Determination of the optimal proportions of public and private funds in project budget management

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Abstract. Although the historical period of public-private partnership in the Russian federation is rather short, yet this type of cooperation of private entrepreneurs and authorities became the major driver of growth in such areas as construction, utilities, infrastructure and energetics. However, even though the experience of foreign countries is much larger than of Russia, great number of human resources are still consumed within disputes and dissensions in order to assess the ratio of private and public funds. The present paper is based on the idea that this ratio can be determined for each of the industries with the use of statistical data. The authors offered the change in project cost range within the project classification regarding to the "project scale" characteristic.

1. Introduction
Public-private partnership is a rather new phenomenon. Despite the fact that historians firstly mentioned the funding of the concession management model in the 15th century, PPP in its modern form started its developing in the 70-80s of the XX century. In that period, governments have identified the problem of implementing large infrastructure projects under difficult macroeconomic conditions. In particular, they faced the issue of attracting investments without increasing public debt [1].

As a result, the concept of relationship between business and the state was developed, which involves the implementation of the project at the expense of private fund. The investor who had built an object got an opportunity to operate this object, which became his benefit. Such a project implementation structure allowed the state to pass the problem of collecting initial investments to a business community, which in its turn received a reliable investment tool.

First attempts to introduce PPPs in Russia occurred in 2006, when on December 25 the authorities of Saint Petersburg adopted the law № 627-100 "On the participation of St. Petersburg in public-private partnerships". Although the federal legislative base for such a way of project implementation had not existed by that moment, the authorities of Saint Petersburg decided to cooperate with business community in “manual” mode. Subsequently public-private partnerships started to be implemented in other regions of the country with the use of local legal acts [5].
Currently the main regulation of PPP in Russia is implemented by the following documents:

- Federal Law № 224-FZ of July 13, 2015 "On Public-Private Partnership, Municipal-Private Partnership in the Russian Federation and Amendments to Certain Legislative Acts of the Russian Federation" [2].
- Federal Law № 44-FZ of 05.04.2013 "On the contract system in the sphere of procurement of goods, works, services to ensure state and municipal needs" [3].
- Federal Law of July 21, 2005 № 115-FZ "On Concession Agreements" [4].

In accordance with N224-FZ, under making a decision of PPP project implementation, the government is obligated to develop a competition documentation which should highlight certain criteria, according to which a private partner will be selected [2]. This procedure involves selection of candidates from the list according to the corresponding of their offers to criteria including fund volume from the business community. Thereby comes the conclusion that the ratio of investments among the state and a private investor becomes a variable, which changes from one project to another.

2. Methods of studies

The federal platform for supporting infrastructure projects was used as the main source of data for the analysis of PPP projects. This system contains the most relevant register of public-private projects.

First of all, the information provided by this service was analyzed providing that 2,444 projects under the PPP procedure are being implemented on the territory of the Russian Federation at the moment (Figure 1).

![Figure 1. Project distribution in accordance with industries](image)

The first stage of the study was to collect information for further analysis. Although the data concerning the PPP projects implemented on the territory of the Russian Federation are concentrated in one place, this information is not considered comprehensive. Nevertheless, the data related to the number of projects implemented or being prepared for the implementation of PPP were obtained with the use of this resource, as well as the data on the volume of total investments in the project and of companies acting as investors (Table 1).
Table 1. Overall characteristics of selected PPP projects

| Industry                  | Number of projects | Amount of investments | Weighted average proportion of investments, (public/private) | Average project cost, bln. rub. |
|---------------------------|--------------------|-----------------------|-------------------------------------------------------------|--------------------------------|
| Road building             | 23                 | 1035.89               | 37.22/62.78                                                 | 45.04                          |
| Production and energy     | 5                  | 397.27                | 29/71                                                       | 79.45                          |
| Housing and public utilities | 16               | 104.65                | 26/74                                                       | 6.54                           |
| Health service            | 4                  | 3.91                  | 11/89                                                       | 0.98                           |
| Social                    | 4                  | 104.72                | 24.5/75.5                                                   | 26.18                          |
| Physical culture and sport | 7                 | 0.44                  | 1.29/98.71                                                  | 0.06                           |
| Cultural                  | 4                  | 2.77                  | 20.25/79.75                                                 | 0.69                           |
| Consumer services         | 5                  | 0.31                  | 0/100                                                       | 0.06                           |

In order to search for data on the correlation of public and private investments into the project, public sources were used, for instance articles in the social media, regional registers of PPP projects, official press releases of investors [6,8,9].

After the accumulation of data, a primary analysis of the data was carried out. Due to the relatively small number of projects presented in our sample, it was decided to measure the average weighted ratio of capital in PPP projects, based on the amount of investment in the project, in addition to measuring the median value. For this, the following formula was used:

\[ X = \frac{\sum I_{pi}}{\sum I_{oi}} \times 100\% , \]

where:

- \( X \) is the proportion of private and public capital in the investment project;
- \( I_{pi} \) is the amount of private investment in the i-th project;
- \( I_{oi} \) is the total investment in the i-th project.

Number of project in the selection 69
Overall amount of investments 1.646 trn. rub.
Amount of private investments 939.42 bln. run.
Weighted-mean value (private/public) 57%/43%
Median value of private investments 92.5%

3. Results
The table shows that there is no obvious pattern for the traditional range of investments in the state's equity participation.

However, when the dividing into ranges was changed, a regularity was detected, in particular: the larger the amount of investment in the project, the greater the probability of increasing investment into this project from the state, and vice versa.

Therefore, the supposing can be made that in order to reduce the investment risks of private capital holders, the state increases its own investments in the project.

After applying the classification of projects according to the "scale" characteristic (small-scale (up to 500 million rubles), medium (from 500 million to 2.8 billion rubles), large-scale (from 2.8 to 5.7 billion rubles) or very large-scale (over 5.8 billion rubles) the following results were obtained (Table 2):
Table 2. Amount of projects with public investments

| Scale of the project | Amount of projects, Units |
|----------------------|---------------------------|
|                      |                           |
| Small                | 34                        |
| Medium               | 10                        |
| Large-scale          | -                         |
| Enormous             | 25                        |
| Summary              | 69                        |

The decision to divide projects in three groups [7] in the term of amount of investments was made in order to confirm this supposing: small-scale (up to 500 million rubles), medium (from 500 million to 10 billion rubles), large-scale (over 100 billion rubles). Then weighted-mean proportion between public and private funds was determined.

Figure 2. Weighted mean value of public-private investments proportion

Therefore, the analysis disclosed the following obvious correlation: with an increase in the cost of the project, investments from the state grow according to an almost linear dependence. Moreover, the area of activity, where the project is developed, is also significant.

4. Conclusion.

The detection of this correlation clearly demonstrates that within the process of implementing a project under a PPP procedure the competitive system for identifying the executor of works can be exempted from a criterion which considers investments from a private partner.

Due to a large amount of data on implemented investment projects, the market can be assumed to determine the necessary amount of public investment for the project by itself. Therefore, the result of the work is a recommendation to change the competition procedure for the selection of the contractor. The reputation of the investor as well as his experience instead of the amount of money he can invest in the project should become the major factors of the competition.
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