

## MODEL OF NATIONAL INNOVATION SYSTEM

**Rakhmanbaeva Roza Abdurakhmanovna**

*Professor of the Department of "Corporate Governance" of Tashkent State  
Transport University*

**Abstract:** The main problems of interpretation of the concepts "national innovation system", "innovation model" are considered. The characteristic features of the economy of various countries are analyzed based on the structure and model of the national innovation system. A classification of types of national innovation systems is proposed.

**Key words:** innovation model, national innovation system, classification of national innovation systems.

At the present stage of development of the world economy, processes have arisen that have radically changed the main direction of economic development and formed a different approach to studying the sphere of production as the main source of economic growth. It is the innovative approach, which in recent years has become the subject of close attention from the Russian media, that is a catalyst for social production, changes its structure, modifies the economic organization of society as a whole and stabilizes the social situation in the country. In this situation, it is most interesting to analyze national innovation systems (NIS) in countries with different levels of economic development.

K. Freeman (Great Britain), B. Lundvall (Sweden) and R. Nelson (USA), who took as a basis the works of J. Schumpeter and his theory of economic dynamics, F. Hayek with the concept of scattered knowledge, D. Northom with institutional theory, R. Solow with an analysis of the role of scientific and technological progress in economic growth, P. Romerom and R. Lucas with their new theory of growth.

These economists analyzed the results of innovation activity in countries with different economic conditions and, on this basis, proposed various interpretations of the NIS with an emphasis on its individual elements and relationships. Both in foreign and domestic literature, such features of NIS are noted as the priority of knowledge over other areas of production; the dominance of competition between entrepreneurs as the most important factor in economic dynamics based on innovation; the impact of institutional features on the content and structure of innovation, as well as the pace of its development; systemic character; dissemination of new knowledge and technologies as the main function of the NIS.

Despite the wide variety of studies devoted to NIS, there is no generally accepted definition of this concept yet. It should be noted that in the United States, an innovation

system is understood as a scientific and technological system, which includes institutions that generate new knowledge: universities, research laboratories, high-tech corporations. In European schools, the term "innovation system" is understood in a broad sense as the dissemination, assimilation and use of knowledge through learning processes between economic entities, experiments and improvement of technologies and products in the process of their use. In Russia, for a long time, NIS was understood as high-tech industries and sciences, primarily under the jurisdiction of the Russian Academy of Sciences.

However, it is more expedient to rely on an expanded interpretation of the NIS and form a system of flexible horizontal and vertical interactions between all economic entities, allowing them to quickly generate, master and disseminate new knowledge. Based on the foregoing, we can give the following interpretation of the concept of NIS: a national innovation system is a special type of the country's economic system, developed taking into account its institutional features, based on an innovative model of interaction between economic entities, the purpose of which is to increase the role of competition between entities based on the introduction of innovation as a key factors of economic dynamics that affect both the structure and the content of the state economy.

In this regard, it would be logical to define the concept of "innovation model". The innovation model is a self-functioning continuous mechanism of intersectoral production relationships in the country's economy, focused on increasing the efficiency of research activities, direct and indirect costs of the company associated with the development of the concept of a new or upgraded product, process, technology, patent or similar asset, incurred within the framework of the scientific process of information retrieval, based on increasing competition between entrepreneurs in order to accelerate the development of complex systems across industries and regions and, as a result, increase its efficiency.

It's no secret that modern conditions dictate the need for some kind of "certainty in the economy", which is understood as sustainable competitive entrepreneurship, the creation of viable, profitable and scalable corporations. This development has several implications:

1. Competition between corporations leads to the formation of self-reproducing and self-regulating innovation ecosystems leading to reliable competitiveness.
2. Sustainable competitiveness between corporations, being the result of a long economic existence and development, contributes to the fact that innovation and profit, as a result, become objectively inaccessible to other economic entities, which can be described as "unfair advantages". In this regard, the economy should have a mechanism based both on competitiveness, but at the same time on complementarity and mutual strengthening of low-, medium- and high-tech companies.

3. The concept of sustainable corporate competitiveness is the basis of the modern path to achieve "democratic capitalism" (as opposed to "people's capitalism" or "casino capitalism"), in which real opportunities to gain access to innovation and economic prosperity as a result are available to all economic actors. This situation should be based on initiatives from both the government and science and entrepreneurs.

It should also be noted that at present, the division of the economy into economic systems is largely ambiguous due to the objective need to abandon the most odious manifestations of both the command-administrative and market systems. Thus, in order to provide the most complete and effective understanding of the problems of the economy of various countries, it is necessary to have a good knowledge of the structure of its individual types, their content and features. In this regard, the most rational classification of the economies of various countries will be the classification not on the basis of the relations to property that have developed in them and the characteristics of the economic mechanism, but according to the types of NIS.

For further analysis, despite the complexity and specificity of each innovation system, it is logical to divide the economies of countries into several groups depending on the basic types of NIS. Undoubtedly, in view of the uniqueness of each NIS, corresponding to the socio-cultural, climatic, geopolitical, resource and other characteristics of countries and regions, there are no universal requirements necessary to ensure innovative development. This division is based on the objective difference between countries in understanding the innovation system and its structure, which largely corresponds to the geo-economic principle of these countries.

It is customary to distinguish four main types of innovation models: Euro-Atlantic, East Asian, alternative and the "triple helix" model. Euro-Atlantic - a model of a complete innovation cycle (from the emergence of an idea to the introduction of a product into production). This model represents all the components of the structure of the innovation system: fundamental and applied science, research, development, launching products into production. This model is used by such countries as Great Britain, Germany, France. The East Asian model is a special model of innovative development. The innovative systems based on this model are almost completely devoid of the "fundamental science" component.

This model is used in Japan, South Korea. Being high-tech export-oriented, countries using this model borrow technology from countries committed to the "traditional" model. Japan's innovation system is considered a classic example of the East Asian model.

An alternative model of innovative development is used mainly in countries that do not have significant potential in the field of fundamental and applied science, do not have rich reserves of raw materials and technologies for their processing. In such innovative systems, a high-tech component is poorly represented or absent altogether.

The countries of this group in their innovation policy focus on training in the field of economics, finance, management, sociology and labor psychology. Much attention is paid to the training of managers for local offices of transnational corporations, international banks, and international political structures. This model is used to develop national innovation systems in Thailand, Chile, Turkey, Portugal and other countries.<sup>1</sup>

The “triple helix” model, which has received practical implementation in the United States, differs significantly from those listed above not only in the structure of the NIS, but also in the mechanism of interaction of its individual elements. The formation of individual elements of this model began in some countries of Western Europe and Japan. The “triple helix” is by far the most advanced model for the formation of NIS. It was developed on the basis of the Euro-Atlantic model. The theory of the “triple helix” as a form of development of the model of innovative development was created at the beginning of the 21st century. Professor of the University of Newcastle (England) G. Itskowitz and Professor of the University of Amsterdam L. Leidesdorf.

The model was developed on the basis of an analysis of the economic development of the American state of New England, in the process of solving the problem of falling industrial production during the global economic crisis of the 1920s. The model is based on the synthesis of a number of sociological theories, the use of analogies from the biological sciences, as well as the similarity of the problem of the relative motion of three bodies, which has no general solution (but particular solutions are possible for some specific initial conditions).

It is adequate with respect to nonlinear multivariant processes. Its main properties:

1) the presence of internal uncertainty of the described process due to the imposition of the influence of the relative independence of each of the selected spirals and the effects of their interaction;

2) the presence of many possible solutions, due to the specificity of the relationship between them;

3) the dependence of these solutions on external initial conditions. The model operates according to the following principle: each two of the three spirals form, with respect to the third, the boundary conditions of the interval situation, and the third one forms the “between” environmental formation, and these frame functions can be performed in pairs by each of the selected variables.<sup>2</sup>

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With regard to innovative development, the triple helix model consists in the interaction of three key objects - the university, government and business - at each stage of creating an innovative product. This is a dynamic model of interstructural interactions that arises as a result of the development of the economy and society. In the early periods of economic development, the interaction between the three institutions was linear. In a modern economy, this interaction should allow institutions to adopt and retain some of the characteristics of each other, interacting at a faster rate than before.

Its main elements are: strengthening the role of universities in interaction with industry and government; cooperation of three main institutions (university, state, business), while the innovative component is generated from this interaction, and not at the initiative of the state, thereby creating an autonomous mechanism for generating an innovative product; complementing the main functions of each institution, in particular by taking over the functions of other institutional areas, which ultimately is a catalyst for innovation.

Thus, in practice, a situation arises when universities, in addition to their main functions - education and scientific research - also contribute to the development of the economy through the creation of new companies, business partially provides educational services of an applied orientation, and the state, in addition to traditional legislative and regulatory functions, acts as a venture capitalist. It should be noted that in this model, the leading role is given to universities, which are turning into a special environment, transforming into entrepreneurial universities or universities of industrial type, applying knowledge in practice and investing results in new educational disciplines.<sup>3</sup>

While in countries with advanced economies a new model of the innovation system is successfully developing as a way out of a new crisis, out of a recession in economic growth, and new approaches are being formed to explain the processes of the emergence and spread of innovations, in Russia this process is only at the inception stage. It is the right approach to building a national innovation system, focused on increasing competition between entrepreneurs based on an innovative approach to development, that will lead to an increase in the efficiency of both the enterprise and industries, regions and the national economy as a whole.

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