### РОЗДІЛ 2

# Інноваційні процеси в економіці

# Innovative Development of Ukraine: Strategies, Models, Mechanisms

Olena M. Ivanova<sup>i</sup>, Valentina V. Ivanova<sup>ii</sup>

The relationship between innovation activity and competitiveness is considered in the article. The stronger the competition, the more active the business entities develop and implement them, providing an innovative basis for their own strong competitive position and competitiveness of Ukraine. So, in fact, in Ukraine, there is a "gap" between the possibilities for generating innovations and the conditions for their generation and implementation. The possibility and necessity of the innovative development of Ukraine based on the use of a sufficiently powerful innovative potential and other factors contributing to the innovative development of the economy are substantiated. This requires the state to create conditions for protecting competition, defining a system of strategies and developing a strategic plan for its implementation. A set-theoretic model of the strategy system and a model of the mechanism for implementing the general strategy of economic management – the strategy of innovative development are proposed. To implement the strategy of innovative development of Ukraine, it is offered to develop intellectual-oriented entrepreneurship as an innovative strategy. The implementation of the chosen innovation strategy should be carried out in two strategic areas: increasing human capital and activation the formation of human potential, the creation of conditions for the implementation of intellectualoriented entrepreneurship. It was proposed to include in the strategy system a number of key functional strategies that are consistent with the overall strategy and ensure its implementation: educational development of intellectual abilities and competencies, structural-sectoral - priority development of high-tech and non-material-intensive industries and active use of knowledge potential for the modernization of all sectors of the economy, organizational and structural - the formation of a cluster model of the economy. Ukraine needs an information strategy for information support of innovative economic development and a mechanism for its implementation.

*Keywords:* innovation, innovative development, strategy, model, competition, Intellectual-oriented entrepreneurship, cluster.

Abbreviation:

NAS - National Academy of Sciences.

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**Introduction.** The innovation factor determines the vector of intensive development of countries, provides structural transformation of economies to gain potential benefits in ensuring the competitiveness of each country. But innovation activity of the national economy is encouraged by the presence and intensification of the competition of business entities. They seek to gain competitive advantage thanks to the use of innovations in their activities. The escalation of competition actualizes innovations, in particular, products and services, methods of their manufacture, as well as the implementation of innovations in modern technologies and the transfer of the latter for further production.

Competition in domestic markets of the most developed competitive countries is intensive. This requires the intensification of innovation activity and actualizes the choice of innovative development path.

**Problem statement.** Ukraine has all the necessary resources, and most importantly, human potential to secure a strong competitive position in world markets. However, modern business conditions require significant changes accompanied by the choice of adequate economic strategy and development of a mechanism for its introduction and further tactical tasks.

The works of A. Amoshi [1], T. Grinko [2], L. Fedulova [3], I. Odotyuk [4], A. Khomenko [5] greatly contribute to the recognition of the strategic priority of innovations for economic development. E. Afanasyev [6], N. Gladinets [7], I. Lukyanenko [8], N. Rud [9] dedicated their research to the modeling of innovation processes. At the same time, the strategic aspects of innovative development management in the Ukrainian economy require additional research.

**The purpose** is a justification of the choice of key strategies for the intensive development of the Ukrainian economy, modeling the mechanism for their implementation.

**Results of the research.** Global Competitiveness Index of Ukraine is relatively low compared with other countries. According to The Global Competitiveness Report 2017–2018, Ukraine ranked 81st among 137 countries studied, although it improved its position by four points [10].

The strong external competitive position of a country is ensured through intensive competition within its borders.

In a competitive environment, businesses seek to get competitive advantages that are possible through innovation. The stronger the competition, the more active the business entities develop and implement them, providing an innovative basis for own strong competitive position and competitiveness of Ukraine. This process is continuous because already gained competitive advantage does not guarantee a permanent competitive position in the future.

By the subindex "Innovation and sophistication factors", Ukraine has low results (Table 1), which were gradually decreasing during 2016–2018 [11, 12]. The Global Competitiveness rating indicated also that the innovative potential of Ukraine is significantly higher than the possibilities and conditions for its implementation. Thus, in terms of the "Innovation" indicator, it took 61st place in 2017–2018, and in terms of the "Business sophistication" indicator – 90th. A similar ratio was observed in previous years.

The innovation potential of Ukraine, which can be used for the development of the economy, may be accessed by its innovative capacity (ranks 61st), the availability of scientists and engineers (ranks 25th). Unfortunately, the quality of research institutes has significantly decreased in recent years (by 10 points), while the links between universities and industry in research and development have significantly weakened (by 16 points). The weakening competition and the lack of motivation for innovation led to the decreasing investments of companies in research and development. Therefore, Ukraine shifted from 68th position in

2016–2017 to 76th position in 2017–2018. Encouragement of innovation activity and intellectualization of entrepreneurship through government procurement of the latest technologies and products was weak, as it is reflected in the rating data. In 2017–2018, this indicator fell lower by 14 points.

Table 1 Indicators of the "Innovation and sophistication factors" subindex of Global Competitiveness Index for Ukraine [10, 11, 12]

	2014–2015	2015–2016	2016–2017	2017–2018
Indicators	ranking from 144 countries	ranking from 140 countries	ranking from 138 countries	ranking from 137 countries
Innovation and sophistication factors	92	72	73	77
1. Business sophistication	99	91	98	90
2. Innovation:	81	54	52	61
2.1. Capacity for innovation	82	52	49	51
2.2. Quality of scientific research institutions	67	43	50	60
2.3. Company spending on R&D	66	54	68	76
2.4. University-industry collaboration in R&D	74	74	57	73
2.5. Government t procurement of advanced technology products	123	98	82	96
2.6. Availability of scientists and engineers	48	29	29	25

Currently a low level of innovation activity in Ukraine does not correspond to the innovation processes of the world economy. According to the State Statistics Committee (Table 2), only 14 % of industrial enterprises introduced innovations [13].

One of the main directions of innovation activity of enterprises was the production of new products, but the success of enterprises during 2010–2017 has fluctuated during 2010–2017.

 $Table\ 2$  The innovative activity of Ukrainian enterprises in 2010–2017 [13]

Indicators	2010	2011	2012	2013	2014	2015	2016	2017
The share of enterprises that introduced innovations, %	11,5	12,8	13,6	13,6	12,1	15,2	16,6	14,3
Implemented new technological processes, processes	2043	2510	2188	1576	1743	1217	3489	1831
In % to the previous year	X	122,9	87,2	72,0	110,6	69,8	286,7	52,5
Introduced the production of innovative products, names	2408	3238	3403	3138	3661	3136	4139	2387
In % to the previous year	X	134,5	105,1	92,2	116,7	85,7	132,0	57,7
The proportion of sold innovative products in the volume of industrial, %	3,8	3,8	3,3	3,3	2,5	1,4	No data available	No data available

One of the areas of innovation is the introduction of new technological processes, which were successful in 2016, but already in 2017 the number of introduced new technological processes is almost halved compared to the previous year.

The share of sales of innovative products in the total volume of industrial products for 2010–2015. constantly decreased during 2010–2015. It accounted for only 1.4 % in 2015.

According to the Global Talent Competitiveness Index in 2018, Ukraine ranked 61st in the overall ranking among the 119 countries studied, that is, improved its position by 8 points (Table 3).

Ukraine is the best in terms of indicators, which indicate the formation of human potential, and, as a result, an innovative potential. In terms of the Global Knowledge indicator, Ukraine ranked 42nd and improved its position by 9 and 19 points comparing to 2017 and 2016 appropriately. This is the indicator, by which high-level skills related to the professionalism and knowledge of employees are evaluated in this ranking. These skills are necessary to shape creativity and solve problems. Their economic effect is estimated by indicators of innovation, entrepreneurship and the development of high-value industries. The production-related skills of employees are highly appreciated (44th position). But the conditions for developing talents remained low. This requires the government to take appropriate corrective actions.

Table 3
The Global Talent Competitiveness Index in 2016–2018 [14, 15, 16]

Indicators	2016	2017	2018
Promoting regulatory and business environment talent development	91	103	99
Attraction of talents	97	94	98
The growth of talent	72	64	66
Ability to retain talented staff	56	54	58
Vocational and Technical Skills of Employees	40	66	44
Global Knowledge Skills	61	53	42
Global Talent Competitiveness Index	66	69	61

So, in fact, in Ukraine, there is a "gap" between the possibilities for generating innovations and the conditions for their generation and implementation. The real significant innovation potential is not realized due to the lack of, above all, a favorable internal environment. A complex of correctly chosen strategies and a mechanism for their implementation are needed to eliminate such a "gap" and intensively develop the economy in Ukraine. Strategic management of the economy involves the definition of strategic goals and the formation of a system of strategies. Imagine a system of economic management strategies as a set-theoretic model:

$$St = \langle Z, K, G, V \rangle$$
 , (1)

where Z – is a generic strategy; K – competitive strategy; G – an aggregate of functional strategies, consists of elements  $g_n$  (functional strategies), i.e.  $G = \{g_1, g_2, ..., g_n\} n = \overline{1,N}$ ; V – an aggregate of connections between strategies. Where

$$V = \{vzk, vkg, vzg, vgn\},$$
 (2)

where  $v_{zk}$  – the connection between generic and competitive strategies;  $v_{kg}$  – the connection between competitive and functional strategies;  $v_{zg}$  – connection between generic and functional strategies;  $v_{gn}$  – the connection between functional strategies.

So, the proposed set-theoretic model of the system of strategies for managing the economy, taking into account the aforementioned connections, will be:

$$St = \langle Z, K, G, (vzk, vkg, vzg, vgn) \rangle$$
 (3)

Given all the above, the strategic goal of managing the economy of Ukraine should be to ensure high international competitiveness and to enter the top ten countries in the world by the Global Competitiveness Index for 5 years. According to this goal, it is advisable to choose an innovative development strategy as a general strategy (Fig. 1).

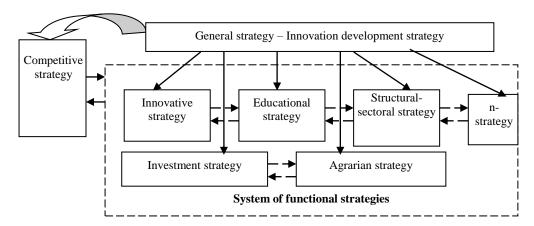


Figure 1. The system of management strategies of Ukraine

The mechanism for implementing an innovation development strategy is based on public policy to create the conditions and increase competition (Fig. 2).

The general strategy for the economy of Ukraine is being decomposed to make a system of functional strategies in various functional areas of activity, for example, budgetary, monetary, educational, innovative, and the like.

Since the general strategy for the economy of Ukraine is an innovation development strategy (the most relevant for its current state), the innovation strategy (as a functional one) is key in such a system.

Innovative strategy is a long-term direction of the country's dynamic development, significantly affects its competitiveness and has long-term consequences.

In the process of choosing an innovation strategy, it is necessary to take into account the sources of innovation for the economy (Fig. 3), which may include employees of business entities, universities, scientific institutions of the National Academy of Sciences (NAS) of Ukraine, innovation clusters (innovation ecosystems), other individual inventors.

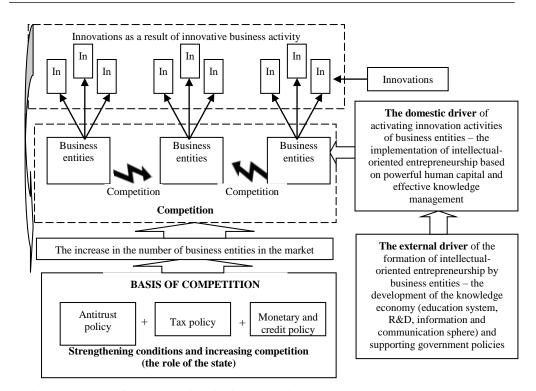


Figure 2. Model of the mechanism for implementing an innovation development strategy

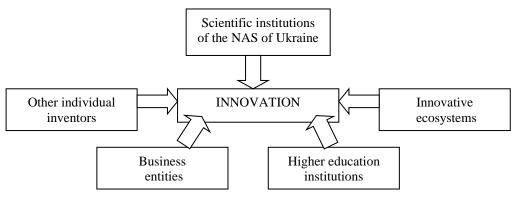


Figure 3. Sources of innovation for the economy

To implement the strategy of innovative development of Ukraine, it is offered to develop intellectual-oriented entrepreneurship as an innovative strategy.

Intellectual-oriented entrepreneurship is based on knowledge. It ensures the generation of new knowledge and its implementation as innovative ideas in products and services, requires a business to constantly learn, and create the necessary conditions for the development of intellectual entrepreneurship through the governmental efforts [17].

Robert Backman notes that "the era of knowledge-driven companies has arrived. And in this situation, the one who has managed to concentrate informal intellectual experience in the framework of his organization and understood how to transfer it from one employee to another on." [18].

Intellectualization of entrepreneurship is the growing role of intangible resources, especially intellectual resources, in the formation of the competitiveness of business structures. The shift from the labor-relied type of entrepreneurship to intellectually-oriented one is characterized by an increase in the level of education, spirituality, and social orientation of entrepreneurial activity.

The implementation of the chosen Innovation Strategy should be carried out in two strategic areas:

1) increasing human capital and activation the formation of human potential through the improvement of health and education systems, the development and implementation of a set of measures for human development, in particular:

development and systematic implementation of a set of measures for the prevention of diseases based on a motivational approach (for example, holding sports competitions, competitions in kindergartens, schools, universities, among residents of localities with a corresponding prize, conducting training trainings of meetings to explain the need and nature of disease prevention using gaming or other creative approaches);

promotion of a healthy lifestyle based on appropriate incentives to comply with it and the media to popularize it;

increase investment in human development;

stimulating the creation of computer programs for the development of human intelligence. using tax leverage;

development of a project to activate the reading of printed sources for the development of mental abilities and deep thinking (using explanatory and motivational aspects), which will contribute to the formation of human potential;

2) creation of conditions for the implementation of intellectual-oriented entrepreneurship, for which it is necessary:

to direct antitrust, tax, and credit policies for formatting and protecting competition, which will encourage innovation activity of business entities during the first half of the general strategy;

develop and implement a set of measures for the education system, in particular, the implementation of a state order for training specialists in knowledge management for business entities, stimulating the actual implementation of a competency-based approach to training specialists and activation the research activities of universities, facilitating the transfer of the results of their research and inventive activity;

increase investment in human capital (education, health, human development)

develop a systemic motivational mechanism for conducting intellectual-oriented entrepreneurship, for example, use innovative vouchers;

to actively use the National Academy of Sciences of Ukraine to form innovative ecosystems based on its structures, but to form them on an objectively realistic basis, taking into account the needs and capabilities of the region;

organizing the transfer of knowledge, technology, inventions, including through a system of portals or information subjects of clusters in the region, from their generators to business entities;

the introduction of a cluster organizational structure of the economy;

the definition of an information strategy for organizing information support for innovation and the economy as a whole;

support of the scientific sphere, in particular, more actively use the mechanism of state orders;

to pursue a favorable tax policy, which should be performed not so much fiscal as stimulating role by reducing the tax pressure on income spent on research, or exempting them from taxation.

Such a strategic plan for the implementation of an innovation strategy activates the generation of innovations, primarily at the level of business entities. It is most important and expedient because their needs are well defined. In addition, often the knowledge of the characteristics of internal activities and the attraction of internal human potential make it possible to limit the development of extensive measures to improve the performance of economic entities. Leaders aimed at conducting intellectual-oriented entrepreneurship, actively cooperate with all generators of innovation.

One of the key strategies for achieving the strategic goal is, which is advisable to choose the development of intellectual abilities and competencies.

Implementation of the chosen educational strategy requires: instructional strategy

1) the transformation of the education system in the direction of the development of intelligence and deep thinking, in particular, is necessary:

develop a system of games and competitions for the development of the intellect of schoolchildren and students;

develop a motivational mechanism for awarding the winners of any intellectual competition, for example, guaranteed admission to any educational institution of Ukraine under the conditions of free education;

study the benefits and potential of using digital information technologies and computer systems in schools along with the risks that they cause for a healthy lifestyle;

2) to provide state support for the motivation of pupils and students to study by activating employers to work with young people, in particular:

use a preferential lending rate for the introduction of a youth project by an enterprise that was developed during training;

to introduce a reduction in the tax rate, subject to the employment of graduates in higher education institutions in the specialty;

3) to focus the attention of higher education institutions on the implementation of a competency-based approach to the training of specialists, in particular

focus the training programs on the needs of business entities, active cooperation in personalizing the training of specialists, which does not require additional training of future specialists on the features of the enterprise in the future;

to organize practical training exclusively in accordance with the specialty of training on the basis of the mutual interest of educational institutions and employers in the training of specialists;

- 4) to develop a mechanism for motivating educational institutions to organize their activities in the direction of developing intellectual abilities and competencies, to introduce the most successful awards;
- 5) to develop a mechanism for stimulating the research work of universities and attracting students to it, which contributes to an increase in the scientific achievements of educational institutions, the formation of the intellectual work skills of students as future specialists, enriches their human and innovative potentials;

- 6) to direct the education system to the organization and implementation of a lifelong learning system;
- 7) to carry out state support for the training of specialists with full economic education in the educational programs "enterprise economics", "business economics", and "economics of entrepreneurship";

To implement the strategy of innovative development of the economy of Ukraine, it is advisable to offer a structural-sectoral strategy, the priority development of high-tech and non-material-intensive industries and active use of knowledge potential for the modernization of all sectors of the economy

Implementation of the chosen strategy provides the following:

- 1) IT development, which requires:
- to organize a competition for the best developer of software and information and communication technology for various spheres of society at the state and regional levels among young people who study in educational institutions of all levels of accreditation. It may bring new products to the market, promote awareness of the need in information market objects, which may be applied in business practice to increase the level of information culture of future professionals;
- to ensure an investment climate for information production and organization of commercial relations in the information sphere to intensify activities of state authorities at the meso-level through facilitating the investment fund at the expense of a private investor and increase public investment too risky projects.
- To ensure more actively the legal protection of intellectual property (prevailing in the information sphere) and strengthen the control measures by law enforcement agencies to combat "piracy".
- 2) to create the necessary investment and innovation climate by the state efforts, focus business activities on progressive technological and organizational innovations, and pursue a flexible credit policy;
  - 3) to introduce a preferential loan rate for start-up implementation;
- 4) to prepare and conduct the explanatory work by state structure regarding the advantages and opportunities for the formation of clusters in the regions and their possible structure and organization;
- 5) to develop a state program for modernization of all sectors of the economy based on an increase in their knowledge component (use of new technologies, equipment, materials, that is, products of the knowledge sector or knowledge economy).
  - 6) to increase the volume of public investment in support of risk projects.
- It is advisable to choose the formation of a cluster model of the economy as an organizational and structural strategy among other functional strategies.

A cluster is a group of interconnected subjects and related organizations, which are the neighbors by geography and operate in a particular sphere. They have everyday activities and complementarity [19].

Clusters are an alternative to a sectoral approach to associations of economic entities and, as the experience of developed countries shows, a progressive organizational model of economic development. In particular, clusters in world practice are widely used for regional economic growth and contribute to reducing the cost of scientific and technological development within their limits [3].

The cluster promotes the establishment of close links between production and research structures, which are simultaneously interested in carrying out R&D and implementation of

the results. They contribute to the innovative activity of both individual subjects and the cluster. It requires the intensification of information support and raising its level, the establishment of mutually directed information flows. Educational institutions for the training of specialists should be provided with information on new theoretical developments and practical experience. Such informational interconnection should be constant, reliable, operative, ensure the transfer of knowledge between individual subjects, therefore a carefully thought-out organizational and institutional decision on the cluster structure is necessary [20].

To create an effective cluster, we need: real interest of the subjects of the region to join efforts; initiative and assistance of the authorities, especially those structures that are created for the development of the regional economy; strategy; a set of organizational measures for interaction of future participants; powerful information support for creating an effective information system of the cluster.

The effectiveness of the cluster is based on its structure, which should include: subjects of various interrelated activities according to the technological chain; higher education institution (required); information subject, which is a key element of the cluster information system (preferably and rationally, that they were higher education institutions).

Among the tasks of clusters are the following:

coordination of the work of all the subjects of this association;

effective information support for the activities of business entities, in particular, ensuring their legal and business information, search and generation of interesting ideas for innovation:

attracting residents of the region, students and students to the development of the regional economy;

ensuring a competence-based approach to the training of specialists, an organization of practice at cluster enterprises, participation of students in the collection of information and the formation of analytical information, the use of cluster subjects as objects of research in scientific works:

the popularization of the region in Ukraine and the world, using Internet technologies; providing information to citizens;

organization of cooperation with other regions.

Special attention should be paid to the information system of the cluster, on the quality of which depends on the efficiency of all processes of such a union and its relationship with other environmental actors.

Conclusions and prospects of further research. The development of the Ukrainian economy requires the intensification of state policy on the formation and protection of competition. Under these conditions, economic entities will strive to gain competitive advantages, activating innovative activities, which will increase competition within the country and will contribute to its competitiveness in the world. The data of world rankings show that Ukraine has a sufficiently strong human potential and other factors promoting innovative development of the economy that are not involved. Successful implementation of this process requires strategic management of the economy, for which a set-theoretic model of the strategy system and a model mechanism for the implementation of the overall strategy for managing the economy of Ukraine – an innovation development strategy – have been proposed. A number of major functional strategies have been proposed that are consistent with the overall strategy and will ensure its implementation.

Further research is required for the problem of information support for the innovative development of the Ukrainian economy, which includes the definition of an information strategy and a mechanism for its implementation.

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### Инновационное развитие Украины: стратегии, модели, механизмы

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В статье рассмотрена взаимосвязь инновационной активности и конкурентоспособности. Сильная конкуренция обуславливает активность субъектов хозяйствования в разработке и внедрении инноваций, обеспечивая инновационную основу их для собственной сильной конкурентной позиции и конкурентоспособности Украины. В Украине имеется «разрыв» между возможностями генерации инноваций и условиями их генерации и внедрения. Обоснована возможность и необходимость инновационного развития Украины на основе использования достаточно мощного инновационного потенциала и других факторов содействия инновационному развитию экономики. Это требует от государства создания условий для защиты конкуренции, определение системы стратегий и разработки стратегического плана для их реализации. Предложено теоретико-множественную модель системы стратегий и модель механизма реализации общей стратегии управления экономикой – стратегии инновационного развития. Для реализации стратегии инновационного развития Украины предлагается инновационная стратегия развитие интеллектуально-ориентированного предпринимательства. Реализацию выбранной инновационной стратегии необходимо осуществить по двум стратегическим направлениям: увеличение человеческого капитала и активизация формирования человеческого потенциала, создание условий для осуществления интеллектуально-ориентированного предпринимательства. Предложено включить в систему стратегий ряд ключевых функциональных стратегий, которые согласованы с общей стратегией и обеспечат ее реализацию: образовательную – развитие интеллектуальных способностей и компетенций, структурно-отраслевую – приоритетное развитие высокотехнологических и нематериалоемких отраслей и активное использование знаниевого потенциала для модернизации всех отраслей экономики, организационноструктурную формирование кластерной модели экономики. Украине необходима информационная стратегия для информационной поддержки инновационного развития экономики и механизм ее реализации.

*Ключевые слова:* инновация, инновационное развитие, стратегия, модель, конкуренция, интеллектуально-ориентированное предпринимательство, кластер.

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### Інноваційний розвиток України: стратегії, моделі, механізми

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У статті розглянуто взаємозв'язок інноваційної активності та конкурентоспроможності. Сильна конкуренція зумовлює активність суб'єктів господарювання у розробці та впровадженні інновацій, забезпечуючи інноваційну основу для їх власної сильної конкурентної позиції та конкурентоспроможності України. В Україні наявний «розрив» між можливостями генерації інновацій та умовами їх генерації і впровадження. Обгрунтовано можливість і необхідність інноваційного розвитку України на основі використання достатньо потужного інноваційного потенціалу та інших факторів сприяння інноваційному розвитку економіки. Це потребує від держави створення умов для захисту конкуренції, визначення системи стратегій та розробки стратегічного плану для їх реалізації. Запропоновано теоретико-множинну модель системи стратегій та модель механізму реалізації загальної стратегії управління економікою – стратегії інноваційного розвитку. Для реалізації стратегії інноваційного розвитку України пропонується інноваційна стратегія – розвиток інтелектуально-орієнтованого підприємництва. Реалізацію обраної інноваційної стратегії необхідно здійснити за двома стратегічними напрямами: збільшення людського капіталу та активізація формування людського потенціалу, створення умов для здійснення інтелектуально-орієнтованого підприємництва. Запропоновано включити до системи стратегій низку ключових функціональних стратегій, які узгоджені із загальної стратегією та забезпечать її реалізацію: освітню - розвиток інтелектуальних здібностей та компетенцій, структурно-галузеву – пріоритетний розвиток високотехнологічних і нематеріаломістких галузей та активне використання знаннєвого потенціалу для модернізації всіх галузей економіки, організаційно-структурну – формування кластерної моделі економіки. Україні необхідна інформаційна стратегія для інформаційної підтримки інноваційного розвитку економіки та механізм її реалізації.

*Ключові слова:* інновація, інноваційний розвиток, стратегія, модель, конкуренція, інтелектуально-орієнтоване підприємництво, кластер.

JEL Codes: C10, I10, O10 Tables: 3; Figures: 3; Formulas: 3; References: 20

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