Effectiveness assessment methodology financial processes in the digital economy

Andrey Mandrykin[1,*] and *Yulia* Pakhomova[1]

[1]Voronezh State Technical University, Moscovskiy prospect 14, Voronezh, 394026, Russia

Abstract. In today's rapidly changing world, the application of the achievements of scientific and technological progress, the development and implementation of investment projects become a competitive advantage and the key to the successful development of regions, clusters, corporations. In some of the most dynamic industries, investing becomes a matter of not just efficient operation, but also determines the presence of companies in the market. Applied research, and even more so fundamental, requires significant investments, the return on which at the first stages of the development and implementation of investment projects is difficult to predict. The end result is also obviously not predictable, which makes investing one of the most risky areas of activity of modern companies. Therefore, today the development and improvement of investment efficiency are the most important tasks. The institutional and economic environment of developing countries may not be the positive effect expected from attracting enterprise investment. These ambiguous results regarding the impact of investment form the motivation and problem of dissertation research. Identifying and improving methodological and economic parameters for increasing investment efficiency in the electricity industry will always be one of the main tasks for owners of enterprises and managers, which determines the relevance of the study. The article developed a methodological approach to assessing the efficiency of investment projects in the electric power industry taking into account the risks taken into account in calculating the discount rate for each phase of the life cycle of the project, which allows you to more accurately calculate the main indicators of the efficiency of the investment project.

1 Introduction

Now, many problems of formation of investment process in modern conditions are caused by lack of accurately developed system of assessment of efficiency of investment policy. The system provides effective interaction of all levels of management, beginning from the enterprises and covering authorities of all levels [1]. It formulates these principles: principle of systemacity, principle of priority, principle of efficiency, principle of coherence and principle of control.

Main objective of formation of the portfolio of investments is implementation of the investment policy developed at the enterprise. At formation of the portfolio of investments

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[*] Corresponding author: mandrykin@mail.ru

the investor sets the following purposes:
*   achievement of necessary level of profitability – receiving income from investments with the predetermined frequency;
*   gain – is provided at investment of means which are characterized by increase in their cost in time;
*   minimization of investment risks – increase in reliability of investments;
*   ensuring sufficient liquidity of the invested means – fast address of investments into cash.
    Assessment of main types of risks based on calculation of the general discount rate for all project is made for ensuring efficiency of the investment project [2].

2 Materials and methods

Currently, are used static,   alternative and   dynamic methods to assess the investment of enterprises.
    The advantage of the statistical method is the simplicity of the calculation algorithm. The main disadvantage is the inability to estimate profitability after the payback period, as well as the inability to use it in calculating the efficiency of the project associated with the creation of the latest product.
    The adjusted present value method allows you to divide the cash flow into several components, for which efficiency is estimated separately taking into account the cost of risk insurance, as well as subsidies and benefits allocated. This method is most effective for evaluating investment projects with multiple sources of financing.
    The main disadvantage of the adjusted present value method is the need to study a significant amount of additional data. Calculated as NPV plus present value (PV) [4].
    The value-added method allows you to estimate the profitability of investments that should exceed the weighted average value of capital. The main advantage of the method is the ability to determine the inefficient use of the funds of an investment project. The disadvantage is the inability to create a forecast for projects with complex cash flows with the need to take into account the time factor. It is calculated as the difference between the revenue from the sale of products and the cost of resources spent on production [5].
The real options method allows you to evaluate created or acquired investment objects over a long time. Calculated by formula (1):

$$C = \frac{IC*(PI-1)}{(1+r)^t} \qquad (1)$$

where C is the value of the real option;
IC - invested capital;
r - discount rate;
t is the term of the option;
PI is the expected value of the profitability index.
    The main advantage of the method is the ability to evaluate the entire project.
    Dynamic methods are also called discounted, it follows that they are based on the theory of the time value of money [6].
    The main indicators for assessing the effectiveness of investment projects dynamically are the net present value, the payback period of the project and the profitability index.
    The criterion for evaluating the project is the net present value mark (NPV). If NPV > 0, the project is accepted if NPV < 0, the project is rejected [7].
    Define the discount factor for the entire project. So, as a risk-free rate, we use a rate corresponding to the yield to maturity in 2018 of Russian Eurobonds. And as the values   of risk premiums, we will take the expert estimates set out in the business plan of this project

(Table 1).

Table 1. Calculation of the discount factor for the investment project in question

Indicator name	measure value, %
Risk-free rate	7.52
Main types of project risks	
Innovative risk	10
Technical and technological risk	5
Commercial risk	2
Financial risk	2
Country risk (included in risk-free rate)	0
Total	26.52%

We will determine the cost-effectiveness indicators of the investment project under consideration at the calculated discount rate (Table 2 - Table 4).

Table 2. Initial data for calculation, thousand RUB

Description of indicators	Period of investment project implementation							
	2019	2020	2021	2022	2023	2024	2025	2026
Concept Formation								
Doinvestitsionny	203000	0	0	0	0	0	0	0
target market analysis	97000	0	0	0	0	0	0	0
Pre-investment calculations of revenues and expenses of the project, justification of its possible								
expediency	0	370 000	0	0	0	0	0	0
Development	0	450 000	0	0	0	0	0	0
Test costs of experienced	0	38 500	0	0	0	0	0	0
product samples	0	47 000	0	0	0	0	0	0
Certification	0	35 900	0	0	0	0	0	0
equipment								
Cost of design and estimate	0	0	1 230 780	1 316 935	1 409 120	1 507 758	1 613 302	0
documentation	0	0	2 030 891	2 213 671	2 412 902	2 630 063	2 866 768	0
Calculations for feasibility study of investment								
project	0	0	0	0	0	0	0	450000
Costs of	0	0	2 030 891	2 213 671	2 412 902	2 630 063	2 866 768	0
technical supervision	300 000	941 400	1 230 780	1 316 935	1 409 120	1 507 758	1 613 302	450 000

Table 3. Calculation of net reduced project income (NPV), thousand rubles.

Description of indicators	Period of investment project implementation							
	2019	2020	2021	2022	2023	2024	2025	2026
Total revenue	0	0	2 030 891	2 213 671	2 412 902	2 630 063	2 866 768	0
Total costs	300 000	941 400	1 230 780	1 316 935	1 409 120	1 507 758	1 613 302	450 000
Gross profit	-300 000	-941 400	800 111	896 737	1 003 782	1 122 304	1 253 467	-450 000
Income tax	0	0	160 022	179 347	200 756	224 461	250 693	0
Net profit	-300 000	-941 400	640 089	717 389	803 025	897 843	1 002 773	-450 000
Rate	26,52 %	26,52 %	26,52 %	26,52 %	26,52 %	26,52 %	26,52 %	26,52 %
discounting	1,00	0,7904	0,6247	0,4938	0,3903	0,3085	0,2438	0,1927
Coefficient	-300 000	-744 072	0	0	0	0	0	0
discounting	0	0	399 873	354 223	313 395	276 952	244 482	-86 716
Initial	458 138							

Table 4. Calculation of NPV for determination of internal rate of return (IRR), thousand rubles.

Description of indicators	Period of investment project implementation							
	2019	2020	2021	2022	2023	2024	2025 г.	2026 г.
Total revenue	0	0	2 030 891	2 213 671	2 412 902	2 630 063	2 866 768	0
Total costs	300 000	941 400	1 230 780	1 316 935	1 409 120	1 507 758	1 613 302	450 000
Gross profit	-300 000	-941 400	800 111	896 737	1 003 782	1 122 304	1 253 467	-450 000
Income tax	0	0	160 022	179 347	200 756	224 461	250 693	0
Net profit	-300 000	-941 400	640 089	717 389	803 025	897 843	1 002 773	-450 000
Rate	45,00 %	45,00 %	45,00 %	45,00 %	45,00 %	45,00 %	45,00 %	45,00 %
discounting	1,00	0,6897	0,4756	0,3280	0,2262	0,1560	0,1076	0,0742
Coefficient	-300 000	-649 241	0	0	0	0	0	0
discounting	0	0	304 442	235 316	181 659	140 075	107 893	-33 392
Initial	-13 248							

3 Results

Thus, as a result of the calculations, we obtain the value of IRR = 44.48%.
Also, using the formula (4), we calculate the investment profitability index PI = 1.44.

Table 5. Calculation of the payback period of the investment project (PP), thousand rubles.

Name	Project Implementation Period							
indicators	2019	2020	2021	2022	2023	2024	2025	2026
Initial investments	-300 000	-649 241	0	0	0	0	0	0
Real value	0	0	399 873	354 223	313 395	276 952	244 482	-86 716
NPV cumulative	-300 000	-949 241	-549 369	-195 145	118 250	395 202	639 685	552 969
result	3,93							

Let us present in general the calculated indicators of economic efficiency of this project (Table 6).

Table 6. Performance indicators of investment project in conditions of total discount rate

Indicator name	value
Discount rate for project,%	26.52%
Project net discounted income (NPV), thousand rubles	458 138
Internal rate of return (IRR),%	44.48%
Profitability Index (PI)	1.44
Project Payback Period (PP), Year	3.93

Thus, in order to justify the effectiveness of the author's methodology for evaluating this project taking into account the main types of risks, the following steps were taken to determine the feasibility of investing in the project and confirm the effectiveness of the proposed evaluation approach [8].

The inflows and outflows were structured according to the project under consideration, after which all the data are summarized in the general table 7.

4 Discussion

To carry out the third to fifth phase of the proposed approach to assessing the effectiveness of the investment project under consideration, calculated discount ratios were used and cash flows and outflows were converted to current value, as well as project performance indicators were calculated (Table 9 - Table 11).

Table 9. Calculation of discount rate for each project phase

Indicator name	Risks used	Value %
Discount rate for phase	Innovative risk	17.52%
shaping the concept	Innovative risk, technical and technological risk,	24.52%
	financial risk	14.52%
Discount rate for development phase	technical and technological risk,	9.52%

Table 10. Calculation of net present income (NPV), thousand rubles.

Description of indicators	Period of investment project implementation							
	2019	2020	2021	2022	2023	2024	2025	2026
Total revenue	0	0	2 030 891	2 213 671	2 412 902	2 630 063	2 866 768	0
Total costs	300 000	941 400	1 230 780	1 316 935	1 409 120	1 507 758	1 613 302	450 000
Profit	-300 000	-941 400	800 111	896 737	1 003 782	1 122 304	1 253 467	-450 000
gross	0	0	160 022	179 347	200 756	224 461	250 693	0
Tax on	-300 000	-941 400	640 089	717 389	803 025	897 843	1 002 773	-450 000
profit	17,52 %	24,52 %	14,52 %	14,52 %	14,52 %	14,52 %	14,52 %	9,52%
Net profit	1,00	0,8031	0,7625	0,6658	0,5814	0,5077	0,4433	0,5291
Rate	-300 000	-756 023	0	0	0	0	0	0
discounting	0	0	488 065	477 651	466 878	455 821	444 544	-238 099
Coefficient	1 038 837							

To calculate the IRR, take the average discount rate for the project, equal to 16.52%. Using the data of Table 10 and formula (16) we obtain IRR = 44.64%

Let's calculate the investment profitability index PI = 1.98. Table 17 shows the calculation of the payback period of the investment project.

Table 11. Calculation of the project payback period (PP), thousand rubles.

Description of indicators	Project Implementation Period							
	2019	2020	2021	2022	2023	2024	2025	2026
Initial	-300 000	-756 023	0	0	0	0	0	0

investments	0	0	488 065	477 651	466 878	455 821	444 544	-238 099
Real	-300 000	-1 056 023	-567 958	-90 307	376 571	832 392	1 276 936	1 038 837
cost					3,19			

We will present in general form the calculated indicators of economic efficiency of the evaluated investment project according to the proposed methodology of accounting for the main types of project risks (Table 12).

Table 12. Project performance indicators calculated according to the proposed methodology

Indicator name	value
Project net discounted income (NPV), thousand rubles	1 038 837
Internal rate of return (IRR),%	44.64%
Profitability Index (PI)	1.98
Project Payback Period (PP), Year	3.19

5 Conclusion

In order to identify the impact of the proposed approach to assessing the effectiveness of the investment project taking into account the main types of risks, we will carry out an analytical comparison of the calculated efficiency indicators according to the author's methodology with indicators of the project economic efficiency calculated according to the general methodology, and we will present quantitative and qualitative changes in Table 13.

Table 13. Comparison of changes in the investment project performance indicators depending on the evaluation algorithm

Name discounted cash flow	measure value	
	calculated with total risk, at the total discount rate for the project	calculated with more complete consideration of the risks of the project, according to the proposed methodology
Project net discounted income (NPV), thousand rubles	458 138	1 038 837
Profitability Index (PI)	1.44	1.98
Internal Rate of Return (IRR), %	44.48	44.64
Project Payback Period (PP), Year	3.93	3.19

Thus, having conducted a comparative analysis of changes in the performance indicators of the analyzed project (quantitative and qualitative) presented in Table 13, it should be said that due to the application of the proposed approach to assessing the effectiveness of the investment project taking into account the main types of risks at the enterprise, it was possible to significantly increase the accuracy of calculations of the forecast values   of the implemented project, namely, net discounted project income (NPV) increased by 126.75%.

When implementing the proposed approach to assessing the effectiveness of the investment project, UEMZ JSC will significantly increase the accuracy of forecast calculations [9]. This has contributed to more effective risk management, which will significantly reduce the uncertainty regarding the decision on whether to invest and the

further implementation of the investment project, which is a clear argument for Investor in favour of choosing this approach to assess the effectiveness of the project in question [10]. Thus, risks are associated with postponing the implementation of the investment project over time, therefore, taking into account uncertainty should be an integral part of the assessment of the effectiveness of projects. When creating and implementing an investment project, it is necessary to take into account innovative, commercial, technical and technological, financial risks. Therefore, it is proposed to improve the methodology for assessing efficiency based on the risks taken into account in calculating the discount rate for each phase of the life cycle of the project [11].

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