

EVALUATING THE IMPACT OF ICT INVESTMENT PROJECTS

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Abstract:

There are many theories and many schools of thought regarding project management and the approach one should consider for a successful project implementation and an efficient spending of the resources. An analysis of the ICT investment projects reveals that most of them, by nature, are project-based. The coordination and implementation of such a project requires a Scope of Work – SoW, more or less formally defined. General multiannual projects, with multiple and diverse sources of funding had to be split into separate projects.

There are several types of ICT-specific investment assessment models. However, their applicability is rather limited. Depending on the purpose of the analysis, we must choose the appropriate model.

Huge differences among assessment approaches are determined by the purpose of the analysis, the type of the organization implementing the project, the project aim, its beneficiaries, technology to be used, influence/dependence/synchronism determined by interactions with other organizations, etc. Given all that, it is impossible to have a model designed to answer all such needs.

As for the quantitative (numerical) methods of project analysis, the legal framework in Romania requires that a public funding-based project use a certain pattern to assess and present the results. Such pattern is not appropriate for ICT investments as it is based on classic models of assessing the cost-efficiency of an investment.

Key words: Evaluation projects; Impact indicators; Results / Outcome indicators; European Structural and Cohesion Funds

JEL Classification: C13, C81, E22, E61, H25, H27, H50, H70, H72, O11, O21

1. INTRODUCTION

There are many theories and many schools of thought regarding project management and the approach one should consider for a successful project implementation and an efficient spending of the resources. The methodology developed by Project Management Institute, USA, and described in *A Guide to the Project Management Body of Knowledge (PMBOK® Guide) – Fifth Edition* (Project Management Institute, 2013) is probably the most widespread.

In Romania the project-based approach has been supported especially in case of international financing or resources, coming mostly from the main international donors such as the European Union/European Commission, World Bank, UK Government, US Government through USAID (United States Agency for International Development) or USTDA (United States Trade and Development Agency), etc

Concepts like project / project management existed in Romania before the international financing emerged. Such concepts were mainly used in the academic environment, as well as in the research-development field. Foreign financing relies exclusively on the concept of project, therefore they contributed significantly to promoting the concept, to raising awareness of the decision makers with regard to the importance of splitting the activity into interconnected projects. A relatively strong campaign has been trying to convince the Romanian Government to elaborate the state budget based on public policies and projects, and not broken down by institutions which use or manage public money.

An analysis of the ICT investment projects reveals that most of them, by nature, are project-based. The coordination and implementation of such a project requires a Scope of Work – SoW, more or less formally defined. General multiannual projects, with multiple and diverse sources of funding had to be split into separate projects. The computerization of the public administration, of the National Health Insurance House, etc. are significant examples in this respect. All these projects lacked an overall strategy (at least sometimes), as well as medium and long-term vision. When their

components were implemented, they were divided into projects with well-defined limits. For example, in the field of education, there have been projects aimed at the reform of the financial management of the high-school education system, the implementation of AeL (Advanced eLearning) or to provide Internet access to the schools in rural areas. The health system benefited from projects such as: e-health systems implemented in hospitals, the implementation of the electronic prescription, of the electronic health card, etc. All these projects should have been part of a projects' multiannual strategy, interconnected and correlated with individual actions. Each project should have had clear, measurable objectives, whose degree of achievement should have been assessed at the end of the implementation.

We should mention that there is no clear, measurable, quantifiable dependence between the external and internal factors and the success of a project. In the past 20 years there have been many international research and studies, conducted by multidisciplinary teams (sociologists, experts in economics or ICT). In most of the cases, the results have shown that the internal factors have a stronger influence on the success or failure of a project than the external factors. An analysis of over 6000 projects, conducted by the World Bank from 1983 to 2011, has revealed that:

„However, a striking feature of the data is that the success of individual development projects varies much more within countries than it does between countries”. (Denizera, Kaufmann, & Kraay, 2013)

The lack of coherence among the approaches of various organizations, the actors on the market and the results of some projects illustrates the lack of ICT models and methods of investment projects analysis. It comes as a shock to see that the degree of dissatisfaction of the implementation of a CRM – Customer relationship management ranges between 52% and 75% (Steela, Dubelaar, & Ewing, 2013)

2. ICT AREA IN STRUCTURAL AND COHESION FUNDS AVAILABLE FOR ROMANIA

2.1. The allocation and functioning of structural and cohesion funds

The 2007-2014 budget had three major objectives at a European level:

- Convergence
- Regional Competitiveness and Employment
- European Territorial Cooperation

During 2007-2014 the Convergence Objective included:

- Regions of convergence: with a GDP per capita lower than 75% of the EU-25 average GDP
- Regions outside convergence: with a GDP per capita over 75% of the EU-25 average GDP, but less than 75% of the EU-15 average GDP

During 2007-2013 the Objective Regional Competitiveness and Employment included :

- Regions of convergence: with a GDP per capita lower than 75% of the average EU-15 (in 2000-2006), but over 75% of the average EU-15
- Regions of competitiveness and employment: it applies to all other EU regions.

To reach the three objectives the European Commission:

- The Cohesion Fund
- the European Regional Development Fund
- the Social European Fund

Each fund had its own regulations, eligibility criteria, monitoring and evaluation mechanisms. At a European level, a certain amount from each fund was allocated to each member-state. Such allocations are not based on any formulas or analytical mechanisms. The allocation is based the member-state needs, its self-established priorities and regional level of development, the

predictions regarding its capacity to absorb funds, as well as on negotiations determined by public policies and priorities in the member-states, especially in the donor-state, (which give more to the EU budget than they receive).

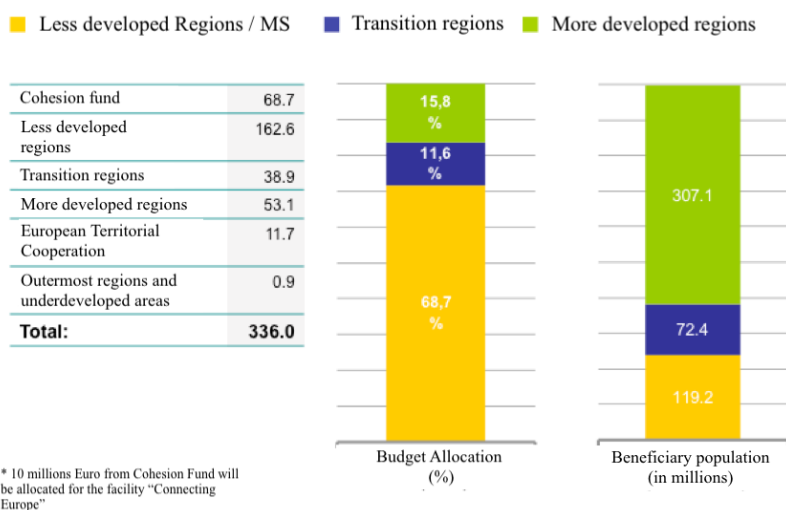
In 2007-2013 the European Commission supported the member-state so that they could ensure the complementarity of financed actions. The European Commission considered such complementarity on approving the Operational Programmes, proposed by each member state, though such complementarity was no longer a priority (as in 2000-2006 budget or as it is expected for 2014-2020 budget). The refers to actions partially financed from different funds or programmes, without overlapping among the priorities of each programme. Thus, a project cannot be eligible for EU financing from two programmes for the same activities/actions.

For 2014 – 2020 the Strategy Europe 2020 is the main EU strategic tool. EU has established 2020 objectives in five priority areas :

- Employment
 - - 75% of people aged 20–64 to be in work
- Research and development (R&D)
 - - 3% of the EU's GDP to be invested in R&D
- Climate change and energy
 - - greenhouse gas emissions 20% lower than 1990 levels
 - - 20% of energy coming from renewables
 - - 20% increase in energy efficiency
- Education
 - - rates of early school leavers below 10%
 - - at least 40% of people aged 30–34 having completed higher education
- Poverty and social exclusion
 - - at least 20 million fewer people in – or at risk of – poverty/social exclusion

In terms of eligibility, for the 2014-2020 budget, the EU regions are divided into three categories, based on the regional GDP per capita compared to EU-27 average GDP

- ✓ **Less developed** regions: whose per capita GDP is less than 75% of the EU average
- ✓ **Transition** regions: whose per capita GDP is between 75% and 90% of the EU-27 average media
- ✓ **More developed** regions : whose per capita GDP is over 90% of the EU-27 average



* 10 millions Euro from Cohesion Fund will be allocated for the facility "Connecting Europe"

Figure 1. The allocation of funds based on the type of region for 2014-2010 budget (billions of Euro)

2.2. Structural and Cohesion Funds available for Romania

The Romanian Government and the European Commission agreed on apart from the 2007-2013 National Development Programme to be funded from structural and cohesion funds; this part was extracted from the 2007-2013 National Strategic Reference Framework (NSRF), which details certain actions from NDP 2007-2013, with very clear monitoring and evaluation indicators (Romanian Government, 2006).

The 2007-2013 NSRG implementation mechanisms were based on seven Operational Programmes. Beside the Operational Programmes, there were other EU funds allocation mechanisms: The Fisheries Operational Programme (FOP) and the National Programme for Rural Development (NPRD)

2.3. ICT EUROPEAN funds available in other EU countries

As shown previously, ICT represented a horizontal objective for the projects implemented as part of the 2007-2013 budget, which means that it was recommended that all projects address the ICT issues and have a component dedicated to ICT use. That is why, without access to all project's documents (especially to the Application) it is impossible to see exactly to which extent the structural and cohesion funds supported the ICT use. Such a detailed analysis is impossible first of all due to the lack of access to relevant documents (the applications are not documents of public interest, so the authorities would not make them public; moreover the information would only be available in print, which means it would be a huge effort on the part of the authorities to deliver such information). Secondly such a detailed analysis implies the study of all projects-related documents. According to the information published by the Ministry of European Funds (Ministry of Public Finance, 2014) on 31 January 2015, 45075 applications had been submitted for all programmes and 15242 had been approved and were in the process of implementation (the contracts had been signed).

Many finance programmes allow for the implementation of projects with ICT components of various size, which is another challenge in identifying and analyzing the ICT components. Some calls have a major ICT component (for example, the Sectoral Operational Programme IEC 2007-2013 Call, Priority Axis III dedicated to the ICT support and use); other calls have a major but not compulsory ICT component (for example 2007-2013 *Regional Operational Programme, Priority Axis 4, Major Intervention Area 4.3. Support for the development of micro-enterprises*).

We should also make a difference between the projects whose aim is to implement an information system and the projects which aim to reach their objectives by using ICT (for example enhancing the efficiency of the city hall activity by implementing an ICT system that includes modules related to the management of documents, secure electronic communication, resource management, financial resources included, as well as a module for the electronic communication with the citizens)

Informatic systems as such should not represent an objective. They should be only a tool one can use to reach objectives like: enhancing the efficiency of resource spending, decreasing the response time, increasing the number of customers, etc. Yet more often than not the ICT use becomes an objective in itself. That is the case of extremely complex systems whose implementation requires a huge and specific effort, when the donor prefers short- and medium- term objectives like *an informatic system which allows the online payment of local taxes*, instead of general and difficult to measure objectives.

However, for a coherent analysis of the structural funds impact on ICT projects and to be able to make comparisons, we will narrow down our scope as follows:

- ✓ we will analyze only the financial sources dedicated to the implementation of ICT solutions
- ✓ we will consider only the financing sources that cover all the (hardware and software) resources that an ICT project requires
- ✓ we will identify the sources of financing with ICT related achievement /outcome indicators

The correlation between the European development objectives and the structural tools, for 2007-2014 budget the structural instruments are financed by the European Social Fund (ESF), the European Fund for Regional Development (ERDF) and the Cohesion Fund (CF). Here are the characteristics of each fund:

- ✓ European Social Fund finances non-investment projects: courses, workshops, exchanges, information or promotion campaigns, analyses, reports, working groups, grants, stipends, etc.
- ✓ Tangible assets, fixes assets or tangible investments are not eligible.
- ✓ European Regional Development Fund finances investment projects. Eligible expenses include purchase of equipment, constructions, etc.
- ✓ Cohesion Fund finances projects of big infrastructure, transport, environment, energy production and transport.

Considering the specificity of each fund, as a first selection criterion in the attempt to identify the ICT finance sources, we excluded the programmes financed by European Social Fund (ESF). No hardware infrastructure compulsory to any ICT project can be purchased under such projects.

The following analysis did not consider the cross-border cooperation programmes, which have different characteristics and rarely include important ICT components. We have also excluded technical assistance programmes, dedicated to the public authorities that manage or are involved in the management of structural instruments. Such programmes generally cover the organizational expenses of the eligible institutions. As the ICT component represents – unfortunately – a very small part of an operational programme, we believe that such operational programmes are not relevant to the current analysis. Unfortunately, no Management Authority has implemented an integrated and coherent information system yet.

The next figure illustrates the percentage of the ERDF funded projects out of the total structural instruments available in our country, as illustrated by the information released by the European Commission, General Directorate for Regional Development (European Commission, 2015)

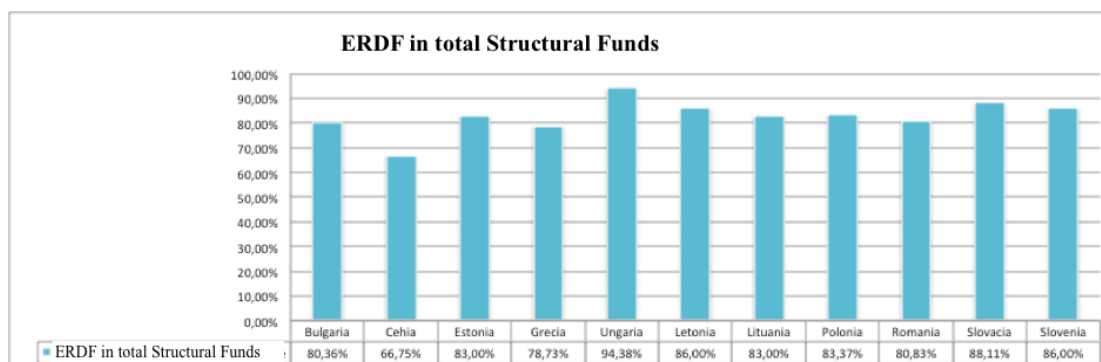


Figure 2. The percentage of Operational Programmes financed through ERDF out of the total of Structural Instruments by country

If we do not take into consideration the extremes (the Czech Republic which has allocated 66,75% of all structural instruments to ERDF projects, Greece which has allocated 78,73% and Hungary, at the other extreme with 94,38% allocate to such projects) the other countries allocated between 80% and 86% to such projects. The European Commission does not have a significant contribution to this allocation, in compliance with the negotiation and approval mechanisms of the Operational Programs. Hence the result shows the priorities of the respective member-state. For Hungary, the infrastructure investment was a priority, while the Czech Republic considered that solving social issues and reforming the administration represented the priorities.

The analysis reveals an extreme, Poland, with the average value of a programme of 11.1 billion euros, i.e. over 70% of all such type of programmes developed by Romania (15.5 billion euros).

It is also worth noting the case of Hungary, where, despite a total budget 50% higher than the budget allocated to Romania (23.6 billion euros compared to 15.5 billion euros), the average value of an Operational Programme is roughly the same, which shows Hungary's option to set targets similar to those of Romania (though the country is about a half of Romania when it comes to population and surface).

As far as maximum and minimum values of an Operational Programme are concerned, we can see that there is a huge diversity among the countries under scrutiny. There are Operational Programmes with budgets of even under 1 billion euros, but there is also the case of Poland which allocated over 27 billion euros for large infrastructure (transport and environment).

Under these circumstances, the analysis of the absolute values of Operational Programmes has major limitations, with a different approach among countries (e.g. Poland and some small countries - Estonia, Latvia, Lithuania and Slovenia – decided to run a single Operational Programme for Transport and Environment, areas with major financial allocations, while the remaining countries decided to run several Operational Programmes for these areas). And the analysis of each Operational Programme values does not take into account the total amount available for that country

As for the average value of the Operational Programmes, contrasts are less relevant with a minimum level registered by Slovakia, with 12%, followed by Hungary with 14%, and a maximum reached by Bulgaria and Romania, with 20%. This shows that Member States have preserved the same balance between the total budget they got and the size of an Operational Programme. Or, from another point of view, Member States have set targets of a similar size according to the budget available.

Analyzing Operational Programmes available in all Member States shows that 4 countries have chosen to run only two Operational Programmes (Estonia, Lithuania, Latvia and Slovenia). All of these countries are small-sized in terms of both population and surface. They also have historical, cultural and economic experiences quite different from Romania's (that all four came out of federal states existing before 1989, the Baltic States from the USSR and Slovenia from Yugoslavia). Under these circumstances, a detailed analysis of the information available concerning structural instruments in the four countries is not relevant.

The list of Operational Programmes carried out by Member States under scrutiny reveals the following types of programmes:

- ✓ Technical Assistance Programmes. As we already mentioned, such programmes also included projects with major ICT components; however, the details of the respective projects are not public interest information, hence it is impossible to assess their performance indicators (that is to identify these indicators and verify the extent to which the projects have succeeded to achieve them).
- ✓ Programmes addressing large infrastructure (transport, environment). In this type of project, at least in terms of the share in the total budget, ICT components are insignificant or non-existent.
- ✓ Programmes addressing regional priorities. Such programmes are expected to address in particular the infrastructure development of local or regional interest. This type of infrastructure has little or no connection with ICT as in most cases it refers to road infrastructure, buildings, social infrastructure, etc.
- ✓ Programmes aimed at supporting economic environment, competitiveness, certain sectors (health, information society, etc.), research and innovation. In such Operational Programmes we expect the programme also include performance indicators for the use of ICT.

Starting from issues previously mentioned, from the list of Operational Programmes implemented by the Member States we will analyze only those programmes focused on business environment and we will only refer to countries with more than two Operational Programmes financed by ERDF in 2007-2013 budget, other than technical assistance project or cross-border programmes (supporting territorial co-operation).

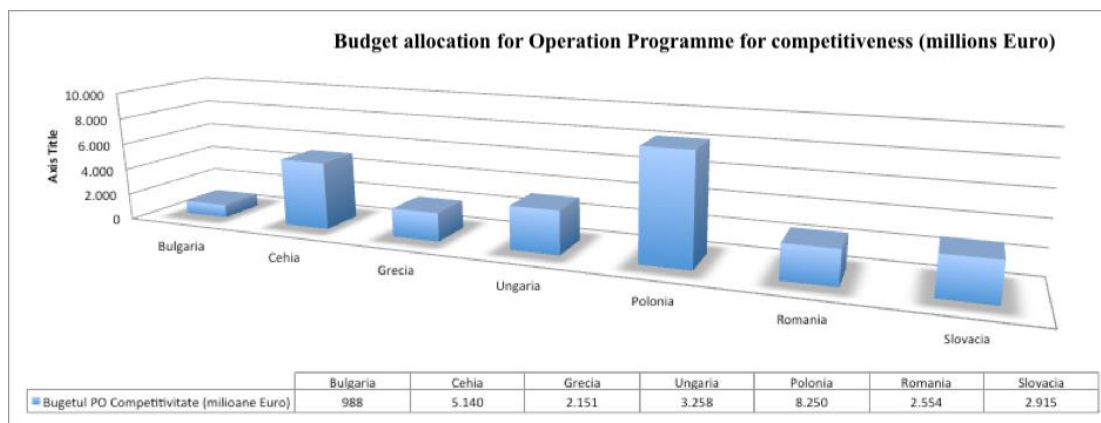


Figure 3. Operational Programmes Budget aimed to support competitiveness in the relevant Member States

First of all, compared to Romania, Poland allocated over three times more money to competitiveness. However, we should also take into account that Poland's budget was almost three times bigger than Romania's, which makes the proportion of the budget allocated in support of competitiveness similar in the two countries, if we consider the total funds available.

Similar, though totally opposite, is the case of Bulgaria, which – of all member states under analysis - allocated the smallest budget to support competitiveness. Yet, if we consider Bulgaria's total budget – which represents 38% of Romania's budget – the amount allocated to competitiveness accounts for 35% of sum allocated by Romania.

We should note the cases of the Czech Republic and Slovakia, countries much smaller than Romania, whose total budget available for structural instruments is similar to Romania's (on case of the Czech Republic) or lower (64% of Romania's budget in case of Slovakia). Both countries allocating budgets higher than Romania's in support of competitiveness, even double in the case of the Czech Republic.

As I have already shown, strictly analyzing the amounts allocated (overall, for programmes financed by the ERDF or, in our case, for those programmes aimed at supporting economic competitiveness) has the great disadvantage that it does not take into account particularities of the country concerned. For each member State, such a comparative analysis should consider:

- ✓ Population
- ✓ Surface
- ✓ Stage of economic development
- ✓ Stage of infrastructure development
- ✓ Needs of vulnerable/deprived social groups

The interest of the Member States in supporting the use of ICT is also reflected by the importance of ICT-related objectives as part of the national strategies, in general, and Operational Programmes, in particular. Thus, we can identify three types of situations:

- ✓ Member States that considered the use of ICT as a "first level" objective, dedicating an entire Operational Programme to this priority
- ✓ Member States that considered the use of ICT as a "second level" objective, dedicating a Priority Axis of an Operational Programme to this priority
- ✓ Member States that considered the use of ICT as a "third level" objective, devoting a Major Intervention Area of an Operational Programme to this priority

3. Current status and trends in ICT performance evaluation

The ICT (Information and Communication Technologies) field has been growing fast in the last decades; it is probably the field with the largest and most radical changes, which greatly affect our life and activity.

In terms of external factors, one should first of all consider the environment (political, economic, and social) of the project involved. As major external factors in this category we mention:

- ✓ *The country's level of economic development (GDP)*. No matter if we examine a project developed by a company or a public institution, economic dynamics, the level and diversity of economic transactions, and the economic performance of the market players, are factors with major impact on the performance of the resources spent in the project.
- ✓ *Development level of ICT infrastructure* in that country. Any ICT investment project involves interaction with other existing IT systems, the use of hardware (e.g. communications infrastructure, data center, etc.) and information infrastructure (databases, structured information available in electronic format)
- ✓ *Users' degree of technological "literacy"*. If the project is to be implemented in an environment where users have neither knowledge, nor access to technology, training sessions and presentations, plans of introducing future changes in the organization, an information campaign, etc. should be taken into account, prior to launching the project.
- ✓ *Human resources able to manage the new system*. Any system, irrespective of the opening and support received from the supplier or third parties, must be taken over by the organization/company. Such take over also involves the existence of human resources at least able to understand, use and run the system.

The factors above can be largely assessed and are relevant at a country and national economy levels. Their wide influence on the project resides in the choice of substantive actions to be implemented in order to insure the project's success and reach the objectives. There is another set of external factors, this time closer to the project, which must be taken into account both when we define a project and when we implement, monitor and evaluate it. These factors are (Steela, Dubelaar, & Ewing, 2013)

- ✓ "Industry context"
- ✓ "Organizational context"
- ✓ "Customer context"

According to the project management theory, as presented by the Project Management Institute, the "project sponsor" plays a key-role in running a project (Project Management Institute, 2013). That may be the head of the company or institution, another decision-maker or a person with influence on company's policies, etc. The study issued by a group of experts - after the assessment of over 6,000 World Bank-funded projects around the world between 1983 and 2011 - reveals the key-role of such a person. One of the results of this research shows that:

"Our main finding here is that task team leader fixed effects are of comparable importance to country fixed effects in accounting for the variation in project outcomes, suggesting a strong role for task team leader-specific characteristics in driving project outcomes. We also document that task team leader quality (as proxied by the average outcome rating on all the other projects managed by the same staff member) is a highly significant predictor of project outcomes." (Denizera, Kaufmann, & Kraay, 2013)

4. Conclusions and results

There are several types of ICT-specific investment assessment models. However, their applicability is rather limited. Depending on the purpose of the analysis, we must choose the appropriate model.

Huge differences among assessment approaches are determined by the purpose of the analysis, the type of the organization implementing the project, the project aim, its beneficiaries, technology to be used, influence/dependence/synchronism determined by interactions with other organizations, etc. Given all that, it is impossible to have a model designed to answer all such needs.

As for the quantitative (numerical) methods of project analysis, the legal framework in Romania requires that a public funding-based project use a certain pattern to assess and present the results. Such pattern is not appropriate for ICT investments as it is based on classic models of assessing the cost-efficiency of an investment.

Both Romania's legal framework and the European recommendations use the method of Cost-Benefit Analysis for the financial-economic assessment. This is a good method; the only problem may reside in measuring the impact of the project. As shown by the examples in this research, quantifying the money proves most difficult especially in case of public institutions. It is even more difficult when the project's main impact targets social benefits (health, education).

The examples above reveal that assessing the investment of a public institution and that of a private company implies totally different approaches. In the first case, financial indicators are not relevant (the impact may even be negative), only the economic impact has to be positive (the overall benefits generated by the project must be higher than the costs). However, in case of an investment made by a private company, the financial impact is critical, as no company would invest without a positive result.

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