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Methodology for Assessing Innovative Entrepreneurship

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ABSTRACT

The article considers the methodology of evaluating the effectiveness of innovative entrepreneurship, as well as criteria and indicators for evaluating innovative entrepreneurship, are considered. The definition of the word "innovation" is given, and the specifics of the assessment of the issue under consideration depending on the levels (state, region, enterprise) are provided. It is proposed to use a systematic approach when evaluating the effectiveness of innovative entrepreneurship. The main reasons that do not allow for a full assessment of the work of innovative entrepreneurship are listed. The subject of the study is theoretical and practical methods of assessing the innovative development of industrial enterprises. The article considers the problem that a necessary condition for improving the system of increasing the effectiveness of state policy to support small and medium-sized enterprises is to increase the availability of financial resources. It consists of the possibility of using the proposed developments when assessing innovation activity and the current economic state of an industrial enterprise in order to determine its potential and make scientifically and practically sound decisions when implementing an innovation strategy. The methodology proposed in the article will allow companies to be ranked according to the level of innovative development, which can be applied by state statistics bodies, and investors. The obtained research results can be used in teaching disciplines in the areas of "Management" and "Innovative Entrepreneurship". The developed methods of assessing innovative development can be presented in the form of a computer program to improve the quality of their use in enterprises.

INTRODUCTION

One of the factors of the country's economic development is the successful functioning of enterprises, which in modern conditions involves the production of innovative products and technologies that can compete in the international market. The positive result of innovation activity is achieved not so much through the production and implementation of innovations, but through effective and high-quality management, analysis, and planning of the development process. As a consequence, the methods of evaluation, monitoring, and control play a decisive role in the management of innovative development of the enterprise. Despite the fact that innovations are one of the important factors of development, few Russian companies strive to produce them in the absence of a scientifically based approach to solving emerging problems. The refusal of industrial enterprises to implement innovation and investment projects is a consequence of the lack of effective methods for assessing the measures being implemented. The existing methods of assessing innovative development are focused on the analysis of a large number of disparate indicators, which creates complexity in their calculation and generalization. At the same time, the fact remains that the assessment of innovative development should be carried out in conjunction with the assessment of the economic condition of the enterprise in order to determine the sufficiency of resources in the implementation of the innovation strategy. Consequently, issues related to methods of assessing innovation activity require improvement and development. When managing the innovative activity of an enterprise, it is necessary to take into account indicators reflecting the main areas of investment in innovation, evaluate the activities carried out, and develop a plan for improving and financing the most promising areas. To do this, the company needs a mechanism that will adjust innovation activities and help with decision-making. The basis of this mechanism will be improved and new methods of assessing the innovative development of industrial enterprises.

1. THE DEGREE OF STUDY AND SCIENTIFIC ELABORATION OF THE PROBLEM.

In the theory of innovation, it is possible to identify the main areas on which the research of Russian and foreign authors is focused. Scientists have made a significant contribution to the development of the concept of "innovation" (Audretsch D, 1995, Schumpeter J.A., 1991 Gomez-Casseres B,1997). The main provisions of the theory of innovation are reflected in the international standards "Oslo Manual" and "Frascati Manual".

To solve the tasks, a systematic approach, methods of analysis, and comparative effectiveness of decisions were used. Constant discoveries in the field of science and technology require the improvement of innovation policy. When an innovation is introduced, the evaluation of a new project is carried out first.

In the modern economic world, under conditions of increasing competition, the effective activity of business structures mainly depends on the reaction to changes in the external environment, the skills of innovation, and the formation of strategic development decisions. Effective use of innovations increases the level of competitiveness of the enterprise. The problems of assessing innovation activity are discussed in the works S. Bertuzzi and J. Lane, 2011, H. Berglund et al., 2020, C. Edquist et al., 2000, S.N. Apenco and S.A. Rakhimova, 2016, H. Westling., 1996. Evaluation of the effectiveness of an investment and innovation project is important from a scientific and practical point of view. The expediency of investments in the implementation of projects, the payback period of the invested funds, and the pace of development of enterprises, regions, and the state as a whole depend on how objectively and comprehensively the assessment will be carried out. With regard to the levels (state, industry, region, enterprise), it should be noted that the enterprise in this system is the main participant and implementer of specific projects, all resources are concentrated here and specific projects are implemented. However, the attractiveness and effectiveness of a particular investment and innovation project should be evaluated at all the above-mentioned levels. A systematic approach is needed here, and many scientists confirm this (Westling H., 1996, L.Tsipouri, 2000; Adewumi, 2022), since the totality of successfully implemented projects has a positive impact on the development of the industry, and projects, in turn, have a positive impact on the development of the region. The pace of development of regions with their own specifics and features of economic potential through the implementation of investment and innovation projects has a positive effect on the country as a whole.

Let us pay attention to the terminology presented in the Entrepreneurial Code of the Republic of Kazakhstan (RK) dated October 29, 2015, No. 375-V3RK.

Investments are all types of property (except goods intended for personal consumption), including financial leasing items from the moment of conclusion of the leasing agreement, as well as the rights to them invested by the investor in the authorized capital of a legal entity or an increase in fixed assets used for entrepreneurial activity, as well as for the implementation of a public-private partnership project, including a concession project. An investment project is a set of measures providing for investments in the creation of new, expansion, and renewal of existing production facilities, including production facilities created, expanded, and updated during the implementation of a public-private partnership project, including a concession project.

There are two types of investment projects in the legislation of the Republic of Kazakhstan:

A. Investment priority project - an investment project implemented by a newly created legal entity for certain priority activities, the list of which is approved by the Government of the Republic of Kazakhstan, and providing for investments in the amount of at least two million times the monthly calculation index established by the law on the republican budget and effective on the date of filing an application for investment preferences.

B. Investment strategic project - an investment project included in the list determined by the Government of the Republic of Kazakhstan and capable of having a strategic impact on the economic development of the Republic of Kazakhstan.

Innovation is the introduction into the use of a new or significantly improved product (product or service) or process, a new marketing method, or a new organizational method in business practice, the organization of workplaces, or external relations.

An industrial and innovative project is a set of measures aimed at technology transfer, creation of new or improvement of existing production facilities, technologies, goods, works, and services implemented over a certain period of time.

According to the terminology, it can be concluded that investments are funds in various forms, one of the directions of which is the creation of new or improved goods and services. Innovation is the result of invested funds in the form of obtaining new or significantly improved products.

Currently, considerable attention is paid in science to the development of an optimal approach to the assessment of the innovative activity of an enterprise. The problem is the multicriteria of evaluation and effectiveness, the complexity of evaluation methodologies, different innovation orientations, and risks of innovation activity. The formation of an innovation strategy for small businesses should be considered one of the most important conditions for the innovative development of the country's economy. At the same time, dynamically changing market conditions require constant improvement in the management of small enterprises. Such dynamism presupposes the ability of managers of small innovative enterprises (hereinafter SIEs) to quickly assess the available reserves and opportunities that can subsequently provide the enterprise with a stable position in the market. Let us summarize the existing approaches to assessing the innovation activity of small businesses. The problem of the need to conduct a multi-criteria evaluation of efficiency arises due to the difference in the goals of an enterprise using innovations, for example:

- reducing the cost of production;
- increase in production rates;
- environmental friendliness of the use of the implemented production technology;
- increase in production volumes;
- improving the quality of products or services;
- improving the safety of working conditions of personnel;
- reduction of the number of personnel.

Based on this, the methodologies discussed below include a system of the comprehensive assessment of the effectiveness of innovative activity of business structures. Methodological approaches to the integrated assessment of innovation activity (Campos and Free, 2017; Maula and Stam, 2020,) distinguish

economic, scientific, technical, social, and environmental indicators of the effectiveness of the implementation of innovation activities. The proposed methodology implies the following sequence of actions:

- Identification of a group of indicators that are aimed at studying the components of innovation activity.
- Consideration of a group of enterprises of interested parties, calculation of the average value for all indicators in the group.
- Calculation of relative indicators.
- Determination of the maximum effect that can be achieved.
- Calculation of the significance coefficient.

According to this approach, the indicators for assessing the innovative activity of an enterprise are determined by a set of integral indicators. The evaluation of the effectiveness of the innovative development of an enterprise depends on the success of the introduction of new or improved products or technologies to the market.

The development of innovative activity requires the creation of a complex of organizational and managerial conditions:

- a) the availability of an appropriate material and technical base, the development of equipment and technologies capable of ensuring the development and implementation of innovations;
- b) availability of sufficient financial resources to finance developments;
- c) participation in international trade, economic, scientific, and technical exchange, and cooperation;
- d) active comprehensive support of the state in various ways and methods;
- e) creation and maintenance of an appropriate work climate and scientific and technical creativity;
- f) the political will of the state leadership to develop innovative activities in the interests of the country and its citizens;
- g) ability to predict the consequences of the introduction of entrepreneurial innovations for the country's economy in general and the environment in particular;
- h) development and provision of patent financial accessibility for all innovators and inventors.

The works devoted to assessing the effectiveness of small innovative entrepreneurship can be divided into four main groups, presented in Figure 1.

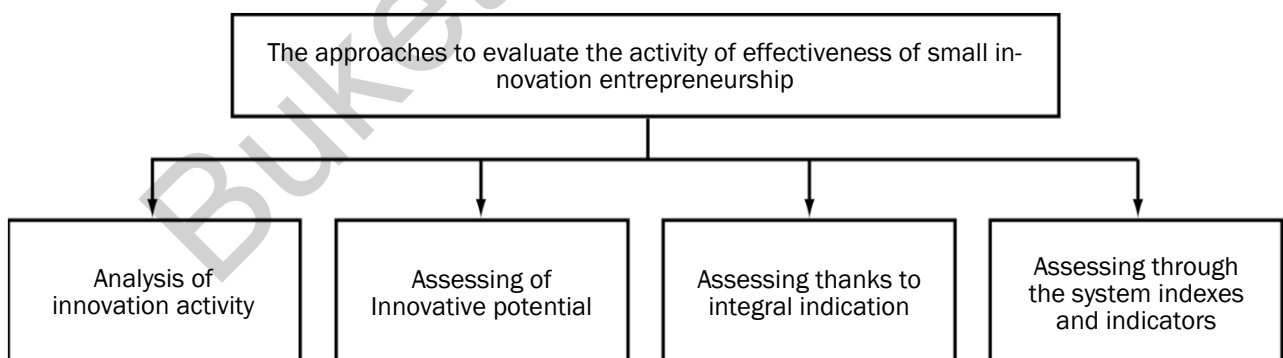


Figure 1. Approaches to assessing the effectiveness of innovative small business

Source: own

As an assessment of innovation activity, a method of analyzing the innovative activity of an enterprise is singled out, selecting for this the following key characteristics of activity: first, innovative susceptibility; second, resource availability; third, the quality of organization and communication.

At the same time (Schumpeter, 1991) put forward a proposal that for the analysis of innovation activity, three components can be distinguished in innovation activity: resource, productive, and statistical. For example, within the resource component, he notes the qualitative and quantitative resource components of the enterprise used in the field of the innovation process. The effective component is considered as the effective effect of the innovative life of the enterprise. With regard to the statistical component, he emphasizes that it is responsible for presenting the stages of the innovation process in the organization. Consequently, it is concluded that innovation activity is a three-component characteristic of the innovative life of an organization, linking the quantitative and qualitative resource components used by the enterprise in production with the products of its innovation activity, and, in addition, determining the level of participation of the enterprise in the innovation process.

The following group of authors assesses the effectiveness of SIE innovation activities using various methods of assessing such an element of the organization as innovation potential.

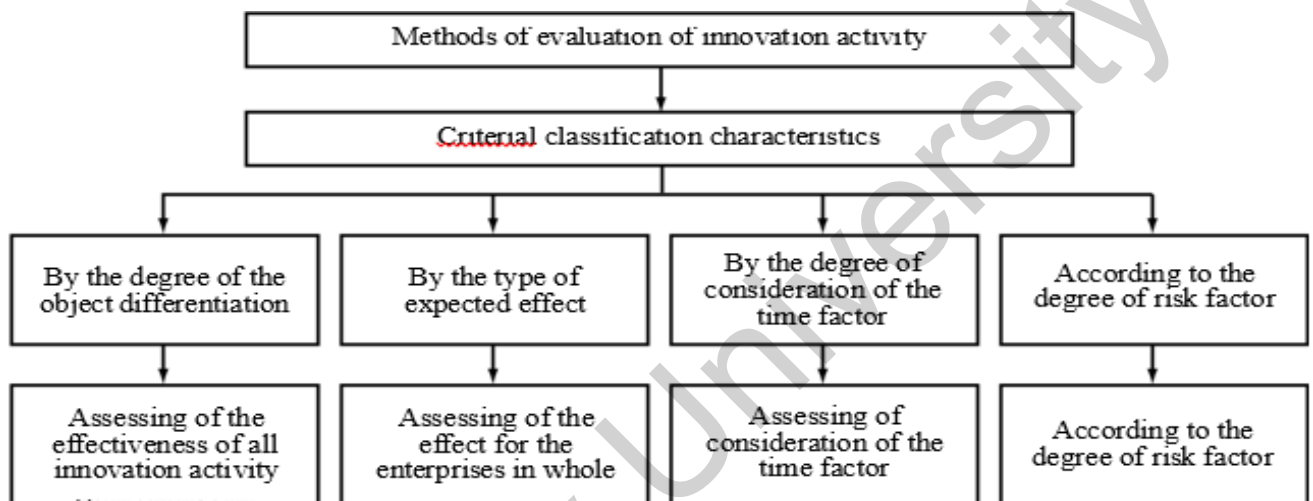


Figure 2. Methods of evaluation procedures of innovative activity of the enterprise

Gomez-Casseres B. (1997) offers various procedures for evaluating the innovative activity of the enterprise, presented in Figure 2.

2. ANALYSIS AND ASSESSMENT OF THE POTENTIAL OF THE INNOVATIVE SPHERE

The main part of the evaluation of the innovation activity of the enterprise is the process of assessing the innovation potential.

The necessary moment of the analysis and assessment of the potential of the innovative sphere of the enterprise is to identify the relationship between the result of the innovation activity and the innovation potential used.

Some scientists studying the quantitative assessment of the innovative potential of an enterprise include in its composition the products of innovative activity as an integral part of it, which in a formalized form can be represented as follows: $innovation\ potential = resources + infrastructure + result$.

Snihur Y, (2021) in a scientific study considers an approach to assessing the innovative capabilities of an enterprise based on measuring the innovative potential as a resource component and determining the type of innovative perception of projects implemented by the enterprise.

To assess the innovative capabilities of the enterprise, the author calculates the level of the innovative potential of the enterprise as a comprehensive evaluation indicator, including the normalized values of individual indicators, taking into account their significance. This indicator is calculated by the formula:

$$IP = \sum_{i=1}^I \sum_{j=1}^J p_{ij} a_{ij}, \quad (1)$$

where:

IP is the level of the innovative potential of the enterprise, in fractions of a unit;

p_i is the significance of the component of the innovative potential i , $\sum p_i$, in fractions of a unit;

p_{ij} is the significance of the indicator j in the component of the innovative potential i , $\sum p_{ij}$, in fractions of a unit;

i – component of innovation potential (financial, economic, organizational, technical, marketing components and human factor assessment), $i = 1, I$;

j – indicator within the component of innovation potential, $j = 1, J$.

The level of innovation potential affects the degree of intensity of the innovative changes carried out at the enterprise, and therefore also the definition of priority areas of development.

Table 1. A way to assess potential using a resource approach

Formula thanks to it conducts an assessment	Description
1. Potential growth and development: $R(t) = \sum_{i=1}^n \sum_{j=1}^k \frac{N_{ij}(t)}{c_{ij}(t)}$	i – type of resource; $N_{ij}(t)$ – total meaning of all types of resources; c – Effectiveness of resource using; i j – technological used type;
2. Effectiveness of resource using: $c_{ij}(t) = h_{ij}(t)$ $f_{ij}(t) = m_{ij}(t)$	$h_{ij}(t)$ – technology adoption rate ($0 \leq h(t) < 1$); $f_{ij}(t)$ – Qualitative of labor organization and management; $m_{ij}(t)$ – resource efficiency ratio; $h_{ij}(t) > 0$; $f_{ij}(t) = 1$
3. Capacity building occurs if the condition is met: $t_c < t_b < t_p < t_{pp} < t_{\tau}$	t_c – the growth rate of production costs; t_p – profit growth rate; t_b – revenue growth rate; t_{pp} – profit growth rate reinvested in production; t_{τ} – technological innovation growth rate.

Source: own

The disadvantage of this approach is that the company has resources that cannot be quantified. Such resources are labor resources. Therefore, when using this method, it is not possible to take into account all available types of resources in the enterprise.

It is possible to consider the potential as the ability of resources to achieve certain results (changes in revenue, profitability, profit, and production volume) using the effective approach presented in Table 2.

This approach does not allow considering all the means available to the enterprise, their sources, the size of reserves, and the opportunities that the enterprise uses to achieve the desired results, since there is an influence of objective factors that the enterprise cannot fix.

Table 2. A way to assess potential using an effective approach

<i>Formula thanks to it conducts an assessment</i>	<i>Description</i>
$R(t) = ni$	ni – technico –economical indications of enterprises activity; $R(t)$ – Potential development

Source: own

With the targeted approach, the potential is considered as the ability of an enterprise to ensure long-term operation and achieve the implementation of strategic goals with a given amount and quality of resources, namely, the ability of an enterprise to engage in activities and achieve the goals set by using a system of available resources.

It is possible to analyze the potential of an enterprise in the form of a set of interrelated potentials (economic, innovative, and production) using a systematic approach (Table 3). The mutual connection of all components provides a synergistic effect.

Table 3. A way to assess potential using a systematic approach.

<i>Formula thanks to it conducts an assessment</i>	<i>Description</i>
$R(t) = f(\Pi_i)$	Π_i – production, economical and innovative potentials of enterprises development

Source: own

A systematic approach has a greater degree of completeness in assessing the potential, since the interconnection of its components (economic, innovative, and production potential) creates a synergistic effect that arises through their interaction and allows the enterprise to develop sustainably.

The following group of authors identifies an integral (single) indicator for assessing the innovation activity of the SIE. For example, Shankarmahesh (2006) considers an approach to assessing the management of innovative development of an organization based on the methodology for calculating the overall efficiency coefficient of innovative development, which is presented in the form of the ratio of the result of innovative development to the assessment of the management system and evaluation indicators of innovative potential.

The efficiency coefficient of innovative development:

$$E = E/K, \quad (2) \text{ where}$$

E – the results of innovative development, determined by the formula:

$$\dot{u} = \sum \dot{u}_i, \quad (3)$$

K is the coefficient of evaluation of the management system (K_1) and indicators of innovation potential (K_2).

Snihur Y. et al, (2021) use the indicator (J) for an integral assessment of the innovation activity of an enterprise, which is determined in this way:

$$J = k_1 \cdot J_1 + k_2 \cdot J_2. \quad (4)$$

At the same time, k_1, k_2 are coefficients characterizing, the ability of the enterprise's adaptability to the external innovation environment and innovative activity within the enterprise, respectively; J_1, J_2 are indicators of the external and internal innovation environment. Having analyzed the estimated indicators, they can be classified and structured in order to characterize the variety of areas of innovative activity of the enterprise.

Frese M. et al, (2014) also single out the only indicator for assessing the effectiveness of SIE innovation activities and believe that the innovative result (the productive component) is understood as the shipped innovative products as a result of the implementation of existing opportunities in the form of a new product that is formed in the process of innovation. From this point of view, the innovative result depends on innovation activity, and this dependence is direct. The degree of influence of innovation activity is determined by the indicator of the effectiveness of innovation activity, and it can be assumed that the result of innovation activity is a function of the actual level of use of the current innovation potential. This support, according to the authors, can be presented by the following image:

$IRid = f(EU; IP; a)$, (5) where IRid is an innovative result,
EU – innovation activity,
IP – innovation potential,
A – the affectivity coefficient of the perceived innovation duty.

It follows from this formula that the innovation result is a function of three variables of innovation activity, innovation potential, and the indicator of the efficiency of use.

Within the framework of this approach, Van Burg E. et al, (2022) identify a system of indicators of internal and external conditions for the development of small enterprises.

- It refers to internal conditions: profit; income; assets; property; liabilities; expenses; taxes and products.
- External: volume of foreign trade of the Republic of Kazakhstan, money supply, import/export of private sector capital, prices, external debt of the Republic of Kazakhstan, income of the population, investments, and GDP of the Republic of Kazakhstan.

An identical typology is also used for the factors identified by the author. Such factors include:

- organizational and managerial characteristics of factors;
- economic characteristics of factors;
- social characteristics of factors.

3. RESULTS

As a result, one can conclude that investment and innovation projects in Kazakhstan should be in priority sectors of the economy, and the effect should be in the form of strategic influence on the economic development of the republic. The selection of projects is carried out according to the priorities of the State Program of Industrial and Innovative Development of the Republic of Kazakhstan for 2015-2019. When determining the priority sectors in the Program, an analysis of the sectors was carried out using a two-factor model. First, the market prospects for the sector were taken into account, including the volume and growth of both the local market and the macroregion market, as well as the potential economic effect of the development of the sector. Second, the possibilities of this sector in the republic were taken into account, including the current level and prospects for development.

According to the results of the analysis, 6 priority manufacturing industries were selected: metallurgy, chemistry, petrochemistry, mechanical engineering, construction of materials, and food industry, which are divided into 14 sectors: ferrous metallurgy, non-ferrous metallurgy, oil refining, petrochemistry, food production, agrochemistry, production of chemicals for industry, production of motor vehicles, their parts, accessories, and engines, production of electric machines and electrical equipment, production of agricultural machinery, production of railway equipment, production of machinery and equipment for the mining industry, production of machinery and equipment for the oil refining and oil industry, production of construction materials.

In the course of the study, considering the methodology for evaluating the effectiveness of projects adopted in the domestic and foreign literature, it was concluded that when evaluating the effectiveness of investment and innovative projects, one methodology is used, namely: assessment of the financial viability

and economic efficiency of an investment project. Occasionally, the difference in the assessment is noted in taking into account the risk factor when evaluating an innovative project.

When evaluating the effectiveness, the method of financial evaluation of the project is mainly used. This is acceptable mainly for an investment project. However, for an innovative project, in the authors' opinion, this is not entirely true, since in order to obtain a final positive result, it is necessary to take into account the specifics and features of the project, especially an innovative one.

An investment project is mainly evaluated through financial indicators and calculations presented in the methodological recommendations for evaluating the effectiveness of investment projects. Commercial evaluation of the effectiveness of an investment project can be divided into a financial assessment, including an assessment of the financial viability of the project, and an economic assessment, namely the determination of the economic efficiency of investments.

Financial evaluation of projects is carried out by means of coefficients:

- profitability,
- turnover (business activity),
- financial stability and liquidity.

The economic evaluation of the effectiveness of an investment project is carried out by two methods:

- simple (static),
- dynamic (discounting methods) by bringing the invested funds to a certain time.

Simple (static) methods are based on the use of the following indicators of economic efficiency:

- payback period of capital investments,
- simple (annual) profit,
- average rate of return on investment,
- (accounting) profitability,
- break-even point.

The following indicators are used in the discounting method:

- net discounted income,
- profitability index,
- profitability of the project,
- internal rate of return,
- annuity,
- payback period.

CONCLUSION

The innovative activity of enterprises has various goals, and means of implementation, based on this, it is impossible to describe the optimal methodology for assessing the innovative activity of an enterprise; it is necessary to determine it based on existing criteria.

In the course of the study, considering the methodology for evaluating the effectiveness of projects adopted in the domestic and foreign literature, it was concluded that when evaluating the effectiveness of investment and innovative projects, one methodology is used, namely: assessment of the financial viability and economic efficiency of an investment project. Occasionally, the difference in the assessment is noted in taking into account the risk factor when evaluating an innovative project.

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The use of the simulation modeling method will make it possible to assess the risks of innovation activity, take into account various evaluation criteria, predict the activity of the organization under the influence of various factors, as well as adjust and verify the future model of activity until the moment of implementation.

The assessment of innovation activity should be carried out according to individual criteria to identify weaknesses to comprehensively adjust the organization's strategy.

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