Information modeling technologies as a growth factor of investment activity in construction

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Abstract: The transition to a new model of economic growth of a country with a sovereign economy requires a significant increase in investment activity not only in the housing sector, road transport infrastructure, but also in the industrial sector of the national economy. The main burden on the creation of industrial enterprises of new industries in the field of high technology lies on the state budget. Meanwhile, a number of projects for the construction of new industrial enterprises, reconstruction and overhaul of existing ones are initiated by the business environment. The active development of industrial mortgages, which started in 2022, opens up new opportunities for activating the sphere of industrial construction. Obviously, the volumes, terms and objects of lending are currently burdened with a number of requirements and restrictions. The analysis carried out by the authors showed that the use of information modeling technologies, big data and artificial intelligence are able, providing transparency of investment and construction processes, to level the risks of their lending. Moreover, bearing in mind the long duration of construction, the authors suggest using smart contracts that allow making operational adjustments to the course of construction.

Key words: industrial mortgage, investment and construction processes, information technology, investment activity, platform solutions, smart contracts.

Introduction

The prevention of destructive processes in the Russian economy and its subsequent development provide for an unprecedented increase in the production of means of production, the expansion of the infrastructure network, the creation of a highly efficient service sector, the development and introduction of new technologies, the creation of advanced high-tech industries, the saturation of the labor market with skilled labor with high wages. The outlines of a new model for the development of a sovereign-type country were presented by the President of the Russian Federation at the St. Petersburg International Economic Forum 2023 [1]. Ensuring investment growth is one of the contours of the new model. The main priority of investment is overcoming the backlog in the production of demanded industrial products, which implies the construction of new production facilities that ensure the achievement of technological sovereignty of the country. The volume of such investments over the next seven years should increase by 5 times, exceeding 10 trillion rubles. Their development is envisaged

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within the framework of the use of state construction order mechanisms. But this is not the only type of investment resources focused on industrial development. Reconstruction, renovation and new industrial construction are currently initiated by private business, despite the increasingly exerted pressure of the collective West [2, 3]. Against the background of the rupture of traditional economic ties, the exchange rate surge of the national currency, the increasing risks of loss of foreign assets, the search for additional investment resources becomes extremely important. In this regard, industrial mortgages have been developed – lending to the construction of industrial facilities against their collateral [4]. At the same time, restrictions on the subject of lending, the volume of allocated resources, the term of lending, the existing investment encumbrances are now becoming a kind of trigger for the growth of prices for existing production areas [5]. This makes it difficult to solve the priority tasks of intensifying import substitution, which is in demand in almost all sectors of the production sector [6]. The experience of industrial mortgage has shown a growing demand for the use of this mechanism. Discussion of the problem at the discussion platforms of the Chamber of Commerce and Industry [7], the Congress of Industrialists and Entrepreneurs [8], etc. it showed the need to expand the subject of lending up to the objects of unfinished construction. It is also advisable to bring the size of the loan to the level of the need for financing modern investment and construction projects of advanced development. Other conditions require expanding the dialogue of potential borrowers, the Ministry of Industry and Trade of the Russian Federation, development institutions and credit institutions.

At the same time, scaling up the use of industrial mortgages and other investment instruments will require a reasonable selection of projects and minimizing the risks of their implementation. As the best world experience and modern domestic developments have shown, a qualitatively new level of implementation of the new investment policy is provided by the principles of platform management. And the first steps of the Digital vertical of the construction industry, covering all stages of the life cycle of investment and construction projects, form the trajectory of safe investment up to the optimization of the supply of building materials, parts, structures, as well as an accurate forecast of demand for industrial products. In this regard, the use of information modeling technologies, big data and artificial intelligence are becoming a decisive factor in investment attractiveness with the expansion of the range of use of new credit mechanisms.

**Materials and methods**

Analysis of investment activity in the construction sector has shown that its peak value has been in the housing sector for the past 10 years [9-11]. Project financing of housing construction, minimizing the risks of disruption of construction deadlines in combination with preferential mortgage lending mechanisms, allowed developers to implement megaprojects of residential development, ensuring the commissioning of 102.7 million square meters of housing in 2022 [12], which became a record for the entire existence of the Russian Federation [13]. At the same time, the localization of apartment building projects in large cities forced the Russian Government to reconsider a number of plans for industrial construction. The stagnation of construction in small and medium-sized cities, the outflow of population associated with the lack of jobs, outdated road and municipal infrastructure has exacerbated the problem of the recovery growth of industrial production.

The long period of stagnation of industrial construction in the Russian Federation has responded in modern conditions of total confrontation of various approaches to the world order with a shortage of production sites. In a literal sense, it concerns the production of all industries. According to the Chairman of the Government of the Russian Federation Mishustin M.V., it is necessary to build at least 20 million square meters of production space annually in Russia. Experts believe that these volumes correspond only to the parameters of simple reproduction [14]. And in the conditions of the actual economic blockade of the country, it is necessary to
ensure import substitution [15]. Moreover, we are not talking about replacing foreign suppliers from unfriendly countries, but about the recovery growth of domestic industry. The recovery growth of the production segment of the domestic economy should be ensured by the launch of a new investment cycle. Its filling with resources depends on the type of project and the level of investment activity of initiators and interested participants [16, 17]. To refer to the absence of investors would be at least imprudent in modern conditions. The investment behavior of the population really remains passive for the time being. The instability of the economic situation, the hard-to-predict consequences of the frozen settlement system in dollars and euros, the reverse results of inflation targeting against the background of systemic support for the country's banking sector have led to the fact that most of the savings are on deposits, and banks prefer to conduct an extremely cautious credit policy in the face of increasing international pressure [18, 19]. The President of the Russian Federation noted that a serious source of inflow of funds to the market should be the savings of citizens who will receive guarantees of safety from the DIA in the amount of 2.8 million rubles. [1].

Despite the far from ideal economic situation, the volume of investments in new construction, reconstruction and major repairs has exceeded 5% in annual terms for the second year in a row. The scale of the tasks facing the country requires an acceleration of the investment cycle, which actualizes the structural analysis of the investment potential of modern Russia and, on this basis, the search for effective financing mechanisms for the expanded reproduction of industrial real estate.

The analysis of the implementation of major investment and construction projects (Amur Gas Processing Plant, pipelines "Power of Siberia", "Vostok Oil", etc.) showed that the commissioning of these capital construction projects and the entry into operation is envisaged in 3-5 years. This indicates that it is necessary to develop investment activities for the implementation of medium- and small-capacity projects that allow significantly faster access to the operating mode. Development institutions and new investment policy mechanisms play a special role in this segment. Until now, a kind of duet of the executive power represented by the Ministry of Industry and Trade of the Russian Federation, which makes decisions on granting loans taking into account state development priorities, and the lending organization have been developing approaches to determining rates in the conditions of industrial mortgage. In terms of using the potential of information technology, as well as according to users, a number of credit conditions currently require adjustment.

Firstly, an industrial mortgage is issued exclusively for the purchase of ready-made industrial facilities, which, of course, narrows the scope of financial resources to cover objects under construction, as well as objects mothballed due to various circumstances.

Secondly, the term of industrial mortgage was a period of 2 to 7 years. At the congress of industrialists and entrepreneurs [8], the issue of a possible increase in the term of an industrial mortgage from 7 to 10 years was actively discussed.

Thirdly, the loan was granted on condition that the borrower undertook that within 3 years after the loan was issued, at least 50% of the area would be used for industrial production, which obviously limited the number of possible borrowers.

Fourth, despite the reduced rates from 3 to 5% per annum, a number of industrial projects of social significance could not be implemented without the inclusion of a mechanism for granting benefits.

Fifth, in the context of large-scale transformations of the national economy, there is an active discussion on the maximum volume of lending. Currently, it is 500 million rubles [14]. Practice shows that this is not enough to implement a large number of popular projects. The consolidated opinion of experts and recipients is reduced to the level of lending of 1.5 billion rubles.

Intensive scaling and adjustment of credit conditions requires activation of banking control tools. Digitalization becomes the most important, since when digitizing construction processes,
it becomes possible to collect, systematize, structure, aggregate and analyze data necessary for the full implementation of the management functionality of investment and construction activities. In the investment and construction sector, it is impossible to make informed decisions without analyzing information.

**Results**

Digitalization of investment and construction processes, projects and their portfolio will allow an investor of any type:

- firstly, based on reliable data, to select the most popular and minimally risky projects for financing;
- secondly, to ensure the transportability and controllability of all components of investment and construction processes, allowing them to be adjusted promptly;
- thirdly, to eliminate out-of-sync and imbalances in the process of construction work, including deliveries, control and payment of work performed and services rendered;
- fourth, to expand the multifunctionality, to ensure the maintainability and renovation of the financed capital construction projects on the basis of continuous monitoring of its digital counterpart;
- fifth, to reduce the risks of real estate redevelopment aimed at the formation of preventive management mechanisms;
- sixth, to accelerate the processes of capitalization of construction projects, including at the stage of current, major repairs and reconstruction;
- seventh, to optimize the processes of resource supply, resource substitution, resource economy, ensuring the growth of the income base of participants in investment and construction activities.

**Conclusions**

Taken together, information modeling technologies will reduce the risks of lending to industrial construction and, as the practice of their use has shown [20], will reduce the investment cycle and reduce construction costs by at least 10-12%.

Having identified the target focus of the information technology package in the field of using industrial mortgage mechanisms, we will form the priority steps for the introduction of information modeling technologies, big data and artificial intelligence:

1. The choice of credit facilities taking into account the dynamically changing structure of needs for industrial real estate, providing a cost-effective, high-quality and safe transition to a new model of development of a country with a sovereign economy. The introduction of big data makes it possible to identify, timely adjust, predict the reaction of each building structure, object as a whole, real estate portfolio, etc. to various internal and external influences, be it climatic conditions, seismic activity or loads during operation. Using complex analysis algorithms, specialists can investigate huge amounts of information about the properties of materials, their change in various conditions and combination with other materials. The creation of digital doubles allows the use of evolutionary-simulation methods for assessing the reaction of structures and the object as a whole to various scenarios of their use, determining the optimal options before the start of construction.

Thus, big data forms an instrumental approach to constructive design that reduces the main risks of construction and operation of industrial facilities.

2. Ensuring the controllability of investment and construction processes. Platform solutions allow the lender to take information ranging from supply analysis, rotation of materials, parts, structures, demand trends in real time, forecasting types of capital construction projects, storage conditions, the possibility of supply disruptions, etc. before optimizing the routes of delivery of materials to the construction site, the structure of the employed, etc. Modern data analysis
systems integrated with GIS allow you to take into account many parameters in real time, choosing suppliers, routes, minimizing time losses due to traffic jams, road works, etc. This makes it possible to contribute to the slaughter-free construction process in a timely manner, maintaining the production rhythm.

In ensuring a given rhythm of investment and construction processes, the use of sensors and IoT devices that collect real-time data on each type of materials, monitoring expiration dates, responding to changes, etc. is expanding. In addition, taking into account the current stage of construction, volumes and characteristics of resources, the sequence and route of delivery of materials is automatically formed, which accelerates investment and construction processes and minimizes costs.

3. The possibility of switching to industrial mortgage smart contracts. The new economic model of the development of the sovereign economy of the country dictates new requirements for the speed, quality and economic parameters of investment and construction processes. In the conditions of the unpredictability of the external environment, understanding and taking into account future trends becomes not just desirable, but without alternative. Bearing in mind the duration of construction cycles, in terms of long-term lending, the parties should be able to adjust the terms of the loan agreement in accordance with the need for possible changes in the design or economic characteristics of the project. In this regard, tools are being updated: systematic data cleaning and verification, integration with accounting and management information systems, security and confidentiality, as well as interpretation and training.

Thus, the activation of information modeling tools, reducing the risks of industrial mortgages, makes it possible to scale its application. At the same time, there is a possibility of rapid response to new challenges or opportunities.

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