

Main Factors for Determining the Economic Efficiency of Innovative Activity at Enterprises of the Fuel and Energy Complex of the Republic Of Uzbekistan

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Annotation The article considers the main factors for assessing the effectiveness of innovative activities at enterprises in the fuel and energy sector of the Republic of Uzbekistan. The method proposed by the author for assessing the economic efficiency of the enterprises of the fuel and energy complex, which uses a multifactorial approach to the objects of the internal environment of these enterprises and takes into account the use of differentiated parameters of subsoil use, is shown. The classification features of innovations are studied, as well as the improved indicators proposed for assessing the effectiveness of scientific and technological achievements at the enterprises of the fuel and energy complex are shown.

Key words: fuel and energy complex, innovations, innovation activity, innovation potential, efficiency, technical and technological potential, stages of the innovation process, methodology, methodology, competitiveness.

In the conditions of intensive development of market mechanisms in the national economy, the main content of the innovation policy of enterprises, including the fuel and energy complex (FEC), is the development and use of intensive technologies and equipment that ensure high economic efficiency.

The fulfillment of the task of increasing the efficiency of production in the fuel and energy complex requires the selection of the most effective options for the implementation of scientific and technological progress, which is possible only on the basis of the application of uniform principles and methods for determining their economic efficiency. The modern market economy in all developed countries is based on common basic principles. Ignoring the generally accepted methodological methods in economic evaluation leads to incorrect results, overestimation of the size of annual economic effects, disorientation in the direction of spending incentive funds for the creation, development and use of scientific and technical developments, scientific and technological achievements.

Innovative development of industries, primarily industries (fuel and energy complex), is now of particular importance in connection with the main tasks of developing the country's economy as a whole. The fuel and energy sector is a unique complex of industries that affects not only the level of development of other industries, but the entire economy as a whole.

The level of development of enterprises in modern conditions is determined, first of all, by three equally important indicators: labor productivity, competitiveness of products, and sustainable development. However, one cannot judge the successful development of the industry only by a

generalized indicator of growth in production volumes. What is important now is not growth in general, but growth through the qualitative development of the technological base and improvement of the management system. Only such growth can ensure stable sustainable development of the industry.

The main goal of the fuel and energy industries is to meet the needs of the economy in the products of its enterprises and to form its technical and technological potential through its interaction with the innovation sphere. In this case, the innovative activity of the industry acts in its narrow sense (an introduced innovation in demand by the market that ensures a qualitative increase in the efficiency of processes or production volumes) and determines the competitiveness of its products to the greatest extent.

The main factors of the industry's competitiveness and its ability to innovate are: solvent demand for the industry's products; resource intensity and the associated organization of production (the quality of raw materials, materials and other material resources, as well as the quality of the technologies used); the level of depreciation of production fixed assets of enterprises in the industry and the level of investment in technical and technological re-equipment.

Efficiency or usefulness of innovation is a category that is used to characterize the results and effectiveness of innovation. The following classification features can be identified as the most significant for determining the essence of innovation (Fig. 1):

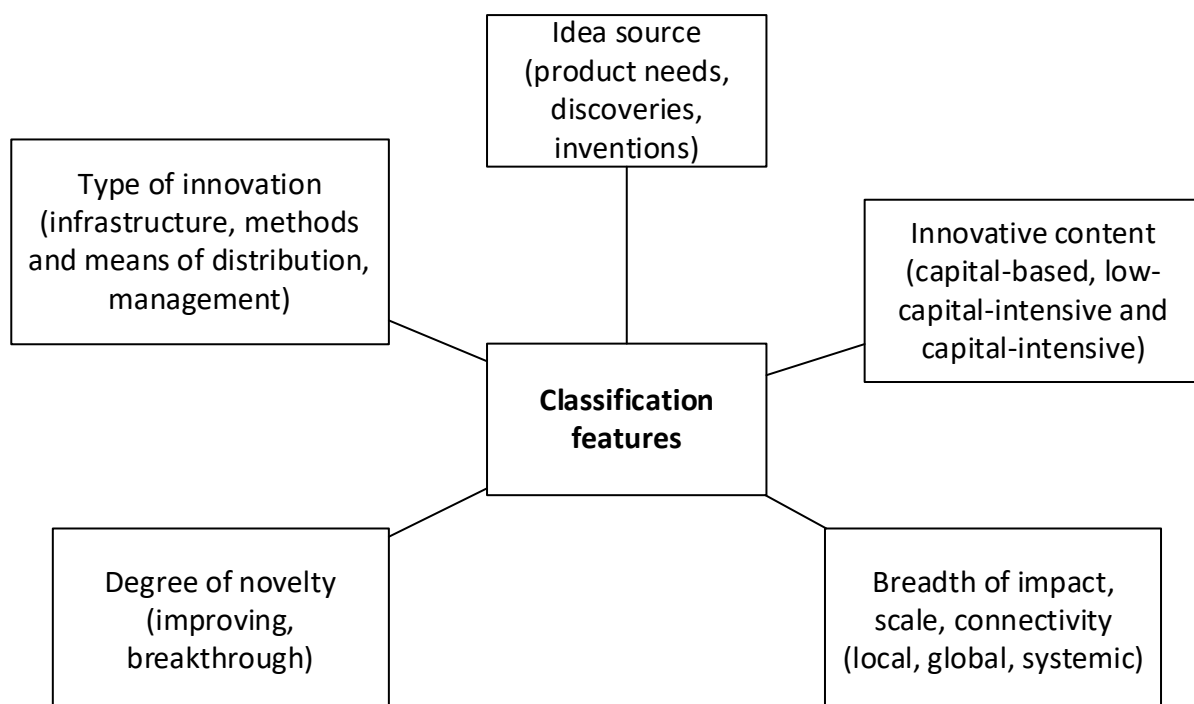


Fig. 1. Classification features of innovation¹

In the distribution of innovations in terms of their effectiveness, two main areas of their selection and evaluation can be distinguished: the type and degree of efficiency. The main task in assessing the effectiveness of innovations and their impact on the activities of the enterprise is to analyze its economic development. To assess the effectiveness of the scope of innovative technologies, all

¹ Makhkamova M.A. Innovation and renewal in entrepreneurship. ACADEMICIA An international Multidisciplinary research journal/ DOI: 10.5958/2249-7137.2020.01690.0/ <https://saarj.com>.

elements of the innovative potential are used that determine the possibilities for developing and implementing innovative solutions: personnel, financial resources, material and technical equipment, intellectual property, organizational and managerial indicators, etc.

The process of evaluating the effectiveness of innovations and their impact on the development of an enterprise is continuous, cyclical and is the basis for developing an innovative strategy for an enterprise (Fig. 2).

The innovation process and evaluation of its effectiveness consists of several stages.

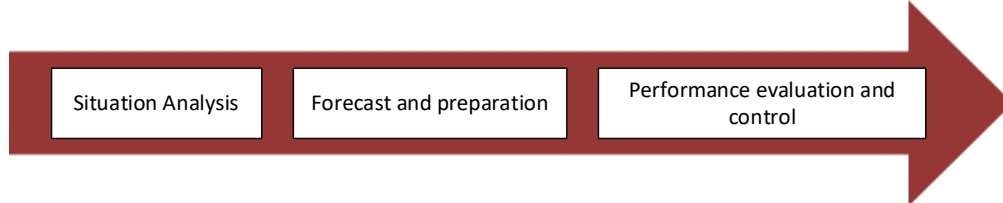


Fig. 2. Full cycle of drawing up an innovation strategy

At the entrance (stage 1), an assessment is given of external (product market potential) and internal factors (enterprise potential) interact;

- to assess sustainability, the criterion of compliance with the potential of the enterprise and the compliance of the material and technical base with it (stage 2) is used. If they correspond to each other, the state of the enterprise is assessed as stable;
- in case of exceeding the potential of the material and technical base over the potential of the enterprise, the choice of organizational and managerial innovations is made from the standpoint of efficiency (stage 3);
- assessment of the influence of quantitative factors on the results of the enterprise (stage 4);
- identification of qualitative indicators of the impact on the efficiency of the enterprise by changing its qualitative and quantitative properties, reducing costs, increasing labor productivity, etc. (stage 5).

The specification of the type of the subject of assessment, the objectives and the methodology used determines in what form the assessment of the innovative activity of the enterprise will be carried out. The subjects of the study of innovative activity can be government authorities, investors, enterprises, competitors and market partners of the enterprise. Note that these studies (assessments) may have certain goals inherent in the subjects of assessment (Table 1).

Table 1.

The main goals of the innovative activity of the enterprise

Subjects of evaluation	Objectives of the assessment
Self-enterprise	Establishing the degree of economic efficiency of innovative projects carried out by the enterprise and their portfolios to track the results of the implementation of the innovative strategies chosen by the enterprise
	Establishing the importance of innovation as a tool for ensuring the competitiveness of an enterprise, i.e. determination of the nature of the impact of the results of the innovative activity of the enterprise on the final results of

	all its production and economic activities
	Justification of the choice of one of the options for planned innovative projects in the distribution of limited investment resources of the enterprise
Market counterparties of the enterprise	Determining the innovative potential of an enterprise to justify the expediency of its inclusion among the participants in joint innovative developments
Enterprises-competitors	Establishing the possibility and expediency of mutual neutralization of innovative strategies and individual innovative developments of the assessed enterprise and appraisers
Investment organizations	Establishment of the actual or prospective efficiency of investing funds in innovative developments of the enterprise
Government bodies	Establishing the feasibility of providing subsidies to finance innovative developments of the enterprise

In practice, this approach is based on the principle of calculating the **annual economic effect, which is equal to the sum of savings in production costs, which arises as a result of the introduction of relevant technical and technological developments.** On the basis of this approach, the author developed an improved methodology for assessing the economic efficiency of the activities of enterprises in the fuel and energy complex, using a multifactorial approach to the objects of the internal environment of these enterprises and taking into account the use of differentiated parameters of subsoil use. This methodology was introduced in the latest version of the Guidance document RH 39.0-137:2017 "SCIENTIFIC AND TECHNICAL PRODUCTS, Evaluation of the economic efficiency of scientific and technological achievements" ("Uzbekneftegaz" JSC).

The choice of formulas for calculating the economic effect is carried out depending on the activities of scientific and technical progress, the technical solutions of which are aimed at [3]:

- achievement of economy of industrial resources;
- creation and production of means and objects of labor for long-term use;
- production and use of objects and means of labor with a service life of less than one year;
- production of new products or products of improved quality;
- the use of new technology in several areas;
- import substitution;
- improvement of machinery and technology for the repair of machinery and equipment;
- receiving other effects.

The sum of the savings of all production resources, which include living labor, capital investments, various types of materials, is the so-called **annual economic effect from the use of new technology.**

To calculate the annual economic effect, the reduced costs for the same volume of production of products (works) using new and basic (with subsequent replacement) equipment are correlated. For machines, equipment and materials produced by the industry - on a comparison of the reduced costs for the production of basic and new equipment.

Below are the main formulas of this improved technique (table 2).

Table 2.

Improved indicators proposed for assessing the effectiveness of scientific and technological achievements at the enterprises of the fuel and energy complex²

Indicator	Calculation method	Conventions
Calculation of the economic result, taking into account all types of costs when using new technology	$\mathcal{O} = (3'_{\sigma} \times A_{\sigma} + \Delta 3' \times \Delta A_{\mu}) - 3'_{\mu} \times A_{\mu},$	$3'_{\sigma}$ - the reduced costs before the introduction of new technology; $3'_{\mu}$ - reduced costs produced using new technology; A_{σ} - the volume of products (works) produced using basic equipment or before the introduction of new technology; ΔA_{μ} - additional volume of products (works) obtained by using new technology; $\Delta 3'$ - reduced costs for the production of a unit of additional products (work) when using replaced equipment.
Long-term cost reduction factor for the base and new technology option	$K_{np1(2)} = \frac{1}{T_{a1(2)}}$	$T_{a1(2)}$ - the period of full depreciation of capital investment objects for the basic and new technology options, determined by the depreciation policy adopted for these objects, years
The sum of the annual present costs per unit of		$I_{\text{тек1}(2)}$ - the annual amount of current costs attributable to a unit of production

² Makhkamova M.A., Allaeva G.Zh. Promising technologies in the electric power industry are the basis of energy saving and energy security in Uzbekistan. // Spec. issue of the journal "Problems of Energy and Resource Saving". Tashkent, 2019. - B. 208-212.

output produced using the basic and new technology options, respectively	$3_{np1(2)} = \frac{I_{mek1(2)} + K_{np1(2)} \cdot K_{\theta1(2)}}{V_{1(2)}}$	produced using the basic and new technology options, respectively; $K_{np1(2)}$ – reduction factor of long-term costs for the basic and new technology options, respectively, w/r; $K_{\theta1(2)}$ – the total amount of capital investments in the development of the basic and new version of the technology, respectively; $V_{1(2)}$ – average annual volume of production with the help of the basic and new version of the technology, respectively, nat. units
Calculation of the annual economic effect, if the introduced new technology provides an increase in products for export	$\mathfrak{D} = (B' \times K_{\theta} - 3') \times A,$	B' , - net foreign exchange earnings from the export of a unit of production, import currency; $3'$, - reduced costs for production and transportation to the border of a unit of export products, thousand soums; A , - the volume of export products as a result of the introduction of new technology in the accounting year, natural units
Calculation of the economic effect from the use of new technology, as a result of which the import of similar products or their substitutes from	$\mathfrak{D}_{umn} = (I_{umn} \times K_{\theta} \times K_{kp} - 3'_{nx}) \times A_{umn}$	I_{umn} - the invoice value of the unit indicated on the foreign supplier's invoice, in the supplier's currency; K_{θ} - coefficient of conversion of foreign currency into national

other countries is reduced		(thousand soums), accepted according to the bulletin of foreign exchange rates (at the time of the conclusion of the contract); K_{kp} - credit impact ratio. Taken into account in the case of using a bank loan for the purchase of imported equipment; $3'_{hx}$ - reduced costs (price) for domestic production of a unit of production (product) replacing imported one, thousand soums; A_{umh} - the number of imported products replaced by domestic products, natural units .
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Note that the analysis of the internal environment and the assessment of its innovative potential can be carried out in the form of a detailed and diagnostic one. A detailed analysis of the internal environment and assessment of the innovative potential of the enterprise is carried out at the stage of justifying an innovative project. With limited access to information about the system, a diagnostic approach is applied, that is, diagnostics are carried out according to an accessible range of parameters on development issues and activity models in assessing the resource potential and determining the directions of an innovative project.³

For evaluation, the following aggregates of evaluation indicators can be distinguished: product; functional; resource; managerial; organizational. As a basic assessment for the innovative potential of the internal environment is a functional unit that determines the innovative capabilities of the system. The indicators for this unit are given in Table. 3.

Table 3.

Indicators characterizing the innovative potential of the organization by functional units⁴

Groups	Indicators
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³ Makhkamova M.A. Market-based methods of estimation of loss of value intellectual property at enterprises of the fuel and energy sector. E1S. Web of Conference 216, 01174 (2020) RSES/
<https://doi.org/10.105/e3sconf/2020216601174/>.

⁴ Makhkamova M.A. Modern methods of effective management of innovation processes in the context of globalization. Published by: TRANS Asian Research Journals. AJMR: AsianJournal ofMultidimensional Research. (A Double Blind Refereed & Peer Reviewed International Journal) ISSN: 2278-4853 Vol 10, Issue 9, September, 2021 Impact Factor: SJIF 2021 = 7.699

Cost indicators	Science intensity of products (the share of R&D costs in the volume of sales)
	The cost of acquiring patents, licenses, know-how
	Acquisition costs of innovative firms
	The structure of costs at the stage of innovation cycles in accordance with the practice prevailing in the world or in the industry
	Availability and amount of funds for the development of innovative developments
Indicators characterizing the dynamics of the innovation process	The period of time from the moment a need or demand for a new product is realized to the moment it is sent to the market or to the consumer in large quantities (TAT ⁵ innovativeness indicators)
	The duration of the process of developing a new product or technology
	The duration of the pre-production process of a new product
	The duration of the production cycle of a new product
	Share of developments based on marketing research
	The share of commercially completed projects in the total number of developments
	The share of innovative developments of R&D departments, which took place on the market due to a successful marketing policy
Renewability indicators	Indicators of the dynamics of product renewal (share of products manufactured from two to ten years in the total volume)
	Number of acquired (sold) new technologies
	The volume of exports of scientific and technical products
	Equipment renewal coefficient, incl. based on a fundamentally new

It should be noted that the analysis of indicators of the managerial unit is significant for assessing the innovative potential, which makes it possible to assess the effectiveness of the activities of managers at all levels in managing the processes of creating and implementing innovations. Indicators of the organizational aggregate give an assessment of how the organizational structure corresponds to the innovative orientation of the system.

The indicators of the product and resource aggregate allow us to assess the products and their provision with resources of all kinds, as well as the compliance with the innovative orientation of the system. The list of indicators of all units may vary depending on changes in the external environment, supplemented depending on the objectives of the assessment, the availability of the necessary information, etc.

In the context of the formation of an innovative economy, the main content of the scientific and technical policy of enterprises, including the fuel and energy complex (FEC), is the development and use of new technologies and equipment that ensure high economic efficiency. At the enterprises of the fuel and energy complex, technical and technological innovations are mainly used, as they are introduced into production and economic activities in order to modernize and update any technological processes and contribute to the enterprise's additional profit through the sale of

⁵ The term "TAT" was first used by Japanese companies and comes from the American phrase "turn-around-time" - have time to turn

products manufactured at modernized facilities. It is difficult to single out from the income received as a result of the introduction of technical and technological innovations exactly the part that would be directly related to innovations. Consequently, the usual methods for assessing the economic efficiency of innovative projects cannot fully take into account all the qualitative and quantitative details of the applied technical and technological innovations, as well as their internal nature.

Thus, taking into account the foregoing, the methods proposed by the author for assessing the quality of the innovation environment, as well as the methodology for assessing the effectiveness of the use of carriers of innovation potential and methods for assessing the effectiveness of an enterprise's innovation activity, allow not only to single out the innovation component in all areas of the organization's activities, based on a multifactorial approach to objects the internal environment of these enterprises, but also to assess both the R&D departments themselves and the production sector, financial activities, as well as all areas of production and economic activities of enterprises.

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