

EFFECTS OF THE RESEARCH PROJECTS ON THE PUBLIC BUDGET

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Abstract: *The efficient financing of the research projects is a main objective for all countries. It is essential to seek support for those projects that provide useful results to the society or results that support progress or which are constructive for the society. Many of the currently funded research projects have difficulties in transferring their results in practice. The research projects must have direct or at least indirect applicable results in order to justify their funding. The evaluation of a research project starts in the moment of its submission then the project continues through out its implementation. To complete the evaluation process it is essential to assess the final results. This paper presents a synthetic analysis of the role that research projects can have on the public budget or how much a part of the budget provided for a research grant returns to public budget with the positive effects on the public deficit.*

Keywords: research project, deficit reduction, efficiency

JEL Classification: G₃₂, O₂₂, O₃₂

1. Introduction

The results of the research projects can be in many forms such as: patents, products, technologies, services, projects, prototypes, drawings, technical books, guides and operation manuals, methods, procedures, articles, scientific papers, etc. (***, 2007). All these results should be

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evaluated and analyzed in terms of how project funding is justified. Cost-benefit analysis can provide important data when taking the decision of funding certain projects (***, 2008). The justification for research project funding requires the recovery of the investment in different forms, not restricted to financial issues, and this involves monitoring the project over its life cycle and a fair assessment of its results. The multiplying effect and the evaluation of the indirect costs (social expenses, consumptions) have a major impact upon the decision for funding.

Thus, an economic dimension, rather than a financial dimension should be considered for assessing research projects. In this context, economic efficiency through its content refers to a double relativity relationship (Gârboan, 2011): on the one hand it requires maximum economic results to a given resource consumption, on the other hand it asks to get a certain amount of results to minimum resource consumption. The character of relativity is also noticeable when several options are compared in time with respect to a certain efficiency threshold.

The investment efficiency (***, 2011) should be considered in relation with the overall interests of the national economy, taking into account the multiple effects that are created up stream and down stream in the applicable field of the research project. It is important to notice here that, at the overall economy level, the efficiency is expressed by the increase of net national product per capita and at the company level efficiency is expressed by the level of labor productivity, unit costs of production, profitability (***, 2007).

During a research project execution and afterwards, depending on the research topic, various economic and social effects occur. The study we have made here aims to analyze the economic and social implications of the research projects both during their performance and after their completion by taking advantages from the research results.

2. Budget analysis

Following the analysis of the current state of economic evaluation of the research projects, arises the need to evaluate all elements influencing a project. Currently, research project evaluation is limited to a small number of indicators, without taking into consideration the persistence of the research results (***, 2008a). The analysis is focused on S&T results of the research (books, patents, prototypes, etc.) (***, 2011a). In order to set up

the budget of a research project, the impact of project results on the economic and social life and its applicability level should be also analyzed.

The evaluation models should include clear and essential elements of the project and take into consideration the multiplier effect of project results. Further more, the social aspect of the research should not be ignored; in which case the result is without financial effects but it has influence under different forms on the social life, adding value to the project.

3. Approach

In order to analyze various stages of a research project it is essential to study the type of costs, their weight factor in the total value of the project, the impact of each cost made within the project and the multiplying effect. In this respect, the research projects have to be selected so that to be representative.

The research projects should be also studied in view of their results, the return of investment, but also during their execution. We have analyzed the research projects using the representative sample method. An ideal situation would be the study of all population representing the object of study. However, in this case this is practically impossible, which is why the sampling procedure has been selected. The multistage random sample for selecting the group of participants in the questionnaire has been considered. The participants in the group are both from research institutes and universities.

The working sample should also include a large number of research projects from various fields. The large variation of the research fields determines higher difficulties in providing the sampling stability. An adjustment depending on each particular field (physics, chemistry, engineering, medicine, mathematics, computer science, biology, geography, geology, environmental science, agriculture, economics, etc.) is required in order to increase the sample accuracy. This analysis establishes the field for which the project is the most appropriate, on national or international levels.

Each project has a research budget distributed on cost chapters. These costs have different shares in the budget depending on the research field, project type and the expected results. Thus, the research projects from the field of human resources have a bigger share on personnel costs comparing with the costs of equipment. On contrary, in the research projects focused on providing equipment, the larger share has the chapter related to capital investment.

All the other cost chapters (sustainable mobility, raw materials, materials, consumables, conference fees, overhead costs, marketing and advertising) have a variable share depending on the research field, expected results, etc. For this chapter of costs we have composed a questionnaire containing 42 questions. The purpose of these questions is to settle a share of cost type that cannot be directly identified.

The questionnaire was delivered to 963 participants, chosen from different research fields. Questions have been formulated in order to identify the weights of the components of the budgetary chapters for which no public data exist and have not been the subject of study before. A number of 112 respondents filled in the questionnaire, representing 11.63% from the universe of population. Taking into consideration a degree of certainty of 95% and a confidence level of 95%, a statistical error of +/- 5%, the number of answers falls into the statistical sample.

4. Results

Following the analysis of the research projects, their budgets express in principal the objective sets. In most of the research projects, human resources (salaries, contributions to the state budget regarding the salary/wage tax, welfare, pension fund, health fund, and unemployment fund) have the larger weight. In the case of projects focused on investments for research, the costs of equipment have the larger weight. To an overall view of the research projects, we have noticed that their budgets include:

- Human resources (salaries and wages, contributions to the state budget, contributions to the welfare fund);
- Sustainable mobility;
- Equipment purchase;
- Raw materials, materials and consumables;
- Conference fees;
- Overhead costs;
- Marketing and advertising;
- Services.

The weights of the costs included in the budget of a research project and their multiplying effects allow an analysis of the manner in which the funding affects both project development and the practical application of the research results. The budgets are prepared depending on the funds set up for financing the research domains and the financing guide drawn up by the contracting

authority. The budget calculation should anticipate the costs related to the project implementation. The cost anticipation should be based on:

- Complete knowledge and deep assessment of all activities, using the activity assessment chart;
- Information on costs from potential suppliers;
- Prognosis of the inflation rate (e.g. the rate used to set up the public budget);
- A desired control margin (e.g. $\pm 10\%$);
- Evaluation of the potential incomes;
- Previous experience.

The budget of the research project is valued by project evaluators by means of its correlation with the foreseen objectives. The mean values during project execution, as they are revealed from the analysis of the sample set of projects, are described in Figure 1, and they show as follows:

- Human resources (salaries and wages, contributions to the public budget, contributions to the health fund) $\sim 17.41\%$;
- Sustainable mobility $\sim 11.70\%$;
- Equipment purchase $\sim 15.66\%$;
- Raw materials, materials and consumables $\sim 13.80\%$;
- Conference fees $\sim 10.98\%$;
- Overhead costs $\sim 12.73\%$;
- Marketing and advertising $\sim 7.89\%$;
- Services $\sim 0.93\%$.

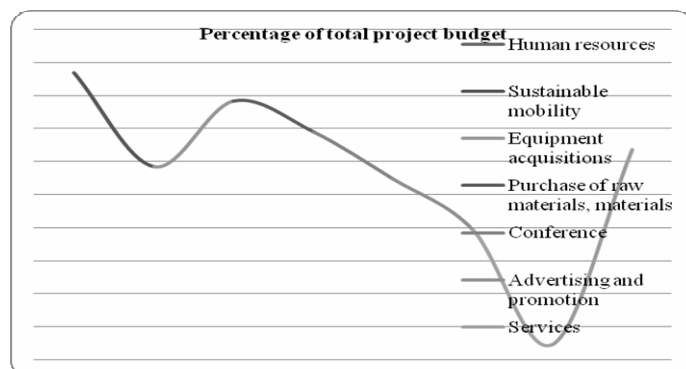


Figure no. 1. The share of each category of costs in the whole project budget

Source: Survey result done by the authors

Each chapter of the budget has economic and social implications, with inferences in the economic environment due to the cash flows generated by the project. For instance, the cost of wages and salaries directly leads to the costs with contribution and taxes to the health and public budget and indirectly determines an increase of the budgetary revenues. The salaries and wages of the personnel involved in a research project return into economic environment under the form of purchase power. This also means the payment of VAT, which represents revenues to the public budget. Another indirect consequence is the profit gained by the economic agent and the tax paid for this profit. Thus, the cash flow generated by a research project budget returns in a major part under the form of budgetary revenues, thus reducing the budgetary deficit and increasing the public investments.

Each budgetary chapter will be found in the form of revenue to the public budget, therefore the investment made by the state in a research project should be analyzed during project execution, too, not only at the end of project, as well as in relation with the multiplying effects of the research results (e.g.: IPRs, innovations).

During a research project execution, part of the project funds is recovered by the state as part of the personnel costs, capital investments, mobilities, consumables, etc. However, any investor that finances a research project will recover in this manner the investment done. Projects results can be further valorized (i.e. IPRs, consultancy services, etc.) and returned to investors in a monetary form. Each research project has a financial and technical risk, usually known even from the project's start phase.

In our study, the research projects in the sample population have been further analyzed taking into consideration commercial and social valorization of the research results. During their execution, the research projects have three essential dimensions:

- The social aspect: the social implications during the execution of a research project depend on:
 - Maintaining or increasing the number of work places;
 - Avoiding the relocation of the investments made in education;
 - Stability of the graduate personnel;
 - Improvement of the educational system;
 - Professional training;
 - The quality of the environment;
 - The environment protection;

- Preservation of the natural resources;
- Equality of chances;
- Involvement of young researchers and women in R&D activities;
- Implementation of new technologies that assure environmental protection and/or lead to the decrease of raw materials, energy consumption and fuel consumption.
- The economic aspect: the economic implications during the execution of a research project depend on:
 - Contributions to the public budget;
 - Contributions to the health fund;
 - VAT;
 - Profit tax;
 - Dividend tax;
 - Preservation/development of trading companies;
 - Maintenance/increase of the equipment production;
 - Maintenance/increase of the production of raw materials, consumables;
 - Maintenance/increase of the purchase capacity;
 - Preservation/development of the companies providing goods and services;
 - Human resource integration according to the specific needs of the activity.
- The technological aspect: the technological implications during the execution of a research project depend on:
 - Implementation of new technologies providing the environmental protection and/or lead to decrease in the consumption of raw materials, energy, fuels;
 - Resource optimization;
 - Increase in the efficiency of processes.

By analyzing research projects considering each component, we tried to establish a weight in the process for each component and the multiplying effects of components, together with their implications.

Following the collection and analysis of data related to the quantifiable effect of all budgetary chapters of a research project, we ascertain that during the project execution occur various effects that

positively influence the public budget, each chapter having larger or smaller positive implications, as presented in the Table no. 1.

Table no. 1. Positive implications on the public budget during the execution of a research project

Component	Positive impact on the public budget [% from the total project budget]
Human resources	10.2
Sustainable mobility	2.8
Purchase of equipment	3.8
Purchase of materials	3.3
Conference fees	2.6
Marketing & Advertising	1.9
Services	2.4
Indirect costs (overhead costs)	4.6
Overall	31.6

Source: according to data centralized in the study

It comes out that human resources have the larger contribution on immediate returns to the public budget, in quota of 10.2%. In addition, appropriate salaries stimulate the interest for achieving efficient results in the project (ex-post implications) and for individual consumption.

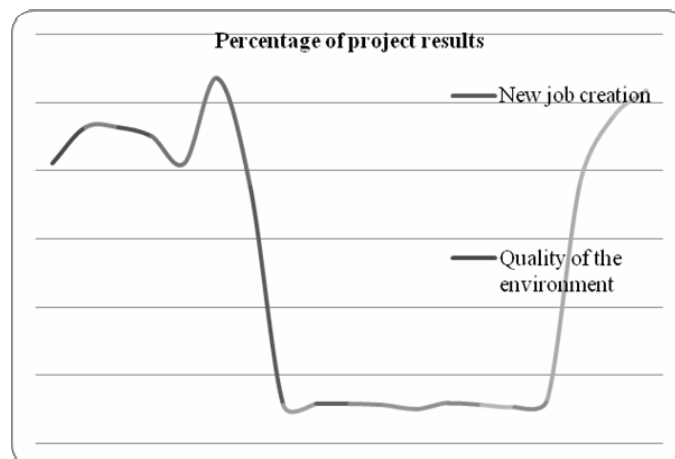


Figure no. 2. The weights of the ex-post results

Source: According to data centralized in the study

The indirect costs (overhead costs) contribute to return on investments in a quota of 4.6% from the total project budget, the share for purchasing research equipment has a contribution of 3.8% and the share for purchasing raw materials, materials and consumables has a contribution of 3.3%. The rest of the budgetary chapters have also a contribution in returning cash to the public budget, which is in average below 3%.

The total value of these contributions is 31.6% from the total project budget. This percentage practically contributes of the public budgetary balance and shows that a research project should be considered beyond usual indicators, which are based on quantifying project results from a scientific perspective.

After the completion of a research project, economic multipliers can be also identified. They vary, depending on the research project type, the scientific results and their implications in economy.

Following the analysis of the ex-post results, as they have been revealed in the questionnaire received from respondents, we have identified the contribution (weight) of each component that contributes to the economic profitability of a research project. These results are presented in Figure 2.

5. Conclusions

Data collected in the survey shows that research projects have direct positive implication on the public budget, beyond the valorization of the ex-post results in various economic activities. We may consider that, during project execution, 31.6% of the project budget is returned to the public budget. In the ex-post phase (project results exploitation) contributions to the public budget is around 27.8% of the project budget, which means that about 59.4% of the project budget is returned to the public budget. Overall, the beneficial effects of a research project are greater in the phase of its execution, both from the perspective of economic value and budgetary deficit reduction.

Subsequently, on the completion of a research project results can be profitably used in the economy and/or have social implications, which is more difficult to calculate in terms of the rate of return on investment (e.g. because the social effects are harder to be economically quantified).

Future work will be considered for setting up quantitative methods able to model mathematically the economic value of a research project.

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