# EFFICIENCY OF USING RECLAIMED LANDS

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## Contents



## Summary

Irrigation and drainage of land contributes towards increasing its productivity as well as expanding the area of arable at the expense of unproductive land.. This permits an increase in national food production and consumption of agricultural products, thus reducing migration and unemployment.

As finance for such projects is limited, it is necessary to evaluate their efficiency both from the beginning and at the end of the investment period. Investment decisions are based on evaluation and comparison of investment opportunities, and future income and expenditure. Investment analysis uses simple methods—those evaluating PP, ARR—and more complicated ones based on discounted evaluations—calculating NPV, PI and IRR. Different evaluation methods used together give the most accurate result. The evaluation of real efficiency of meliorated lands is done with the use of data obtained during the realization of investment projects.

Methods of calculation of economic efficiency of investment projects can be broadened and extended to evaluate expenses and results with financial, economic, social and ecological objects in view.

## 1. Significance of Land Reclamation

As humanity is not producing enough foodstuff, irrigation, drainage and flood control

must play a significant role in promoting self-sufficiency of food in many countries of the world. During the last half of the twentieth century, according to FAO, the area of irrigated lands expanded by more than 2.5 times, a rate of expansion which could be considered too great.

According to UNIDO the main objects of state investment in irrigation and corresponding agricultural development projects are: raising of agricultural production; redistribution of incomes; increase of incomes and consumption in the poorest social groups (peasants); increase of consumption in some backward regions, and reduction of migration and unemployment.

## 2. Evaluation of Possible Expansion of Arable lands

To select lands suitable for irrigation projects the following indicators are used:

- land productivity index;
- net farm income;
- net profit gain due to irrigation.

Land productivity index is the ratio of productivity of the land in question to that of the best lands. Land productivity can be present-day as well as future potential.

Net farm income is the difference between total return and total variable and constant costs. It is usually estimated for the situation when the project has not yet been carried out, as at the initial stage of the research the expenses of irrigation are unknown.

Net profit gain due to irrigation measures potential increase in productivity per land unit after the project has been developed. It is estimated as the difference between previous returns and the returns after the irrigation project has been carried out.

## 3. Peculiarities and Principles of Efficiency Evaluation

One of the peculiarities of the investments in meliorative systems is the fact that such systems are partly financed by state, particularly the construction of infrastructure such as reservoirs and main canals. So it is necessary to determine the efficiency of investments in three aspects: commercial, budgetary and economic. Commercial efficiency shows financial consequences of the project realization for the participants. Budgetary efficiency shows the consequences for federal and local budgets. Economic efficiency shows financial, social, ecological and other consequences all in all. Usually it is determined for large-scale projects which can bring benefit to many farms, regions and even the whole country.

By common practice, the main approaches to the efficiency evaluation of investment projects are the following:

- comparison of future integrated costs and results with the achievement of necessary income rate;
- calculation of project's realization efficiency during its whole life cycle,

including pre-investment, investment and operational stages;
- discounting of future incomes and costs at the basic period of time;
- taking into account the results of marketing, the financial situation of the enterprise investing in the project, and the trustworthiness of the possible participants;
- taking into account inflation, payment delay and other factors influencing the value of money resources;
- taking into account uncertainties and risks connected with the project's realization;
- estimation of summary effect with economic, social and ecological consequences (both positive and negative) of melioration in view.

To ensure high efficiency of investments the following investing rules or principles should be observed: the principle of investments being well tested and appraised; the principle of complex approach; the optimality principle.

The principle of investments being well tested and appraised means that money should not be invested into business schemes if their efficiency has not been proved.

The principle of complex approach provides for the necessity to take into account all the direct and indirect costs and expenses involved in the development of the project as well as all the possible returns.

The optimality principle means that the investment options which ensure the highest economic efficiency and the best functioning of the project in question should be carried out throughout its life cycle.

The second peculiarity is that even before the construction is finished some lands should be used for agriculture, to provide some income.

One more peculiarity is that the cost of land and water use and the costs of pollution must be taken into account.

## 4. History of the Question

Before 1950 irrigation projects were usually evaluated only in relation to their financial advantages. The profit of an irrigation project in this case should be equal to a certain percentage of initial investments plus coverage of annual outlay.

In subsequent years methods of economic efficiency evaluation became increasingly accurate; economic analysis of a profit and loss has been introduced and widely used (see Table 1).

For example, these indices are described in details by Gittinger J.P., (1982)

In recent decades some methods of taking into account social and ecological costs and effects have been developed, as well as various social goals connected with job creation, regional problems and so on. This complex of aims and criteria for evaluating results

makes it much more difficult to evaluate the advantages and benefits of each project. In spite of the fact that it is desirable to ensure satisfactory economic and financial efficiency, in many cases and under different conditions, economic factors are not the only ones that need to be considered.

| **Item** | **Farm income analysis** | **Funds flow analysis[a]** | **Farm investment analysis[b]** |
|---|---|---|---|
| General objective | Check current performance of farm | Check farmer's liquidity | Check attractiveness of additional investment |
| Period usually analyzed | Individual years | Loan repayment period | Useful life of investment |
| Prices used | Current prices | Current prices | Constant prices |
| Circulation of capital | Annual depreciation charge | Cash purchases and sales | Initial investment, residual value |
| Off-farm income | Excluded | Cash portion included | Cash and non-cash included |
| Home-consumed farm production | Included | Excluded | Included |
| Performance criteria | Return to capital and labor engaged on farm | Cash available to farm family | Return to additional resources engaged |
| Time value | Undiscounted | Undiscounted | Discounted |
| Performance indicators | Profit as a percentage of net worth, family income | Cash surplus or deficit | Net present worth, internal rate of return, benefit-cost ratio, net benefit increase |

Source: Gittinger J.P., (1982)
**a**/ Also called sources-and-uses-of-funds analysis.
**b**/ Benefit-cost analysis of on-farm investments.

Table 1. Differences in the analyses of farm incomes, of funds flows and of farm investments.

Many projects, in spite of the fact that their financial and economic parameters were well appraised in the development phase, failed to achieve the set goals. Irrigation requires such inputs as foreign exchange and skilled manpower, and both can be invested in many other no less profitable endeavors. Furthermore the inputs required were often underestimated and the level of output, as well as the level of output prices, overvalued. Thus a typical appraisal study would prove to be over-optimistic. At the same time, even in the industrially developed countries, irrigation works can be used to reduce unemployment, like other public works such as tree planting, road building and so on.

## 5. Expenses for Construction of Reclamation Systems and Land Development

*Investment* in the broad sense of the word means expenditure of money on various capital and financial values or assets. The narrow professional meaning of "investment" is a long-term money allocation or capital input into a business, or enterprise, to gain a profit.

In practice there is also the meaning of “clear and real investments”, namely, capital investments allocated to support or expand the capital of an enterprise for purchase and installment of equipment, construction of buildings and structures and so on.
The cost of irrigation can vary from hundreds up to tens of thousands of dollars per hectare. In fact, surface irrigation is very cheap but the necessity of building dams greatly increases the costs. Subsoil irrigation is more expensive. It includes capital expenses of welldrilling, equipment installation and sometimes electrical wiring. Running costs generally depend on the depth of the well.

Planning and construction of distributive canals make large reservoirs more expensive and if an irrigation system is being built in a new region it often needs drainage and collector networks to avoid salinization. According to available data the price of irrigation water varies from 0.5 cents/m³ to 20 cents/m³ or more, and it is often lower than the cost of its delivery. It is not recommended for any government to use water prices as the means of subsidizing or taxing the users, because if the price is too high some farmers will not be able to afford the water, and if it is very cheap, or even free, they are likely over-use it and spoil the land. Furthermore, the low price of irrigation water becomes an indirect economic burden for tax-payers, industrial and domestic consumers who pay more for their water.

The total investment for an irrigation project includes the costs of planning, land expropriation (such as for a dam, reservoir, canals and roads), irrigation network construction, and purchase and installation of the necessary equipment.

As far as the value of investments is concerned, all the investor's expenses, often those of the state, should be included in any project assessment. First it is necessary to find out if the proportion of costs in national and foreign currency is correct, as is done when evaluating the gross output. This is important for all states with unconvertible currency.

In this case the evaluation of all kinds of imported equipment must be corrected, in particular all the indirect taxes (on import of goods, purchase of gasoline, etc.) must be excluded.

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