PARTICULARITIES IN THE FIELD OF THE ANALYSIS OF INVESTMENT EFFICIENCY IN HIDROAMELIORATIVE IMPROVEMENTS

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In the evolution of society, investments have always had a primary role in best satisfying the material and spiritual needs of its members. Throughout the centuries, every country's economic and financial evolution has depended on the investments' volume and efficiency. The correlation between investments and modernization is fundamental for any economic activity, regardless of the branch in which it may be carried out. Promoting economic and technical progress is a vital condition for the economy of our country and also one of the most important ways of enhancing competitiveness, by means of large investment funds. Thus, the necessity for investment processes justifies the thorough evaluation of investment projects.

Key words: *efficiency, investments, hidroameliorative improvements.*

I. Introduction

A correct determination of the efficiency of investments made in hidroameliorative improvements involves taking into account all the effects generated by the investment project. Any omission may lead to a diminution in efficiency, and thus, to making a wrong decision. Although no problems occur when calculating annual production profits, as they can be determined precisely, there are often issues concerning the quantification of the results obtained after damage elimination.

A particularity of the calculation and analysis of investment efficiency in agricultural investment projects, especially in hidroameliorative improvement projects, are the investment efforts made besides the investment process. Thus, for obtaining the effects mentioned earlier, efforts additional to the initial investment made for land improvement (e.g. irrigation) are necessary, efforts consisting of subsequent investments for covering agrotechnical, ameliorative and agropedoameliorative expenses. During the exploitation period of the irrigation works, for instance, they depreciate, thus increasing ameliorative expenses and shrinking net economic effects by the following means:

- Flowing canals shrink in depth because of alluvial deposits, thus losing discharge and preventing the irrigation project to go ahead as initially planned;
- Parts of the canal modify their slope, and therefore the water discharge doesn't reach the initially foreseen quota;
- Replacing deteriorated irrigation installations;

All these supplementary expenses must be taken into account when calculating efficiency indicators. They need to be compared with the achieved economic effects, with the net supplementary income and with the savings obtained before and after the investment was made.

The total investment being given (I_t), the annual effect profits (ΔE_{ff}), and the arrangement period, the project's efficiency can be established by the following equation:

$$E = \frac{\Delta Eff}{It}$$

This way of calculating investment efficiency can also be found in other economic branches, but it is used more often in agriculture, characterizing hidroameliorative improvement projects. This

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explains the fact that, when determining the efficiency of this sort of investment, the "with and without an investment project" method is always used. Its application here, however, occurs in different contextual circumstances compared with other branches, due to the length of the period necessary to carry out and adapt hidroameliorative improvements.

In the "without a project" case scenario, the calculations must rely on the present situation and on the existent structure, work force, mechanization degree, efficiency, etc,
as well as to take into account the possible annual production growth as an effect of certain improvements, independent of an investment project (the possible usage of ameliorated species, fertilizations, the correct execution of works, etc). The efficiency calculations in the "without a project" case scenario mustn't be static, but dynamic, bearing comparison with the "with a project" case calculations.

In the "with a project" case scenario, the probable evolution is mainly conditioned by the financial and technical means used. Irrigations, for instance, are very costly and are done in several phases throughout a longer period of time. Thus, in a primary stage, the water must be brought onto the cultivator's property (natural or juristic person), which must be arranged for irrigation. Then, during the adaptation phase, the assortment structure can be changed. Following these works, which are generally sponsored by the state and are to be recouped from the taxes on the used water, the private entrepreneurs also execute a series of activities and make investments in improvements such as:

- The preparation of the field for irrigations (leveling, embankments, getting the aspersion installations);
- The development of funds for buying fuels, pesticides, fertilizers, and salary supplementations;
- The development of the material base (silos, storage facilities, stables, machines for agricultural mechanization) etc.

The realization of these private investments usually takes a long time. Likewise, the growth of the incomes is also conditioned by other factors, such as the human and financial ones, which we must take into account when calculating the future income of the exploitation and its evolution on the analyzed horizon. Also, we must take into account the fact that the length of the period of time following the importation of the water and prior to its utilization depends on the farmers' degree of professionalism in making irrigations and in their results.

An important factor upon which lies the length of the period in which the land improvement projects reach the parameters projected to the incomes is also the financial one. The adaptation period will be shorter if the necessary funds are available in due time.

The length of the period of effective materialization of the investments and also of adaptation for obtaining the desired effects is thus calculated in a dynamic way, dependant of the available resources, of the possibilities of accumulation of capital and of the agro-technical demands.

2. Supplementary methodological elements for calculating indicators

The determination of investment efficiency in the case of projects for new irrigational improvements (as in the cases of other land improvements), must be made by rigorously respecting certain supplementary methodological elements for calculating indicators. The most important of these elements are:[1]

- The equivalence of the surfaces of the studied perimeter for both situations – before and after the arrangement. The raw surface to be arranged includes, next to the fields which are effectively cultivated, the space for the irrigational improvements.
- In the case of fields which are owned by several categories of owners (individuals,

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[1] Ion Ionita, Gh. Blidaru – "The efficiency of investment in agriculture", CERES, Bucuresti 1999

associations, firms, etc), calculus elements such as the average production per hectare, the value of the investment, the surface, etc, must be presented distinctly for each category of owners.

- The average productions taken into account, for both situations, must be normal, meaning those which can be obtained in normal conditions.
- In order to have a correct image of the efficiency, the precision with which the productions obtained off the irrigated lands using agro-techniques and optimum irrigations are provisioned is very important.
- When evaluating the vegetal production, next to the main production, a secondary and a double culture production must be included, which are to be taken into account for their high value and importance to the live-stock sector. The secondary production is also taken into account when calculating the costs for the cultures which generate it (wheat, corn, etc), and their value. When establishing the production value, the same prices will be used for both situations, so as not to influence the results.

The calculation of the production profit after the irrigation arrangement must take into account the fact that this is also determined by the following changes:

1. The increase of the arable and of the cultivated surface as a result of the transformation of unproductive or low-productive terrains into normal ones;
2. The structural improvement of cultures, through an increase in the number of surfaces cultivated with plants which, in the presence of irrigations, result in high productivity and profitability.
3. The growth of the production rate per hectare for all the cultures, as a result of the use of agro-techniques and optimum irrigations.
4. An increase in the number of surfaces with double cultures.

- The investments which are taken into account when calculating efficiency indicators are those which create a maximum economic effect. As a result, if all these investments have not been included in the general estimate of the project, the projector will have to calculate and add them to the total investment. For example, if the planting of an orchard is foreseen in a newly irrigated perimeter, and the investment in the plantation itself is not included in the general estimate of the irrigation works, it must be included in the efficiency calculations, because it too contributes to the economic effect registered in the perimeter after the arrangements. In the same case, the efficiency calculations must also include the investments made for territorial organization (access roads), as well as the endowment of the exploitations with the equipment, installations, storage facilities, etc necessary for a normal development of the production process in the new conditions created by the irrigation system, so that the foreseen profits can be achieved. The same must be done about fallowing process for example, which are only necessary on small, scattered areas within the perimeter, if they have not been proposed by the projector with a view to improving the land structure and obtaining normal crops.

This shows that the total investment necessary for a new irrigation arrangement for vegetal production must include not only investments in land improving works, which are foreseen in the general estimate, but also investments unforeseen in this, but which are absolutely necessary for obtaining effect profits, and credit interests. The total investment is split between the land owners and insurance sources.

3. The system of indicators used in the evaluation of investment projects for hidroameliorative improvements

The necessity for substantiating economic decisions upon rigorous calculations derives from the limitedness of resources as well as from the possibility that an activity or an investment project be realized through several solutions that are differentiated by a series of parameters such as the specific intakes of natural resources, the work productivity, the factor efficiency, etc. But to choose the solution which insures the realization of all the objectives foreseen in the project with a minimum intake of resources, calculations and analyses of economic efficiency are necessary.

A. Investment efforts include all the expenses for the social work necessary for the realization of the investment objective, as well as the equivalent value of the economic effect losses which register through the elimination of some fields from the agricultural circuit and through the immobilization of the investment funds throughout the accomplishment of the objective. Concretely, in the structure of the "I" investment effort for hidroameliorative improvements are included the following:

$$It = Id + Icol + Icom + Eim + Tv + D$$

Direct investments (I_d) are calculated using estimates on calculation articles and estimates on categories of works, which are then registered in the general estimate of the technical project in chapters I-IV. In the case of hidroameliorative improvements, direct investments include:
a) The investments for the actual realization of the hidroameliorative improvements:
- Expenses for studies and field research;
- Expenses for the elaboration of project efficiency studies;
- Expenses for the projection work and the elaboration of execution details;
- Expenses for the acquirement of objects, installations and equipment necessary for the realization of the project;

- Expenses requested by the hidroameliorative works (dams, accumulation lakes, irrigation canals, draining networks, soil conservation works, headquarters, etc)
b) The value of the terrains permanently or temporarily removed from the agricultural circuit by means of occupying them with the objects and installations of the hidroameliorative system.

For determining the value of these terrains, the agricultural surface which is permanently occupied by the projected works (the width of the dams, the emplacement of pumping stations, etc), must be established upon certain medium indicators from the arranged surface, which vary according to the type of the work (damming, draining, irrigation). The calculations for the surface permanently occupied by the hidroameliorative works are done for all the elements included in the works, divided into usage categories and fertility classes. For determining the value of these terms the price of sale per square meter is applied to the established surface or, alternatively, the net agricultural income loss is calculated and to it are added the expenses necessary for returning the field into the farming circuit after the dissolution of the hidroameliorative objective, in case it has a limited lifespan.

The calculations for determining agricultural income losses can be done as follows[2]:

$$Y = \sum_{h=1}^{De} VNA_{ha}(1+i)^h \cdot S \qquad (1)$$

$$Y = VNA_{ha}(1+i)^h \cdot \frac{(1+i)^h - 1}{i} \cdot S \quad (2)$$

where:
Y is the net agricultural income loss;
VNA_{ha} – annual net agricultural income per hectare;

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[2] Ion Ionita, Gh. Blidaru – "The efficiency of investment in agriculture" CERES, Bucuresti 1999

S – the surface (ha) removed from the farming circuit;

i – the annual growth rate of the net agricultural income;

De – the time period, in years, during which the terrain is removed from the farming circuit;

The second relation, (2), is used when the value of "i" remains constant throughout the "De" period.

The equivalent value of the income losses from the lands that have been temporarily removed from the farming circuit is established upon the rent paid for these terrains throughout the execution of the works, to which the eventual production losses are added, if any crops have been damaged by opening the work place. The two relations are also applicable.

Collateral investments

This category of investments, for agricultural ameliorations, includes the expenses needed beside the project, respectively in the development of a technical and material base in farms – including the creation of new secondary branches of the agricultural production – for the revaluation of the favorable conditions created by the investment objective and for obtaining profit. The following categories of expenses must be taken into account:

▪ The endowment of farms with supplementary production means for insuring an optimum exploitation of the improved lands. This category includes the investments made by farms to increase the number of tractors, transport machines, to extend storehouses, to construct roads, etc.;

▪ The creation of new cultures in the agricultural production as a result of the adequate conditions obtained through hidroameliorations.

Common investments

In the case of hidroameliorative improvements, the efficiency of the investments is established for each object and service solicited by the beneficiary and foreseen in the projection theme.

The economic effects of the investments and those of the exploitations cannot, however, be clearly delimitated upon these elements as they are formed by an entire complex of land improvement works. There are also certain works to which the effects can be established precisely, but it is only the case of those resulted from direct investments. For example, it's the case of irrigation works, draining works, damming works, etc., but even here, the effects of collateral investments, which play an important part in obtaining the economic effect foreseen by the direct investments, as previously shown, cannot be established completely. In some situations, economic efficiency calculations are necessarily made on natural zones (terrace, waterside, etc.), or on secondary branches of agricultural production, such as the development of livestock, which necessitates arranged terrains for enhancing the fodder production.[3]

The effect of the immobilization (E_{im}) represents the net income loss that the investor registers as a result of the immobilization of the investment funds during the project's edification. These losses are included in the total effort and recovered with the investment. Their value can be calculated using the following relation:

$$E_{im} = \overline{M} \cdot d \cdot e,$$

$$\overline{M} = \frac{\sum_{h=1}^{d} I_d(d - h + 1)}{d}$$

where:

M is annual average quantity of the immobilizations;

d – the period of time during which the objective is carried out;

e – the investment efficiency coefficient (shows how much net income in lei is obtained per year from an investment of one leu);

h – the reference year (h= 1, 2 …, d).

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[3] Ion Ionita, Gh. Blidaru – "The efficiency of investment in agriculture" CERES,Bucuresti 1999

Customs duties (Tv) are included into the investment effort when imports are made for the construction of the objective.

Interests (D) appear in the case when the beneficiary contracts credits for making the investment.

The last two elements of the total effort usually do not appear in the general estimate, but are included in the direct investment.

B.   The investment effects include the financial, economic and social results foreseen to be obtained through the objective's realization and function. The effects act mainly as a consequence of the investment efforts, factors which bear economic and social effects concerning the beneficiary of the investment and the society during the objective's working period.

A classification of an investment project's effects highlights several categories:

- Economic effects;
- Social effects (the creation of new jobs, an increase in the level of social assistance, an increase in the supply of agricultural products on the market, etc.);
- Political effects (an intensification of the country's participation in the world circuit of values, an increase in the country's economic and political independence, etc.);
- Ecologic effects, etc;
- Some investment effects are not value quantifiable and this is why they need to be taken into account in the analysis phase in order to choose an optimum option and to make the right investment decision.

- In the case of land improvement projects, the quantifiable effects which are included in the economic efficiency calculations fall into two categories:
- Supplementary **incomes** obtained from the agricultural production profits registered after the investments;
- **Savings** resulted from the removal of certain natural deficiencies or organizational shortcomings of the activity which occurred before the investment. Certainly, beside these quantifiable direct effects there are also others, which are either intangible or unquantifiable and which appear in other branches of the economy as well as in the social and political environments.

Conclusions

Although all the methods of investment efficiency evaluation are applicable, none can completely express the project's efficiency. This is the reason why a project's economic and financial substantiation must necessarily be the result of the use of several methods, among which the intern profitability rate, the profitability index, the actual net income and the retrieval term are vital.

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