

# FINANCE, INVESTMENT AND INSURANCE OF THE INFRASTRUCTURE OF THE REGIONAL ECONOMY

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## Abstract

*The article discusses key aspects of financing, investment and insurance for infrastructure facilities, considering their role in regional economic development. Particular attention is given to the relationship between the effectiveness of regional financial instruments and the sustainability of territorial economic growth. It examines modern mechanisms for attracting investment in infrastructure projects, including public-private partnerships, project financing, and infrastructure issuance. This allows the most promising areas for developing the financial architecture of regional economic systems to be identified. Particular attention is given to insuring infrastructure risks, which is an integral part of ensuring the long-term sustainability of regional investment projects and protecting the financial interests of everyone involved in infrastructure development.*

**Keywords:** regional economy, infrastructure, financing, investment mechanisms, risk insurance, public-private partnership

## I. Introduction

The efficiency of the use of the natural resource and social potential of the region largely depends on the availability of infrastructure - a set of enterprises and organizations belonging to industries that ensure the uninterrupted, effective functioning of a large number of other enterprises and organizations, often belonging to several industries and spheres of activity lies in the fact that they do not produce material products (goods), but mainly provide services necessary for the successful functioning of the branches of material production and, as a result, the economy as a whole [11]. The level of infrastructure development is one of the determining factors of the economic and social stability of the region, affecting its investment attractiveness, production efficiency and quality of life of the population.

## II. Methods

With the help of general methods of scientific cognition, the role of infrastructure in the socio-economic and spatial development of the regions of the country is considered.

## III. Results

Infrastructure is a complex of interrelated service structures, systems and facilities that provide the basis for the functioning of the economy and the life of society as a whole. In the economic

context, infrastructure includes fundamental structures, objects and systems necessary for the effective functioning of industries and ensuring the life of the population, creating technical and socio-economic conditions for the development of productive forces and improving the quality of life.

Depending on the functional purpose, the following main types of infrastructure are distinguished: production (transport networks, energy systems, water supply, telecommunications, logistics complexes), social (institutions of education, health care, culture, sports, social security), market (banking system, insurance companies, stock exchanges, marketing, consulting and information centers), institutional (government bodies, law enforcement agencies, judicial system), innovation (technology parks, business incubators, technology transfer centers, venture funds), digital (data centers, broadband access networks, software platforms, cloud services), as well as environmental (waste disposal systems, treatment facilities, renewable energy facilities) [5]. Each of these types of infrastructure performs specific functions, but together they form a single complex that ensures the integral functioning of the economy and creates conditions for the sustainable development of territories

Infrastructure plays a decisive role in ensuring the sustainable development of the region, acting as a fundamental basis for economic growth, social well-being and ecological balance of territories, which is manifested in the formation of attractive conditions for investment, reduction of business transaction costs, increasing the mobility of production factors and the efficiency of resource use. Developed infrastructure contributes to reducing spatial imbalances in regional development, ensures the availability of social services for the population, promotes the introduction of innovations and digital technologies, creates conditions for the environmental modernization of production and the transition to a low-carbon economy. At the same time, it is the quality and accessibility of infrastructure that determine the competitiveness of the regional economy, its ability to adapt to changing environmental conditions, withstand economic shocks and ensure long-term balanced development of all spheres of life in the region, which allows us to talk about infrastructure as a key factor of sustainability, linking the economic, social and environmental aspects of regional development into a single system. focused on improving the quality of life of present and future generations.

Infrastructure finance is a system of economic relations arising in the process of formation, distribution and use of monetary funds intended to finance the creation, modernization, operation and development of infrastructure facilities and complexes. This category includes a set of financial mechanisms, instruments and institutions that ensure the mobilization, accumulation and effective distribution of financial resources to meet the infrastructure needs of the economy and society as a whole. Financing of infrastructure facilities is characterized by a number of specific features that distinguish it from the financing of other sectors of the economy. First of all, infrastructure projects require significant capital investments with a long payback period (often 15-30 years or more), which creates a significant burden on sources of financing and increases the requirements for the long-term sustainability of financial models. Infrastructure projects are characterized by high upfront costs with relatively low operating costs, the difficulty of accurately estimating future cash flows due to many uncertainties (political, economic, technological, social), as well as the presence of significant positive externalities that are difficult to monetize directly [1]. These features determine the need for the use of specialized financial mechanisms and instruments adapted to the specifics of infrastructure projects, including complex structures for the distribution of risks between various participants, a combination of public and private financing, the use of project financing and other innovative approaches that provide an optimal ratio of return and risk for all stakeholders.

In the modern economy, a wide range of sources of financing infrastructure projects are used, including budget funds of various levels (federal, regional, municipal), extra-budgetary funds, funds of private investors (including institutional investors, such as pension funds, insurance companies, investment funds), bank credits and loans, funds raised in financial markets through

the issuance of bonds and other debt instruments, funds international development financial institutions, as well as financial resources mobilized through public-private partnership mechanisms. Depending on the specifics of the infrastructure project, its scale, socio-economic significance and potential commercial efficiency, an optimal financing structure is formed, which ensures a balance between the availability of financial resources, the cost of their attraction and the distribution of risks between various sources of financing, while an important role is played by the creation of favorable conditions for attracting long-term investments in infrastructure through development institutional environment, improvement of the regulatory framework and introduction of innovative financial instruments [4].

The Russian economy and financial market are operating in a wide range of challenges, primarily unprecedented sanctions pressure. At the same time, the Russian authorities are facing large-scale tasks of structural transformation of the economy, achieving technological independence and reorienting international economic relations. Transformation, in turn, is associated with a significantly increased need for financing structural changes [9].

The modern financial market offers a variety of instruments for financing infrastructure projects, including infrastructure bonds (including green, social and sustainable bonds), project finance, syndicated loans, mezzanine financing, securitization of infrastructure assets, infrastructure investment funds, concession agreements and life cycle contracts. Each of these tools has its own advantages and limitations that determine the feasibility of its use in specific conditions and for specific types of infrastructure projects. Innovative financial technologies, such as digital platforms for fundraising, asset tokenization, distributed finance models, and smart contracts based on blockchain technologies, open up new opportunities for resource mobilization, increased transparency of financial flows, and efficient financial management of infrastructure projects, which is especially important for emerging markets with limited traditional sources of financing.

#### IV. Discussion

The introduction of new technologies and support for innovations in the financial market contribute to increasing the availability of various types of financial and payment instruments for citizens and businesses, the development of competition and the emergence of new business models, increasing labor productivity and, ultimately, contribute to the structural transformation and development of the Russian economy [9].

Financial models of infrastructure projects are comprehensive tools that allow assessing the economic efficiency, financial stability and risks of projects at all stages of their life cycle. They include cash flow forecasting, sensitivity analysis to changes in key parameters, assessment of the cost of attracting various sources of financing, calculation of financial performance indicators (NPV, IRR, DSCR, LLCR, etc.), modeling of various scenarios for project implementation and stress testing to assess the stability of the financial structure in the face of adverse changes in the external environment. A high-quality financial model makes it possible to optimize the financing structure, determine acceptable parameters for the distribution of risks between project participants, assess the need for state support and form effective mechanisms for managing financial risks throughout the life cycle of an infrastructure facility, thereby ensuring its long-term financial stability and attractiveness for potential investors. Insurance is one of the key financial institutions of a market economy and a mechanism for effective protection of property interests of citizens, enterprises and organizations from various risks [10]. Infrastructure insurance is a complex system of economic relations aimed at the formation and use of special monetary funds to protect the property interests of owners, operators and users of infrastructure facilities from various risks. This type of insurance is a critical element in the overall risk management system of infrastructure projects, providing financial protection against unforeseen events that may lead to damage or destruction of infrastructure facilities, interruption of their normal operation or the emergence of liability to third

parties. In today's environment, the growing scale and complexity of infrastructure projects, the increasing frequency and severity of natural disasters associated with climate change, and the increase in technological and cyber risks make infrastructure insurance not only desirable, but a necessary component of ensuring sustainable economic development.

Insurance of infrastructure facilities is a special category of property insurance, characterized by a number of significant distinctive features, which together form a unique profile of this insurance segment. The large scale and complexity of infrastructure facilities inevitably require an individualized approach to the assessment of associated risks, the development of specific insurance programs and the determination of adequate insurance amounts, since standardized insurance products are often not able to fully meet the specific needs of large-scale infrastructure projects. The extraordinary cost of infrastructure insurance objects necessitates the use of complex mechanisms for diversifying risks realized through coinsurance and reinsurance with the involvement of multiple insurance companies, including international reinsurance organizations that have sufficient financial capacity to assume such risks. The long-term implementation characteristic of infrastructure projects creates additional challenges for insurers associated with the need to predict potential risks for long periods of time and take into account possible transformations of the risk profile in the long term.

The systemic interconnectedness of various infrastructure elements gives rise to the phenomenon of cascade of possible damages, when a destructive impact on one object can provoke a sequence of failures in the functioning of related systems, which requires a comprehensive analysis when assessing potential total losses. The dual nature of many infrastructure facilities, which combine a commercial component with high social significance, predetermines the need to take into account not only direct financial losses, but also a wider range of socio-economic consequences when developing the parameters of insurance coverage. The involvement of government agencies in the implementation of infrastructure projects can significantly affect the configuration of insurance protection, in particular, through mechanisms for providing state guarantees for certain categories of risks or through the creation of specialized insurance pools for insuring risks that commercial insurers are not ready to accept for their own retention [7].

The insurance industry has developed specialized products to protect infrastructure facilities at all stages of their life cycle:

1) Construction and installation risk insurance (CAR/EAR) provides protection against property risks at the stage of construction of infrastructure facilities, including damage or loss of building materials, equipment, structures, as well as liability to third parties. This type of insurance is often supplemented by Delay in Commissioning Insurance (ALOP), which compensates for financial losses from the delay in the start of commercial operation of the facility.

2) Property insurance of infrastructure operators covers the risks of damage or destruction of completed facilities during their operation. For complex infrastructure facilities, individual insurance programs are developed, taking into account the specifics of the risks associated with a particular type of infrastructure and the conditions of its operation.

3) Business interruption insurance (BI) compensates for loss of income and additional expenses arising from property damage. For infrastructure facilities that provide critical services, cascade effects insurance associated with the disruption of interconnected systems can also be applied.

4) Civil liability insurance includes general civil liability (to third parties), product/service liability, environmental liability, professional liability (for designers, engineers, consultants), as well as specialized types of liability for specific types of infrastructure (e.g. operators of airports, ports, railways).

5) Political risk insurance protects investors in infrastructure projects from expropriation of assets, political violence, breach of contracts by government authorities, restrictions on currency conversion or repatriation of profits.

6) Parametric insurance is an innovative approach in which payments are made on the basis of predetermined parameters (e.g. earthquake strength, precipitation level, wind speed) without the

need to assess the actual damage. This type of insurance is especially effective for quickly obtaining funds to rebuild infrastructure after natural disasters.

7) Cyber insurance covers the financial consequences of cyberattacks, data leaks, failures in the operation of information systems, which is becoming more and more in demand for operators of digital and intelligent infrastructure.

A comprehensive approach to infrastructure risk insurance, combining traditional and innovative insurance solutions, is an integral element of an effective strategy for financing and managing infrastructure projects. In the context of the increasing complexity and interconnectedness of infrastructure systems, as well as the increasing influence of climatic, technological and socio-political factors, the importance of insurance as a mechanism for the transfer and distribution of risks will only increase, requiring constant improvement of insurance products and risk assessment methodologies.

The Central Ring Road (CRR) project is a good example of an integrated approach to financing large-scale regional infrastructure in Russia using the mechanism of public-private partnership. The total investment in this infrastructure project exceeded 350 billion rubles, and financing was carried out from multiple sources, including funds from the National Welfare Fund, the federal budget, private investment and the issuance of infrastructure bonds through LLC SEC CRR [12]. A feature of this project was the formation of a complex multi-level system of risk distribution between government agencies and private investors, in which commercial risks were mainly transferred to the private sector, and regulatory and political risks remained in the area of responsibility of the state. Insurance protection for the project was organized through the formation of an insurance pool, including leading Russian insurers with reinsurance support from international companies, which made it possible to cover risks at the stages of construction and operation of the road, including insurance of construction and installation works, civil liability and insurance against business interruptions. This case demonstrates the effectiveness of integrating various financial instruments and risk sharing mechanisms for the implementation of capital-intensive infrastructure projects of regional importance. Optimization of financial mechanisms for the development of regional infrastructure requires an integrated approach based on interrelated strategic areas that contribute to the sustainable economic growth of territories. A fundamental condition for the successful modernization of regional infrastructure is the improvement of the regulatory framework, which involves the formation of transparent and stable rules for the interaction of all participants in infrastructure projects, the creation of effective investment protection tools, the simplification of administrative procedures related to the approval and implementation of infrastructure projects, as well as the introduction of tax preferences for investors investing in development critical regional infrastructure facilities.

Stimulating private investment in regional infrastructure is an equally important area that requires the development and implementation of innovative mechanisms of public-private partnership that take into account regional specifics and ensure a fair distribution of risks between the public and private sectors, the creation of infrastructure bonds and other specialized financial instruments aimed at attracting long-term capital to infrastructure projects, as well as the formation of a system of state guarantees for strategically important regional infrastructure projects, increasing their investment attractiveness for private capital [3].

The main condition for attracting investment for infrastructure projects at the regional level is the investment attractiveness of the region and the prospects for the profitability of the facilities being created [2].

The development of regional financial development institutions is the next key component of optimizing financial mechanisms for infrastructure development, which involves the creation of regional infrastructure funds that accumulate financial resources from various sources for the implementation of priority infrastructure projects, the formation of specialized regional banks or development agencies with competencies in the field of structuring and financing complex infrastructure projects, as well as the development of interregional financial

institutions that contribute to the implementation of large-scale infrastructure projects that go beyond the administrative boundaries of individual entities, which together will create a sustainable financial ecosystem for the planned and balanced development of regional infrastructure that meets modern economic and social challenges.

It should be noted that the dynamic development of infrastructure, which requires the attraction of both private and public investment, largely determines the trajectory of the development of the region's economic system. The implementation of infrastructure projects should be based on a comprehensive analysis of the regional economy with a clear statement of the goals and objectives of the project, as well as an understanding of the consequences of its implementation. The implementation of the strategic goals and objectives outlined in the Strategy for Spatial Development of Russia [8] will require a transition from the central-peripheral model of development, characterized by the permanent emergence of zones of intensive development and areas of depressed territories, to a polycentric model aimed at smoothing out territorial asymmetry and integrating regional economies into the geo-economic space of the country [6].

#### CONFLICT OF INTEREST.

Authors declare that they do not have any conflict of interest.

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