



MECHANISM OF STRATEGIC MANAGEMENT OF INNOVATIVE ACTIVITY IN INDUSTRY

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ABSTRACT

In countries striving for high industrial development, scientific and economic growth should be carried out mutually. Enterprises and organizations achieve better results by applying high-quality, newer, and more efficient technologies and equipment in production. In modern times, the innovation system is developing at a rapid pace. Innovation refers to the correct and efficient application of technological and scientific advancements in the economy. Another significant factor contributing to the relevance of this issue is the importance of effective innovation management in creating competitive advantages, economic growth, employment opportunities, and increasing sustainability. In the context of rapidly changing economic conditions, increasing globalization, and the merging of economic and political interests, innovation is crucial for the survival of enterprises. Every enterprise faces the necessity to modernize its production system to some extent, search for new opportunities to improve its products, implement innovations, engage in competitive struggle, and work out a development strategy. Thus, the issues of strategic management of innovative activities are highly relevant for modern enterprises. Strategic management is undoubtedly one of the key components of the innovation management system as it is aimed at solving problems related to the planning and implementation of long-term innovation projects. These innovative projects, by their nature, are focused on significant, qualitative changes in the production and commercial activities of an enterprise. Unlike operational management, which ensures the survival of an enterprise in the short term, the strategic management of innovative activity is aimed at gaining leadership positions in business in the long term.

Keywords: innovation; competition; strategy; efficiency; innovation projects; scientific-technical potential.

Date submitted: 21.01.2025

Date accepted: 20.05.2025

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Innovations represent the process of creating new products, technologies, and scientific-technical advancements. The term first emerged in academic discourse in the 19th century. Initially, it was used to describe cultural transformations. Economic innovations began to evolve in the early 20th century. W. Sombart interpreted the concept of entrepreneurship as an innovative phenomenon in his article «The Entrepreneur-Capitalist» [1]. In his studies, B. Santo considered innovation as a techno-economic process that leads to the production of high-quality goods through the use of inventions and ideas [2]. F. Valenta emphasized that innovations lie at the core of structural transformations in production. A. Biryutin, having studied technological innovations in the industrial sector, concluded that technical, economic, and social efficiency is achieved through the implementation of diverse innovative changes in systems and structures [3]. Yu. Yakoves perceived innovation as a qualitative shift in the processes of production and management [4]. S. V. Valdaytsev pointed out that innovations play a key role in the production of new goods based on advanced

technologies in response to surplus demand in the market [5]. Joseph Schumpeter, in his work *The Theory of Economic Development*, was the first to address the concept of «new combinations» in economic progress. These new combinations signify innovations and the process of innovation is explained within the context of economic development [6].

V. A. Kolokolov defined the innovation mechanism as the economic-organizational form of conducting innovation activity. He further emphasized its function in facilitating innovation processes, searching for optimal innovative solutions, and providing regulatory and incentive mechanisms for such activities [7].

Innovation strategy involves acceptance of rules and regulations that define the selection of innovations in technology management and the modification of their implementation system in alignment with societal development trends. The degree of alignment of the innovation strategy parameters depends on the integration level of these elements into the innovation process and the effectiveness of its implementation. The primary objective of innovation strategy is to maximize the alignment of the interests of all innovation participants [8].

In light of these conclusions, most countries are for-

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<http://dx.doi.org/10.5510/OGP20250201076>

Table 1 Areas where technologies related to the industrial revolution are most applied	
2020	The number of robots to be used in the industry will reach approximately 3 million
	The number of interconnected devices will increase from 13 billion to 29 billion
	The size of internet. Things market will increase from \$656 billion to \$1.7 trillion
2025	The economic effect generated by industrial robots will range from \$0.6 to \$1.2 trillion annually
	In developed countries, 15-25 % of production processes will be automated
	The OECD states that GDP growth will depend on productivity growth driven by innovations.
2030	Digital technologies will have a powerful impact on productivity, income distribution, and the environment
	Half of global trade will involve interactions between smart objects



Fig. 1. New strategies for industrial revolution in countries

Table 2 Distribution of areas by complexes	
Industrial Complexes	Sectoral Complexes
Primary Resources and Energy Carriers	Oil production industry Gas Industry Electric Power Industry
Processing Industries	Oil Refining Industry Chemical and Petrochemical Industry
Investment Sectors	Machine Engineering and Metalworking Building Materials Industry Construction
Production Infrastructure	Finance, Management Science, Education, Culture Transport Communication Light Industry Food Industry Agriculture

ulating their strategies and roadmaps for the new industrial revolution in terms of their competence and originality (fig. 1).

The beginning and end of a complete technological cycle are always considered to be the extraction of resources and the production of services, as well as the final product, respectively. However, it should be noted that there are both direct and indirect links between technologies and sectors, which complicates the selection of areas and technologies. Accordingly, four technological complexes of combined areas were chosen. Equipment, machinery, and technologies that facilitate the movement of materials and products from one position to another help adapt these complexes to the management and labor system. The distribution of areas across complexes is shown below (table 2).

It is important to note that conducting calculations for alternative possibilities may not be economically justified when implementing strategic innovations, due to the complexity of assessing the payback of developed innovations and in cases where the development and implementation of innovations are forced (i.e., during adaptive innovations) [9]. We consider it relevant in such cases to take into account the factor, in terms of alternative costs, to achieve the best possible outcome within the innovation project.

Methods for evaluating innovation projects at the enterprise level: are the followings:

- a) Calculation of the payback period for innovation projects;
- b) Calculation of discounted profit from the efficiency of investments in innovation projects;
- c) Ensuring the expected net effect (net present value);
- d) Calculation of the profitability level of innovation projects.

Using the coefficient analysis method, various relative indicators characterizing different aspects of the formation, distribution, and use of profits at the enterprise are determined. To do this, using the capital ratio (RE), the three-factor DuPont model is applied. This model is expressed as follows:

$$RE = V_y \times F_y \times RC \times K_1 \times K_2 \tag{1}$$

where V_y and F_y are the ratio of tax and interest burden, respectively; RS – the profitability ratio of net profit from sales; K_1 – the asset turnover; K_2 – the financial dependence ratio.

The return on investment in an innovative project can be calculated as follows:

$$A_d = \frac{K_b}{t_s} \sum_{i=1}^p \frac{1}{(1+y)^i} - K_b \geq 0 \tag{2}$$

The following formula is proposed for determining the amount of the bank loan payment over a specified period:

$$B_k = \frac{P_k Q'}{1 - (1+Q')^t} \tag{3}$$

where B_k – the payment amount for the specified period, in manats; P_k – the total loan amount, in manats; Q' – the interest rate on the loan; t – the loan term, in months.

Azerbaijan's position in the global innovation index				
Indicators	2019 rank/value	2020 rank/value	2021 rank/value	2022 rank/value
Global Innovation Index	89/29.3	83/30.57	82/31.2	85/30.21
Input Sub-Innovation Index	84/27.3	79/41.7	76/37.4	77/41.5
Output Sub-Innovation Index	100/22.1	88/20.4	88/20.9	90/31.2
Innovation Efficiency Ratio	105/0.7	102/0.6	99/0.8	99/1.5

Source: <https://www.weforum.org/reports/the-global-competitiveness-report> [8]

The flow of discounted profits for the enterprise is determined as follows:

$$D_b = \sum_{t=0}^n \frac{(\Pi_t - M_t)(1 - V_t)(1 - K_t)}{(1 + D_n)^t} \quad (4)$$

where D_b – the discounted profit at the time of attracting bank loans; K_t – is the weight of payments to creditors in the enterprise’s profit [10, 11].

When calculating these indicators, all alternative options should be considered, including various funding sources, the time factor, and the requirements of the legislation of the Republic of Azerbaijan, implemented by state and local authorities.

Currently, resource-innovation development strategies for Azerbaijan’s industrial complexes are being modeled, creating conditions for the regular improvement of the technological processing level of extracted resources. This growth, compared to the 1990s, allows for more primary resources to be introduced into the production cycle.

One of the key indicators of the development of each country’s economy is the state of innovation activity. Innovations in economic development aim to achieve integration into the global economic system, ensure sustainable socio-economic development, provide competitive products, and renew the technological base. As a result, the country will achieve entrepreneurship development, improve service quality, strengthen its economic potential, develop regions at the previous level, and develop the industry as a whole. Table 3 shows Azerbaijan’s position in the Global Innovation Index.

Azerbaijan, like other developing countries, will achieve economic growth and the implementation of an innovation policy through the application of research and development results in the economy.

The results achieved from the implementation of new technologies and activities (including biological and nano-technological impacts on deposits) in the Bibi-Eybatneft Oil and Gas Production Department (OGPD) under Azerneft in 2022 and 2023 are shown below (table 4).

If to pay attention to the table, we see that in 2023, compared to 2022, although 235 thousand manats less were spent, greater efficiency was achieved. This shows that these resources are being spent in the right direction.

Figure 2 illustrates the types and volumes of new equipment and technologies used in the Bibi-Eybatneft OGPD. If to analyze the technical and economic indicators, we see that production increased due to the introduction of new equipment, technologies, and adopted measures. The improvement of Bibi-Eybatneft’s indicators compared to previous years is not only due to the aforementioned reasons. The main reasons are the expansion of enterprises and organizations in the republic and the creation of favorable

conditions by the government for the implementation of innovative measures.

Let’s consider the 10-year Prospects of the Resource-Innovation Strategy for the Country’s Economic Development:

1. The first strategy option reflects the regular increase in product output at field complexes. In this option, the production-technological potential and production-technological relations in the supporting infrastructure align with the established development traditions. The additive accumulation of economic efficiency from innovations is considered one of the primary characteristics of this development.

The application of this strategy allows to only local locally improve the technological structure of the economy’s production. It is not considered effective for improving the entire system. As a result of the first strategy option, the diffusion of innovations occurs at a slow pace in homogeneous industrial enterprises.

Results of the application of new equipment and technologies in the Bibi-Eybatneft OGPD				
Years	Indicators	Number of aActivities	Costs (thousand manats)	Effect (tons)
2019		193	797	1259
2020		107	613	169
2021		115	671	577
2022		71	565	543
2023		70	330	739

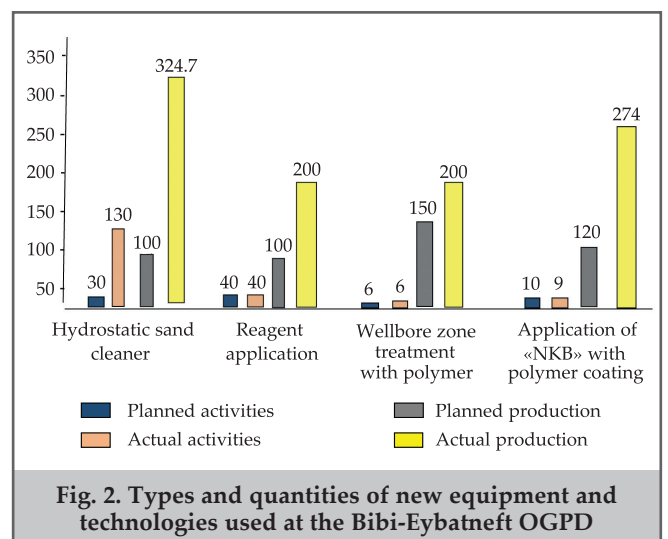


Fig. 2. Types and quantities of new equipment and technologies used at the Bibi-Eybatneft OGPD

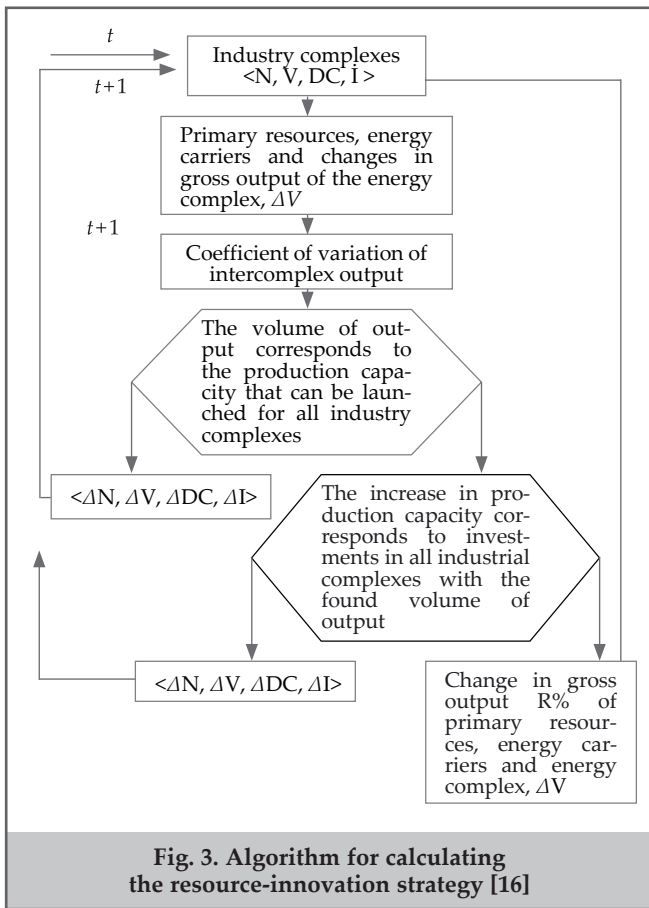


Fig. 3. Algorithm for calculating the resource-innovation strategy [16]

2. The second strategy option ensures the regular increase of production volumes at field complexes. When implementing the second strategy option, innovations will create opportunities to significantly improve the production-technological structure.

Ultimately, the result will be increased efficiency and reduced losses in the production structure. This leads to a multiplicative accumulation of the effectiveness of innovation utilization in the economy. The second strategy option is implemented in 3 stages [12]:

Stage I: Mobilization and evaluation of the production-technological potential. Conditions will be created to increase the share of energy carriers and primary resources in production. This refers to the portion of products intended for dispatch to processing sections. As a result, there will be a parallel increase in production volumes at processing sites and the processing of primary resources, with products produced at the processing sites being sent to the domestic market and for export.

Stage II: The increase in demand for investment products is driven by the growth of production in the processing and extraction sectors. The existing machine-building equipment, machinery, technologies, and machines in the country create favorable conditions for developing the production-technological base and its supporting infrastructure. The abovementioned ensures conditions for the regular improvement in the quality of products produced and the level of their processing, as well as the renewal of fixed assets.

Stage III: The increase in production by the third

stage provides the opportunity to increase income levels for the population and its demand. This stage is characterized by the active use of innovation potential and a focus on innovative quality improvements.

Below is the algorithm of the developed method for calculating the resource-innovation strategy option in the form of a flowchart (fig. 1):

In the flowchart (algorithm) of the resource-innovation strategy calculation method:

- I – Investments
- N – Production volumes
- V – Gross output volume
- DC – Additional value

Global forecasts indicate that technologies related to the new industrial revolution will find more areas of application and exhibit a consistently increasing trend [13, 14].

Coordinated actions of economic agents and the state create the possibility of calculating the resource-innovation strategy for the development of the country’s economy using the algorithm. These measures should be based on a forecast of the technological development of the country, considering the importance of Azerbaijan’s integration into the global economy. Such a forecast should reflect the following:

- Specific types of technological units based on domestic technologies;
- Prospective external and internal markets for the country’s economy;
- Competitive types of products that will create advantages in specific markets [15].

First of all, based on the forecast and the developed development model, an assessment of prospective markets for identified types of products is carried out, and the selection of basic and systemic technology options for these products is made. Based on the results obtained and the evaluation of the potential for implementing the strategy, a multi-level and multi-option development model is constructed.

In the next phase of this forecast, a model of the technological structure of the country’s economy is developed. This model is considered the core object of innovative development. As a result of using such technologies, relationships between management, labor mechanisms, and equipment are altered [17, 18].

The model of interaction between the elements of the technological structure in the implementation of the resource-innovation strategy is illustrated in the following diagram (fig. 4).

Finally, it should be noted that development-oriented effective mechanisms that ensure this strategy should be developed and applied taking into account the growing needs and economic development in the current period. If to consider developed countries, we will see that competitions, research centers, various programs, etc. are prepared and supported, ensuring the development of this direction. Such mechanisms are an integral part of state policy [19, 20].

First of all, good conditions for the creation and implementation of new technologies should be created. If these measures are implemented correctly, new products and, in parallel, consumer markets will appear. Later, as the market grows, state support, such as grants, preferential loans will also increase [21, 22].

The mechanism for implementing innovation activities is reflected in figure 5.

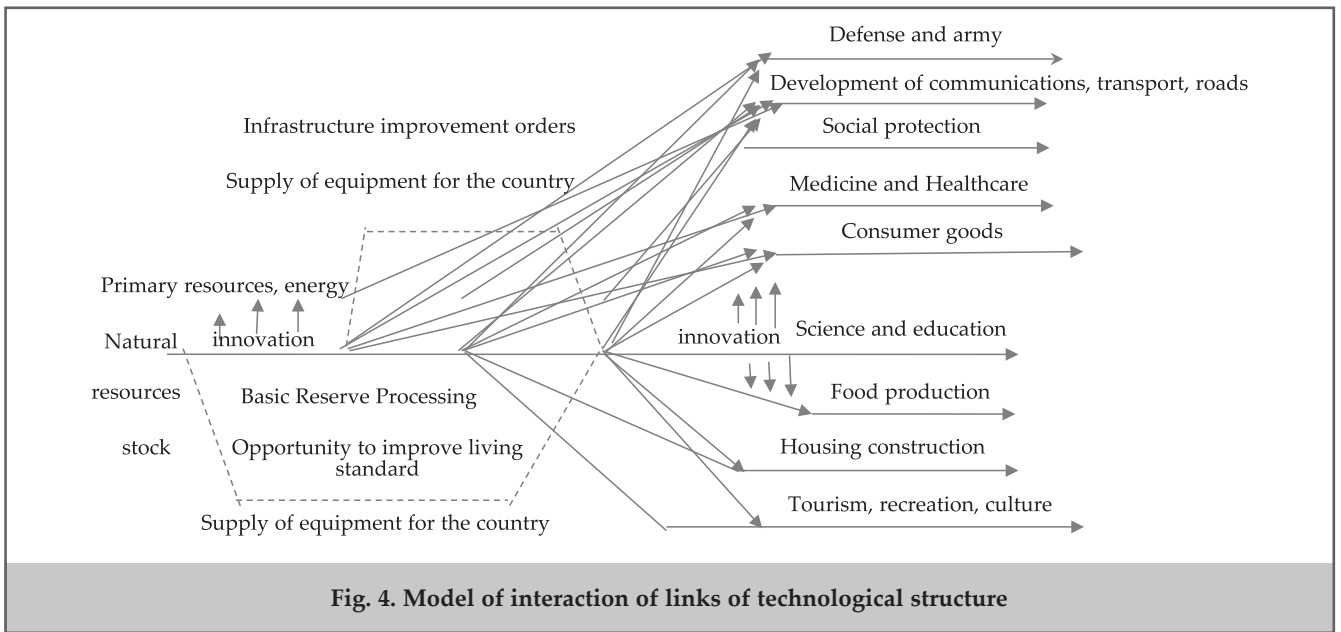


Fig. 4. Model of interaction of links of technological structure

Key principles of the state policy for stimulating innovative activity should include:

- the proper use of the country’s scientific and technological potential;
 - the implementation of credit, customs, and other policies that promote the development of innovative activity;
 - steering the country’s economy towards a path based on innovation.
- general characteristics shared by all innovation-active countries include:
- the important role of the state in financing various innovative projects and in the development of innovative activity in general;
 - a stable legal framework that facilitates the development of innovative activity [23, 24].

Finally, it is worth noting that the innovation system in Azerbaijan was formed during a period when the financial situation was less favorable compared to developed countries. However, as a result of the development and implementation of the «Concept of Innovation Policy of the Republic of Azerbaijan», the «Program for the Formation and

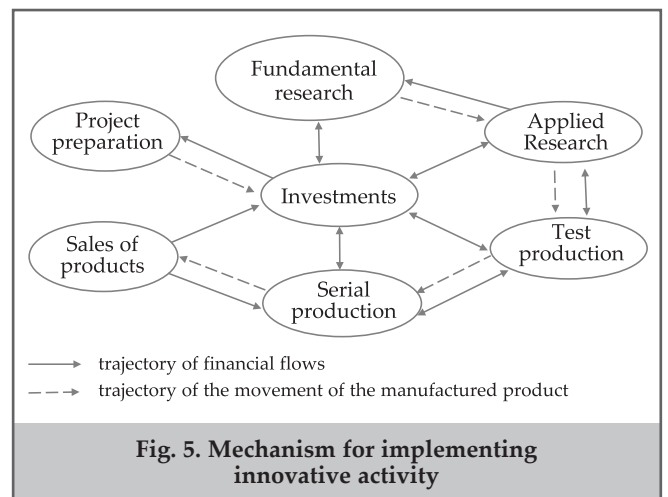


Fig. 5. Mechanism for implementing innovative activity

Development of the National Innovation System» and the «Concept of the National Innovation System» by the decree of President Ilham Aliyev, the country’s innovation system has significantly advanced [25].

Conclusions

1. Proper management of innovative activity primarily depends on the well-prepared project. The project must be correctly developed, and there should be no issues related to commercialization and financing. Accounting for risks, time factors, and even advance planning during the implementation of innovative measures will ensure proper management. Government support in this area will contribute to the successful execution of activities.
2. The effectiveness of innovative activity requires the complementarity of innovation measures, innovation policies developed at both macro and micro levels, and various innovation development programs.
3. The article presents an algorithm for calculating the implementation option of a resource-innovation strategy in the form of a flowchart.
4. It is important to prepare and use highly qualified personnel to create and manage innovative activities. Through these activities, it is advisable to exchange knowledge and optimize interdisciplinary relationships.
5. The article proposes a model for the interaction of elements within the technological structure in the implementation of the resource-innovation strategy and develops a mechanism for implementing innovative activities. This is crucial in establishing a strategic mechanism for the effective management of innovation activities in industry.

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