Development of PPP-based investment and construction projects

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Abstract. The construction industry is one of the leading sectors of the modern economy. The object of the study is an investment and construction project implemented on the basis of public-private partnership, and complex of relationships between its participants. The article deals with current problems of the construction industry whose solution requires new methods. One of the most effective tools for the development of the construction industry is public-private partnerships. The government and private companies are mutually complementary sectors that help attract investments in the construction industry, develop the infrastructure industry, while achieving a synergistic effect. An algorithm for selecting large-scale PPP-based investment and construction projects has been developed. It takes into account risks at each stage of project selection and meets the interests of the population.

1. Introduction

In June 2020, the real estate and construction market was characterized by pessimistic financial perspectives. 89% of construction companies predict a decrease in the volume of profit. The situation is complicated by the risk of bankruptcy: about 15% of construction companies can be closed (they have already become bankrupt or are likely to become bankrupt in the next six months). In absolute terms, the construction market is characterized by an expected reduction in the number of employees by 400 thousand people.

A rise in prices in the real estate market is predicted by 48% of developers, while 27% speak of a decline and 25% do not believe that the crisis will have an impact on the industry. The prices are growing. A distinctive feature of the construction market is the prediction of a decrease in demand for housing (84%, which is 1.6 times higher than the all-Russian indicator). This factor is the main barrier to the recovery after the 2020 crisis.

Thus, the main problems of the construction industry are an increase in the total cost of construction projects, long production cycles and investment, high cost of construction works, reduced labor productivity, equipment delivery interruptions, insolvency of customers, and decreased demand for apartments [1,7,9]. During the current crisis and depreciation of the national currency, these problems are crucial. To solve the existing problems, the authors suggest implementing the public-private partnership mechanism.

2. Public-private partnership as a tool to attract investment in the construction industry

The development of PPP and private investment in the construction industry are the most effective tools.
In recent years, due to the difficult socio-economic situation, the role of interaction between the public authorities and the private sector in solving social problems has increased. Public-private partnership has become a powerful incentive for the development of social infrastructure, an effective means of implementing innovation and investment policies aimed at stimulating the sustainable growth in the construction sector.

A significant advantage of public-private partnership as an instrument of interaction between the government and private construction companies is the focus on the development of public infrastructures [12]. Within the PPP, the efficiency of the use of public property, the investment potential of the territory, the quality of final products or services provided improve, and the social needs of the population are met.

The socio-economic indicators that determine the level of economic development, the speed and quality of implementation of government programs with the participation of business structures, the level and quality of life of the population, the speed of implementation of innovation projects in the construction industry depend on the model of interaction between government agencies and businesses [2,11].

The housing construction market experiences a number of problems: guarantees to protect the interests of equity holders, the development of infrastructure in economy-class districts, programs for the relocation of people from dilapidated and emergency housing stock, etc [6].

Since the cost per square meter of economy-class housing objects is limited, and the cost of infrastructure development should not have a negative effect on the quality of construction, there is only one way out: long-term investment [1]. Public-private partnership (PPP) allows you to attract long-term investments and provide all the guarantees.

The interaction of government authorities and private companies will allow for the development and implementation of large-scale infrastructure investment and construction projects.

The benefit for the government is private investments and reduced budget expenditures. For business, the obvious advantages are the ability to implement long-term projects with government guarantees of profitability, reduced government pressure and creation of a good image.

In Russia, there is a lack of low-cost housing objects. The demand for them is not compensated by the equilibrium supply. At the same time, in the segment of expensive housing (three- and four-room apartments), supply exceeds demand (Fig. 1).

![Figure 1. The structure of demand and supply in the housing market of the Russian Federation based on PPP projects (2019).](image-url)

Construction projects that use mortgage schemes are another area where PPP plays a very important role. Partnership participants are provided with additional benefits to make housing more affordable for the population. For this, the supply of economy class housing and social housing is increasing [4]. Land plots with developed infrastructure are allocated through the system of tenders. The purchasing power
of the middle-income population is stimulated through mortgage loans provided at affordable interest rates.

The government develops infrastructure and accelerates construction by removing bureaucratic obstacles, and attracting private investments. The degree of involvement of the government and business depends on the PPP model [5]. There are the following options:

- a contract is concluded between the government and the company;
- public or municipal property is leased to the company for a certain period at a certain price.
- partners enter into a concession agreement, under which the government transfers certain rights to the private company [3];
- the government and the company conclude the production sharing agreement;
- joint venture involves the government and the company as partners.

Of particular interest is the municipal-private partnership. Participants in such partnerships are companies that take over socially significant objects (kindergartens, nursing homes, etc.) for 20 years or more upon completion of the construction project. Such companies have already been created in the Russian construction industry.

When creating partnerships between the government and private companies, a number of specific problems arise. According to the expert community, they can be summarized as follows:

1. When developing laws and regulations, it is necessary to interact with the business community. The interests of business representatives in the PPP are insufficiently protected [3].
2. The procedure for selecting private partners for PPP projects should be more transparent, with clearly established selection criteria.
3. In order for the partners to be respected, a greater degree of interaction with the business community is required.
4. Interaction with foreign partners is necessary to learn from the experience of successful interaction between private companies and the government.
5. It is necessary to develop the base of information on PPP projects, as well as to cover them in the media [10].

In order for the PPP project to be successful, it is necessary to minimize possible negative consequences through the accurate preliminary risk assessment. The business partner might violate the contract. If the private party has a lot of powers in managing the partnership, it is painful. If the project fails, the burden of balancing the disadvantage will fall on the shoulders of taxpayers [5].

Furthermore, the costs might be higher than those included in the project. There are also risks of violation of deadlines, etc. The terms might be violated by government representatives, amendments to the laws, tax regulations, inflation, currency exchange rate fluctuations, etc. Finally, for both parties there is a risk of force majeure situations: natural disasters, social unrest, military actions, etc.

At the stage of project development, all possible risks must be identified. If possible, it is necessary to assess their consequences in monetary terms. It is necessary to understand how likely each risk is and develop appropriate protection mechanisms.

Figure 2 shows the author's algorithm for selecting investment-attractive construction projects based on the PPP mechanism.

Refinement of projects, indicated in the diagram, is carried out by improving the indicators of economic efficiency of investments: by changing the distribution of the investment load.
The algorithm for selecting PPP-based investment and construction projects increases the level of their socio-economic significance and helps to satisfy public interests through the interaction of partners.

Currently, the average cost of one PPP-based construction project is 4.86 billion rubles. In case of unsatisfactory indicators of commercial efficiency, the private partner will not be interested in the project. If the project is of high public importance, the government can increase its share of the investment burden, reducing the burden on private companies. This improves the indicators of

Figure 2. The algorithm for selecting PPP-based investment and construction projects.
commercial efficiency of the project and increases its attractiveness for the private partner. This process is shown in Figure 3.

![Figure 3](image_url)

**Figure 3.** The ratio of shares of the government and private partners in PPP projects.

Projects with payback periods of up to 5-7 years or 10 years are attractive for the private partner in the construction industry. At the same time, for the government, the payback period for projects of high social significance can be more than 30 years. The ratio of funds from the government and the private partner ranges from 45% / 55% - 20% / 80%. At the same time, projects differ by the volume of investment, indicators of economic efficiency, implementation time, etc.

Thus, the task of determining the economically sound distribution of the investment burden is very important. The ratio of shares of the government and private companies in PPP-based projects is as follows:

$$IC_b = \frac{IC_g}{IC_p}$$

where

- $IC_b$ - investment burden of the government and the private company;
- $IC_g$ – share of public investment;
- $IC_p$ – share of private investment.

The investment burden increases with an increase in the cost of investment and construction projects and decreases with an increase in the duration of the construction project; the investment burden on the private business increases with an increase in the duration of the construction production and decreases with an increase in the cost of the project.

The model needs further refinement in view of new large infrastructure projects and improvement of the legislative mechanisms of public-private partnership.

The investment instrument for interaction between the government bodies and private construction companies will help reduce the following risks: corruption at all government levels, changes in the legislation, bureaucracy, changes in priorities of the socio-economic development, political changes, insolvency of customers, changes in the market conditions.

### 3. Conclusion

The development of public-private partnerships in the infrastructure sectors is characterized by expanding partnership relations. When a joint agreement is concluded, private companies can work on a long-term basis, implementing innovations, reducing the cost of investment and construction projects, and increasing the efficiency of infrastructure which is very important for government authorities.

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