DIRECTIONS OF INNOVATION STRATEGY AND KNOWLEDGE ECONOMY

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ABSTRACT

On the basis of modern methodological approaches, the author investigates the patterns of mutual influence of innovation policy and innovative economy as the basic categories of social and socio-economic processes of Russia's modernization development. The features of classification, criterial series, models and directions of strategy are shown, which are formed in the conditions of competitive market environment and contributed to the emergence of knowledge economy, intellectual capital of organizations. An assessment is given and examples of innovative projections on the state and prospects of development of transport corporations and structures are given.

Keywords: transport, knowledge economy, innovative policy, science-intensive products, development strategy.

Background. *According to the definition, innovation is the process or result of the transformation of a creative idea into a useful product, service or method of performing work; way of organizing activities to transfer knowledge into practical innovations to meet the needs of individuals and organizations, social groups and communities, the whole society. From the point of view of economic interests, innovation is an important competitive advantage of the organization, based on the use of knowledge and realized through the competence of its owners, managers and personnel. The initial component of innovation is new knowledge about the goals, means and results of activities [1]. An example of innovation is the introduction to the market of products (goods and services) with new consumer properties or a qualitative increase in the efficiency of production systems.*

Objective. *The objective of the author is to consider knowledge economy and directions of innovation strategies.*

Methods. *The author uses general scientific methods, comparative analysis, economic evaluation, analytical approach, generalization.*

Results.

Typology and criteria

The most traditional approach to the typology of innovations is their division into technological, social (process), food, organizational, marketing.

Innovations are conditionally divided into minimizing (stabilizing), transformational and transaction costs. In other words – related to material and non-material production.

According to the technical and economic content innovation can be radical (fundamental, revolutionary) and evolutionary (gradual, modernization). It should be noted that it is useful to divide innovations into continuous and jump-like, or intermittent ones. The latter classification is related to the notion of «product platform». According to A. A. Dynkin, Corresponding Member of the Russian Academy of Sciences [2], a product platform is «a set of subsystems and interfaces that form a basic structure that allows efficient development and production of a stream of derivative products». The product platform is based on a basic set of consumer properties that allows it to be further differentiated by combining standard and variable elements of products and services. It is important to note that within a single product platform, a wide variety of products is possible that allow to develop differentiated segments of the market and significantly save production and marketing costs.

An example is Chrysler, which organized its constructive and engineering innovations around five product platforms: minivans, large cars, minivans, jeeps, trucks and special projects.

Recently, this set of criteria is being supplemented by new ones, which have not yet been firmly established in the scientific literature. For example, it is offered to divide innovations into upstream and downstream, or innovations that are «knowledge-driven» and «use-driven». Often the same organizations use both sources, but they are motivated by highly different goals. In the first case, another approach is important in order to solve the problem, in the second it is important to get completely new knowledge. With the process of upstream innovations, ideas are transformed into technological opportunities and are represented in the form of prototypes of product concepts or platforms. After the technological base is created, this knowledge interacts with market research, if it is downstream innovations, then knowledge turns into commercial products or services. For example, in American corporations, only one out of 3000 ideas bring commercial success in the ascending phase. On the descending branch of the innovation process – one of four projects is successful [2].

It should be noted that as a root cause for innovation can be considered either technology push, or demand pull. In connection with which of the above stimuli is the leading one, the division into «innovations of supply» and «innovations of demand» is used. At the same time, some scientists believe that the scientific and technical prerequisites are crucial (for example, A. Schumpeter, K. Freeman, N. Rosenberg, R. Nelson, A. Phillips), others believe (J. Schmuckler, G. Mensch, E. Wonhippel) – demand.

Effective management of companies should be based on new approaches. The competition comes to the fore not only in the field of innovative goods, services and technologies, but also in methods of management, innovative professional management.

The result of innovative activity is the emergence of a new organizational and economic form of the subject, which should provide an innovative cycle [1].

The concept of «knowledge economy» originated in the late 1980s, with the development of the immaterial sphere significantly accelerating. Intellectual capital became the main cost for shareholders, and the competence of management began to be determined by the effectiveness of management of intellectual capital.

It is now accepted to evaluate innovations not only from the position of technological introduction, but from the point of view of the business strategy. The base of innovations is the qualified management of knowledge, the practice of management includes the concept of «just in time knowledge».

It is significant that the basis for formation of the knowledge economy was the existence of a developed and stable institutional environment.

The essence of the knowledge economy is to ensure development through the production of intellectual and science-intensive products. Under conditions of a post-industrial society, knowledge becomes a commodity, and the notion of innovation, like innovation activity, extends not only to the technological, but also to the social and humanitarian sphere: education, health, culture, etc. The formation of the knowledge economy is one of the conditions for the transition to a postindustrial society [3].

Criteria of knowledge economy:

– more than 80 % of GDP growth is provided through the production and sale of high technology products and services;

– growth rate of financing of basic research exceeds the rate of growth in the volume of purchases of science-intensive technologies by the industry;

– supply of innovative products exceed demand for it.

Features of innovation policy

Leading countries of the world in the 2000s intensified the search and implementation of new options for innovation policy. Russia is also involved in this process. Since the national innovation system (NIS) of each country represents the result of a long evolutionary development, it is not possible to achieve rapid results here. The political, economic and administrative decisions of the authorities tend to improve the functioning of existing ones and help create new sectoral NIS, improve the institutional environment, and stimulate innovative behavior of individual firms. At the same time, the state's efforts do not bring the desired results if the objectives of innovation policy do not correspond to the realities of the local and global economic environment.

An analysis of the main provisions of Russia's innovation policy in 2002–2015 showed that despite the efforts made by the Russian government to activate the innovation policy in all areas, its results are contradictory: on the one hand, legislation has been reformed, development institutions, not existing before, have been established, tools of innovative policy correspond on the basic parameters to the experience of advanced countries, the costs of science are growing; on the other hand, the statistics registers the stagnation of most indicators of innovative development, the technological gap from the countries-technological leaders is growing. Against this background, the innovative paradox of Russia is that a country that possesses modern science and education, technology and industries, substantial budgetary and human resources, is gradually losing its competitive advantages. And this situation is a consequence of objective and subjective reasons.

Analysis of the new legislation in the field of innovation shows that there is an internal contradiction in the content of a number of legislative acts restricting their application, as well as unsatisfactory results of implementation of basic government decisions in this area. It can be concluded that the task of stimulating scientific and innovative activities has not been adequately addressed: competition has not been developed in the allocation of budgetary funds for the conduct of scientific research; the procedures for formation of federal targeted programs do not imply the existence of an initiative «from below»; the amount of competitive financing through the system of research funds is insufficient to have a serious impact on improving the quality of scientific research; there are no clearly defined criteria for the choice of recipients of tax preferences, etc. [3].

The main problem of Russia's innovation system is the low activity of the business sector, which does not play the role of the NIS locomotive. The new approach proposed by the Russian government to solve this problem is an attempt to realize innovative business functions through large state corporations. As a result, leading state corporations participate in the formation of technological platforms, develop strategic research programs, identify medium- and long-term sectoral priorities, build mechanisms for scientific and technical cooperation, create the necessary innovation infrastructure, and establish training and retraining programs. That is, corporate innovation systems are being built that ensure interaction between state authorities, production, scientific, educational and innovative organizations.

The scientific and industrial complex of Russia inherited the type of etatist corporations that are part of the state as a mega-corporation. They were effective at the time of the formation and flourishing of mass industrial production, but in the period of post-industrial transformation of the economies of developed countries became uncompetitive. Now the infrastructure of the innovation system is focused on creating innovation-active territories (science cities, special economic zones, technology parks, etc.) [1].

The peculiarity of Russia is that its economy is characterized by a developed resource sector, scientific and educational potential, based on fundamental science and the system of training personnel, the availability of knowledge-based industries. These are underserved yet competitive advantages, which create real development opportunities in any of the three areas.

Resource of knowledge economy

A reasonable question arises, whether it is possible to switch from a raw-material model of the economy in Russia to a knowledge economy?

It is impossible to understand such a difficult and important issue without analyzing the current economic model and possible ways of its transformation.

In the scientific literature, there are usually different terms for a new type of economy – for example, science-based economy, creative economy, knowledge economy, etc.

Science-based economy is an economic system, the main resource of which is knowledge, as well as the ability of its subjects to generate new knowledge and their practical implementation.

Creative economy is an economic system characterized primarily by the use of new technologies and discoveries in various fields of human activity, by the large volume of already existing knowledge, the generation of new knowledge, by the high degree of motivation of the desire for innovation, and the source of its strength is education.

Knowledge economy is a new stage in the development of the economy, in which knowledge plays a major role, and their production is the source of growth. The formation and development of the knowledge economy is closely linked to the fifth technological order, which can be defined as a way of information and communication technologies, and its key factors are microelectronics, computer hardware and software [1].

Labor, capital, natural resources and scientific and technical progress are the main factors affecting economic growth, while in the long run the latter factor becomes decisive.

Table 1

The change in capital structure in Western countries, in %

Form of capital	1800	1860	1913	1950	1973	1998
Physical capital	78–80	77–79	67–69	52–53	43–44	31–33
Human capital	20–22	21–23	31–33	47–48	56–57	67–69

Table 2

Scientific research and innovations in Russia

Indicators	2000	2003	2005	2006	2007	2008	2010	2011	2012
Number of organizations: – performing research and development;	4089	3656	3566	3622	3957	3666	3492	3682	3566
– carrying out innovative activities	2686	2515	2708	3285	3339	3414	1840	1782	1725
Internal costs of research and development, billion rubles.	766,7	196,0	230,8	288,8	371,1	431,1	523,4	610,4	699,9
Research and development costs, % to GDP	1,05	1,15	1,07	1,07	1,12	1,03	1,13	1,09	1,12
Total volume of innovative goods, works and services by type of economic activity*	no data	312,7 (4,7)	545,5 (5,0)	714,0 (5,5)	916,1 (5,5)	104,7 (5,1)	116,6 (4,9)	184,7 (6,1)	251,0 (7,8)

* As a percentage of the total shipped goods, work performed and services.

Over time, the production of knowledge as an industry began to be singled out as an independent economic process [14, 15]. And from this point of view, the innovative economy should be attributed to a higher type of society in which, as K. Marx noted in the 19th century and D. Bell in the 20th century, science becomes an immediate productive force, and the progress of society is increasingly determined by successes in the field knowledge. Let's add that the innovation economy – unlike modernization – is formed naturally over the decades, if not during the change of several generations. In addition, modernization does not necessarily lead (in practice – and does not) to the formation of an innovative economy[1].

In Western countries, the transition to a knowledge economy was accompanied by a constantly increasing share of human capital in its total volume (Table 1). At the same time, since the second half of the 20th century, the rate of capital growth has increased. From 1913 to 1973, this share increased from 26 % to 57 %, and after another quarter of a century it reached 70 % [6].

The current situation in Russia is characterized by insufficient funding of scientific research aimed at creating new technologies (Table 2) [11].

The practice of recent years has shown that as the growth and success of companies increasingly depend on the knowledge they accumulate, the value of these companies is determined not so much by the amount of their tangible assets as by the reserve of intellectual resources.

One of the important moments is the creation of a new image of the leading Russian corporations, both private and public, that will engage in applied and fundamental research based on the development of research sectors, including research laboratories. JSC Russian Railways can serve as an example. The basis for successful interaction between the holding and domestic manufacturers is the scientific and technical policy formulated in the form of the «White Paper» of JSC Russian Railways (Strategic Directions of Scientific and Technical Development) and in innovative development programs. This benchmark allows the purposefully developing and introducing into production new samples of rails, locomotives, passenger and freight cars, and other products for railway transport. In a number of areas, the lag in which cannot be significantly eliminated within the timeframes specified in the White Paper, the companies create joint ventures with leading foreign producers [12].

The experience of JSC Russian Railways shows that the existence of an open scientific and technical policy covering periods of time comparable to the industrial cycle of developing and mastering the production of new products is an effective incentive for innovation.

In general, taking into account the experience of Russian Railways, we have to state that the scientific and technical potential available in the

[1] http://postindustrial.info/publications_main/id-2.pdf.

country has not been really involved yet. To accelerate the processes of Russia's transition to an innovative economy, i.e. knowledge economy, it is necessary to increase the role of state participation in the implementation of technological modernization and the activation on the basis of targeted financing of the scientific and technological development of natural monopolies [13].

At the same time, the main methodological problem of innovation policy is the desire to move to innovative development and post-industrial society, using a conservative («biting itself for the tail») methodology of the resource-industrial economy.

Conclusion.

When implementing innovation policy in Russia, the following positive aspects can be highlighted:

– from a certain moment for ministries and departments, innovation policy has become a priority;

– a unified strategy of the innovation system is being developed that could combine budgetary support and incentive measures;

– goals and objectives of innovation policy are developed using medium-term statistical indicators;

– complex forecasting is in the top priority when setting promising tasks, identifying trends and measures of innovation policy.

Disadvantages of the state innovation policy are:

– many tasks and directions of innovation policy are not supported by concrete measures, especially when developing sectoral strategies;

– tax regulation, competitive and antimonopoly policy and other general measures do not play a significant role;

– in the innovation strategy, the policy in the field of science and technology, education, industrial and regional policies are not integrated into a single and clear program;

– innovation policy is based on a set of conceptual documents that often duplicate each other, which indicates a low quality of their development and elaboration;

– the results of monitoring, analysis and evaluation of certain activities related to innovation policy are not always used to adjust the strategy, and the necessary system approach is absent here.

The main goal of the innovation policy should be the creation of effective mechanisms to stimulate technological modernization of all industries and services. From the position of the macroeconomic situation in the country, the difficult geopolitical situation, the factor of economic sanctions, this is especially true for railway transport.

It is necessary to create special programs that would simultaneously promote innovation, protect intellectual capital and commercialize new products in rail transport and other sectors of the modernized and adaptable to a new concrete economic environment.

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Article received 29.07.2016, accepted 23.10.2016.