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THE SYSTEM OF FACTORS INFLUENCING THE INNOVATIVE DEVELOPMENT OF THE CHEMICAL INDUSTRY

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Dekhkanova Nargiza Sharifovna
Tashkent State University of Economics "Green" economy
Department Senior Lecturer Phd
n.dexkanova@tsue.uz phone:+99899-017-00-20
https://orcid.org/0009-0004-7730-2020

Abstract

The article discusses issues closely related to innovative activity, understanding and analysis of comparative advantages. Since the chemical industry is mainly focused on product production, that is, extraction and processing processes, the factors affecting its innovative activity or the effectiveness of technological innovations were analyzed in the article. In addition, a general classification of innovations and a classification table for the application of innovations were developed. Also, the analysis of scientists and the author's conclusions and suggestions on the systematization of factors affecting the effectiveness of innovative activity of industrial enterprises are presented.

Keywords

chemical industry, innovative development, innovation factors, R&D, technological modernization, digitalization, investment, sustainability, industrial policy, Uzbekistan

Introduction

The chemical industry occupies a central position in the global industrial system because it provides intermediate and final products for almost all sectors of the economy. Its development has a multiplier effect on agriculture, automotive production, pharmaceuticals, textiles, energy, and construction. For this reason, the innovative development of the chemical industry is not only a sectoral issue but also a macroeconomic and strategic policy priority. Recent data underline this importance: the global chemical industry accounts for more than USD 2 trillion in world trade, while in Europe alone the sector generates approximately EUR 635 billion in turnover and supports about 1.2 million direct jobs. At the same time, the structure of the global market is changing rapidly: China now represents 46% of

global chemical sales, whereas Europe's share has fallen to 13% [1]. These shifts show that innovative capability, scale, and speed of technological adaptation have become decisive factors in international industrial competition.

Analysis of literature on the topic.

Early scientific approaches to explaining innovation development viewed innovation not as a single enterprise activity, but as a system of interactions between knowledge, institutions, markets and technologies. The Cambridge study on sectoral innovation systems analyzed the chemical industry through the interaction of the knowledge base, technologies, products, institutions and competencies of firms[1]. The OECD, however, shows that the relationship between innovation and trade in the chemical sector is manifested differently in different subsectors.

In developing this theoretical framework, the work of scholars such as Christopher Freeman, Bengt-Åke Lundvall, Richard Nelson and Charles Edquist on innovation systems plays an important role. They argued that innovative outcomes are shaped not only by R&D expenditures, but also by the interplay of universities, public policies, manufacturers, financial institutions and knowledge exchange mechanisms. This approach is particularly relevant for the chemical industry, as the sector is characterized by a simultaneous interaction of scientific research, industrial-scale capital intensity, safety requirements, and market differentiation. Therefore, in the literature, the innovative development of the chemical industry is usually viewed as a sectoral innovation system [2]

Research methodology

The research mainly used scientific research methods such as statistical grouping, comparative scientific abstraction, i.e. innovations, their impact on the economy, innovative activity in the chemical industry, the role and significance of the chemical industry in the development of innovative activity in developed countries. A general classification of innovations was developed and analyzed. The work of scientists on the systematization of factors affecting the efficiency of innovative activity of industrial enterprises was studied. Conclusions and proposals were developed for the development of the chemical industry.

Analysis and results

The best way to develop a country's economy is to pay special attention to the relative advantages of the economy. In fact, understanding and analyzing relative advantages is closely related to innovative activity. This is especially important when analyzing competition and trade between countries and companies based on technologies and innovations.

[1] https://icca-chem.org/focus/trade

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Relative advantages can be expressed in innovative activity in the following ways. Firstly, technological innovation: for example, the development of highly efficient new, energy-saving technologies or the improvement of existing technologies in one country allows it to produce products cheaper and of higher quality than in another country, that is, it has a relative advantage over other countries. This is one of the main factors of relative advantage.

Secondly, increasing economic efficiency through innovation. Innovative activity allows countries to create their own relative advantage by creating new products, improving existing products, or optimizing production processes. For example: automation and digital systems help companies become more efficient than their competitors, which allows them to produce competitive products on the global market.

Third, innovation drives trade and economic specialization to create comparative advantages. That is, new technologies and innovation processes themselves encourage countries to specialize in their strongest sectors. For example, China and Germany are countries that specialize in the chemical industry compared to other countries. For example, a country that develops new biotechnology can become a global leader in this sector, as a result of which this country will have a comparative advantage in exporting its products to other countries.

Fourth, conquering new markets and competitive advantage. Innovation not only increases competition in existing markets, but also creates new markets. The development of new technologies allows companies to conquer new and highly profitable markets. Example: A country that develops new environmentally friendly energy technologies will be able to create its comparative advantage in this sector and obtain economic benefits by satisfying the demand for environmentally friendly products on the world market.

Therefore, special attention to the comparative advantages of the economy is the best way for the country's innovative development. The chemical sector has significant attractiveness and opportunities for technological innovation and development due to the country's advantages, large natural oil and gas resources, high product diversity, technology and market.

The innovation process is dynamic, as these interacting factors change and evolve over time, and this can lead to changes in contexts that can make innovation unfeasible or lead to unexpected results in a short period of time, according to American scientist J. Utterback. [3]

It is important to take into account the principles of sustainable development in the development of innovative activities. Economic growth and development can

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be achieved without harming the environment by developing environmentally friendly technologies, increasing energy efficiency, and rational use of natural resources.[4]

Afuah also calls innovation a set of new knowledge incorporated into products, processes, and services. He classifies innovations according to their technological, market, and administrative/organizational characteristics. (Table 1.1)

Table 1.1

General classification of innovations[2]

Technology	**Market**	**Administrative-Organizational**
Product	Product	Strategy
Process	Price	Structure
Service	Place	Systems
	Motivation	People

Technological innovation is the knowledge of the components, relationships between components, methods, processes and techniques that make up a product or service.

Process innovation is associated with the introduction of new functions into the activities of an organization, for example, input materials, task specifications, work and information flow mechanisms, equipment used to produce a product or provide a service. The main idea of innovation is to speed up processes and introduce innovations into production, as well as achieve goals: (maximizing profits, the effectiveness of social projects, sustainable economic growth, etc.). It is also classified according to their application in practice.

Table 1.2

Classification of innovations by application[3]

№	**Classification symbol**	**Classification categories (types) of vations.**
1	Innovation Application	Management, organizational, social, industrial, ultural, etc.
2	Stages and Results of Innovation	Scientific, technical, technological, engineering, uction, information.
3	Innovation Intensity	"Boom", uniform, weak, mass.
4	Innovation Implementation Pace	Fast, slow, decaying, growing, uniform, sharp.
5	Scope of Innovation	Transcontinental, transnational, regional, large,

[2]Afuah, A. (1998). Responding To Structural Industry Changes: A Technological Evolution Perspective. Oxford University Press, Usa, Vol.6, Issue 1, pp. 183-202.
[3] Davydenko, L. (2011). Fundamentals Of Economic Theory: Principles, Problems, Politics Of Transformation. International Experience And Belarusian Vector Of Development. Manual, Minsk

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		ium, small.
6	Innovation Efficiency	High, stable, low. Economic, social, ecological, rated
7	Effective Innovation	Management, organizational, social, industrial, ultural, etc.

To determine how to create a favorable innovation environment, it is necessary to analyze and systematize the factors influencing innovative development. M.M. Manukyan systematizes the factors influencing the effectiveness of innovative activities of industrial enterprises according to four characteristics: organizational, functional, innovative and investment. (Table 1.3)

Table 1.3

Systematization of factors influencing the effectiveness of innovative activities of industrial enterprises[4]

	INFLUENCE FACTORS			
	Functional	**Organizational**	**Innovative**	**Investments**
1	Used for fixed capital innovative activity	Organizational ure of the enterprise tion department	The level of complexity nufactured products nnovative products in terprise	Composition and e of foreign ments
2	Availability and size of ction capacity nnovative activity	The structure of tion management	Sizes and usageR&D at terprise	The existence of the vestments for nnovative activity
3	Possibility of mentationpublic rement enterprise for ation	ntegration nterprises (holding, , association)	To have intelligenceto enterprise	Composition and e of the enterprise's ng capital
4	Technologies used n innovative activities	Company ownership ure	The existence of an rial research institute	The cost of the tive product produced products
5	Assortment of tive products produced	Availability of a y management system	Using technology er for innovative ies	Level of demand for tive products ced products

[4] Манукян М.М "Факторы, влияющиу на развитие инновационной дуятельности промышленного комплекса региона" Вестник Самарского Университета, Экономика и Управление Том 10,2019 №1. С 32

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6	Level of ification manufactured cts	Possibilities of state tion of the economy nnovative sector	Availability of innovative ts with foreign partners	nvestment bilitybusiness gies
7	Quality and cations of employees	Geographic and rial factors	Level of implementation cientific and technical pments to production	Company lization level
8	The level of use of ted technologies	Adequacystrategic of innovations events	Company transparency	nvestmentscompany ess

In this case, it should be remembered that in order to determine how to create a favorable innovation environment in industrial enterprises, it is necessary to analyze and systematize the factors affecting innovative development, achieve sustainability, and increase efficiency without innovations.

This is because achieving sustainable efficiency requires adapting and changing processes, products, management approaches, and policies. Therefore, change is a key element for organizations, supply chains, and communities to develop on a sustainability trajectory.

In our opinion, for the sustainable innovative development of chemical enterprises, it is also necessary to change, that is, update, management principles, products, and processes. In order to develop them, it is necessary to analyze the factors affecting them. (Figure 1.4)

Figure 1.4

Factors influencing innovation for sustainable development in industrial enterprises[5]

FACTORS		
MACRO-ECONOMIC FACTORS 1. Politics/institutions (national/international policies, sectors, institutions). 2. Nature/natural resources (climate change, renewable/non-renewable resources, biological diversity, ecosystems). 3. Economy(globalization, economic growth, markets, crisis, socio-technical	**MICRO-ECONOMIC FACTORS** 1. Organizational governance: (stakeholders, shareholders, top management team, etc.) 2. Organizational strategies (sustainable competitive advantages, strategic location management, sustainable development strategies, eco-innovations,	**SPECIFIC FACTORS OF TECHNOLOGY AND ECOLOGICAL INNOVATIONS** 1. Technology and Innovation characteristics (uncertainty of outcome/economic and social risk; criticality/ motivation/motivatio

[5] Author's development

systems, technological innovation systems). 4. Culture/knowledge (geographical regions, country, industry, system values) 5. International standards, norms 1. 6. Society (social action and perception, legitimation)	environmental management, social responsibility of the company) 3. Markets (market formation, user exercises competition/alliance) 4. Resources (available material and intangible resources; budgets, costs, investments, technologies, knowledge, skills) 5. Organizational efficiency (economic, environmental and social efficiency, effectiveness) 6. Industry (industrial structure, business sector: manufacturing, services, supply) 7. Size: (multinational, small and medium-sized enterprises, entrepreneurship)	n; technical complexity, frequency of occurrence; urgency 2. Climate change and ecological pressures, resource scarcity (energy-efficient technologies, climate-adapting technologies)

We have divided the factors influencing innovation for sustainable development in industrial enterprises into three main components. Elements: contextual factors influencing strategic technological innovation for sustainable development, strategic innovation, technological innovation, and sustainable development characteristics should be taken into account.

The chemical industry, which is mainly focused on extraction and processing and product production processes, as far as the strategic development of its innovative activities and influencing factors are concerned, allows us to define the innovative development of an enterprise in modern conditions as a strategic direction for its sustainable growth and development in the context of innovative modernization of the domestic economy, aimed at qualitatively changing the position of the enterprise in a competitive environment.

Figure 1.4

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Factors influencing the development of innovative activity in the chemical industry[6]

Internal factors	External factors	International factors
• • innovative initiative	• government policy, legislation	• foreign investments
• • level of modernization	• innovation infrastructure	• technology transfer
• • financial stability	• market competition	• international standards
• • workforce skills	• technological infrastructure	• global certifications
• • innovative management	• environment and ecological environment	• global partners

Conclusion and suggestions

So, to summarize, stimulating the high-tech sector of the economy, increasing the share of science-intensive industries that produce high-tech products that meet world standards is one of the main factors of economic development. Therefore, the transition of our economy to a new stage of development will increase the importance of innovative activity and the innovative potential of the renewing Uzbekistan, which will allow for the reorganization and improvement of its economic structure, the rapid development of production types, the introduction of science, production and practice to a high level.

The classification of approaches to the development of innovative activity at chemical industry enterprises is compiled taking into account the characteristics of the chemical industry (hazardous substances, technological complexity, environmental requirements, raw material dependence). The importance and necessity of approaches to the development of innovative activity are:

- firstly, it simplifies strategic planning at chemical industry enterprises, that is, it helps to determine which types of innovations to prioritize. (for example, technological, environmental or market-oriented innovations).

- secondly, it ensures the rational use of resources, since each approach requires its own financial, human and technological resources. Through classification, resource allocation becomes more efficient.

- thirdly, it increases competitiveness, that is, through a correctly chosen innovative approach, the enterprise gains an advantage over competitors - for example, through cost reduction or product quality.

- fourthly, it improves organizational and management systems, that is, based on classification, the enterprise can systematically organize internal management - the activities of R&D departments, and external cooperation strategies.

List of used literature

[6] Author's development

1. F.Cesaroni, A.Gambardella, W.Garcia-Fontes The chemical sectoral system: firms, markets, institutions and the processes of knowledge creation and diffusionl Secroral systems of Innovation Concept,Issues and Analyses of Six Major Sectors in Europe pp 124-154.

2. Christopher Freeman, Bengt-Åke Lundvall, Richard Nelson va Charles Edquist. National Innovation Systems: The Emergence of a New Approach November 2011.Science and Public Policy 38(9): 669-679 DOI:10.3152/030234211X13070021633

3. J. Utterback "Mastering the Dynamics of Innovation: How Companies Can Seize Opportunities in the Face of Technological Change" Harvard Business School Press, Boston, USA (1994)

4. Dekhkanova N.Sh 2026 Theoretical aspects of innovative activity in industrial enterprises, Scientific electronic journal "Financial Technologies" No. 2. ISSN: 2181-3965 VOLUME 5. Tashkent 2026

5. Afuah, A. (1998). Responding To Structural Industry Changes: A Technological Evolution Perspective. Oxford University Press, Usa, Vol.6, Issue 1, pp. 183-202.

6. Davydenko, L. (2011). Fundamentals Of Economic Theory: Principles, Problems, Politics Of Transformation. International Experience And Belarusian Vector Of Development. Manual, Minsk

7. Манукян М.М "Факторы, влияющиу на развитие инновационной дуятельности промышленного комплекса региона" Вестник Самарского Университета, Экономика и Управление Том 10,2019 №1. С 32

8. https://icca-chem.org/focus/trade