized. The second component should be more consistent due the multiple valences of the social benefits.

Regional and local business environment projects aim to set up and develop business support structures of regional and local importance, rehabilitate industrial sites and support regional and local entrepreneurial initiatives, in order to facilitate job creation and sustainable economic growth. The expected effect of these projects is to improve the economic environment by creating new companies (especially SMEs) or reorganize others.

In case of the development of sustainable business support structures of regional and local importance, the expected positive result should be gathered near the new support structures which will be set up. The minimum positive externalities which should be monetary quantified in each project are related to:

- unemployment rate which should become smaller as an effect of the new businesses began at the business support structures;
- regional economic growth as domino effect originated in new economic activities from business support structures.

In case of rehabilitation of unused polluted industrial sites and preparation for new activities, the expected positive result should be gathered near the sites which were reintroduced in economic environment. The minimum positive externalities which should be monetary quantified in each project are related to:

- unemployment rate which should become smaller as an effect of the new businesses began ex-unused polluted industrial sites;

- regional economic growth as domino effect originated in new economic activities from ex-unused polluted industrial sites.

Financial benefits are fees collected for supplied services and revenues from selling goods or rents.

List no. 04: Minimum benefits which should be quantified in regional and local businesses projects

Type of investment	Benefit	Financial analysis	Economic analysis
Regional and local business environment projects	Reduction of unemployment rate		X
	Benefits from regional economic growth		X
	Revenues from services (if applicable)	X	X

3.4.5 INVESTMENTS IN TOURISM (CULTURAL HERITAGE, HISTORY, TOURISM INFRASTRUCTURE)

In financial analysis the benefits should be covered by the revenues collected from the charged tariffs on offered services (for example: tariffs for entrance tickets in museum). In some domain where public institutions offer services the prices are established by the responsible authority (for example: Ministry of Culture). In this particular situations, the prices which will be taken into account in the financial analysis will be those established (and expected to be established) by responsible authorities.

In economic analysis the benefits will have two major components. Firstly, the revenues identified in financial analysis will be corrected with conversion factor. Secondly, the positive externalities arising from the compliance with EU regulations specific to each domain will be monetized. The second component should be more consistent due the multiple valences of the social benefits.

Promotion of tourism projects aim mainly to sustainable valorisation and promotion of the cultural heritage and natural resources with tourism potential, as well as to improve the quality of accommodation and leisure tourist infrastructure, in order to increase the regions' attractiveness, develop the local economies and create new jobs.

In case of restoration and sustainable valorisation of cultural heritage and setting up/modernizing the related infrastructure, social benefits should be focused on improving touristic and economic activity near the objectives. The minimum positive externalities which should be monetary quantified in each project are related to:

- Unemployment rate which should become smaller as an effect of the touristic objective revival;
- Higher number of visitors and souvenir buyers, in a continuous basis by promoting all seasons the touristic objectives.

In case of creation, development, modernization of the tourism infrastructure for sustainable valorisation of natural resources and for increasing the quality of tourism services, social benefits should be focused on

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improving touristic and economic activity near the objectives. The minimum positive externalities which should be monetary quantified in each project are related to:

- Unemployment rate which should become smaller as an effect of the new touristic objective revival;

- Higher accommodation ratio in hotels, in a continuous basis by promoting all seasons the touristic objectives.

Financial benefits are fees collected for supplied services and revenues from selling goods (for example: fees paid at museums and entertainment objectives, accommodation paid in hotels and guest houses).

List no. 05: Minimum benefits which should be quantified in tourism projects

Type of investment	Benefit	Financial analysis	Economic analysis
Investments in tourism	Reduction of unemployment rate		X
	Benefits from higher number of visitors and souvenir buyers		X
	Benefits from higher accommodation ratio in hotels		X
	Revenues from services (if applicable)	X	X

3.4.6 INVESTMENTS IN INNOVATIVE PRODUCTION AND ECO-EFFICIENT SYSTEMS (SUSTAINABLE DEVELOPMENT OF PRODUCTION AND ENTERPRISE DEVELOPMENT)

In financial analysis the benefits should be covered by the revenues collected by selling goods or services produced in the enterprises which benefit from financial support. The market of these enterprises is usually with strong competition, fact that generates realistic market prices which will be taken into account in CBA.

In economic analysis the benefits will have two major components. Firstly, the revenues identified in financial analysis will be corrected with conversion factor. Secondly, the positive benefits generated in the geographic area where project was implemented will be monetized. The second component should be more consistent due the multiple valences of the social and economic benefits.

Innovative and eco-efficient productive system financial support is very varied, addressing to a large scale of potential beneficiaries. The most substantial support is offered for large enterprises for tangible and intangible investments. The main objective is to develop and strengthen the business by purchasing new equipment, technologies and know-how to enable adaptation of production to internal market requirements. It wants that new considerable investments to help extension of activities and production of high added value products.

In case of support for strengthening and upgrading the productive sector by tangible and intangible investments for large enterprises, social benefits should be focused on improving the economic

environment due the huge economic and social power of these large enterprises. The minimum benefits which should be monetary quantified in each project are related to:

- Unemployment rate which should become smaller as an effect of the revival of local economy because large enterprises' activity require substantial working force inside the enterprise and outside at suppliers and intermediaries;

- Number of SMEs which will focus their activity in direct relation to the large enterprise as client or supplier of raw materials or services.

Financial benefits are based especially on fees and charges collected as a result of implementing the investment. Such revenues could consist from selling inventions and goods produced by those implement the investment.

List no. 06: Minimum benefits which should be quantified in innovative production systems and eco-efficient projects

Type of investment	Benefit	Financial analysis	Economic analysis
Investments in innovative production and eco-efficient systems	Reduction of unemployment rate		X
	Benefits from increasing number of SMEs upstream and downstream from large enterprises		X
	Revenues from selling goods and services (if applicable)	X	X

3.4.7 INVESTMENTS IN RESEARCH, TECHNOLOGICAL DEVELOPMENT AND INNOVATION

In financial analysis the benefits should be covered by the revenues collected by selling goods or services produced in the enterprises which benefit from financial support. The market of these enterprises is usually with strong competition, fact that generates realistic market prices which will be taken into account in CBA.

In economic analysis the benefits will have two major components. Firstly, the revenues identified in financial analysis will be corrected with conversion factor. Secondly, there will be monetized the positive benefits generated in the geographic area where project was implemented. The second component should be more consistent due the multiple valences of the social and economic benefits.

Research, technological development and innovation projects have as the main objective to increase research and development capacity, stimulation of cooperation between RDI institutions and enterprises, and increase of enterprises' access to RDI. Large programs which require BCAs are concentrated on RDI infrastructure development.

In case of development of the existing R&D infrastructure and the creation of new infrastructures (laboratories, research centres) the social benefits come from the potential new results which could improve

the quality life, environment conditions, etc. in these conditions, the minimum benefits of these projects should be focused on:

- Benefits from implementing results of research and development activities which were created and patented in RDI institutions and enterprises;

- Unemployment rate which should become smaller as an effect of creating new companies which implement the results of the research and development activity from RDI institutions and enterprises.

Financial benefits are based especially on fees and charges collected as a result of implementing the investment. Such revenues could consist from selling inventions and goods produced by those implement through the investment.

List no. 07: Minimum benefits which should be quantified in research, technological development and innovation for competitiveness projects

Type of investment	Benefit	Financial analysis	Economic analysis
Investments in research, technological development and innovation for competitiveness	Benefits from implementing results of research and development activities		X
	Reduction of unemployment rate		X
	Revenues from selling goods and services (if applicable)	X	X

3.4.8 INVESTMENTS IN ITC FOR PUBLIC AND PRIVATE SECTORS

In financial analysis the benefits should be covered by the revenues collected by selling goods or services produced in the enterprises which benefit from financial support. The market of these enterprises is usually strongly competitive, fact that generates realistic market prices which will be taken into account in CBA.

In economic analysis the benefits will have two major components. Firstly, the revenues identified in financial analysis will be corrected with the conversion factor. Secondly, the positive benefits generated in the geographic area where project was implemented will be monetized. The second component should be more consistent due the multiple valences of the social and economic benefits.

ITC for private and public sectors projects contribute to support the economic competitiveness through increasing the interactions between the public sector and enterprises/citizens by fully exploiting the ITC potential.

In case of supporting schools to connect themselves to broadband internet connections, the social benefits will result from the higher degree of education of the pupils who learn in such schools. These pupils will have access to diversified learning methods, will have better quality information on-line and will have

supplementary motivation to continue their education in school. As an indirect effect, these pupils will have more chances to find jobs, will be more competitive in the labour market and will be able to produce more value in the economy. The minimum social benefits which should be taken into account are:

- Rate of school absenteeism in region which should reflect the high level of school attendance due the conditions and motivations offered by local schools;

- Unemployment rate which should become smaller as an effect of high level of education of the pupils from the region.

ITC could improve the performance of public and private sector, especially in administration, health and education. Thus, projects supporting the implementation of e-government solutions, increasing the interoperability of systems, implementation of E-Learning applications, and implementation of e-health solutions generates numerous social benefits. The most important are:

- Unemployment rate which should become smaller as an effect of high economic activity in various fields: administration, education, health, ITC etc.;

- Quality of life will increase because citizens will have access to better services, faster and without the need to move.

Financial benefits are based especially on fees and charges collected as a result of implementing the investment. Such revenues could consist from selling inventions and goods produced by those implement the investment.

List no. 08: Minimum benefits which should be quantified in ITC for public and private sectors projects

Type of investment	Benefit	Financial analysis	Economic analysis
Investments in ITC for public and private sectors	Reduction of the rate of school absenteeism		X
	Reduction of unemployment rate		X
	Reduction of unemployment rate		X
	Benefits from increasing quality of life		X
	Revenues from selling goods and services (if applicable)	X	X

3.4.9 INVESTMENTS IN ENERGY (ENERGY EFFICIENCY AND SUSTAINABLE USE OF RENEWABLE ENERGY, DIVERSIFYING ENERGY INTERCONNECTION NETWORKS)

In financial analysis the benefits should be covered by the revenues collected by selling goods or services produced in the enterprises which benefit from financial support. The market of these enterprises is usually strongly competitive, fact that generates realistic market prices which will be taken into account in CBA.

BENEFITS

In economic analysis the benefits will have two major components. Firstly, the revenues identified in financial analysis will be corrected with conversion factor. Secondly, the positive benefits generated in the geographic area where project was implemented will be monetized. The second component should be more consistent due the multiple valences of the social and economic benefits.

Increasing energy efficiency and security of supply, in the context of combating climate change projects contribute to reducing the energy intensity through the implementation of new technologies in order to increase productivity, especially to industrial end-users and to increase the use of renewable energy sources. An important support will be given to implementing new technologies in order to reduce emissions of energy plants (essential to the National Energy System), and to diversification of interconnection networks in view of strengthening security of energy supply, which lies at the basis of any sound economic system.

Energy efficiency increasing through investments in machineries, equipment, in expanding and upgrading electricity/oil/natural gas networks, in plants contribute to a better environment and sustainable development of the region. The most important social benefits in this context are related to:

- Quality of life in a protected environment as a result of environment friendly way of producing, transporting and using energy.

Allotment of financial support for investment projects in the use of renewable energy for green energy production aims to support investments in upgrading and building new capacity and thermal power generation through renewable energy resources exploitation: biomass, hydro resources (low power), solar, wind, biofuels, geothermal and other renewable resources energy.

The impact of such investment projects on the economic environment and positive externalities which are created can be measured using the following minimal benefits:

- Reduction of polluting elements from the surrounding environment by a more rational use of natural resources;
- Benefits from improved quality of life which translates into an improvement in the overall conditions of populations' health as a result of pollution prevention.

The projects focusing on diversification of interconnection networks in order to increase security of energy supply wants to assure support for investments in the national transport network interconnection of electricity and gas to European networks. From this point of view, the benefits of such projects contribute to:

- Improving general life conditions of the citizens by offering them multiple alternatives to energy sources.

Financial benefits are based especially on fees and charges collected as a result of implementing the investment. Such revenues could consist from selling inventions and goods produced by those implement the investment.

List no. 09: Minimum benefits which should be quantified in Increasing energy efficiency and security of supply, in the context of combating climate change projects

BENEFITS

Type of investment	Benefit	Financial analysis	Economic analysis
Investments in energy	Benefits from increasing quality of life		X
	Benefits from reduction of polluting elements		X
	Revenues from selling goods and services (if applicable)	X	X

4. BENEFIT CALCULATION

Minimal benefits presented in previous section should be estimated by monetizing each relevant element which could contribute to obtain that benefit. For each type of benefit, not only the indicators differ, but the methodology could be adapted for the particularities.

In this section we will present some methodological issues on how to monetize benefits, followed by some short examples of algorithms which could be used to calculate benefits in EU projects. These algorithms are simple proposals of dealing with social benefits, other possibilities being not excluded or rejected.

Data source

Estimates of benefits are typically made by combining information from multiple sources and extrapolating from contexts in which similar effects have been estimated to the policy context (Hammitt, 2011, p. 14). Data used in monetizing benefits could be obtained from numerous sources. It is vital to use credible documents and statistics in order to not miscalculate indicators. Data should be as recent as possible, preferably primary data instead of secondary or tertiary. The date source should be:

- Statistics offered by national or international statistic organisations, public institutions, specialized associations with a notoriety in field (examples are listed below);

- Normative acts (yearly budget laws, Fiscal Code, Pensions Law, Health Assurance Law etc.);

- Governmental documents and strategies;

- Scientific articles and working papers;

- Surveys.

List no. 10: Recommended statistical data suppliers for benefit monetization

Recommended statistical data suppliers
Romanian National Institute of Statistics
EUROSTAT
International Monetary Fund
National Bank of Romania
Line ministries, their subordinated public institutions and coordinated companies (depending the nature of the investment)
Ministry of Public Finance
Romanian National House of Public Pensions

Romanian National Unemployment Agency
Professional Associations declared of public utility (Romanian Federation of Public Authorities, Romanian National Association of Traveling Offices etc.)

Algorithm of calculation

Benefit monetization represents an estimate in currency of all outputs generated by the investment project. Often the monetization process is criticised, because there are some things considered priceless and placing an economic value on them is effectively devaluing them (Kotchen, 2010, p.4).

For benefit monetization is absolutely necessary to clarify some basic issues (adapted from JJEC, 2002, p. 7-8):

- Benefits for whom?

  It is important to measure at least two beneficiary categories: direct beneficiaries (benefits for citizens visiting museums, drivers using new highways, households having water services, seniors benefiting from social and health services; life-course gains due better social services, better education, reduced crime rate etc.) and society (decrease unemployment, decrease judicial costs, increase taxes collected to budgets etc.). Cost decrease should be judged in terms of marginal costs, being the value of benefits experienced by taxpayers as a result of reducing costs.

- What is the monetized value of benefits?

  The monetization is the most complex step. It is mainly a statistical procedure of quantifying. The obtained results are never exact values, being approximations obtained using different type of methods characterized by different degree of complexity.

  Benefit evaluation is not an easy issue because numerous items can be converted in monetary terms using proxies which distort the exact result. The literature retained some approaches, each of them having pros and cons.

  o **Market Choices Method** is used when beneficiaries make purchases at market prices they reveal that the things they buy are at least as beneficial to them as the money they relinquish. Consumers will increase their consumption of any commodity up to the point where the benefit of an additional unit (marginal benefit) is equal to the marginal cost to them of that unit, the market price. Therefore for any consumer buying some of a commodity, the marginal benefit is equal to the market price. The marginal benefit will decline with the amount consumed just as the market price has to decline to get consumers to consume a greater quantity of the commodity. The relationship between the market price and the quantity consumed is called the demand schedule. Thus the demand schedule provides the information about marginal benefit that is needed to place a money value on an increase in consumption (Watkins et al., p. 1).

- o ***Willingness to pay* (WTP)** measures both the direct and indirect benefits and provides a method of measuring the individuals' preferences by asking them how much they are willing to pay for an output.

  Some scholars question the efficiency of this method. Richardson et al. (2010, p. 1122) state for health system that the wedge between recipients and funders of health services invalidates the logical connection between social goals and private WTP and makes the interpretation of WTP data problematical.

- o ***Human-capital approach*** is based on the calculation of value of life as the present value of the lifetime earnings. In human capital approach the benefits represent productivity gains from extending life.

  The human capital approach has been used for many years, particularly in the estimation of the total cost of illness associated with a disease (Olsen et al., 1999, p. 4).

  Using the human capital approach, we obtain that people with lower income have lower value put on their lives compared with people with higher incomes.

Benefit monetization should offer a value for each beneficiary category presented above. The total monetized value is obtained by summing up the individual values of benefits.

- What do we know about the long run?

  A good cost-benefit analysis, however, seeks to determine the long-run benefits of different program and policy alternatives. Assessed investments are designed to generate benefits on a large number of years (often decades), so benefit monetization should take into account all this time frame.

Validation of benefit calculation could be made, if studies are available, by comparing with values obtained in similar cases. The values should not be identical, but correlated. The correlation should take into account differenced in macroeconomic indicators, region, natural conditions, culture etc. For example, the benefits of preventing car accidents in Romania and in Norway (as calculated by Statens vegvesen p. 115) should be correlated.

5. EXAMPLES IN BENEFIT CALCULATION

Case study of benefit calculation at a hospital modernization

Step1: economic and social benefit identification

In case of modernization of a hospital the economic benefits which should be monetized are:

- Economic benefit: time saved by reducing hospitalization duration

- Economic benefit: cost saved by reducing hospitalization duration

- Social benefit: benefits for employees by creating new jobs in medical services

- Social benefit: benefits for the public budget by creating new jobs in medical services

Step 2: identification of parameters which contribute to each economic and social benefit estimation

- Time saved by reducing hospitalization duration can be estimated using:

    o The average value of an hour of work

    o The number of new beds offered by the hospital

    o The rate of bed use

    o The rate of hospitalized working persons

    o Time economy per person

- Cost saved by reducing hospitalization duration can be estimated using:

    o The average value of one hospitalization day

    o The number of new beds offered by the hospital

    o The rate of bed use

    o The rate of hospitalized persons which pay services from own resources

- Social benefit: benefits for employees by creating new jobs in medical services

    o The number of new jobs intended to be created

    o Value of average net salaries in field of medical services

- Social benefit: benefits for the public budget by creating new jobs in medical services

    o The number of new jobs intended to be created

    o Value of average brut salaries in field of medical services

    o Rate of salary taxation

Step 3: identification of data sources for each parameter which contribute to economic and social benefit estimation

BENEFITS

- Time saved by reducing hospitalization duration can be estimated using:

    o The average value of an hour of work: statistic reports from EUROSTAT or Romanian National Institute of Statistics. If forecast is available, it could be used.

    o The number of new beds offered by the hospital: the technical documentation of the project

    o The rate of bed use: previous reports of the hospital to Health Ministry

    o The rate of hospitalized working persons: previous reports of the hospital to Health Ministry

    o Time economy per person: statistics or research studies

- Cost saved by reducing hospitalization duration can be estimated using:

    o The average value of one hospitalization day: medical statistics or even an average based on the offers of some existing medical units

    o The number of new beds offered by the hospital: the technical documentation of the project

    o The rate of bed use: previous reports of the hospital to Health Ministry

    o The rate of hospitalized persons which pay services from own resources: previous reports of the hospital to Health Ministry

- Benefits for employees by creating new jobs in medical services

    o The number of new jobs intended to be created: the technical documentation of the project

    o Value of average net salaries in field of medical services: statistic reports from Romanian National Institute of Statistics. If forecast is available, it could be used.

- Benefits for the public budget by creating new jobs in medical services

    o The number of new jobs intended to be created: the technical documentation of the project

    o Value of average brut salaries in field of medical services: statistic reports from Romanian National Institute of Statistics. If forecast is available, it could be used.

    o Rate of salary taxation: taxation legislation

Step 4: building formulas to yearly economic and social benefit estimation

- Time saved by reducing hospitalization duration can be estimated using:

The average   x   The number   x   The   x   The rate of   x   Time   x   365 days

BENEFITS

value of an	of new beds	rate of	hospitalized	economy	per year
hour of	offered by	bed	working	per	
work	the hospital	use	persons	person	

- Cost saved by reducing hospitalization duration can be estimated using:

The average value of one hospitalization day	x	The number of new beds offered by the hospital	x	The rate of bed use	x	The rate of hospitalized persons which pay services from own resources	x	365 days per year

- Benefits for employees by creating new jobs in medical services

The number of new jobs intended to be created	x	Value of average net salaries in field of medical services	x	12 months

- Benefits for the public budget by creating new jobs in medical services

The number of new jobs intended to be created	x	Value of average brut salaries in field of medical services	x (	Adjusted rate of income taxation[3]	+	Rate of social contributions	) x	12 months

Step 5: description of benefits

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[3] Adjusted rate of income taxation should be calculated separately because social contributions retained for employees are not taxed. The adjusted rate of income taxation = (1 – employee contribution rate) x income taxe rate

BENEFITS

In order to present the methodology and results in the CBA report, a descriptive presentation is required. It is recommended to use short and clear presentation of used hypothesis, data source, data and results obtained. The description should permit to verify the results.

Examples of other benefit calculations

Example 1: Benefits from reduction of unemployment rate

If the investment generates new permanent jobs, the benefits will generate a reduction of unemployment rate. The monetized effects of these benefits are:

- Higher revenues at social contribution budgets:

   Benefits = no of new jobs x average salary x no of months x social contribution ratios[4]

- Higher revenues at state budget:

   Benefits = no of new jobs x average salary x no of months x (1-employee's contribution rate) x 16%

Example 2: Benefits from improving life quality

Improving life quality is possible by raising the healthy life expectancy. Statistical authorities and World Health Organization offers detailed data on average life expectancy, respectively healthy life expectancy, for different age and gender categories.

Social surveys can reveal the advantages offered by each investment project in improving the life quality of the beneficiaries. Benefit monetization require establishing the financial value of the gained healthy years by the beneficiaries. A useful indicator is "Value Of Statistical Life" which use information from life insurance companies. This methodology permits benefit calculation:

   Benefits = no of gained healthy years x Value Of Statistical Life

Example 3: Benefits from preventing accidents

The benefits of preventing accidents valued according to the so called "human capital" approach, which assigned a value to preventing a fatality or an injury proportional to the value of production lost. This had the rather awkward consequence that saving the lives of people outside the labour force, like children or the retired, did not have a monetary value, since these people did not produce anything that had a market value (Safetynet, 2009, p. 7).

   Benefits = no of gained healthy days x Value Of A Labour Day

Example 4: Benefits from saving time spent in flight waiting for a landing slot

Benefits from saving time spent in flight waiting for a landing slot could be calculated using the marginal operating costs by type of aircraft assuming a capacity utilisation (for example 65%) and using market prices. By removing this delay the project will save resources such as fuel, maintenance and labour for other uses (Barrett and Applegate, 2011, p. 11).

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[4] Employers' ratios summing approximately 28% depending on the domain and ownership
Employees' ratios summing 16.5%

BENEFITS

$$\text{Benefits} = \begin{array}{l} \text{marginal operating cost per hour at a} \\ \text{certain capacity utilization for a minute of} \\ \text{flight} \end{array} \quad x \quad \text{saved hours in flight}$$

Example 5: Benefits by offset of carbon dioxide emissions

Replacing polluting electricity generators with ecological ones, will bring a reduction of the harmful substances relist in atmosphere. The monetized benefits of a wind turbine can be established estimating the CO_2 offset quantity and the damage caused by the replaced power plants. Damages can be estimated using research results made for different areas and fuels (Johnson and Solomon, 2010, p. 954).

Benefits = CO_2 offset quantity x unitary damage value

6. CONCLUSIONS

Benefits and their monetization is a basic requirement of any cost-benefit analysis. From theoretical point of view, the situation is relatively simple because these benefits incorporate all the advantages generated by the investment. In practice, monetization of benefits is quite difficult in many cases. Thus, for a high quality cost-benefit analysis it is important to have some basic rules related the main categories of benefits which should be considered in the analysis.

Minimum standards of benefits help to a homogenization of the cost-benefit analysis and assure premises for a corresponding quality work. These minimal benefits should be present in each cost-benefit analysis made for an investment, but it should be completed with other specific benefits.

The lists of minimal benefits identified in this paper want to be a synopsis of best practices in establishing benefits in cost-benefit analyses. The paper is based on numerous theoretical studies and practical cost-benefit analyses.

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Contract No 46/ 8.12.2010

„Development of the capacity for the Cost-Benefit Analysis"

Project co-financed by the European Regional Development Fund through the Technical Assistance Operational Programme 2007-2013

The views expressed are the author alone and do not necessarily correspond to those of the European Union.