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A. O. Kasych, Doctor of Economic Sciences, Professor,
M. Vochozka, Doctor of Philosophy Sciences (Economics)

A. O. Касич, д. е. н., професор,
М. Вохозка, д. філос. н. (економіка)

CONCEPTUAL PROVISIONS OF THE DEVELOPMENT OF UKRAINIAN NATIONAL INNOVATION SYSTEM
КОНЦЕПТУАЛЬНІ ПОЛОЖЕННЯ РОЗВИТКУ НАЦІОНАЛЬНОЇ ІННОВАЦІЙНОЇ СИСТЕМИ УКРАЇНИ

Urgency of the research. In most countries the national innovation system concept (NIS) is used to justify the economic policy content and to aim development at an innovative path as the basic one.

Target setting. The theoretical and practical justification question regarding the content of the NIS development concept in Ukraine still remain relevant.

Actual scientific researches and issues analysis. The conceptual issues of the NIS development in different groups of countries have been studied in the works of prominent foreign and Ukrainian scholars, in particular, by R. D. Atkinson, V. M. Heyets, B. Godina, B. A. Lundvall, L. I. Fedulovoyi, S. Feinson, C. Freeman.

Uninvestigated parts of general matters defining. Article should investigate the existence of differences between the NIS concept in developed and developing countries.

The research objective. To analyze the NIS differences of developed and developing countries and to formulate the conceptual provisions for the NIS formation in Ukraine.

The statement of basic materials. The article systematizes the existing scientific approaches to the development of national innovation systems (NISs), determines the NIS value for the development of a country. It emphasizes the existence of differences between the NIS concept in developed and developing countries.

The article presents the development of basic points of the NIC concept that are the most important to understand its nature.

Conclusions. The complexity of the NIS formation causes even some doubts as for the effective implementation of this concept in developing countries. It means that the NIS concept content and a set of tools for implementation requires a clear, scientific justification based on a strategic approach. This long-term strategy of innovative development by improving NIS can be considered the starting point of a state policy in the innovative sphere that will enable a country to develop adequate implementation toolkit and transform it into a legislative framework, targeted and comprehensive development programs.

Keywords: innovation; concept; system; differences function.

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Urgency of the research. The economic development in the XXI century is not based on natural resources only, but, primarily, depends on the opportunities which come out of knowledge and innovation.

Актуальність теми дослідження. У переважній більшості країн для обґрунтування змісту економічної політики та спрямування розвитку на інноваційний шлях, в якості базисної, використовується концепція національних інноваційних систем (НІС).

Постановка проблеми. Питання теоретико-методологічного обґрунтування змісту концепції розвитку НІС України залишаються актуальними.

Аналіз останніх досліджень і публікацій. Концептуальні питання розбудови НІС у різних групах країн досліджено в працях зарубіжних та українських вчених, зокрема, Р. Аткінсона, В. М. Гейця, Б. Годіна, Б. Лундвала, Л. І. Федулової, С. Фейнсона, К. Фрімена.

Виділення недосліджених частин загальної проблеми. У статті досліджено існуючі відмінності між концепціями НІС для розвинених країн та країн, що розвиваються.

Постановка завдання. Проаналізувати існуючі відмінності НІС в розвинених країнах та країнах, які розвиваються та сформулювати концептуальні положення формування НІС в Україні.

Виклад основного матеріалу. У статті систематизовано існуючі наукові підходи до розвитку національних інноваційних систем (НІС), визначено значення НІС для розвитку країни. Наголошено на існуванні відмінностей у концепції НІС в розвинених країнах та в країнах, що розвиваються. Також було сформульовано базисні положення концепції НІС, які мають найбільше значення для розуміння її сутності. **Висновки.** Складність процесів формування НІС зумовлює, навіть, певні сумніви в ефективній реалізації даної концепції в країнах, що розвиваються. Все це означає, що і зміст концепції НІС та набір інструментів для реалізації потребує чіткого, наукового обґрунтування на засадах стратегічного підходу. Саме довгострокову стратегію інноваційного розвитку через удосконалення НІС можна вважати вихідною точкою реалізації державної політики у сфері інновацій, що дасть можливість державі розробити адекватний інструментарій реалізації та трансформувати його в законодавчу базу, цільові та комплексні програми розвитку.

Ключові слова: інновації; концепція; система; відмінності; функції.

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Nowadays the dependence of economic growth on the ability of a system to produce innovations is observed even more than before, because the dynamics of scientific progress has slowed down, and, therefore, its results are becoming more valuable.

In most countries the national innovation system concept is used to justify the economic policy content and to aim development at an innovative path as the basic one.

It has been designed for developed countries and represents a clear orientation of all socio-economic processes and institutional transformations to innovative benchmarks.

Developing countries are in a catching up state, so their focus on innovation is also significant. Herewith, the NIS formation in these countries is one of the most dynamic processes.

The national innovation system concept was approved in Ukraine in 2009. In accordance with the concept, ambitious plans to provide innovative national economy and obtain significant results in 2025 were set.

However, half of the period has already passed, but the results stated in the programme are still unattainable. This means that the designed concept has had a declarative nature and it has not provided real management mechanisms of the entire innovation sector.

That is why, the theoretical and practical justification question regarding the content of the NIS development concept in Ukraine, and ensuring its tools for its effective implementation still remain relevant.

Actual scientific researches and issues analysis. The conceptual issues of the NIS development in different groups of countries have been studied in the works of prominent foreign and Ukrainian scholars, in particular, by R. D. Atkinson [4], V. M. Heyets [1], B. Godin [8], B. A. Lundvall [9], L. I. Fedulovoyi [3], S. Feinson [6], C. Freeman [7].

K. Freeman's [7] article, which can be considered as a "pioneering" one, reveals the evolution of the innovation role in economic development, summarizes the experience of many countries and leads to understanding the importance of creating a national innovation system to ensure the promotion of innovations.

The concept of the NIS construction justified by scientists has an important significance because it allows to determine the content of public policies, which is directed at the systemic solution to the objectives of technological development.

Thus, B. Lundvall [9] has claimed that the NIS concept is not a theoretical concept, as it takes on different meanings in different contexts, it means that there are certain differences in the NIS functioning, for instance, in developed and developing countries.

According to N. Sherif [11], the significance of the NIS concept, in some aspects, goes beyond economics and has a broad socio-economic and global geopolitical context.

The existing differences in innovation activity in developed and developing countries, have been studied in the works by [2; 5; 6; 10-12], which allows us to emphasize the need for further research to understand the NIS concept for developing countries.

The objectives of the article. Considering the importance the NIS formation for Ukraine, to our mind, it is necessary:

Firstly, to analyze the NIS differences of developed and developing countries, that will determine the regularities of these processes;

Secondly, to formulate the conceptual provisions for the NIS formation in Ukraine, which should get out of the catching-up country position during 10-15 years using the innovative characteristics.

Main part. In modern conditions the competitiveness of developed countries is based on their technological leadership, which is the result of the effective national innovation system (NIS). However NIS in developed countries continue to evolve, as always there is a dynamic environment and the changing of innovation determinants causes the changes all NIS.

Regardless the fact that the NIS concept in developed countries has been crystallized by stages and considering the most positive experience, its automatic application in any country is impossible.

Since conditions in each country differ significantly, the basic NIS provisions cannot be mechanically transferred into a very different social, economic and cultural environment and provide the same results.

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Despite the fact that developing countries actively solve problems of industrial development, they have also taken the innovation-oriented model as the basis, but they did that later in time, and, therefore, the results, which they have received are somewhat more modest.

As a result, there are some differences between developed and developing countries.

Using the results of the analytical studies in OECD countries and their research enables to analyze the performance more comprehensively and to identify the differences of the NIS in different groups of countries (Tab. 1).

Table 1

Differences in NIS in developed and developing countries

Criteria	Developed countries	Developing countries
I. Features:		
The purpose of the operation	The realization of a sustainable development concept through the innovation implementation in all spheres of society	Overcoming the economic development lag by forming innovative sector
The composition of subsystems and components	The creation of new innovation infrastructure elements is taking place	The pre-existing elements of the innovative infrastructure are continuing to function. New forms of the innovation operation have limited development.
The interaction between the elements	The high level of efficiency of interaction of the existing institutions	Fragmented interaction, lack of real cooperation, the problem of coordination
The sources of innovation (mechanisms)	Self-sufficient innovative systems that develop for the account of domestic sources of innovation creation	Focused on the exploitation of the overseas innovation
The degree of state support	An effective set of tools, including the direct research funding, is used	The state uses a limited set of tools for the stimulation of innovation
Directions of scientific research	The formation of specialization in scientific research	The development of innovations that are important for the development of basic industries
Priorities in the development of science	Funding of the development of new areas of basic science	Applied science for industrialization
II. Quantitative indicators, trends:		
Gross Domestic Expenditure on R&D	2-3% GDP, a growth tendency	less than 1 % GDP, a growth tendency
Gross Domestic Expenditure on education	4-5% GDP, a slow growth tendency	2-4% GDP, a slow growth tendency
The number of scientific personnel per 1 thousand employees	10-15 people, a growth tendency	2-4 people, a growth tendency
Capital formation	17-20% GDP, a slow decrease tendency	27-45% GDP, a significant increase tendency to the industrialization completion
The share of high-technology export	17-25% of industrial export	5-15% of industrial export

Source: the author's one

The comparison of the NIS in the developed and developing countries, has allowed to highlight a number of key differences that reflect fundamentally different perception of innovations.

1. The distinction in targeting is that the tasks for the NIS development are absolutely different. The aim of the NIS construction in developed countries is founding the innovative basis in all processes of society functioning, i.e. the actual implementation of sustainable innovation oriented development concept

The objectives for developing countries are limited by the following factors:

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Firstly, the search for embryonic elements of the innovation process and the creation of conditions that facilitate the spread of innovation;

Secondly, the direction of every effort to overcome the "technology gap" using importing technology and the development of internal capacity for their effective use;

Thirdly, the expansion and promotion of investments aimed at the acquisition and implementation of technologies, and at the development of technological capabilities.

The aim of attainment of innovation independence is strategically important for developing countries, but this task is long term one.

2. The differences in the composition of NIS subsystems and interaction between them. Understanding of the structural NIS characteristics is important to determine the points of application of an effort to enhance innovation. Developing countries have a well-formed NIS infrastructure on macro (labor markets, financial markets, education system, etc.), meso (technological parks and platforms, thematic networks, etc.), and on micro level (innovation active enterprises of various kinds and research institutes of creation of new knowledge). It is noteworthy, that it is exactly developed countries that are in a constant search for new organizational forms of innovation operation activation. In developing countries, there is a focus on updating the existing elements and on creation of "new" ones, using the experience of developed countries.

3. The differences in the content of public policy. In developed countries, the innovation process is an embedded driver of socio-economic development, primarily through free competition, and formed market institutions. Developing countries are characterized by a limited role of government at all stages of the innovation process and lack of financial resources that the government assigns for education and science. That is why, in developing countries the formation of the state innovation policy should become the first step in the NIS formation.

Implementation of the NIS concept in developing countries requires the development of a policy directed at improving the overall innovation system configuration, in particular regarding R&D expenditure distribution; stimulating cooperation between firms, public and private institutions; reducing regulatory barriers to the mobility of human resources. Overall, the implementation of the NIS concept should be considered as a learning process that can lead to public policy system reshaping.

4. The differences in the NIS formation mechanisms. "Borrowing" and adaptation of technologies from countries that are technology leaders have become important for the development of developing countries at the present stage. The combination of all possible methods i.e. reverse engineering, licensing, overseas trips of scientists, inviting foreign companies and experts to participate in international scientific collaboration - they are difficult to implement immediately and in combination, but these tools are used by developing countries while constructing the NIS.

5. The differences in quantitative indicators of resource provision and effectiveness of NIS functioning. In developed countries, innovations have long become the philosophy of the entire economy, and, thus, their indicators are quantitative benchmarks for the resource support of the NIS. At this stage, developing countries should actively create conditions for the perception of innovations and ensure their effective adsorption by relevant industries and enterprises, and this requires not only qualitative changes in the economy, but also orientation to quantitative performance indicators of the NIS in developed countries. In accordance, the developing countries increase the level of financial provision and staffing of the NIS development by the increasing in investments in R&D and education, increasing the number of people with high education, increasing the number of scientific staff, etc.

Considering the listed above and other differences in the NIS development, it should be emphasized that there is an important motive of innovation intensification in developing countries, which forms a key competitive advantage in this group of countries, such as lower costs of innovation, compared with developed countries. As a result, enterprises are able to create their own "niche" on global markets. Respectively, having provided the expansion for innovation adsorption ability at the initial stages, in developing countries, the NIS should be aimed at the development of opportunities for making innovation with higher value, and this is possible only on the conditions of the creation of an effective NIS.

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The understanding of the existing differences gives an opportunity to imagine the challenges that are faced by some countries, such as Ukraine, in the context of innovation development acceleration. The features of the contemporary NIS development of Ukraine are as follows:

1. The justification process of the NIS development goals should consider the fact that the processes of industrial production industrialization take place slowly, and the investment activity is declining. Therefore, the important task for Ukraine is to get (create) innovation, the use of which will increase the overall productivity in the existing industrial branches and will increase the effectiveness of science.

2. Ukraine still has certain infrastructure conditions to activate innovation, such as universities, research institutes, and factory science. However, low funding and insufficient interaction leads to an outflow of personnel from the field of science, reducing the impact of science as a whole. Taking into consideration the NIS performance indicators of Ukraine, it can be concluded about the movement in the direction opposite to that of the global trends.

3. Instead of implementing an active innovation directed policy, the state of Ukraine has taken the passive observational position. NIS formation is a priority task for the government and should be implemented on the declaration level without developing a meaningful innovative policy that should be accompanied with the formation of effective levers for innovation activation.

The understanding of the presented differences of the NIS functioning in different countries and of the features of the present stage of innovation activity in Ukraine allows to emphasize on the importance to formulate the conceptual provisions of the NIS development, which may be the first stage of innovation orientation in the development of a country (Fig. 1).

Developing the NIS concept implies reasoning for the content of the constituent elements on three levels, i.e. the theoretical, methodological and practical ones.

The scientific basis of the NIS concept is formed with the theory of economic dynamics, theory of a firm, investment and innovation theory, theory of regional economy, which allow to build structural and logical relationships between the key drivers of development in modern conditions and to determine the role of NIS in these processes.

The use of the scientific theories content and author's research have allowed to formulate the regularities of the contemporary stage of the NIS development, which should be taken into account while developing the conceptual provisions of activation of innovative processes in Ukraine. Therefore, among the most important regularities of the NIS development there are the following ones:

- an innovative directivity of economic development, i.e. innovations have been recognized by scholars and practitioners as the most effective driver of all processes of human life, so the NIS formation does not have an alternative form of multilevel governance of the innovation processes of a society and economy;

- constant evolution, i.e. NIS is a structure that is constantly improved, and at the same time is an adaptive mechanism of economy, that allows to adjust to the most requirements and challenges of our time by improving the forms and institutions of innovation;

- up-building the resource potential, i.e. resources remain a critical factor in the innovative development and launching of mechanisms to self-development of NIS, this, in particular, includes material, financial, intellectual, information and other resources;

- preservation of the leading role of a state in the initiation of innovative development, i.e. in most countries, the state continues to have an important role in NIS shaping: from the formation of innovation policy and the creation of legal and economic conditions for the transformation of enterprises into real innovation drivers to participate in advanced research projects through the use of the state budget;

- the globalized nature of the result use, i.e. competitive innovations almost instantly become the object of interest on global markets, although their creation takes place in specific areas where participants are focused on the innovation process and the formation of critical resources. As a result, innovations in modern conditions operate in the globalization-localization coordinate.

These regularities allow to define the conditions in which the development of the innovation sector takes place in most countries.

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The starting point of proper directing of the virtually chaotic processes of the NIS development in Ukraine should be the definition of scientific approaches, understanding of which will allow to build the overall logic of the reform process.

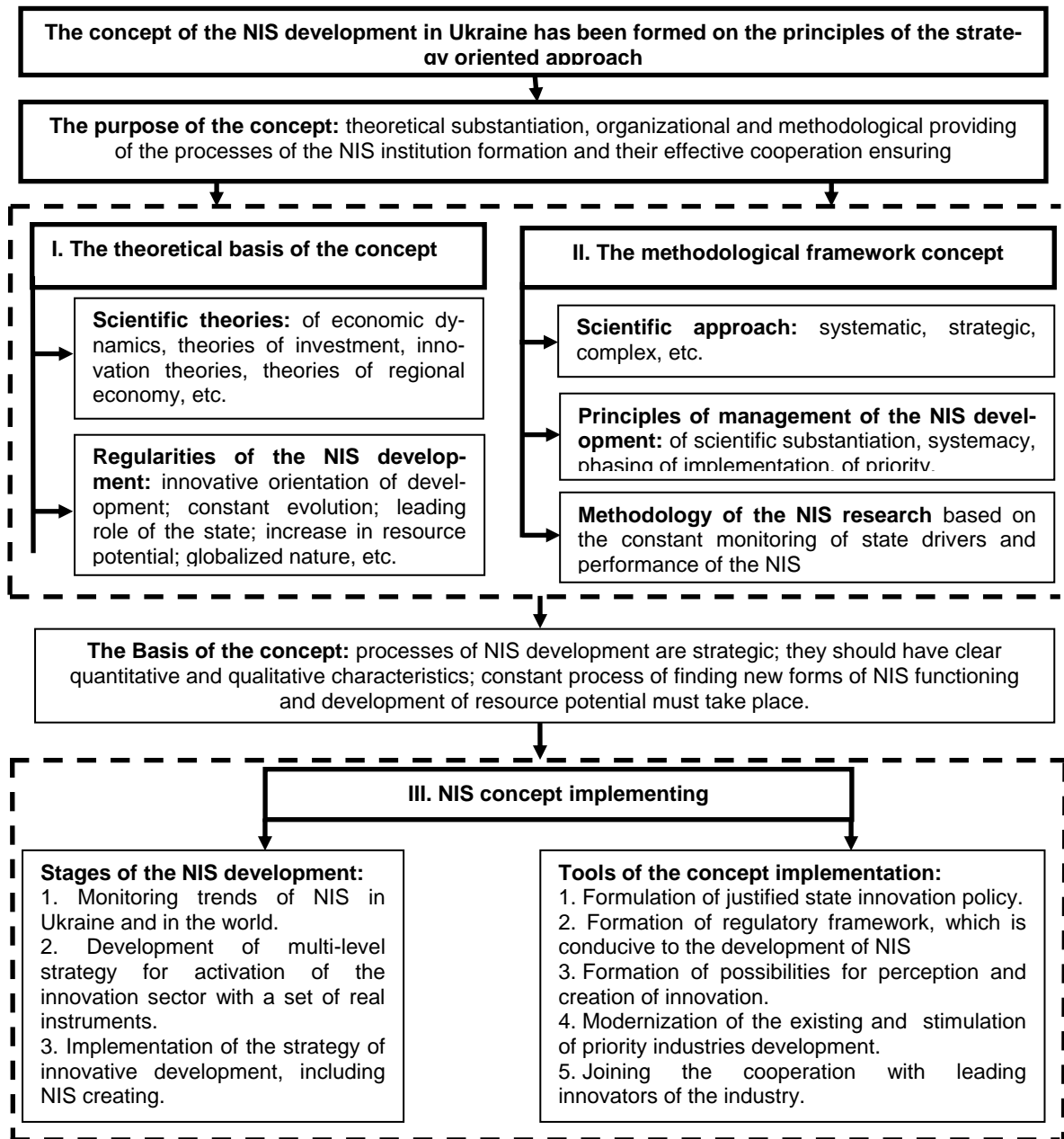


Fig. 1. The constituent elements of the NIS concept formed through strategically-oriented approach

Source: the author's one

1. A strategic approach defines the necessity to form a long-term strategy of innovative development for Ukraine's economy, which would contain a set of quantitative and qualitative objectives with defined terms forecasted (expected and actual) results and the opportunity to review and adjust them

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if it is necessary. In our opinion, while developing the NIS concept of Ukraine, a strategic approach should be used as a basic one.

2. A systematic approach, i.e. systemacy as a principle of NIS functioning, means that its elements should not be characterized by a mechanistic combination; they should have consistency and interaction, which eventually will provide an attainment of innovation sector onto the level of self-development.

3. A comprehensive approach determines the necessity for consideration the objectives of the NIS development on all levels of its operation (macro, meso and micro), which means the need to provide not only the development of theoretical provisions for suppling the scientific basis under the program development in a country, but also for creating a set of specific regulations, the introduction of new forms of activation processes on the level of actual participants of NIS, i.e. enterprises, educational or scientific institutions, etc.

In accordance with the current stage of the innovation sphere development in Ukraine, the following basic provisions of the concept are offered as the priority ones:

1. The process of innovative processes activation through the NIS creation should be considered as strategic ones and those that determine the prospects for the national economy on all levels of operation, and, therefore, they are uncontested.

2. The processes of the NIS development should have clear quantitative and qualitative targets as for the forms and terms of implementation, since the postponement will eventually require spending even more resources in order to receive even slight results.

3. The processes of the NIS development are complex and multidimensional, and, therefore, require the development and implementation of a scientifically grounded innovative policy aimed at the preservation of the existing and development of the necessary resource possibilities.

In order to implement the developed provisions regarding the NIS development in the practical sphere, it is necessary to apply a number of instruments for different levels of action. As for the priority measures, the following steps are advisable:

On the state level – to develop a long-term strategy of the NIS evolution; to introduce a system of the NIS efficiency monitoring according to the methods, that are used by OECD countries; to ensure formation and implementation of the state innovation policy; to develop a regulatory framework, that is conducive to the NIS development, etc.;

On the industrial enterprise level – to modernize the economy, using technological innovation that will ensure the empowerment and perception of innovation in real production; to attract strategic partners for joint development of new innovative projects; to step up export opportunities, etc.

On the research and educational institution level – to ensure the creation of complex conditions for storing, updating and development of human potential research sector; to increase the scientists' motivation and the implementation of research results in the real economy; to prevent intellectual emigration and to improve the level of economic security on this basis.

Conclusions. The complexity of the NIS formation causes even some doubts as for the effective implementation of this concept in developing countries. It means that the NIS concept content and a set of tools for implementation requires a clear, scientific justification based on a strategic approach. This long-term strategy of innovative development by improving NIS can be considered the starting point of a state policy in the innovative sphere that will enable a country to develop adequate implementation toolkit and transform it into a legislative framework, targeted and comprehensive development programs.

The vast majority of the proposed instruments for the implementation of the concept relate to systemic measures, which have a lag time of implementation, but without their action, the creation of an effective NIS is impossible.

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