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Suggestions for Improvement of the Methodology of Elaboration and Substantiation of Economic and Financial Investment Projects in Agriculture

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Abstract. *The investment activity in agriculture has a multitude of particularities. Our proposals designed to align the methodology and structure requirements of the European Commission methodology for investment projects in agriculture. To this end we will make a presentation to the requirements of the methodology and then, using a case study, we demonstrate both the applicability and superiority in relation to the methodology currently used at the moment here.*

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1. Requirements cost-benefit analysis for projects financed by FEADR Program

This analysis is based on Working Paper no. 4 European Commission - Directorate General for Regional Policy (www.ec.europa.eu/regional_policy), which is a guide for developing cost-benefit analysis for projects to be co-financed by ERDF or Cohesion Fund during 2007-2013. The objectives of cost-benefit analysis are:

- to determine the extent to which the project contributes to regional development policy and, specifically, the objectives of priority axis in which the funds requested;
- to determine the extent to which the project needs of ERDF co-financing for financially viable.

To estimate the economic, social and environmental impact of the project we operate with assumptions which introduce a number of uncertainties. Therefore a risk analysis should be included in cost-benefit analysis. In the risk analysis there will be included the measures to minimize the negative impact of certain risks. These measures may introduce evidence of additional expense, which means a reversal design.

Once identified target groups, the conditions and the project needs, the objectives are clearly established. Different types of solutions will be evaluated according to the extent they can help to achieve the objectives. It must be shown that the selected and developed solution of the project is best suited to achieve the objectives. It is necessary that the objectives be more clearly defined and their corresponding indicators properly quantified because they are elements of analysis.

For investment projects in agriculture it is necessary to determine effectiveness and to consider two levels: at the investor level (micro) and at the national economy level (macro).

Efficiency investment project at the micro level is the goal of financial analysis, where assessments are made on the position of investor interests, which achieve a maximum return on their allocated funds.

In the financial analysis to determine revenue and expenses there are taken into account taxes and any budget subsidies, and prices are that ones on the market both for products in the country and for the import teel ones. In the financial analysis the following categories of problems are approached: the optimal structure of financing sources, analysis of self-financing capacity, return on capital invested.

Economic analysis approaches the project's efficiency from the company's interests point of view. It aims to substantiate timeliness and effectiveness of

the project by comparing the total effort made to build overall objective and the results obtained. Unlike financial analysis, the market costs are calculated without tax consideration, the prices used are those established on domestic under competitive conditions, and if they are missing world market prices are used. Synthetic criterion for assessing the efficiency of investment projects is national project profitability, based on net present value and internal rate of return. In this respect, besides the quantitative effects the project generates, social and economic aspects are considered: coverage of needs for the poor sectors of the economy, labor absorption, etc.

1.1. Financial analysis (Financial cost-benefit analysis)

As noted in the methodology cost-benefit used by the European Commission for co-financing investment projects the financial analysis and economic analysis are applied.

The main objective of financial analysis is the calculation of financial performance indicators project, that it the investment profitability allocated to the project beneficiary. This analysis is developed normally, in terms of the legal owner or manager of infrastructure. There are cases where the owner and operator of infrastructure are not the same entity (Delegated management). In these cases a consolidated financial analysis will be further developed as would be the same entity.

The method used in developing financial cost-benefit analysis is the "discounted cash flow net". Unforeseen expenses in the general estimate of costs will be considered only if they are included in the eligible project costs. Specifically, they will not be counted in determining the need for funded, as long as there is not an effective cost, but a measure to mitigate some risks.

The horizon of analysis recommended for projects funded through this type of action is 20 years. Recommended discount rate is 5% financial analysis.

Analysis will be achived using in the incremental method. When it is difficult or even impossible to determine costs and revenues in the statement "without project", European Commission recommends that no project scenario to be considered as that with "no infrastructure", meaning that revenues and operating and maintenance costs to be considered for all infrastructure, not only for the portion rehabilitated, modernized by the project.

Financial analysis will assess in particular:

a) the financial profitability of investment and proper project invested contributions determined with net income indicators calculated on the total investment value noted with VNAF.

b) internal rate of return calculated on the total investment value (RIRF). Total investment value includes both eligible costs, and those not eligible in the estimate of costs.

Profitability of own contribution invested in the project are determined considering only its contribution to the project measured by net income for updated financial analysis of capital investment (VNAF/K) and internal rate of return on invested capital (RIRF/K). In this case its contribution is considered when it is actually paid (for example, a loan repayment case).

Optimal amount of financial assistance from the Structural Funds is established by the level determined for RIRF/K and VNAF/K. If two values are very good indicators this means that the proportion of funding was reimbursed more than necessary.

Financial sustainability of the project in terms of financial assistance from the Structural Funds is evaluated by checking the cumulative cash flow net. This must be positive in each year of the analysis. In determining the cumulative net cash flow all costs (eligible and ineligible) and all funding sources will be considered.

1.2. Economic analysis (economic cost-benefit analysis)

Economic analysis measures the economic, social and environmental impact of the project and evaluates the project in terms of general society interests. A project is not always necessary and desirable. Therefore, where appropriate, economic analysis will be accompanied by a study on the availability of target groups (people) to pay for services provided by infrastructure constructed/rehabilitated/upgraded by the project. There have to be taken into account, where applicable, factors such as endurance tariff for population or environmental costs (applying the "polluter pays" principle).

The basis for developing an economic analysis is financial analysis tables. To determine economic, social and environmental performance aspects of the project it has to be accomplished a series of corrections for both costs and incomes, such as:

a. Tax corrections applied to indirect taxes, if were included in costs (eg VAT, when it was included in eligible costs and/or operating and maintenance costs, as employer obligations regarding wages, or any grants if they were included in costs). The requirement is imposed by the fact that it constitutes income to the state/local budget.

b. Corrections for externalities refers to the effects of the project in its environment and economy and must be considered as:

- Adverse effects which are included in the analysis of economic cost position can be:

  - during construction. For example, during construction of a road the traffic is diverted, leading to delays of half of an hour for all vehicles;
  - during the life of the project. For example, a new route will increase pollution by emissions from vehicles passing on this road, like in any traffic increase case.
- Positive effects which are included in the analysis of economic benefits position can be:
  - during construction. For example, a number of temporary jobs that are offered during construction;
  - during the life of the project. For example, reducing emissions, reducing energy consumption in case of thermal rehabilitation of a hospital or school, increased land value due to design, increasing the number of SMEs, etc.

These positive effects are found in the impact indicators (those related to general objectives).

All these effects are divided into:

- economic (growth of indirect revenue, additional indirect costs);
- social (reducing unemployment, the number of jobs lost, the number of displaced people, etc.);
- environment (increase/decrease pollution, as appropriate)

c. Corrections to transform the market price into accounting prices (shadow prices). In many cases market prices do not reflect the true prices of goods, being distorted by subsidies or other protectionist policies. Thus, the amounts included in the financial analysis hides these issues and the formed image is wrong in terms of company. These distortionary elements such as custom duties will be eliminated from the economic analysis.

Moreover, shadow prices should reflect opportunity cost and consumer willingness to pay for goods or services provided by that infrastructure.

Shadow prices are calculated by applying conversion factors on prices used in financial analysis. They are determined separately for labor force (taking into consideration the area unemployment rate) and for goods that are marketable (taking into account, for example, custom duties and various export subsidies).

The discount rate used in economic analysis is called the *social discount rate.*

For the period 2007 - 2013 Commission recommended a discount rate of 5.5% for social cohesion countries, hence, for Romania too.

Every project must assess the following economic indicators for the full value of the project:

- Net Economic Update (VNAE) - it must be positive;
- Economic Internal Rate of Return (RIRE) - it must be greater than or equal to the social discount rate (5.5%);
- Report Benefit/Cost (B/C) - it must be greater than 1.

Projects that do not meet these conditions have not relevant impact, hence are not important and will not receive structural funds.

1.3. Risk analysis and sensitivity

Risk analysis and sensitivity will be made and included in the feasibility study for all projects, regardless of their total value.

In accordance with 40 (e) of Regulation no. 1083/2006, cost-benefit analysis should include a risk assessment. This will be done in two steps:

a. sensitivity analysis, in which the *critical variables* are identified; the financial and economic performance of the project will be analyzed when their values can vary by plus or minus 10%. What we are trying to determine are the values that influence the stability of the project, ie the conditions under which the net present value reaches zero (Ie: what is sensitive project, it is calculated for both VNAF, and for VNAE).

b. risk analysis will take into account the probability that the critical variable that will change as we estimated in sensitivity analysis. Different statistical methods will be used and probability distribution of financial or economic indicators will be determined. It is not always possible to determine the likelihood of change by a certain percentage of the value of critical variables and therefore we can not always develop a risk analysis based on sensitivity analysis. In these cases a qualitative risk analysis will be made.

2. The proposed indicators for efficiency and financial merits of investment projects in agriculture

In analysing the efficiency of investment projects, an important tool of investigation is the economic indicators. They are designed to reflect the actual contents of numerical parameters that characterize the project under consideration, relationships and correlations between parameters, their evolution over time. The indicators for calculating the efficiency of investment use, therefore, qualitative and quantitative characterization of the degree and level of recovery of investment resources, each version of the project, thus ensuring a proper foundation of investment decision.

Indicators used in calculating the efficiency of investment projects for agriculture must be designed to meet the following fundamental requirements:

- to provide information to land owners to enable them to know the amount of investment required, annual operating costs, increase predictability of economic impact, cost savings by making the investment;
- provide decision-making bodies, particularly creditors, sufficient informations on the opportunity and return on investment for enforcement work designed, the possibility the required loans be rendered;
- to provide useful information to judge whether the investment decision in relation to other design objectives in other sectors of national economy and abroad are suitable.

2.1. Dynamic indicators used to substantiate the efficiency of investment projects in agriculture

Dynamic indicators are based on updating efforts and investment effects, action that ensures comparability of efforts, evidenced during the building project, with effects obtained during the operation.

Updating method is based on the following reasoning: a *leu* invested today, early period, in a productive activity undertaken with a certain efficiency (a) is equivalent in more than one year with an amount greater than a *leu*, so 1 = 1(1+a), where a is the profit achieved in the activity for which the initial amount was spent. Reinvesting this amount next year is obtained 1(1+a) (1+a) = $(1+a)^2$, which after h years becomes $(1+a)^h$. It follows that an investment made today by a *leu* equals over h years not with a *leu*, but with a sum of $(1+a)^h$.

The expression $(1+a)^h$ is called factor of fructification and it is used for comparability of amounts currently past or present in the future. When we want to equate the future amounts currently one uses the discount factor whose mathematical expression is:

$$\frac{1}{(1+a)^h}$$

Among the indicators that are part of this class, the methodology we will use in this case study includes the following: total expenditures to date, updated investment recovery period, the economic return on investment updated index of profitability of investments, net income update report revenue costs to date, internal rate of return.

Updating technique involves using a discount rate expressing the annual efficiency with which a unit value is used and is determined from a basic size that can be achieved the average profitability in the industry which includes

project analysis or average Bank Interest on loans, plus a risk factor and any inflation factor.

2.2. Our opinion on setting the discount rate

Should make it clear at the outset that the size of the discount rate has a decisive impact on the results, and therefore the investment decision. The higher it is, the indicators calculated value is diminishing and, therefore, some projects will be eliminated. In our opinion choosing the discount rate is subject to the investors financial situation. Thus, if the necessary investment is provided from its own sources, size is determined by the rate of return on average invested funds during the period immediately prior to the project. Discount rate, however, needs to be greater equity loan interest rate money market. Instead IRI (Internal rate of return on investment) must be greater than the discount rate for that amount of cash flows generated by the project to be positive. When funding is attracted to sources, the discount rate should be dimensioned to a size weighted average cost of different sources of capital, which will add a risk.

If the revenue streams generated by the project shall be taxed at a rate r_i, the discount rate is the minimum that can be accepted: a = d (1- r_i), where "d" is the interest rate on borrowed capital. The apparent size of that rate results from the fact that investor saves, in this case, part of taxable income by deducting financial expenses due.

There are other views on the definition of the size the discount rate. Some authors suggest the opportunity cost of capital rate, ie the last units of investment profitability possible at a cost of capital. Although it seems a good solution, this method is impractical, whereas determining the opportunity cost of capital is difficult.

2.3. Economic content and relations of calculation to determine the effectiveness of proposed indicators of investment projects in agriculture

1. *Updated total expenditures (K_{at})* - expresses the total expenditure which an investor does to achieve expected levels of use values. The calculation includes investment and operating expenses (in new targets) or as annual bonus (at modernization development projects). Therefore it is desirable that the total discounted costs are minimal. To establish the annual growth rate of expenditure it must be taken into account comments made under this section on additional costs after the project.

$$K_{at} = I_t + \sum_{h=1}^{De} Ex \frac{1}{(1+a)^{h+d}} ,$$

where:

It – total investment;
De – operating efficiency of the project duration;
Ex – annual operating expenses;
h – reference year (h= 1,.., De +d).

2. *Updated investment recovery period* - expresses the time after which the investment is recovered in annual profit growth achieved by commissioning and operation of facilities. It is a very complex indicator, with a large reflection capacity of efficiency. Any investor is interested to know after how long can recover invested capital based on net income, to begin a new investment. The updated form is determined by the formula:

$$It^{ac} = Ph\frac{(1+a)^{Tac}-1}{a(1+a)^{Tac+d}}$$

where:

T^{ac} – updated recovery period
Ph – annual profit.

Updated recovery period is determined by logarithm and will be chosen that option for which this indicator is minimal.

3. *Updated economic efficiency for Investment* - is one of the most complex investment efficiency indicators. it expresses how much cash net profit updated on entire lifetime investment objective is at investment update. In case of land improvement project it is taken into account annual profit growth. The project variants which will be chosen is that at which the indicator level is the highest.

4. *Investment profitability index* (Ipi) - expresses how much updated net income is obtained at updated investment. Between two or more versions of project it is preferred that one with the highest level. Relationship indicator is calculated:

$$\text{Ip} = \sum_{h=1}^{De}(Vh-Ih-Ch)\frac{1}{(1-a)^{h+d}} / \sum_{h=1}^{d} Ih\frac{1}{(1+a)^{h}}$$

where:

Vh - annual revenue
Ih - annual investment
Ch – annual expenditure
a – discount rate

h – reference year.

5. *Updated net income (VNA)* - expresses how much updated net income the investor will get from building and operating effectively during the project life. For new projects, the calculation formula is as follows:

$$VNA = \sum_{h=1}^{De+d} (Vh - Ch - Ih)\frac{1}{(1+a)^h}$$

For development, modernization and land improvements, works pointer consists of net revenue growth of the plant and the average annual savings resulting from elimination of damage to be recorded prior to development.

$$\Delta VNA = \sum_{h=1}^{n+d} (\Delta Vh - \Delta Ch - Ih)\frac{1}{(1+a)^h}$$

where:

ΔVh - total annual revenue growth

ΔCh -total annual costs growth

ΔIh - total annual investment growth

ΔVNA - updated net income growth

a – discount rate

h – reference year.

Remember that, in calculating the indicator, the depreciation of fixed assets is not included in costs to avoid double counting (at the time of purchase as investment, then during the period of operation of the asset as depreciation allowances).

In terms of efficiency, according to this indicator, it can be acceptable alternatives to the VNA greater than zero. We consider that this indicator is most important, as expressed directly to any investor's objective - to obtain a maximum net income. However, it should it be considered a volume indicator, and it doesn't make a comparison between effects and efforts.

6. *Internal rate of return on investment (RIR)* - expresses the rate of discounts for total revenues equal total costs, that is the discount rate for which project profit is zero. IRI calculation can be done by graphical representation, established itself for a positive net income properly updated at a minimum discount rate (a_{min}) and a negative net income properly updated at a maximum discount rate (a_{max}).

$$\text{RIR} = a_{min} + (a_{max} - a_{min}) \times \frac{VNA_+}{VNA_+ + |VNA_-|}$$

Compared with the VNA, internal rate of return has some limitations, due to the fact that annual flows are discounted at a rate which doesn't express the opportunity cost of capital.

It is indicated that the selection of investment projects based on RIR to take place by comparing the efficiency obtained in similar economic objectives.

7. *Cost-income ratio.* For this indicator, the projects are accepted if the ratio is higher or at least one. The calculation formula for the indicator is:

$$\frac{V}{C} = \frac{\sum_{h=d+1}^{d+De} Vh \frac{1}{(1+a)^h}}{\sum_{h=1}^{d+De} (Ih + Ch) \frac{1}{(1+a)^h}}$$

where:

V = income, C = cost.

In projects practiced in agriculture it is necessary for this report to be substantially higher than one, because here the risk of failure to forecast the revenue is increased than in other branches.

We appreciate that the indicator is very suggestive in expression efficiency, whereas sets the increase of the net effect updated that will be obtained per unit of effort all updated.

3. Conclusions

Practical activity shows that these methods and their results can lead to contradictory decisions, as the various projects compared are often times incompatible in that:

- projects which necessitate the same capital expenditures have different functioning periods;
- project which have the same functioning period have different initial capital costs;
- projects which differ both in their functioning period and in their initial capital costs.

French economics M. Levasseur recommends only the VNA (*Updated net income)* methods, as it applies the fundamental economic principle according to which a project must be accepted if it bears superior profitability, that is, marginal income superior to marginal cost. The idea which dominates this thinking is that of rationality, or of the project which makes the biggest contribution to increase the company's worth.

Contrary to this opinion, it can also be mentioned that no solution is truly imposed. Thus, on the one hand, financial methods express different objectives of a company, like VNA (*Updated net income)* targets yield or project value maximization; the term of maturity expresses the investor's interest in earning liquidity as soon as possible and, on the other hand, all the above-mentioned methods conflict with each other in one aspect or another.

Consequently, the investment decision must be compatible with the company's objectives, as well as with the project objective, which makes any profitability analysis of the project have multiple criteria.

In our opinion, the specificity of investment projects in agriculture must also be found in the methodology of elaboration and economic and financial substantiation of investment projects in this field in order to correctly evaluate their efficiency.

From the points made above we can conclude that the investment activity in agriculture has a multitude of particularities which makes the economic and financial substantiation of investment projects in agriculture a tedious process. The complexity of the system of assessment indicators of farm performance and that of agricultural investment project efficiency both support this idea.

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