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ASSESSMENT OF INNOVATION ACTIVITY ENTERPRISES USING THE MATRIX METHOD

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Abstract: The innovative activity of an enterprise is associated with a high degree of risk. Therefore, the management and organization of innovative activities of an enterprise is accompanied by constant consideration and assessment of all criteria, factors and indicators that influence the efficiency and effectiveness of the activities carried out. The main tools used in assessing innovation activity, taking into account all indicators and indicators, strengths and weaknesses of innovation activity, opportunities and threats, taking into account their strategic significance, risks and expected profitability, include: indicators of innovation activity, financial indicators, key production indicators (KPI), assessment of market reaction, SWOT analysis, use of technological and methodological tools, as well as matrices. These tools help assess important aspects of an enterprise's innovative activities and make informed management decisions for the further development and optimization of the company's innovative potential.

Keywords: matrix, assessment, criteria, degree of novelty, degree of application, Radical Innovations, Incremental Innovations, Discontinuous Innovations, Sustaining Innovations, product, utility model, degree of novelty, time horizon, life cycle phase, level of risk.

Introduction. The implementation of innovative activities is an important component of the economic activity of an enterprise, necessary in creating innovations, unique properties and features of manufactured products, which contribute to increasing competitiveness, attracting consumers, entering new markets, developing export activities and import substitution. Innovative activity is directly related to innovative potential, investment and risk. Therefore, the management and organization of innovative activities of an enterprise is accompanied by constant consideration and assessment of all criteria, factors and indicators that influence the efficiency and effectiveness of the activities carried out.

In the scientific literature, there are many methods for assessing innovation activity, but there is no single method that allows determining the effectiveness of both current innovation activity and over the years. Therefore, the study provides a method for assessing innovation activity that is easily applicable to enterprises in any industry, which facilitates its use in enterprises. We were interested in assessing innovation activity by determining whether the enterprise is introducing innovations or not, and if so, which ones.

The purpose of the study is to develop an easily mastered method for assessing innovation activity, helping to determine the current state and make the choice of innovation, direction and strategy for innovative development, taking into account risk, degree of novelty, life cycle, degree of application, and innovative potential.

Degree of knowledge: The analysis showed a variety of approaches to assessing the innovative activities of an enterprise and the formation of a comprehensive system of indicators. The most common ones are formal, resource-based and effective approaches. Today, approaches using matrix models are being developed. Thus, scientists in their

studies devoted to the issues of assessment, activation, and effective use of innovative activities use such a tool as a matrix.

Razinkina I.V., Lazarev N.V. offer a matrix of relationships between types of managers, as well as companies by readiness for innovation and types of innovation by their novelty. Innovative companies are such thanks to innovatively active management. They are able to cope with innovations of different levels, ranging from global ones to products and processes that are new only to a particular organization. [2]

Morkovina S.S. and Stepanova Yu.N. use the Matrix of positioning of the innovative potential of the enterprise. Considering the methodology for assessing the innovative potential of an enterprise, the authors place its results in a square matrix. In the construction of which, along the Y axis, the values of the economic-technological index score lined up as they increase are plotted, and along the X axis, the score values of the index of the enterprise's ability to innovate, lined up as they increase, are plotted, as shown in Figure 2. In this matrix, highlighted nine zones - squares, each of which characterizes the innovative potential of the enterprise [3].

The matrix approach also allows for a strategic assessment of the innovative activity of an enterprise according to various parameters of innovation activity. Thus, the competition/know-how matrix evaluates two parameters of an enterprise's operation: the pressure of competitive forces and, accordingly, the need to urgently present innovative developments to the market as a way to reduce this pressure; existing know-how at the enterprise as a weapon of competition. The Input/output matrix allows you to analyze innovation activities depending on the competitiveness of innovative developments and the amount of resources spent on the corresponding research and innovation projects. [4]

Methods. The methodology for assessing the innovative activity of an enterprise, taking into account all factors, opportunities and threats, is based on the author's method, based on the division of innovation according to criteria. The final indicator for assessing the innovative activity of an enterprise is determined by summing up the assessments of all criteria. The main tools that will be used in assessing the innovative activity of an enterprise are indices, criteria, matrix and evaluation algorithm. The assessment procedure is carried out in the following sequence:

- 1) Indices of innovation activity are determined;
- 2) Criteria are identified and calculated;
- 3) The results are placed in a matrix;
- 4) The results obtained in the matrix are assessed and the effectiveness of the enterprise's ongoing innovative activities is determined;
- 5) Formation of conclusions based on the assessment results.

The assessment of the innovative activity of an enterprise is carried out using two indices:

1. index of the degree of novelty (I_{sn}), which evaluates innovative activity by reflecting the level of uniqueness or innovativeness of an idea or innovation. Novelty can range from improvements to existing products to radically new concepts or technologies;

2. index of application degree (Icp), which evaluates innovative activity and the breadth of application of innovation. This index evaluates the potential impact or significance of an idea or innovation on an activity. This may include aspects such as potential revenue growth, increased process efficiency, expanded markets, etc.

Indices include criteria reflecting the degree or level of its impact. It should be noted that indices and criteria can be changed depending on the purpose and objectives of the study. With such an assessment, the level of innovative activity of an enterprise is easily determined and assessed. The evaluation of criteria in the indices is based on determining the level or degree of each criterion. Positive dynamics of the criterion are assessed as 1 point, negative or zero dynamics are assessed as 0 points. Thus, summing up the total number of points, the value of the indices (Isn) and (Icp) is determined.

Each number of points corresponds to the qualitative state of the assessment of the enterprise's innovation activity index. 10 points - the highest level; 9–8 points – high level; 7–6 points – average level; 5 points – moderately average level; 4 points – moderately low level; 3–1 point – low level; 0 points – minimum low level.

Table 1. Criteria and indices for assessing the innovative activity of an enterprise.

Application Index Criteria		Novelty index criterion
1.	Types of innovation	Subversive Sustainable Effective Radical Innovation Incremental Innovation Discontinuous Innovation Consistent Innovation Imitation Interpretative
2.	Extent of application, expansion of markets	Narrow application at the enterprise level, new management methods, electronic (digital) programs, automation At the regional level, potential revenue growth Wide application at country level, new markets
3.	Time horizon – assesses the period of time required to develop and implement an innovation	Short term Medium term Long-term
4.	Life cycle phase - assesses what life cycle the innovation is in	Idea and research Introductory Developing Mature Outdated
5.	Risk level - assesses the risk level of an innovation	Short Average High

The previously discussed methodology for assessing innovation criteria contributes to the choice of the direction of innovative development and the development of a strategy for innovation activity, which generally affects the implementation of effective innovation activity. The results of evaluating the criteria can be placed in a matrix. The innovation activity matrix is a tool that allows you to determine the direction of development, as well as an effective strategy for the innovative development of an enterprise, taking into account the assessment and analysis of all impact factors. An innovation matrix is a tool that helps systematize and classify innovation in an organization. It can be used to determine innovation priorities and strategies. The Innovation Matrix helps businesses determine the direction of their innovation strategy and allocate resources to develop and implement innovations according to their potential impact and level of risk.

In order for the matrix to cover all factors and criteria of impact and the need to take into account when implementing innovative activities, it is advisable to include the following elements of the matrix:

1. Types of innovation. According to the “Innovative Development Strategy of the Republic of Uzbekistan for 2022-2026”, the innovation ecosystem consists of interconnected “disruptive”, “sustainable” and “effective” innovations [1].

- “Disruptive” innovations involve the production of new types of products or the organization of new types of services, which in most cases require capital investment, but are of great importance because they contribute to the creation of a large number of new jobs.

- “Sustainable” innovations consist in ensuring and systematically improving the effectiveness of “disruptive” innovations in a rapidly changing market, do not create new jobs and do not require large investments (stabilize the innovation market and its consumer of “disruptive” innovations and ensure their attractiveness).

- “Efficiency” innovations, which create large amounts of capital, making sustainable innovations cheaper and scalable, but lead to job losses. To cover the need for new jobs, part of the capital created must naturally be directed to “disruptive” innovations and the cyclical process must be continued periodically. Therefore, part of the capital generated to cover the need for new jobs is redirected to “disruptive” innovations.

-Radical Innovations. Ideas or innovations that represent a high degree of novelty and have the potential to have a significant business impact. These innovations typically require significant resources and may involve a high level of risk.

- Incremental Innovations. Ideas or innovations that are improvements or modifications to existing products, services or processes. They may have little novelty, but usually involve less risk and resource requirements.

-Discontinuous Innovations. Ideas or innovations that have a high degree of novelty but low business impact. These innovations may be experimental or exploratory ideas that may require time and additional resources to develop into valuable products or services.

-Sustaining Innovations. Ideas or innovations that are small improvements or changes that do not make a significant difference to the business. These innovations often involve operational improvements or upgrades to existing products.

- "Imitation" innovations. These innovations build on successful ideas, technologies or concepts of other companies or organizations, presenting them with minor changes or adaptations for their own use.

- "Interpretive" innovations. These innovations are new approaches to the way existing products are perceived or used. They can change consumer perceptions or change the context of use, not always making significant changes to the products or technologies themselves, but changing their perception and value to users.

2. Degree of coverage:

- narrow application at the enterprise level, new management methods, electronic (digital) programs, automation;

- potential revenue growth at the regional level;

- wide application at the country level, new markets

3. Time horizon:

- Short-term innovation: Changes that can be implemented within a short period of time.

- Medium term;

- Long-term innovation: Changes that require significant time to develop and implement.

4. Life cycle phase:

- Introductory innovation: New products or services introduced into the market.

- Developing innovation: Improvement and refinement of products or services.

- Mature Innovation: Stable and widely accepted solutions.

- Outdated innovations: Those that have passed their life cycle and have lost their relevance.

5. Level of Risk: risk assessment is important when deciding on the choice of direction and developing a strategy for innovative development:

- Low Risk: Innovation with a high probability of success.

- Medium Risk: Innovation with a moderate level of uncertainty.

- High Risk: Innovations associated with high degrees of uncertainty and risk.

These elements must be taken into account when constructing an effective, detailed and tailored innovation matrix according to the specific needs and characteristics of the organization.

Taking into account the above criteria, we will build an innovation matrix for the enterprise.

This matrix identifies 9 zones - each of which determines the types of innovations according to the degree of novelty, levels of risk and scale of application. To select an innovation, a rating scale is used in which a high level of novelty and risk corresponds to values of (8-10) points, an average level of the index corresponds to values of 5-7 points, a low level is demonstrated by indices that score less than 4 points.

The green zone in the matrix includes innovations with a low degree of novelty and risk, with narrow application within the enterprise and sometimes the region. The green zone includes squares IP9, IP8 of the matrix. Typically, enterprises that use similar innovations have low innovative potential and a low level of resource provision with an unstable susceptibility to innovation.

Matrix for evaluation and selection of innovations

	Degree of novelty	Low degree of novelty	Average degree of novelty	High degree of novelty
	Application level			
(8-10)	Wide application at country level	Effective I ₃	Sustainable I ₂	Disruptive I ₁
(5-7)	Average level at the regional level	Imitation I ₆	Incremental I ₅	Radical I ₄
(0-4)	Narrow application	Interpretative I ₉	Consecutive I ₈	Discontinuous I ₇
		(0-4)	(5-7)	(8-10)

Fig.1. Matrix of assessments and selection of innovations.

The orange and yellow zones in the matrix include innovations with a medium degree of novelty and risk, with varying levels of application. Typically, such enterprises have sufficient potential and resources. They respond promptly to changes in the environment and create competitive advantages by improving their products.

The red zone in the matrix includes innovations with a high degree of novelty and a critical degree of risk, with wide application on a regional and national scale. and the enterprises located in these squares are leaders in the field of innovation. They have high innovative potential. Such innovations create monopolies. Enterprises implementing them use the “Blue Ocean” innovation development strategy.

Table 2. Evaluation of innovative activities of enterprises based on the choice of innovations.

Index value	Identifier of innovative activity of the enterprise	Matrix conventions
8-10/8-10	Effective innovation activity	I ₁
8-10/5-7	Absolute leader of innovation - Monopolist	I ₂
8-10/0-4	Successful Traditionalist - Moderate Innovator	I ₃
5-7/8-10	Successful Traditionalist - Humble Innovator	I ₄
5-7/5-7	Moderate Traditionalist - Innovation Leader	I ₅
5-7/0-4	Moderate Traditionalist - Moderate Innovator	I ₆
0-4/8-10	Moderate Traditionalist - Humble Innovator	I ₇
0-4/5-7	Humble Traditionalist - Innovation Leader	I ₈
0-4/0-4	Humble Traditionalist - Moderate Innovator	I ₉

As can be seen from Table 2. "Assessment of innovative activities of enterprises based on the choice of innovations," an enterprise can carry out 9 different options for innovative activities. Depending on the goals of the enterprise, innovative potential, volume of investment, degree of novelty and level of risk, enterprises make a choice of innovations, directions and strategy for innovative development. For example, in the case when an enterprise achieves the maximum value according to two indicators, it corresponds to the I1 field in the matrix.

This situation evaluates and characterizes the high activity and efficiency of the enterprise's innovative activities, based on the introduction of disruptive innovations, inventions with a high degree of risk and a wide level of implementation. The innovations being introduced are unique and create a monopoly in the market, since there are no similar innovations on the market. Consequently, the enterprise has an effective OEM, innovative potential, capable of carrying out its own research and development, creating inventions, introducing new equipment and technology, improving production methods and processes, obtaining patents for intellectual property.

The proposed method for assessing the innovative activity of an enterprise can be applied to any enterprise. Let's apply it to an enterprise in the textile industry of the Namangan region for the period 2020-2023 (Table 3)

Table 3. Assessing the innovative activity of an enterprise.

Business name	Evaluation period			
	2020	2021	2022	2023
DAVRON TEXTIL SANOATI OOO https://davrontextile.com/contact/	I ₈	I ₈	I ₅	I ₅

"Davron Textile" is one of the leading textile enterprises in the Namangan region, engaged in sewing men's, women's and children's clothing for 15 years. The company has: - the international quality standard ISO 9001:2015, which means that the company uses effective processes, the staff is trained, so the products produced are constantly being improved, improved, impeccable and unique, meeting the expectations of consumers and clients.

- standard ISO 45001:2018 "Occupational health and safety management systems. Requirements and Guidance for Use is a new standard for occupational health and safety in the workplace, a single set of international requirements aimed at helping organizations protect personnel from accidents.

- ISO 14001:2015 standard is an established and accepted worldwide standard for certification of environmental management systems. consisting in maintaining measures to protect the environment and prevent its pollution while maintaining a balance with the interests of the organization. [5]

As can be seen from Table 3, the enterprise "DAVRON TEXTIL SANOATI LLC" has an average assessment of innovation activity, introducing consistent innovations into

the production process in 2020-2021, which are small improvements or changes that do not require significant changes in activity. These innovations often involve operational improvements or upgrades to existing products. In 2022-2023, introduced incremental innovations inherent in improving or modifying existing products, services or processes.

They may have little novelty, but usually involve less risk and resource requirements. The company has introduced new methods of processing textile material to improve the strength of the fabric. Engaged in the development and implementation of new design patterns and coloring techniques for unique textile products, on the basis of which it is gradually expanding the range of manufactured products. The introduced innovations are aimed at imparting uniqueness and distinctive properties to existing products, increasing the competitiveness of manufactured products. Such changes are at the level of the enterprise itself and the region.

Interpretation of results. Assessing the effectiveness of an enterprise's innovative activities can be carried out using various methods, tools and criteria. One such tool is the matrix. After filling out the matrix, you can analyze the relationships between various aspects of innovation activity depending on the level of risk and time horizon. This matrix allows you to visualize where the most promising points are located or, conversely, risky combinations of factors. This approach helps to systematize and evaluate various aspects of innovation, taking into account their diversity and interconnection.

This matrix can help an enterprise organize its innovative ideas and make informed strategic decisions in the context of degree of novelty, application, time horizon, life cycle phase and level of risk.

The matrix allows for a more in-depth analysis of the impact of each aspect on the others and helps in assessing their impact on financial health, environment, social responsibility, productivity and risk, as well as implications for making more informed strategic decisions in the context of innovation in the textile industry.

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