



CONSTRUÇÃO DE UMA ECONOMIA DO CONHECIMENTO NO CONTEXTO DA CRESCENTE COMPETITIVIDADE INTERNACIONAL

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RESUMO

Objetivo: Este estudo desenvolve abordagens para a construção de uma economia do conhecimento no contexto da crescente competitividade internacional. As transformações globais nos sistemas de inovação impulsionam a aceleração dos processos inovadores e a diminuição do tempo para o desenvolvimento de novas tecnologias, criando novos atores no cenário econômico e tecnológico.

Métodos: O estudo utiliza métodos teóricos e metodológicos, incluindo dedução, indução, análise e síntese lógica, além de métodos estatísticos e econômicos. Dados estatísticos de agências governamentais e resultados de pesquisas científicas compõem a base informacional para o estudo.

Resultados: A pesquisa identificou os principais desafios e oportunidades para a implementação de políticas de inovação na economia do conhecimento, com destaque para a importância do apoio estatal às pesquisas e ao desenvolvimento tecnológico. As principais políticas de inovação da Federação Russa foram discutidas, incluindo o desenvolvimento de ciência fundamental, a formação de parcerias público-privadas e a cooperação científica internacional.

Conclusões: O estudo conclui que os fatores de inovação ainda não desempenham um papel significativo no crescimento econômico da Rússia, exigindo uma maior coordenação entre governo, ciência e indústria. Medidas de suporte à ciência fundamental e à inovação tecnológica são essenciais para garantir a competitividade da Rússia no cenário internacional.

Palavras-chave: Economia do conhecimento. Inovação. Apoio do Estado. Instabilidade econômica. Tecnologia.





BUILDING A KNOWLEDGE ECONOMY IN THE CONTEXT OF GROWING INTERNATIONAL COMPETITIVENESS

ABSTRACT

Objective: This study develops approaches to building a knowledge economy in the context of growing international competitiveness. The global innovation system is driving faster innovation processes and shorter timelines for the development of new technologies, creating new players in the economic and technological landscape.

Methods: The study uses theoretical and methodological methods, including deduction, induction, logical analysis, and synthesis, along with statistical and economic methods. Statistical data from government agencies and scientific research results form the informational basis for the study.

Results: The research identified the main challenges and opportunities for implementing innovation policies in the knowledge economy, highlighting the importance of state support for research and technological development. Key innovation policies in the Russian Federation were discussed, including the development of fundamental science, the formation of public-private partnerships, and international scientific cooperation.

Conclusions: The study concludes that innovation factors still do not play a significant role in Russia's economic growth, requiring greater coordination between government, science, and industry. Support measures for fundamental science and technological innovation are essential to ensure Russia's competitiveness in the international arena.

Keywords: Knowledge economy. Innovation. State support. Economic instability. Technology.

1 INTRODUCTION

The principal changes in the properties of the knowledge economy are associated with integrating science into the sphere of production interests and incentives for firms, as well as increased responsibility for regional innovative development. Upon reaching the limit of economic growth, the economic system comes to a state where the interaction of technical and economic spheres initiates the creation of new technologies that revolutionize the production system.

Global experience demonstrates that a technological gap can be closed if a country has a well-developed knowledge production system (mainly comprised of science) that rests on a considerable fundamental research sector, an effective education system, and their systemic interaction with business. In such circumstances, developing the innovation policy, selecting and developing tools to stimulate innovative development, and supporting the interaction between science and industry become particularly important.





Innovative activity remains an inextricable feature of any civilized state. Recognition of the value of innovative development by the governments of developed countries has led to the implementation of innovation strategies in their macroeconomic policies. The innovation component of the knowledge economy has become supranational and has been incorporated into many international programs, projects, and activities, which have grown in popularity due to the need for countries to continuously maintain and improve their competitiveness.

The development of the knowledge economy is covered by E.V. Agamirova et al. (2017), N.I. Demkina et al. (2019), T. Dzhancharov et al. (2023), G. Dzhancharova et al. (2023), E.E. Konovalova et al. (2018), E.S. Loseva et al. (2017), and others. However, the innovative development trends unfolding in the Russian Federation remain understudied. There is a need to identify the conditions of innovative activity in Russia compared to global indicators. Analysis and recommendations are needed for the stimulation and development of innovation infrastructure. This presupposes further study of these global economic processes.

The present study aimed to develop approaches to forming the knowledge economy in the context of growing international competitiveness.

2 METHODS

The theoretical and methodological foundation of the study comprised the abstract-logical method and induction, deduction, analysis, synthesis, and systematization to substantiate approaches to the formation of the knowledge economy and statistical-economic and graphical methods to study the development of the knowledge economy at present and trends in its parameters.

The information base of the study consisted of statistical data from government agencies, legislative and regulatory documents governing the aspects of knowledge economy regulation, assessments of the effectiveness of innovative technology implementation in the work of enterprises in the context of knowledge economy globalization, and results of scientific research (Lebedev et al., 2018; Mukhlynina et al., 2018).

In the framework of this research, we systematized various aspects of the knowledge economy, developed measures to coordinate the activities of the key participants in the innovation economy, compared different approaches to knowledge economy tools, and identified their features in the context of growing international competitiveness.



3 RESULTS

The global innovation system is undergoing fundamental changes: the intensity of innovation processes is growing, the timeframe for creating innovations is shrinking, developers and consumers are becoming new participants in innovation activities, and their relations and functions are changing. We can distinguish the following main directions of innovation policy in Russia (Figure 1).

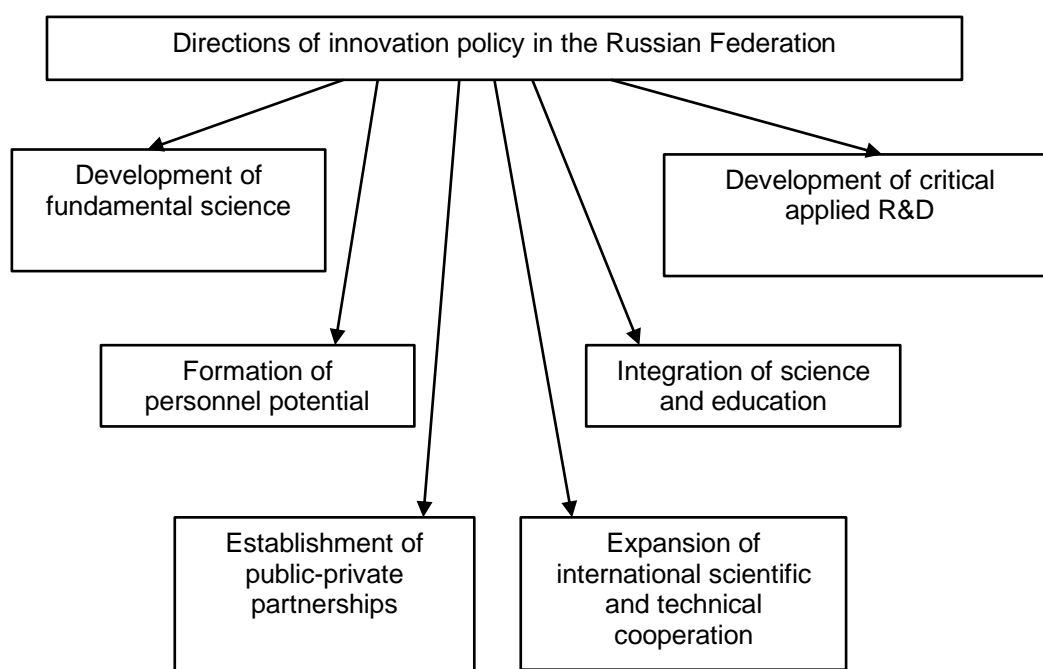


Figure 1. Main directions of innovation policy in Russia

Research and development are receiving state support significant in scale and diverse in methods. This support is urged and justified by economic instability and the low and ineffective interest of private entrepreneurs in conducting and financing scientific and technological research, which requires significant funds for developing projects and their successful implementation in production.

Governments and leading companies in the most developed countries spend billions of dollars to stimulate and maintain a high level of mass innovation activity. For example, Japan has a very high intellectual activity rate (the number of national patent applications per 10,000 population) of 27.7 compared to 4.5 in the USA (Loseva et al., 2017; Nikolskaya et al., 2018a).

The R&D sector's structure and public-to-private funding ratio in developed countries



respond to economic growth needs. The scale of state funding in developed countries correlates with the degree of self-financing by the private business sector, where the bulk of all industrial R&D is carried out.

Some developed countries limit the amounts of budgetary allocations for innovation activities. For example, the Constitution of Japan stipulates that budgetary funds allocated for financing fundamental scientific research should be less than 3% of gross domestic product. Along with R&D budget financing, a substantial amount of funds is allocated by large corporations, producers of knowledge-intensive products. For example, the expenditures of leading corporations on R&D amount to (billion USD): General Motors – 7.9; Ford – 6.3; Daimler Chrysler – 5.8; Siemens – 5.5; IBM – 5.3 (Nikolskaya et al., 2018b; Voskovskaya et al., 2022).

This demonstrates that in developed countries, conducting a wide range of studies and creating new technologies are in the sphere of interests of both the state and private economic sectors. Since the 1990s, the world has followed the Standard International Trade Classification (SITC), under which high-level technologies became popular within science-intensive and high-tech industries.

The Organization for Economic Co-operation and Development (OECD) considers industries knowledge-intensive if their knowledge intensity index (the ratio of R&D expenditures to output or income) exceeds 3.5%. If the indicator falls within the 3.5-8.5% range, the production and its products are classified as high-level technologies, and those exceeding 8.5% are recognized as leading knowledge-intensive technologies. According to Eurostat, only three industrial sectors are high-tech: basic pharmaceutical products and pharmaceuticals; computers and electronic and optical products; and aircraft and spacecraft (Konovalova et al., 2018; Shakhmametev et al., 2018).

The starting threshold for the global economy innovation model is set at 40% of innovations and at least 2.5% by the GDP knowledge intensity indicator. This threshold is virtually unattainable without structural changes in the national economy.

With the transition of Russia from an administrative command to a market economy, the management system for scientific and technological progress underwent a deep transformation. In the early 1990s, innovative activity in the country was developed based on planned centralized management marked by an industry-specific approach and poor diffusion (distribution) of innovations. At the start of Russia's transition to market relations, opportunities to apply the scientific and technological achievements of science and science-intensive industry to attract large investments became groundbreaking.



However, these expectations have not been fulfilled. Productive investment has been concentrated in the primary sector, while the science and technology sector has received little funding. Large industrial enterprises' products lose to foreign analogs in price and quality. Material resources have been depleted over the years, and equipment has grown obsolete. Financial reserves have dried up, and the opportunities for improving many traditional technologies, technological parameters, and processes have diminished. Some ideas and developments have become outdated.

This leads to the separation of science from production and the reduction of innovative activity on the part of industrial enterprises. The Russian government has failed to ensure the progressive development of science and make it the leading factor of economic growth based on innovation, jeopardizing the scientific and technological potential inherited by the country. Russia inherited several fundamental problems in all sectors since it was almost entirely integrated into the overall, including the scientific and technological, structure of the USSR, the collapse of which broke most of the established ties and rendered further effective functioning of economic entities in the market conditions impossible. In Figure 2, we illustrate the present-day market of innovative investment objects.

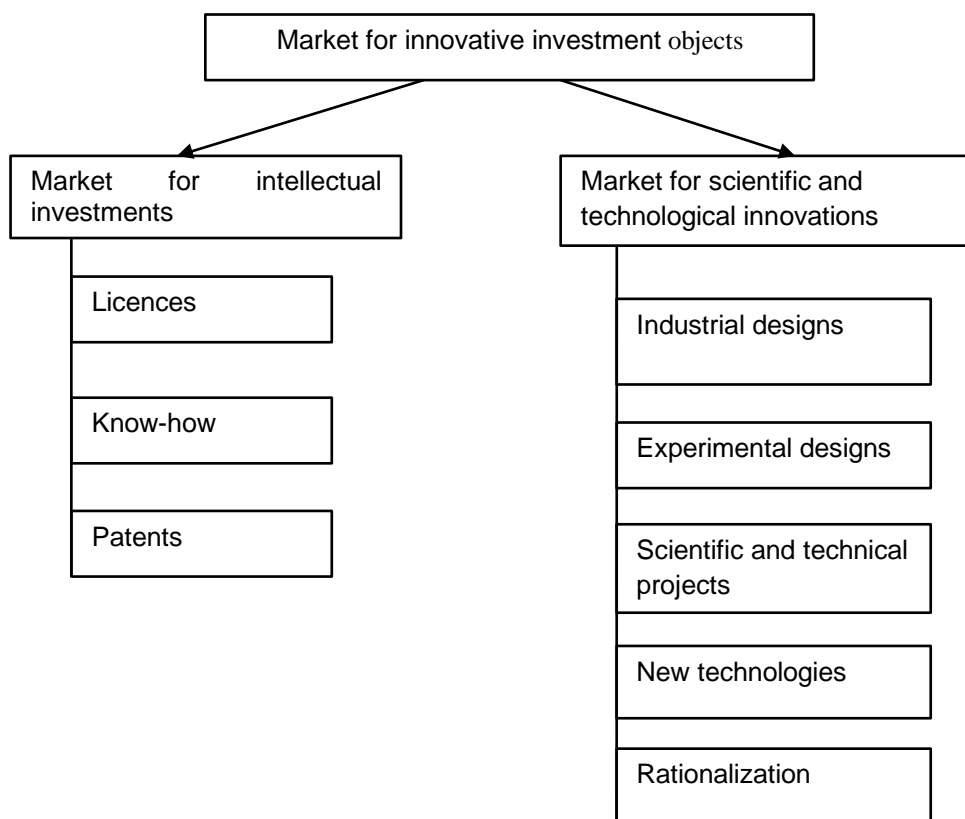


Figure 2. Market for innovative investment objects in Russia



The reproduction structure of the Russian industry evaluated according to technological methods does not respond to the demands of the time. The so-called fifth information mode of industrial production, which now prevails in developed countries, does not exceed 5% in Russia. Following the collapse of the USSR, Russia received a large-scale scientific complex represented only by the public scientific sector, while the share of state expenditures in GDP decreased significantly. The scientific potential, capable of turning the Russian industry into the leading economic lever and source of innovation renewal, is practically neglected. Therefore, the industry of the 3rd and 4th technological modes is increasingly becoming a priority.

In the face of growing international competition, national enterprises lose markets due to the low competitiveness of their products. Many industrial enterprises further reduce production because of the significant deterioration of fixed assets, obsolete technologies, and the lack of financing sources. The long-term economic crisis, the burden of social and economic problems, and the severity of regional imbalances in today's Russia make it impossible to intensify innovation at the regional and national levels.

The realization that countries with innovative high-tech economies have tremendous advantages over others (especially in the context of increased market competition) has finally led authorities, academia, business, and public figures to focus and join forces in accelerating innovation processes to make innovations a no-alternative, integral, and influential component of the Russian national policy.

Russia is facing the need for significant adjustments to its scientific and technological policy. This is confirmed by numerous legislative and regulatory documents and state programs approved by the authorities in the sphere of scientific, technological, and innovative development in recent years.

However, the provisions of these legal acts concerning benefits to innovative enterprises are suspended annually. There are also many contradictions in the interpretation of some provisions due to the inconsistency of laws. Innovation capacity and technological readiness are integral components of the competitiveness of the national economy.

The Global Competitiveness Index (GCI) is currently the most comprehensive measure of a country's competitiveness, comprising assessments by more than 1,300 independent experts from different countries and fields and official statistical data. The GCI is based on 12 sub-indices combined into three groups by the power of country development factors: basic conditions of development, catalyst factors, and the factors of innovation and development.





The leading reasons behind the low technological readiness in Russia include the economy mainly exploiting previous technological achievements; the share of intermediate consumption in the output structure remaining high; the innovative activity of enterprises being low (compared to the EU); and failure of the regulatory and legal instruments to protect intellectual property rights and technology transfer.

The development of innovative activity in Russian regions is extremely uneven, largely relating to innovative infrastructure development. The analysis of the existing infrastructure for innovation activity in Russia shows its underdevelopment, functional inferiority, and inability to cover all links of the innovation process. The leading cause of this is that the technological growth rate in Russia is much lower than in the developed world. Russia's innovative development faces obstacles associated with the unpredictability and uncertainty of the current situation.

4 DISCUSSION

The reliability of our approaches is supported by the fact that global development trends and a real assessment of Russia's scientific, technological, and innovative activity indicate the threat of lagging behind the global development of powerful innovative systems (Agamirova et al., 2017; Dzhancharova et al., 2023; Nikolskaya et al., 2018a). Due to the precarious financial and economic situation, most industrial enterprises display low innovative activity. Their expenditure on R&D averages less than 1% of the cost of production, leading to a significant reduction in operations.

The interaction of participants in the innovation process takes the form of trial and error, and control is becoming mainly reflexive. There is also a relative isolation of scientific organizations and universities from the business sector and each other. International cooperation in Russian science is also underdeveloped, and there is a significant outflow of qualified specialists. Finally, the average age of a scientific worker in Russia is above 40 years.

The level of scientific development and innovation in industry is poor. The number of new designs of machinery and equipment created for the first time in Russia decreases annually by almost 20%. The technical level of many of them does not satisfy modern requirements or is undetermined because enterprises lack information about the world's best analogs. Creating less knowledge-intensive products to make a quick profit is becoming more attractive for enterprises.





The absence of an up-to-date progressive material and technical base is the biggest obstacle to achieving positive research outcomes. The park of research instruments and equipment in research organizations and laboratories is now considerably outdated.

Russia needs a reform to revitalize the network of R&D institutes in universities, academia, industry, and companies. The institutions should have thematic specialization and achieve efficiency in their work to ensure commercial attractiveness for business.

5 CONCLUSIONS

General trends and a real assessment of Russia's scientific, technical, and innovation activity testify to the danger of being left behind in the global development of a powerful innovation system. Innovation factors still do not play a significant role in economic growth and are not reflected in the real actions of public authorities. However, such a policy can secure the country's long-term economic development.

Scientific development in the age of the knowledge economy preserves and enhances the priority of fundamental research. At the present stage of scientific and technical progress, the success of fundamental R&D is largely contingent on a solid foundation of fundamental knowledge. Russia is one of the few countries where fundamental research is conducted in all branches of science. In countries that take the lead in scientific and technological development, expenditures on fundamental research are increasing.

An important facet of Russia's scientific and technological policy is the realization of the existing potential to take a worthy place in international integration, cooperation, and division of labor in fundamental science. The ratio of R&D expenditures fluctuates depending on the country's financial capacity. In countries focused on scientific and technological development, spending on fundamental research and scientific and technical services is growing.

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