Evaluation of the effectiveness of innovative activities of companies in the agro-industrial complex in the context of the investment process

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Abstract. The study presents the results of studying the relationship between the effectiveness of innovation and the investment process, based on a comparison of concepts, analysis of the return on investment by type of activity, and ranking of factors of the effectiveness of innovation. The article presents a comparative analysis of methods for determining the effectiveness of innovative activities, which showed the quantitative ratio of factors that limit innovation and typical assessment methods. The key principle of building a system for the effectiveness of innovative activities of companies in the agro-industrial complex in the context of the investment process has been determined. An experimental test of the methodology for assessing the effectiveness of innovative activities from the investment position was carried out and a complex for the development of innovative activities was developed, which determined the opportunity to identify the most promising market niches of the company.

1 Introduction

Speaking about the effectiveness of innovative activities of companies in the agro-industrial complex, first of all, they determine its effectiveness, which is not necessarily related to the financial aspect. Among other things, the effectiveness of innovation can be viewed from the consumer's side, when not only the cost savings associated with the consumption of innovative products come to the fore, but also other intangible effects aimed at more complete satisfaction of needs [1].

Due to the fact that in the literature and practice, innovation is supplemented, and often replaced by investment, explaining that innovation is not possible without investment, the study conducted a comparative analysis of these two types of activities in terms of performance (table 1) [2].

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Table 1. Comparison of the concepts of investment and innovation

Comparison criteria	Innovation activities	Investment activities
Effectiveness	Patent clearance, number of advanced technologies created, volumes of advanced technologies trade	Financial result, payback period.
Efficiency	Bilateral interest from both the innovation organization and the innovation technology consumer	Interested in the investor himself.
Approaches to calculating efficiency	Based on the principle of discounting	
Parties concerned	Innovation organizations, R&D	Investors

If we carry out a comparative analysis of the profitability of invested funds by type of activity, we will get the following results [3] (Figure 1).

Fig.1. Income per ruble of invested funds in innovation and investment activities

It can be seen from the figure that the greatest efficiency from an economic point of view for an investor, of great interest will be occupied by investment (financial or natural) activities, which is determined by higher incomes in comparison with innovation. Innovation activity during the analyzed years demonstrates a fairly stable dynamics. However, the economic effect in the general case does not reflect the efficiency that can be obtained from innovation [4].

Despite the various widespread methodological recommendations in domestic and foreign literature, the effectiveness of innovative activity should be expressed not only by the income from investment of funds, but also by the result that is also obtained from the consumer [5].

2 Materials and methods

The problem of forming a methodology for determining the effectiveness of innovation is associated with a number of difficulties, the main of which, in our opinion, are [6]:

- 1) Lack of any generally accepted assessment guidelines.
- 2) Uncertainty in the structure of the effectiveness of innovation.
- 3) Closedness of information on which any external economic assessment can be based for a third-party investor.

In statistical observation, there are three groups of factors that, in the opinion of innovatively active organizations, impede innovative activities, and, therefore, affect the assessment of their effectiveness [7].

Having ranked the obstacle factors according to the strength of the impact, we obtained the following result (table 2).

Table 2. Ranking of factors of efficiency of innovation activity

Factors	The degree of influence				
	1	2	3	4	5
Economic forces					
Lack of own funds					23,7 %
Lack of financial support from the state				11,5 %	
Low demand for goods, works, services		4,3 %			
High cost of innovation					15,6 %
High economic risk				8,7 %	
Internal factors					
Low innovation potential of the organization				9,8 %	
Lack of qualified personnel			5,4 %		
Lack of information about new technologies			5,1 %		
Lack of information about sales markets	2,7 %				
Underdevelopment of cooperative ties.	2,4 %				
Other factors					
Lack of legislative and regulatory documents that regulate and stimulate innovation		4,4 %			
Underdevelopment of innovation infrastructure (intermediary, information, legal, banking, other services)	3,1 %				
Uncertainty of the economic benefits of using intellectual property			4,4 %		

The uncertainty of the economic benefits from the use of intellectual property, according to the respondents, has an average power of influence, but, nevertheless, does not lose its relevance [8].

Based on the presented results of determining the effectiveness of innovation activities based on the data of the Federal Statistics Service, as well as on the analysis of the results of efficiency coefficients, we will try to identify factors that allow us to determine the effectiveness of innovation activities with a view to its subsequent investment [9].

The analysis was carried out on the basis of data provided by the company of the agro-industrial complex, while paying attention to the target orientation of each of the methods (Table 3).

Table 3. Comparative analysis of methods for determining the effectiveness of innovation

	Economic forces	Internal factors	Political and legal factors	Infrastructure factors	Investment factors	Other factors
NPV						
IRR						
PI						
CBA						
Innovation coefficient						
Vector forecasting method						
ROI						
State Gate model						
Kano method						
Real options

- allows you to take into account the factor;
- the factor is taken into account partially or indirectly;
- connection could not be established.

If we pay attention to the quantitative ratio of factors that limit innovation and evaluation methods, we get the following ratio [10]:

- 1) 80% of assessment methods are aimed at 39.3% of economic factors - constraints;
- 2) 40% of assessment methods are aimed at 24.6% of internal factors - constraints;
- 3) 5% of assessment methods are aimed at 4.4% of political and legal factors - constraints
- 4) 20% of assessment methods are aimed at 3.1% of infrastructure factors - constraints;
- 5) 70% of assessment methods are aimed at 24.3% of investment factors - constraints;
- 6) 25% of assessment methods are aimed at 4.4% of other limiting factors.

Based on the results of the analysis, we can conclude that a more acceptable assessment of the effectiveness of innovation will be a full combination of factors - constraints, assessment methods, assessment indicators [11]. In turn, the entire system for determining efficiency should be built according to the following principle:

1. The degree of influence of the factors of the first and second factors that they are capable of exerting on the overall efficiency of innovation.
2. Behavior of factors of the third class under the change of the first two.
3. General structure of the assessment for all three classes of factors.
4. Scheme for assessing the effectiveness of innovation in the context of the investment process.

3 Results

After analyzing the results from the implementation of the innovation program, we determine that the profitability in the company will significantly increase by 75% and amount to 37.125%. [12]

1. Compliance with the company's development strategy. Focusing on the priorities established at the zero stage, as well as the results of the first stage of the assessment, we obtain the following results [13].

Table 4. The effectiveness of innovation in the first stage

Strategic priority	Way to achieve
Strengthening the innovative activity of the organization	- with a decrease in costs with a simultaneous increase in turnover; - with a decrease in the cost of the company's services due to a decrease in the cost margin.
Increasing the share of profit attributable to results from innovation	- while maintaining the same selling prices or decreasing them 20.73 and 25.88%, respectively.
Increasing the company's innovativeness	- while maintaining the condition that the risk coefficient will be more than one in both cases.

2. Critical factors. [14] Provided that the price remains at the same level, as well as the range of its fluctuations for products and services as a result of the introduction of innovative activities in the amount of 20.23%, there is every chance of increasing its market share with a positive prospect of its strengthening, in addition, it appears a significant opportunity to prevent the transition of key customers to substitutes by minimizing transaction costs and the complete absence of any requirements of a technical, financial, etc. nature to them [15].

4 Discussion of the results

An experimental test of the methodology for assessing the effectiveness of innovative activities of companies in the agro-industrial complex was carried out according to the data provided by the company. The survey regarding the need to implement the system, as well as its development was conducted among the following groups of respondents of the organization: clients; leadership; direction managers responsible for the implementation and maintenance of the system [16].

Thus, it has been established that most of the directions, within the framework of the development of the company's innovative activities, are of high interest in the eyes of customers, the organization's leadership and project management.

5 Conclusions

The main goals of the company's development should be the preservation of the product portfolio and the development of new areas of activity. Focusing on the competitive environment, it was determined that the expansion of sales markets is a priority condition for the development of a company in the external environment. The partner companies appreciate the program for the implementation of the innovative development complex.

Among the strategic priorities were identified:

- strengthening the innovative activity of the organization;
- increasing the share of profit attributable to the results of innovation;
- increasing the company's innovativeness, especially in the eyes of partners.

Structural factors should be:

- strong market position of the company in relation to competitors;
- strong relationships with investors;
- provision with all necessary resources.

The proposed complex for the development of innovative activities, according to consumer companies, is able to significantly simplify the pricing procedure and focus on programs to reduce selling prices to retail consumers. The direct management of the organization and the project management team places high hopes on the organization's innovative development program, because there is an opportunity to identify the most promising market niches.

References

1. A. Nazifi, S. Murdy, B. Marder, J. Gätke, B. Shabani, A Bit(coin) of happiness after a failure: An empirical examination of the effectiveness of cryptocurrencies as an innovative recovery tool. *Journal of Business Research* **124**, 494-505 (2021) doi.org/10.1016/j.jbusres.2020.11.012
2. S. Botwright, A.-L. Kahn, R. Hutubessy, P. Lydon, How can we evaluate the potential of innovative vaccine products and technologies in resource constrained settings? A total systems effectiveness (TSE) approach to decision-making, *Vaccine: X* **6(11)**, 100078 (2020) doi.org/10.1016/j.jvacx.2020.100078
3. D. N. Lambert, A. Swartzendruber, Examining Innovative Digital Methods for Health Promotion: The Feasibility and Cost-Effectiveness of Reaching Sexually Active Adolescent Substance Users in the South Through Online Social Networking Platforms. *Journal of Adolescent Health* **66(2)**, S137 (2020)
4. K. Koziol-Nadolna, J. Wiśniewska, Supporting Managerial Decisions with IDI in the Organization's Innovative Activities. *Procedia Computer Science* **176**, 2783-2793 (2020) doi.org/10.1016/j.procs.2020.09.278
5. M. Buffart, G. Croidieu, P. H.Kim, R. Bowman, Even winners need to learn: How government entrepreneurship programs can support innovative ventures, *Research Policy* **49(10)**, 104052 (2020) doi.org/10.1016/j.respol.2020.104052
6. E.M. Gimenez-Fernandez, F.D. Sandulli, M. Bogersbc, Unpacking liabilities of newness and smallness in innovative start-ups: Investigating the differences in innovation performance between new and older small firms, *Research Policy* **49(10)**, 104049 (2020) doi.org/10.1016/j.respol.2020.104049
7. D. Herzer, How does mortality affect innovative activity in the long run? *World Development* **125**, 104688 (2020) doi.org/10.1016/j.worlddev.2019.104688

8. D. Kim, J. Shin, M.-G. Seo, M.-Ji. Sung, Enjoy the pain that you cannot avoid: Investigation on the relationship between developmental job experience and employees' innovative behavior, *Journal of Business Research* **126**, 363-375 (2021) doi.org/10.1016/j.matpr.2019.05.221
9. R. Henao, W. Sarache, I. Gómez, Lean manufacturing and sustainable performance: Trends and future challenges, *Journal of Cleaner Production* **208**, 99-116 (2019) doi.org/10.1016/j.jbusres.2020.12.064
10. J.M. Cramm, M.M.H. Strating, R. Bal, A. P.Nieboer, A large-scale longitudinal study indicating the importance of perceived effectiveness, organizational and management support for innovative culture, *Social Science & Medicine* **83**, 119-124 (2013) doi.org/10.1016/j.promfg.2019.04.043
11. A. Kurt Möldner, J. Arturo Garza-Reyes, V. Kumar, Exploring lean manufacturing practices' influence on process innovation performance, *Journal of Business Research* **106**, 233-249 (2020) doi.org/10.1016/j.socscimed.2013.01.017
12. D. Audretsch, A. Colombelli, L. Grilli, T. Minola, Einar Rasmussenf, Innovative startups and policy initiatives, *Research Policy* **203**, 301-310 (2020) doi.org/10.1016/j.respol.2020.104027
13. K.A. Barmuta, A.A. Borisova, M.P. Glyzina, Features of the modern system of management of development of enterprises. *Mediterranean Journal of Social Sciences* **6(3S4)**, 91-96 (2015) doi: 10.5901/mjss.2015.v6n3s4p91
14. V.V. Mazur, K.A. Barmuta, S.S. De min, E.A. Tikhomirov, M.A. Bykovskiy, Innovation clusters: Advantages and disadvantages. *International Journal of Economics and Financial Issues* **6(1S)**, 270-274 (2016)
15. K. Barmuta, V. Ponkratov, M. Maramygin, N. Kuznetsov, V. Ivlev, M. Ivleva, Mathematical model of optimizing the balance sheet structure of the Russian banking system with allowance for the foreign exchange risk levels. *Entrepreneurship and Sustainability Issues* **7(1)**, 484-497 (2019) doi: 10.9770/jesi.7.1(34)
16. N. S. Plaskova, N. A. Prodanova, A. S. Samusenko, E. A. Erzinkyan, K. Barmuta, R. A. Shichiyakh, Investment decisions for mation: Innovative assets. *International Journal of Engineering and Advanced Technology* **9(1)**, 2913-2916 (2019) doi:10.35940/ijeat.A1213.109119