

# Tools for Estimating the Risk Effect on the Investment Project Efficiency

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**Abstract.** The purpose of this article is to analyze the effectiveness of an investment project. In the theoretical part, the authors cite the essence of the category “investment”, “investment project” from the point of view of different authors. The popularity of the use of criteria for evaluating the effectiveness of IPs directly depends on the method of calculating indicators, the degree of difficulty in performing calculations. Using international practice and information can determine the strengths and weaknesses. The analysis of the investment project effectiveness is held on, the land for the greenhouse complex construction is located in the Republic of Bashkortostan. Performance indicators of the investment project, conclusions are calculated.

## 1. Theoretical foundations of the investment project effectiveness

The economic nature of investments is due to the regularities of the expanded reproduction process and consists in using part of the additional social product to increase the quantity and quality of all elements of the system of productive forces of society. [11]

The concept of "investment" has become a commonly used term in the economic sector. The key concept of not only the investment process, but also the investment activity in general, is the concept of “investment project” (hereinafter referred to as the IP). The problem of evaluating the effectiveness and implementation of IP is crucial for the socio-economic development of enterprises and is becoming increasingly relevant due to the current chronic underfunding of practically all industries in recent years.

According to P.L. Vilensky, V.N. Livshits and S.A. Smolyaka IP - “a project involving investments” [5, p. 42] Unlike the above authors, I.I. Mazur, V.D. Shapiro and N.G. Olderogge specifies the IE as “an investment action involving the investment of a certain amount of resources, including intellectual, financial, material, human, in order to obtain the planned result and achieve certain goals within the stipulated time frame” [8, p. 20]. In addition, S.I. Sabirov, M.M. Korablev and F.S. Abdulganiev allocate a social orientation in the tasks of IP [12, p.4] .1.1 Theoretical foundations of the effectiveness of an investment project

G.V. Savitskaya gives the following formulation: investments - long-term investments in the assets of an enterprise in order to increase profits and increase their own capital [9].

Often decisions must be made in conditions where there are a number of alternative or mutually independent investment opportunities. In this case, it is necessary to make a choice of one or several

options, based on accepted criteria. Obviously, there may be several such criteria, and the likelihood that some option will be preferable to others is usually less than one. [7]

The special literature in Russian was very small until 1995, for the term “evaluation of the effectiveness of an investment project” referred to the capitalist system of economic management, and not to the socialist one. To determine the component, they resort to a standard financial management scheme, which makes it possible to determine the degree of risk and the possibility of introducing new administration systems based on English-language sources. Even the nineteenth-century Western economists, such as Malthus DA and Kane B.R. have come up with this way of introducing plans into an economic analysis that fully complies with the government regulatory framework. In international terminology, they began to use the economic concept of NPV - IRR, which is actively used today in all civilized and developing countries of the world, including Russia and the CIS countries [16]

. In accordance with the current legislation, the concept of “investment” is considered in a broad sense of the word and represents all types of material, property and other values, including intellectual, which are invested in business and other activities in order to generate income and achieve a different beneficial effect.

The time factor plays a key role in evaluating an investment project. There are three main phases of project development: pre-project, investment, operational. The total duration of these stages is the lifetime of the project [3, p.45].

In accordance with Article 1 of the Law “On Investment Activities in the Russian Federation”, “an investment project is a rationale for the economic feasibility, amount and timing of capital investments, including the necessary project documentation developed in accordance with the legislation of the Russian Federation, as well as a description of practical investment activities (business plan) ”[1]. The purpose of the main article is to consider the issue of evaluating the effectiveness of an investment project.

**2. The economic essence of evaluating the effectiveness of an investment project**

“Economic efficiency is the effectiveness of economic activity, economic programs and activities, characterized by the attitude

the economic effect, the result to the costs of factors, resources that led to the receipt of this result, the achievement of the greatest volume of production with the use of resources of a certain value ”[2].

However, in addition to the above, in the world and Russian practice D.R.

Greham, K.R. Harvey, S. Greco, B. Bouchon-Meunier, L.S. Valinurova, OB Kazakova

There are many other indicators, criteria and evaluation methods [4; 17,18].

Thus, “Economic efficiency is a relative indicator that measures the resulting effect with the costs or resources used to achieve this effect” [13].

The popularity of the use of criteria for evaluating the effectiveness of IPs directly depends on the method of calculating indicators, the degree of difficulty in performing calculations. Using international practice and information, you can identify the strengths and weaknesses of the most common indicators in Table 1.

**Table 1.** Definition of advantages and disadvantages of the main indicators \*.

Indicator	Advantages	Disadvantages
NPV	It has the property of additivity, perhaps the ratio of the indicator of different projects. This criterion responds to project scaling. The time value of money is taken into account.	This indicator gives preference to projects larger in scale and lower in yield. The refinancing rate is not taken into account. Does not calculate the profitability of the project.

		The discounting amount is constant.
IRR	<p>Comparison of projects that are different in scope and type of activity.</p> <p>Determination of the level of profitability of the project.</p> <p>It does not depend on the discount rate.</p>	<p>If cash flows with different signs, can be calculated incorrectly.</p> <p>This indicator does not take into account the level</p> <p>reinvestment. It is impossible to determine the return on investment in absolute values.</p> <p>It is impossible to establish the impact of the project on the capital of the enterprise.</p>
ARR	Ease of calculation	<p>Does not take into account the time factor.</p> <p>Ambiguity of interpretation of the source data. There is no calculation of capital price</p>
PP	Ease of calculation	The disadvantages of this method are similar to the disadvantages of the method ARR.
DPP	<p>The time factor is taken into account when evaluating payback period.</p> <p>Does not depend on the calculation period.</p>	<p>The refinancing rate is not taken into account.</p> <p>Does not take into account the dynamics of cash flow. Does not calculate the profitability of investments.</p>
PI	<p>Comparison of projects that are different in scale. Ability to compare projects of various initial investments and periods implementation.</p>	<p>The impossibility of bringing all cash flows to a single moment.</p> <p>The subjectivity of the choice of the discount rate.</p>

In addition to statistical and dynamic methods, the effectiveness of IP can be assessed using indicators that characterize the financial condition of the company, which is the initiator of the project. For example, using indicators such as the coefficients of financial stability, solvency, current and instant liquidity, we can assess the ability of an enterprise to implement an IP. [6]

Despite the diversity, traditional methods of evaluating the effectiveness of IP in terms of risk and uncertainty have limitations in practice due to the fact that these methods do not take into account

changes in the conditions of the project. In addition, they do not take into account the manager's ability to influence the investment process and the ability to adapt to changing external and internal factors. Due to the reasons listed above, performance evaluation models are being developed that are focused on value creation. Common 5 models are considered.

1) A group of indicators of economic value added (Economic Value Added - EVA). A striking example of the EVA group is the patented indicator of the consulting company Stern Stewart & Co., denoted by *EVATM*. The difference of the indicator is due to the specifics of the calculation of invested capital and operating profit.

2) McKinsey (Residual Income– RI) residual income. This indicator is also calculated on the basis of economic profit.

3) It should be noted that often when calculating the authors of the indicators use their own adjustments to the financial statements, the terms and notation presented in table 2.

**Table 2.** Comparison of EVA and RI \* terminology.

Economic Value Added (EVA)	Residual income (RI)
$EVA = (ROI - WACC) \times Invested\ Carital,$	$RI = CE \times (ROCE - WACC),$
$ROI (Return\ On\ Investment) =$	$ROCE(Return\ On\ Capital$
$Profit\ from\ investments - Cost\ of\ investments)$	$Invested) = EBIT/CE,$
Cost of investments	$CE (Capital\ Employed) =$
$Cost\ of\ investments$	$Total\ Assets -$
$EVA = NOPAT - WACC \times IC,$	$Current\ Liabilities$
$NOPAT (Net\ Operating\ Profit\ After\ Tax)$	$EBIT (Ernings\ Before$
$= Operating\ Profit - Tax$	$Interest\ and\ Tax$
	$= Revenue - Operating$
	$Expenses$

4) Cash Flow Return on Investment (CFROI).

This indicator, patented by HOLT Value Associates, does not ignore the actual inflows and outflows of cash and eliminates the lack of EVA in focusing on profits. CFROI is the internal rate of return on assets already made. Important parameters for the calculation are the value of assets and their service life, projected cash

flows, residual value of assets. The calculation method is given CFROI shown in table 3.

**Table 3.** Method of calculation CFROI\*.

Period	(Gross Investment)	(Gross Cash Flow)	Cash (Salvage Value)	Scheme cash streams
0	<i>GI</i>			-GI
1		GGF		GGF
2		GGF		GGF
		GGF		GGF
		GGF	SV	GGF +SV
CFROI				$IRR = (\sum_{i=0}^n CF_i)$

(Cash Return on Capital Invested – CROCI). CROCI patented by Deutsche Bank is similar to the method of calculation CFROI and is presented in table 4.

**Table 4.** Comparison of calculation methods CFROI и CROCI\*.

Profitability based on cash flow	Cash return on invested capital
$CFROI = \frac{CCF - ED}{GI}$	$CFROI = \frac{OI \times (1 - t) + D + A}{GFA + NCWC}$
<i>GCF</i> – Gross Cash Flow	<i>OI</i> – Operating Income
<i>ED</i> – Economic Depreciation	<i>NCWC</i> – Non-cash Working Capital
<i>GI</i> – Gross Investment	<i>DFA (Gross Fixed Assets)</i> = <i>Net Fixed Assets</i> + <i>Accumulated Depreciation</i>

### 3. Risk analysis methodology of PJSC “GTLC” on the example of an investment project

Investment project for the construction of a greenhouse complex for year-round cultivation of vegetables with an area of 9.8 hectares. [ten]

Growing products produced by low-volume technology of cultivation of vegetable crops with the use of an integrated drip irrigation system using electric lighting.

In 1990, the total area of protected soil in Russia as a whole was 5.7 thousand hectares, including:

- facilities under glass (winter greenhouses) - 3.5 thousand hectares;
- film shelter (spring greenhouses) - 2.2 thousand hectares.

The crisis situation in the agro-industrial complex of Russia, which was formed in the 90s, was also reflected in the condition of vegetable growing in protected soil. Greenhouse vegetable growing in Russia today:

- total area of winter greenhouses - 1.9 ha;
- reduction of the area of winter greenhouses since 1990 - by 45%;
- physical wear of greenhouses - 80%;
- outdated technology;
- a higher degree of risk compared with modern Western business.

Currently, in the Russian Federation, according to the Association “Greenhouses of Russia”, there are about 2013 hectares of glass greenhouses, while in the 90s there were 3,900 hectares. About 80% of the areas of greenhouses built in the 70s of the last century are morally and physically outdated and require complete replacement.

In the countries of the world, protected ground covers areas significantly exceeding the Russian ones and comprises: Spain - 52,000 hectares, Japan - 42,000 hectares, Turkey - 35,000 hectares, Italy - 20,000 hectares, the Netherlands - 10,000 hectares. Morocco - 10 000 ha; France - 8 500 ha; Poland - 6 300 hectares.

According to the World Health Organization and the Scientific and Research Institute of Nutrition, for a normal life, a person needs to consume at least 87.6 kg of vegetables per year, including fresh vegetables during the off-season period of 13 kg.

Greenhouse enterprises of the Russian Federation annually produce 630 tons of vegetables or 4.3 kg per capita, which is 30% of the medical consumption rate. The missing quantity is reimbursed by imported products and not always of good quality.

To meet this need at the expense of domestic production, it is necessary to build modern energy-efficient greenhouses.

The land plot for construction of a greenhouse complex is located in the Republic of Bashkortostan. Construction of the complex is planned to be carried out in one turn in 2019. The planned annual production of cucumber is 6860 tons, tomato 1489.6 tons, lettuce - 161.2 tons. The volume of investment in the project is 1 936000 thousand rubles: own funds of the project initiator - 600 000 thousand rubles, borrowed funds - 1 336 000 thousand rubles. The start of production is scheduled for September 1, 2019, more details in Table 5.

**Table 5.** Project Implementation Schedule \*.

Stages	Term	Volume
Design work	3/2019	36 000, thousand rubles.
Construction of PS	3/2019 – 4/2019	100 000, thousand rubles.
Roads + landscaping	3/2019 – 8/2019	15 000
Greenhouse + CMP	3/2019 – 8/2019	1 523 000 thousand rubles.
Start of production	9/2019	6048 кг.
Maximum power output	11/2020	767553 кг.

The budget efficiency of the project was calculated at a discount rate of 20%.

Tax revenues to the federal budget amount to 24, 2622 thousand rubles, while in the territorial budget 279,770 thousand rubles. The net present value of the federal budget is 54957 thousand rubles, but the NPV is more expensive than 173026 thousand rubles.

**Table 6.** Project Efficiency.

	Efficiency of full investment costs	Efficiency of equity	for Bank efficiency
Discount rate, %	20	20	18,5
PP, of the year	3,04	1,36	1,93
NPV, thousand rubles.	1626293	1361268	2371566
DPP, года	3,41	1,37	2,07
IRR, nominal – adjusted for inflation, %	51	100,5	86,0
PI	1,87	2,19	2,8
MIRR, %	24,74	27,59	28,38
Refinancing rate of income, %	20	20	19
Investment Discount Rate costs, %	20	20	19

The project is acceptable based on the values of the following indicators:

IRR more WACC indicates the feasibility of investing in the project;

- PI profitability index characterizes the level of return per unit of expenditure, therefore the value of the indicator is greater than 1 confirms the efficiency of capital use, the costs are fully paid off due to the inflows received;

- MIRR < IRR, the real level of costs is less than the internal rate of return, which indicates that: the invested capital pays off, expenses are covered, investors do not lose anything.

#### 4. Conclusion

PJSC "GTLC" is one of the leading companies in the Russian leasing services market, however, in the process of assessing the impact of investment project risks, using a number and study of the procedure of project financing, a number of shortcomings were identified.

In the process of ranking PI takes into account the insufficient amount of indicators to rank the project. Lack of accounting for such indicators as:

environmental impact of the project, marketing strategy, project risk minimization measures, market analysis and SWOT analysis; means that the Company misses these risks when assigning a rating to an investment project and, therefore, increases the risk of overdue payables. Without taking into account the analysis of the market, such key indicators as: degree of saturation, development dynamics, key segments, entry barriers to the industry and the degree of state regulation of the market are missing. Inclusion of these indicators in the rating rating will reduce the risks when financing a project for the Company.

In the process of analyzing the investment project "Construction of a greenhouse complex for growing vegetables," provided in PJSC "GTLK" revealed the absence of an analysis of project risks. This omission means the absence of: types and descriptions of the main risks for the project, a qualitative assessment of the magnitude of the risk, a quantitative assessment of the probability of risk realization, a sensitivity analysis, a safety analysis and the degree of potential damage.

Addition of the requirements for the content of the business plan and financial model in the field of assessing the analysis of project risks, sensitivity analysis and break-even analysis of the project to reduce risks for the Company and optimizes the process of assessing risk events.

The absence of a risk analysis eliminates the existence of a risk management strategy by which enterprises eliminate risk factors. Risk minimization measures are urgently needed to reduce the negative impact of risk factors on key economic indicators of the project. The solution to this problem is to include in the mandatory conditions for financing the provision of an analysis of project risks.

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