NATIONAL INNOVATION SYSTEM AS THE BASIS OF INNOVATION-TYPE ECONOMY

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Summary. The theoretical and methodical aspects of national innovation system formation have been considered. The basic organizational-technical requirements for formation of national innovation system of Ukraine have been proposed.

Key words: national innovation system, knowledge, innovations, scientific-technical potential, generation, technology, innovation economy.

INTRODUCTION

The development tendencies of the modern world economy, obtaining more and more innovation features, are concerned with development, introduction and usage of high technologies. The transfer of leading countries to the new stage of forming the innovation society - constructing economy based mainly on knowledge generation, distribution and usage (knowledge based economy) convincingly shows that Ukraine has no other way of development but forming the economy based on knowledge - innovation-type economy.

On 17 of June, 2009, The Government of Ukraine approved the Concept of national economic system development which had been worked out by the State agency of Ukraine for investments and innovations, thus having finally selected the innovative model of economic development. The general aim of developing the national innovation system of Ukraine was defined as the creation of conditions for increasing productivity of labor and competitiveness of domestic commodity producers for improving the welfare and providing the stable economical growth.

The current process of national innovation system formation in Ukraine is concerned with the certain number of problems, primarily with the fact that Ukraine lost its place in the structure of international technological exchange and correspondingly the system which can effectively concentrate material, labor, scientific and financial resources in strategic high-priority directions of industrial growth. As a result, production of raw materials and semi-fabricated products dominates the export of
Ukraine. In the same time the leading countries enter the world markets with high-technological production – the result of knowledge implementation.

The current structure of investments not only doesn’t promote progressive technological shifts but also exacerbates the situation by supporting enterprises of a lower, third technological way and limits the development of higher, fourth and fifth technological ways.

However, overcoming the modern economic crisis in Ukraine is possible through the realization of its benefits, such as the high level of education and qualification of the population and the remaining scientific and productive infrastructure of Soviet-era. Thus, the issues which are concerned with the national innovation system formation have nowadays acquired a special relevance for Ukraine.

**MAIN RESULTS OF THE RESEARCH**

Creating an effective national innovation system could involve existing scientific and technical potential of the country for technological modernization of the economy and activate the business sector in the innovation sphere. In practical terms, the task consists in forming a system that could provide the effective interaction between business and knowledge producing environments – a scientific-research complex. Moreover, such interaction should provide not only the knowledge transfer but also knowledge reproduction and its economic usage. In turn, the business environment must constantly send pulses to the national scientific-technological sphere, targeting it at the development of a product or a technology [4].

The national innovation system is the basis for constructing the knowledge-based economy, which means that formation of national innovation system should be directed at transforming new knowledge into products and services required by economy and society. For example, the share of new knowledge embodied in technologies, equipment, staff training, organization of production now accounts for 70 to 85% of gross domestic product (GDP) growth in the economically developed countries.

It is necessary to consider that knowledge alone does not transform the economy, also there are no guarantees that investing in research and development of certain higher education products will bring positive results. Many countries (e.g. Brazil, India, Russia) have invested significant financial resources in the formation of scientific and technical potential but have received no considerable economic return from their investments. This can be explained by the fact that the scientific and technical knowledge bring maximum benefit only when they are used in a complex system of institutions, organizations and processes, known as the “national innovation system”.

It should be noticed that for the first time the concept of national innovation system has been used in 1987 by Chris Freeman (Science Policy Research Unit, Sussex) in his study of technology policy in Japan (Freeman, 1987) [10]. The essential elements of Japanese national innovation system, which ensured the country’s economic success in the postwar period, have been described in the research. Since the early 1990's the concept of national innovation system has been placed in the center of attention of scientists studying the problems of technological development.
The initial interpretation of the "national innovation system" concept suggested focusing on science and technology as the main factors determining the environment of the enterprises activity. Then, by the end of 1990’s, the concept of national innovation system has gained a broader context, approving that the national innovation system includes all elements of the social economic system and that the level of technological development and innovation is determined by the national characteristics of the country's historical development.

One of the first definitions of national innovation system was proposed in official documents of the Organization for Economic Cooperation and Development (OECD). According to the definition, the national innovation system is understood as a set of institutions belonging to the private and state sectors, which individually and in combination cause the development and distribution of new technologies within a specific state.

At the moment there are three main interpretations of national innovation system category [6].

The first one is the examination of the national innovation system as a set of institutions, activities of which are aimed at the generation and diffusion of innovations. This definition means that innovation processes are being realized directly in the business practice. The main emphasis of this concept lies in the sphere of commercialization, the practical result of science, as the emergence of a new product is associated with the cooperative work of a number of economic entities.

The second concept interprets the national innovation system as a complex of conjugated economical mechanisms and activities that provide innovation processes. This definition is more functional as it emphasizes the dynamism of national innovation systems interaction and the transition to a nonlinear model of the innovation cycle without taking into account the motive forces of innovation processes.

The third point of view is concerned with a deeper essence of economic relations. The national innovation system is regarded as a part of the national economic system that provides organic embedding of innovation processes into the progressive development of economy and society. This concept considers that the creation of formal innovation structures doesn’t guarantee the success of innovations. Establishing adequate economic environment and favorable social climate for innovation is also necessary.

The innovation economy, based on the overall interest in the use of new technologies, suggests a new system of economic relations, the formation of which has a common order for all countries. Simplistically, this order can be described in the framework of the following logical chain: emergence of new technologies → increase in expenses on permanent staff retraining → lower production costs and prices of consumer goods and services → change in the structure of demand for goods and services → increase in household expenses on education → improving the population qualitative composition → change in the structure of national wealth → forming a new system of interest → reviewing the criteria of the economic growth effectiveness. Fig. 1 shows the baseline data, goal, objectives and main functions of forming the national innovation system.
Baseline data for the national innovation system formation:
- Macroeconomic forecast of the social and economic development of the state;
- Condition and directions of development of innovation sphere regulatory legal support;
- Forms of innovation sphere state regulation;
- Condition and directions of development of scientific-technological and industrial potential of the state;
- Condition and forecast of inner commodity market and labor market development.

National Innovation System
The purpose of creation – forming favorable legal, institutional and economic conditions for effective development in the production of the latest scientific-technological and technical achievements from the positions of state innovation policy.

Tasks
- Creating a market background for the high-tech competitive products (services) implementation
- Creating conditions for a dynamic and effective update of obsolete and physically worn-out main funds in a sphere of high-tech competitive products (services) creation
- Creating conditions for forming an integrated triad "science - education - industrial production" for the innovation potential development

The main functions - providing the stable economic development of the state and improving the welfare of population through:
1. Creating additional jobs in spheres of science, manufacturing and services;
2. Increasing incomes to the budgets of different levels due to the growth of manufacturing competitive high-tech goods and services production;
3. Increasing the educational level of the state population;
4. Solving the national environmental and social problems through the use of new technologies.

Fig. 1. Background, purpose, objectives and main functions of the national innovation system formation

The system aspect of the national innovation system concept is that it is a set of interrelated institutional structures (small and large firms, universities and government research centers, government and regional administrations, the objects of innovative structures, financial markets, etc.) that influences the development of innovation [7].

The modern national innovation system is being formed on the basis of the overall state policy and the regulatory legal framework ensuring the implementation of
The state is the main initiator of the national innovation system creation and it fully guarantees its development with resources on the basis of the annual selection of innovation activity priority directions.

The key elements of the national innovation system are represented in the diagram (Fig. 2): they are science (the system of generation and dissemination of knowledge), the innovation sector of production, education aimed at preparing highly skilled staff, the innovation infrastructure, the mechanisms for innovation activities support. Taking into account the fact that the functioning of the national innovation system is built up on the basis of the market economy conditions, the high technology products and services market can be regarded as one of the elements of the national innovation system.

Fig. 2. The main elements of the national innovation system

Thus, the national innovation system assumes a set of interrelated organizations, which are directly engaged in the production and commercialization of scientific knowledge, technologies and also a complex of legal, financial and social institutions providing functioning of innovation structures.

The most prevalent simplified general model, describing the interaction of the national innovation system elements, defines the role of the private sector and the role of the state. The role of the private sector is to develop technologies based on their own research and to implement innovations to the market; the role of the state is to promote the production of the fundamental knowledge (in universities) and the production of a complex of strategic technologies, as well as to build up the infrastructure and favorable institutional conditions for innovation activities of private companies. Thus, the individual specifics of different innovation system models consist of variations of the predominant involvement of the state and private sector in implementing certain functions in the innovation process [8].

Within this general model the national features of national innovation systems are being formed: the greater or lesser role of the state and the private sector in realization of these functions, the relative importance of small and large businesses, the
ratio of fundamental and applied research and development, the dynamics of evolution and sectoral structure of innovation activities [2].

Innovation systems of different countries differ, as well as innovation strategies of different states do. National innovation systems in different countries may have different goals. In every single case the strategy of the national innovation system development is being determined by the current public policy, the regulatory legal support, the forms of direct and indirect state regulation, the state of scientific, technological and industrial potential, the state of inner commodity and labor markets, as well as historical and cultural traditions and peculiarities. The development of innovation activity can be affected neither by the type of state nor its political regime. So, the innovation activity has been successfully developing both in federal (USA, Germany), and in unitary states (France), under conditions of a constitutional monarchy (Great Britain, The Netherlands, Spain), as well as in the communist regime of China. Therefore, we can assume that the decisive factor is the stability of the political situation in the country [6].

There are two main approaches to the national innovation system formation:
European-American approach, based on the predominant development and usage of its own scientific and technological potential for generating an innovation product which includes the entire innovation cycle - from basic ideas through applied research and development to the finished product;
Japanese approach, based on the predominantly external borrowing of scientific and technical information with its subsequent finalization in order to obtain an optimal outcome.

However, there is no optimal national innovation system, as there is no single state innovation strategy that can be considered the most effective one. On the contrary, there are many national innovation systems with its own advantages and disadvantages. National innovation systems have certain common traits and the experience of economically and technologically more competitive countries can and should be used by less competitive ones.

CONCLUSIONS

The world experience of innovation development allows allocating the following basic organizational and technical requirements for the formation of a national innovation system of Ukraine:
the development of scientific research and technical spheres, aimed at expanded reproduction of knowledge, information and technologies, oriented on satisfaction of production innovation needs;
the interaction of research units and business structures in order to transfer knowledge in the competitive technologies and creation of a market of high-tech products;
the formation of the business layer that is able to use competitive technologies in manufacturing and can receive high profit;
the targeted character of direct state support, implemented either by means of capital investment or through the transfer of intellectual property rights;
the immunity from tax for profits that are spent on the introduction of new technologies, funding research and development;

the creation of small firms that provide the new technologies development and transfer, as well as centers of technologies transfer in scientific research institutes and universities, including by the means of providing them with the initial capital and tax privileges, legal and informative support.

Thus, the most important priorities of scientific and technological development in Ukraine should be linked to the continuous daily work of forming national innovation system, which is regarded as an institutional model for the generation, dissemination and usage of knowledge, its embodiment in new products, technologies and services in all spheres of society life.

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