



## Financial analysis of e-services investment projects in Romania\*

*Analiza financiară a proiectelor de investiții în e-servicii în România*

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### **Abstract**

*Cost-benefit analysis is considered to be one of the most efficient tools in order to quantify the necessity and opportunity of an investment project. The main advantage of this method is that it can be very easily applied in practical situations. Nevertheless using cost-benefit analysis has to take into account the specific elements of the analyzed project in order to draw the appropriate conclusions. Public e-services investment projects are a special type of investment projects that do not generate any incomes and are subject to non-reimbursable funding thorough existing financing programs. These particularities make for some adaptations to the classic cost-benefit analysis methodology..*

**Keywords:** *cost-benefit analysis, public e-services, non-reimbursable funding*

### **Rezumat**

*Analiza cost-beneficiu este considerată a fi unul dintre cele mai eficiente instrumente pentru a cuantifica necesitatea și oportunitatea unui proiect de investiții. Principalul avantaj al metodei este că poate fi foarte ușor aplicată în situațiile practice. Cu toate acestea, la utilizarea analizei cost-beneficiu trebuie să se țină cont de elementele specifice ale proiectului analizat pentru a se ajunge la concluzii corespunzătoare. Proiectele de investiții în e-servicii sunt un tip special de proiecte de investiții care nu generează venituri și pot apela la fonduri nerambursabile prin programele de finanțare existente. Aceste particularități presupun efectuarea anumitor adaptări ale metodologiei de analiză cost-beneficiu clasice.*

**Cuvinte-cheie:** *analiza cost – beneficiu, e-servicii publice, fonduri nerambursabile*

**JEL Classification:** L86, D61, H54

## Introduction

**I**N 2007 Romania joined the European Union and started benefiting from the non-reimbursable European funds in order to reduce the gap between its economy and those of the other member states in the European Union. One of the areas identified and financed by the “Increase of the Economic Competitiveness” Operational Sectorial Program 2007-2013 (POS CCE) is the Information Technology and Communication (IT&C) domain.

The general objective of the POS CCE is to increase the productivity of Romanian enterprises, while considering the principles of sustainable development and reducing the gaps in productivity compared to those of the European Union, so that Romania can reach, by the year 2015, an approximate level of 55% of the average productivity in the European Union.

This financing program identifies a Priority Axis in order to finance the IT&C investment projects: Priority Axis 3 – “Information technology and communications for the public and private sector”. This financing axis, through its three major intervention domains, it supports the economic competitiveness and promotes the interaction between the public sector and enterprises/citizens by capitalizing on the IT&C potential.

The e-services investment projects are financed by the Major Domain of Intervention 2 (DMI 2) – “The development and increase of the efficiency of the electronic public services”. There are four categories of projects identified to be financed, so there are four financing operations:

- Operation 1 – “Support for the implementation of e-government solutions (including e-administration) and provision of broadband connections” (O321);
- Operation 2 – “Implementation of IT&C systems in order to increase the interoperability of the informatics systems” (O322);
- Operation 3 – “Support for implementing e-learning applications” (O323);
- Operation 4 – “Support for implementing systems, services and electronic applications for e-health and provision of broadband connections” (O324).

The objective of these financing operations is to make available services by using electronic means and to create benefits both for the users and for the public entity that provides the services.

## The financing program’s goals and restrictions

One of the most interesting regulations is the one presented regarding the e-government investments. These investment projects that are financed by the Operation 1 – “Support for the implementation of e-government solutions (including e-administration) and provision of broadband connections”, have to provide at least one public service for the citizens/business enterprises/public administration at a minimal level of sophistication 3.

The 5 possible levels of sophistication are:

- Posting information online;
- Unidirectional interaction: the existence of online forms to be downloaded;
- Bi-directional interaction: the possibility to transmit online the filled forms;
- Complete electronic transactions, including delivery and/or payment;

- Personalization and pro-activity – it reflects the degree to which the available online services respond to the users’ needs. This fifth level of sophistication includes two new concepts:
  - The pro-active delivery of services, which means that the public administration takes action in order to improve on the quality of the provided services and on the attitude towards the user. Pro-activity examples: raising awareness in the users regarding certain measures which they have to take, pre-completion of some of the form’s fields with data already existent in the public administration’s databases;
  - The automatic delivery of the service: the public authorities automatically deliver certain economic or social services that are rightfully due to the citizen/business enterprise, without them needing to request these services. This financing operation has two main objectives that must be addressed simultaneously:
- *To deliver on-line public services* to the citizens/business enterprises/public administrations;
- *To increase by using IT&C means the effectiveness of the public institution’s internal processes* which contribute to the provision of the fore mentioned services.

The dossier that comprises the specific documentation in order to obtain non-reimbursable funding includes a feasibility study with a cost-benefit analysis chapter.

The cost-benefit analysis of an e-services investment project implies the following steps:

- The identification of the investment and definition of the corresponding objectives, including the specification of the reference interval;
- The options analysis;
- The financial analysis;
- The economic analysis;
- The sensitivity analysis;
- The risk analysis.

The cost-benefit analysis’ structure is regulated by the Government Decision (HG) 28 issued on January 9<sup>th</sup> 2008 regarding the approval of the technical and economical documentation’s content-framework for public investments, and of the structure and methodology for the general estimate for investment objects and intervention work, and later detailed by Order 863 issued in July 2<sup>nd</sup> 2008.

The legally regulated structure for the cost-benefit analysis is based on the structure provided by the Working Document no. 4 of the EC, but a major difference is that this European document mentions the use of the cost-benefit analysis for major infrastructure projects. The major projects are considered those projects whose values are larger than 25 M. Euro or 50 M. Euro for the environmental projects.

The Romanian legislation, as well as the Romanian European fund management authorities, failed to capture this essential recommendation, and impose in most cases the cost-benefit analysis regardless of the project’s specifications.

This is also the case of the IT&C investment projects. This situation generated the necessity for establishing a methodology for the cost-benefit analysis for those projects which do not need in fact this analysis.

### **A proposed approach for the financial assesment of e-services investment projects**

The cost-benefit analysis for e-services projects implies an adaptation of the given regulations, alternative which is presented in detail in this chapter.

The first stage of the analysis is the identification of the given project and the definition of its objectives, also specifying the reference interval for the analysis.

E-services projects are projects that implement an integrated informatics system by the public authorities/ institutions/ administrations. This system will provide online public services to the citizens/ business enterprises/ public administrations and will ensure an increase in the efficiency of the internal data processes associated to these services. By correctly identifying the project to be implemented, the defined objectives of this project are also specified:

- To provide public services using electronic means;
- To facilitate the access of the citizens/ business enterprises/ public administrations to the public services provided by the implementing public authority/ institution/ administration;
- To increase the efficiency of the activity of the implementing public authority/ institution/ administration.

Choosing an appropriate reference interval for the cost-benefit analysis is a very important step. In this case, the reference interval is considered to be 10 years after the implementation of the project. This interval is considered to be sufficient for observing the financial coordinates of the project.

The next step in the cost-benefit analysis is the option analysis. This analysis starts with the identification of the existing/ possible options. The options are essentially different ways to ensure the fulfillment of the announced objectives of the project. The choice of the options to be analyzed implies taking into account possible and probable scenarios, some of which are presented next:

- The first option to be considered is not to implement the project, which means that the situation remains unchanged for the entire reference interval, no costs or benefits being produced;
- The implementation of the project with non-reimbursable financing, and in this case there can be taken into account the various technical and functional alternatives;
- The implementation of the project without the non-reimbursable financing.

The difference between the last two options resides in the financial constraint placed upon the implementing public authority/ institution/ administration. It is obvious that for the option that implies the non-reimbursable funding the financial performance indicators will take values corresponding to a much more favourable outcome.

The identified options will then be analyzed by using a decision criterion like the ones that are presented in the following:

- The lowest cost;
- The most advantageous technically;
- The most advantageous economically.

The first two decision criteria imply the one-dimensional analysis of the options by comparing them to each other considering their respective characteristic, be it the

investment cost, or the technical performances of the analyzed system. The latter criterion makes possible a complex analysis of the considered options.

Considering “the most advantageous economically” criterion one, the decision-maker defines certain decisional characteristics that represent his view on the economical value of an analyzed option. These characteristics can be either minimal or maximal and each one has an associated importance coefficient that quantifies its subjective importance. Each alternative is scored/valued by the decision-maker taking into consideration each defined characteristic. Next, the scores are normalized using the following formulas, in order to ensure the possibility to summate them for each of the options:

■ Minimum criterion

$$P(i,j) = (V_{max}(i) - V(i,j)) * P(i) / (V_{max}(i) - V_{min}(i))$$

where:  $P(i,j)$  = the score for criterion  $i$  of option  $j$ ;  
 $P(i)$  = total points associated to criterion  $i$ ;  
 $V_{max}(i)$  = maximal value for criterion  $i$ ;  
 $V_{min}(i)$  = minimal value for criterion  $i$ ;  
 $V(i,j)$  = value associated to criterion  $i$  for option  $j$ .

■ Maximum criterion

$$P(i,j) = P(i) - (V_{max}(i) - V(i,j)) * P(i) / (V_{max}(i) - V_{min}(i))$$

where:  $P(i,j)$  = the score for criterion  $i$  of option  $j$ ;  
 $P(i)$  = total points associated to criterion  $i$ ;  
 $V_{max}(i)$  = maximal value for criterion  $i$ ;  
 $V_{min}(i)$  = minimal value for criterion  $i$ ;  
 $V(i,j)$  = value associated to criterion  $i$  for option  $j$ .

The obtained scores are summated and the total scores are compared. The chosen option is the one with the highest score, this option being the one that is the most advantageous economically for the decision-maker.

The chosen option is then subjected to a *financial analysis* in order to determine the financial performance indicators. Based on these indicators one can justify the necessity and opportunity of the project.

The financial analysis implies the estimation of the benefits and costs and based on these estimations the net cash-flows can be calculated. The indicators to be determined are:

- Net Present Value;
- Internal Rate of Return;
- Benefit/Cost Ratio.

The public e-services investment projects do not generate any supplementary monetary incomes. This is the case because these projects are essentially basic infrastructure and they are necessary because they contribute to a better quality of life.

Usually at this point, the incomes and the costs are determined, but since these projects generate no supplementary incomes, the costs will be supported from the public entity's budget. This is an important observation because it means that, in order to compute the financial performance indicators, we can ignore the incomes and costs.

The following calculations are made:

■ *Net Present Value:*

It's an indicator that quantifies the project overall value on the chosen reference interval (10 years). The utilised formula is:

$$NPV = -IV + NIF + RV$$

Where: NPV = Net present value;  
 IV = Investment value;  
 NIF = Net income flux (which is 0);  
 RV = Residual value.

The following assumptions can be made:

- The discount factor can be considered to be 5%;
- The residual value can be considered to be 30% of the total actualized value of the investment.

■ *Internal Rate of Return*

The Internal Rate of Return is essentially the value of the discount rate that makes the NPV to be zero.

Because the project doesn't generate any net incomes, this indicator shouldn't be computed since for any value assigned to the discount rate the Net Income Flux will be zero.

■ *Benefit/Cost Ratio*

Because the project doesn't generate any net incomes, this indicator *can't be computed*.

The conclusion that can be drawn is that the project is necessary but can't be realised without the non-reimbursable funding.

Analyzing the values of these indicators, one can draw the following conclusions regarding the necessity and opportunity of the investment:

- If  $NPV < 0$  this means that one the considered time interval the investment is not a profitable one, but if we are talking about e-services investment projects that do not generate any incomes, one can conclude that the investment is in dire need of non-reimbursable funding;
- If IRR has a smaller value than the discount rate, which is implicit if  $NPV < 0$ , the conclusion is similar;
- If the Benefit/Cost Ratio is larger than 1, then the opportunity of the investment overweighs the associated costs, making this investment a very attractive one.

The next step in the cost-benefit analysis is the *economic analysis*, which aims to extend the conclusions formulated earlier based on the financial performance indicators. The financial analysis is extended by applying certain fiscal, externalities related and shadow-prices related corrections. For e-services investments this economic analysis is not needed and should not be performed because these projects are not major infrastructural projects and do not generate any additional incomes. Rather one can perform an analysis on the social and economic impact of the project, also describing the promotion methods based on the target audience. This description is essentially a qualitative economic analysis, highlighting the relevant social aspects.

*The risk analysis* refers to indicating the problematic areas of the project, those aspects which can result in not implementing the project in the expected time and with the expected costs. The risks that have to be highlighted are: exceeding the expected costs, external dependencies, management risks.

Following this qualitative analysis one can perform a more quantitative analysis that requires the identification of the probability distributions for the critical variables of the project.

The project's key factors are identified in *the sensitivity analysis*, and for these key factors the financial performance indicators are recalculated in order to assess the impact that the variance of these factors has.

If a modification of the key factors by 1% induces a modification of the indicators by more than 5%, those factors are critical variables of the project. The absence of any critical variables indicates a stable and well structured project.

### Remarks

Performing a complete and adequate cost-benefit analysis requires an interpretation of the general guidelines presented in both the regulatory documents, specific to the financing program, and the existing scientific literature.

The main problem with performing a “by the book” analysis for the e-services investment projects resides in the fact that these projects don't generate any revenues, this making the financial indicators potentially irrelevant, if at all possible to compute.

Considered to be one of the most efficient tools for analyzing an investment project, the cost-benefit analysis was legally regulated, in order to take advantage of its benefits, without considering its purpose and essence. This is why, when using the cost-benefit analysis to analyze an e-services investment, the specifics of the projects need to be taken into consideration with the outmost care.

One way to approach this problem is presented in this paper, with the mention that it isn't the only one, and maybe not even the most adequate, but by having in mind the specifics of the problem (the non-reimbursable funding, the specification of the financing program) this method can easily be used and understood.

### Bibliography

- Boardman, A E; Greenberg, D H; Vining, A R; and Weimer, W L. (2004). *Cost-benefit analysis: concepts and practice* – Second Edition, Ed. Arc
- Purcaru, I.; Beganu, G., and Verboncu, I. (2007). „Some considerations on the Informatio and Diversity Measuring”, *Economic Computation and Economic Cybernetics Studies and Research*, 3-4, vol. 41
- Sacal, B, Badescu, A. V. (2008). „A fuzzy approach to Different Public Acquisitions Procedures”, *Economic Computation and Economic Cybernetics Studies and Research*, 1-2, vol. 42
- Vasilescu, I., Cicea, C. (2004) *Competition of investment projects within the market economy*, International symposium „Alternative Economic Strategies”, URSA Gheorghe Cristea, Ed. Era, ISBN 973-8153-61-1
- \*\*\* (2008). *Solicitant's Guide* - A3-O321;

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