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Performance Evaluation Technique of Life Cycle Contracts for Innovation-oriented Companies

Timchuc Oksana
Irkutsk National Research Technical University
Irkutsk, Russia
664074, Lermontov St., 83

Lyubov Nikituk
Irkutsk National Research Technical University
Irkutsk, Russia
664074, Lermontov St., 83

Dorzhieva Erzhena
Irkutsk National Research Technical University
Irkutsk, Russia
664074, Lermontov St., 83

Dykusova Anastasia
Irkutsk National Research Technical University
Irkutsk, Russia
664074, Lermontov St., 83

***Abstract* –In the modern economic environment, the innovative-investment activity of companies is acquiring great importance. According to the authors, public-private partnership (PPP) is described as the foundation of the innovative activity, as an essential tool for increasing the efficiency of the national innovative system, which contributes to incentives of investment, and optimal use of material, technical, human and financial resources. The article examines the interaction between the government and private business at different stages of the innovative process which promotes the improvement of design arrangement quality and the efficiency of the investment and innovative activity. In the article, the authors pay special attention to the necessity of application of life cycle contracts (LCC) as an effective instrument of the implementation of public private partnership for the development of the national economy. Also, they give their own definition of "lifecycle contract", and the key characteristics of LCC. The authors suggest a business model of the interaction between the state and private business based on PPP and LCC, contributing to improving the quality of design arrangements and the efficiency of investment and innovative activity in the HPU sector. The advantages and disadvantages of PPP (based on LCC) for the business and government are also identified and substantiated in the article. Moreover, the authors developed and gave scientific and theoretical credence to the technique for efficiency evaluation of investment projects, implemented as part of PPP on the basis of LCC. This technique is based on the use of the net present value, the profitability index, the internal rate of return and take into account possible fluctuations of investment risk. All these factors as a whole enable one to assess the efficiency of investments in innovation-oriented companies. According to the results of the research, the authors concluded that it is the projects of PPP, based on life cycle contracts, that can be the real instruments, contributing to the stabilization and improvement of the situation for the development of innovative-investment activity of the companies.**

Keywords – innovations; investments; public-private partnership; life cycle contracts; national economy; project life cycle.

I. INTRODUCTION

At the present time in Russia, the state and private entrepreneurship cooperation in the spheres where the state has been traditionally a monopolist (e.g. power industry, transport infrastructure, public utilities, health care, education, etc) is being widely discussed. The promising way of such cooperation is the public-private partnership (PPP) well-proven in foreign countries [10,14]. In some countries, there are international institutions of research of specific features of PPP, its promotion and improvement, for example: the European Expertise Centre for public-private partnerships and the National Council for Public-Private Partnerships of the USA [9]. However, in the strategy of innovative development of Russia up to 2020, there is a serious underrun of the PPP system in the Russian Federation caused by countries with an advanced innovative system [17]. For example, in Russia, state financing of innovative projects is less than 1 %, in Belgium - 12.7%, and in Germany – 8.8% [1, 19].

It is the public-private partnership that must be the main instrument for the solution of the problems and the improvement of investment and innovative climates of the main economic sectors both at federal, regional and municipal levels [15]. This instrument will allow attracting private investments in capital-intensive designs, which have very important social and nationwide meaning, as well as using the experience of private entrepreneurs for more effective property management and the improvement of service quality [12]. PPP in the sphere of innovations is a key factor in establishing a regular knowledge and resources exchange between private business and government [3, 20].

It is the projects of PPP, based on life cycle contracts, that can be the real instruments, contributing to the stabilization and improvement of the situation in the main sectors of economy. The state, acting through regional and municipals authorities with the help of PPP, will be able to move beyond project budget financing (limited to various extents) in different sectors of economy to the promising model of borrowing private money under the terms of sharing the risk,

thus increasing the efficiency of its activity [28, 21]. PPP on the base of life cycle contracts (LCC) will be able to help to finance economic objects and minimize state project risks [7]. For Russia, life cycle contracts are an absolutely new method of infrastructure project implementation.

Nowadays in scientific literature, there are different approaches and different understanding of the tools which should be used for attracting money to the economy. In practice, there are also variable schemes, differing in efficiency [2]. All these speak for the urgency of the research, the practical importance of attracting money to the fund renewal, and the need for the innovative approach for the solution of the problems, existing in the field [18].

II. Results and Discussion

The nature and characteristics of the life cycle contract (LCC)

The life cycle contract can be defined as a contractual form of PPP, according to which a public partner makes a designing, constructing and exploitation agreement with a private partner on a competitive base for the life cycle period of an object, and makes equal payments after putting the object into operation providing that the private partner maintains the object in accordance with its functional requirements.

The following key characteristics of LCC, distinguishing this type of contracts from other contractual tools, used in Russia, result from the given definition [12]:

- this contract comprises all three stages of an object life cycle: designing, constructing and exploitation;
- an LCC private partner makes all design and technical decisions by himself, and bears all technical and design risks [13];
- the payment for the project is an annual (or quarterly) service payment and depends only on meeting the functional requirement of the contract [22]. Otherwise, a special project company is penalized according to the contract;
- LCC does not include the issues of payment collection for the use of an infrastructural object. Service payments from the state relate only to the object quality [24];
- both public and private parts, depending on the specificity of the object, can have the ownership of HPU objects;
- service payments from the public partner should be guaranteed for the whole period of the contract [11].

The Russian Federation has not used widely foreign experience of implementing LCC (Life Cycle Contract) or DBFM (Design–Build– Finance–Maintain) until this moment. Basically, when implementing infrastructure projects in Russia, a "standard scheme" is used more often, the basics of which are the division of the project into stages with the transfer of different types of work on design, construction and operation of individual contractors and separate acceptance of the results at each stage. As a result, the risks at each stage are managed inefficiently, and all responsibility rests within the state's jurisdiction. In case of implementation of large-scale projects, risks can entail a significant increase in costs, failure to meet deadlines and even failure of the project itself.

The LCC/BDFM concept was widely covered at the Via Nordica conference in Finland, where the LCC/BDFM were thoroughly considered thanks to the reports of the Finnish, Swedish and Danish authors [5, 25, 26, 27].

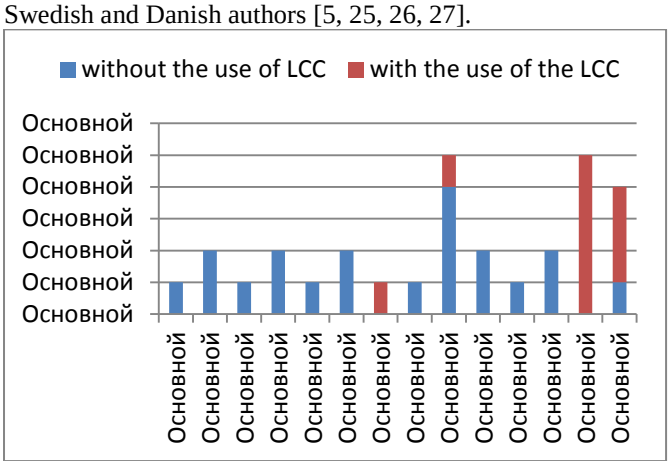

Fig. 1. Growth of popularity of in the EU [5]

In addition to the legislative complexities of applying the LCC/BDFM, there are also risk components:

<u>For a private investor:</u>

1. The private investor is forced to use a large amount of loan financing at the initial stages of the project. With possible long construction times and the need for debt servicing, loans create a significant financial burden.

The practice of implementing large-scale mixed public-private partnership projects shows that the share of borrowed financing, attracted by a private partner, can be up to 80% of the project cost. From 20 to 40% of all expenses are usually covered by the private funds of a private partner.

Payments from the state partner begin to arrive only with the beginning of the operation of the facility (subject of its compliance with the characteristics established by the agreement). And before this moment, the private partner cannot reduce the debt burden without applying emergency measures.

2. LCC/BDFM, like any long-term contract, is accompanied by "long-term risks": general inflation risks, risks of changes in legislation, political conjuncture and early termination of the contract.

2.1. Inflation risks. If one fixes payments by a contract in a firm amount, the contractors are likely to tend to overcharge prices. In case of a small contract, these risks are uncritical: the main amount of investment will be at the construction stage - a relatively short period, which inflationary risks, as a rule, are easily calculated. However, when implementing expensive, non-standard projects, it is more expedient to envisage mechanisms for changing the price of the contract. This possibility is available to state and municipal customers.

According to the Federal Law "On the Placement of Orders for the Supply of Goods, Works and Services for State and Municipal Needs", if the contract term is at least three years old and its price is higher than the amount specified by law (for contracts for performing work for federal needs - from 10 billion rubles, for contracts with the subjects of the Federation - from 1 billion, for municipal contracts - from 0.5 billion rubles), the price of the contract is allowed to change.

Under federal state contracts, the price can be changed by a decision of the Government of the Russian Federation, by regional and municipal ones, on the basis of the law of the constituent entity of the Federation and the decision of the representative body of local government (Parts 6.2 and 6.3 of Article 9 of Federal Law No. 94-FZ July 21, 2005 Placing orders for supply of goods, performing work, rendering services for state and municipal needs).

It should be outlined that the law allows one to change the price of the contract only in cases when it comes to the performance of work. Accordingly, the subject of the life cycle contract should in such cases be formulated as performance of work, rather than the provision of services. The difference between works and services is the availability of the results of the work, and not just the fulfillment of certain actions. This means that the state or municipal customer has to evaluate the work performed by certain indicators, and the results of this work should be presented during the whole contract period to the customer in the form of a tangible object [13].

2.2. Risks of legislative changes. In this case, these risks can be considered as minimal, since the state seeks to develop PPPs (public private partnerships), so it can be assumed that changes in legislation will be positive for LCC/BDFM.

2.3. Risks of political conjuncture. These risks are minimal in the Russian Federation, since the positions of the ruling party are strong enough, and the next major elections will take place in several years.

2.4. Early termination of the contract is possible if the terms of the contract are violated. This risk arises when a private partner cannot fulfill obligations. Minimizing this risk is possible through a thorough study of the stages of project implementation [4].

For a state partner:

1. The LCC assumes payment by the state partner for a long time, which creates a long-term burden on the budget, if it cannot be reduced without violating the contractual obligations of the private partner.

When a state creates an infrastructure object, according to the classical scheme of state order, it simultaneously reserves a significant amount in the budget for the design or construction of the facility. In the case of the creation of the same facility under the LCC/BDFM scheme, the state will be able to "break" the specified amount for 20-30 years. On the one hand, this gives the state the opportunity to immediately launch several large contracts in parallel, without having in the budget of the current financial year the entire amount necessary to create an object under the classical contract scheme. On the other hand, such “installment plan" creates increased risks in the event that the state assumes more obligations than it can fulfill [6].

The given risk can be minimized by careful planning of expenses for the long-term period and involving in development of the project of the Ministry of Finance of Russia. The practice of applying LCC/BDFM shows that a carefully designed financial model of a particular project is resistant to external negative impacts.

2. Among the risks, it is necessary to note the difficulty of eliminating mistakes made by the state partner when preparing the project after its implementation, for example, in determining the functional and consumer properties of the facility.

If the state partner cannot accurately determine the characteristics of the object, identify the optimal financial and (or) legal scheme, in foreign countries, the mechanism of competitive negotiations is usually applied. This procedure, often preceded by the prequalification of applicants. It allows receiving and discussing proposals with potential private partners for any conditions for the implementation of the project, choosing the best option most suited to the interests of the state partner, adjusting the competitive documentation in accordance with it, and only then selecting the optimal tender offer of one of the participants [12].

From the name of the PPP contract form, it logically follows that its key element is the contract. The main features of a PPP, based on a contract, are:

- the land of state partner transfers, property or other objects controlled by the private partner, usually for as long as contract lasts;
- the private partner builds, reconstructs or modifies the object;
- the state partner determines the characteristics that the created, reconstructed or modified object must possess;
- services are provided by a private partner using the facility.

The life cycle contract can be defined as a contract form of public-private partnership.

From the definition above, the following key characteristics of LCC/BDFM that distinguish this type of contracts from other contractual PPP mechanisms applicable in Russia are carried out:

- this contract covers all three stages of the life of the facility - design, construction, operation;
- the private partner for LCC/BDF takes all the design and technical solutions necessary for the implementation of the project, and bears all technical risks and risks of design decisions;
- payment for the project is an annual (or quarterly) "service fee" and depends only on the performance of the functional requirement for the contract. In case of their non-fulfillment, the special project company is subject to the penal sanctions stipulated in the contract;
- LCC/BDF M does not include the issues of operating, i.e., collecting fees for the use of an infrastructure facility. Payments for the services provided by the state are tied only to the quality of the facility;
- property rights to housing and communal services can arise both from the public and the private side - depending on the specifics of the particular project;
- Payments for the service from the state partner must be guaranteed for the entire contract period.

Meanwhile, it should be noted that lifecycle contracts are signed for a very long period which means that regional or municipal authorities need to create registers of expenditure obligations. Therefore, the Budget Code of the Russian Federation provides in such cases for the inclusion of

obligations beyond the three-year period in the special register of expenditure obligations, art. 85-87 [5].

Legislative initiatives should serve as a prerequisite for a more intensive introduction of the LCC/BDFM model in Russia [23].

LCC/BDF Mis currently a promising contractual form of PPP, the application of which, without amendments to the current legislation, is possible for a limited number of entities. A public partner may participate indirectly in the LCC/BDFM, for example, through companies with state participation or through a management company.

The model of the mechanism of interaction between the government and business based on PPP and LCC

Using foreign and local experience and researches, the author made a model of cooperation mechanism of the state and business community based on PPP and LCC (see fig. 2):

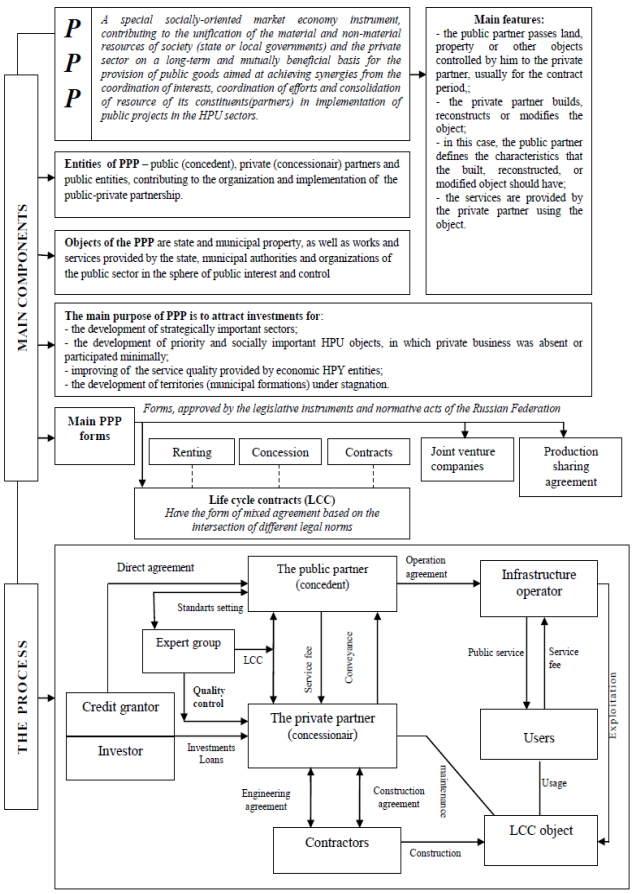

Fig. 2. A model of cooperation mechanism of the state and business community based on PPP and LCC

This model includes all key points of PPP in the LCC process. An expert group, which controls the performance quality and standards compliance according to the contract, is given as a separate group; and in its turn, it will contribute to risk minimization from the part of the concedent [26].

As part of this research, the authors made the calculation methods of the efficiency of an investment LCC project [25]. These methods are based on the use of net present value, profitability index, and internal rate of return, and take possible investments risk fluctuations into account. All these will allow appreciating correctly the efficiency of investment LCC projects for innovation-oriented public clients from different sides.

According to the authors, to make LCC more attractive, all their rules and conditions should be written very clearly. Also the systemic issues should not be dealt with only by means of contractor responsibility increasing.

The evaluation technique of the economic efficiency of investment projects based on PPP and LCC

The whole project life cycle take into consideration the methods of investment efficiency evaluation upon indications of the cash flow. (see fig. 3).

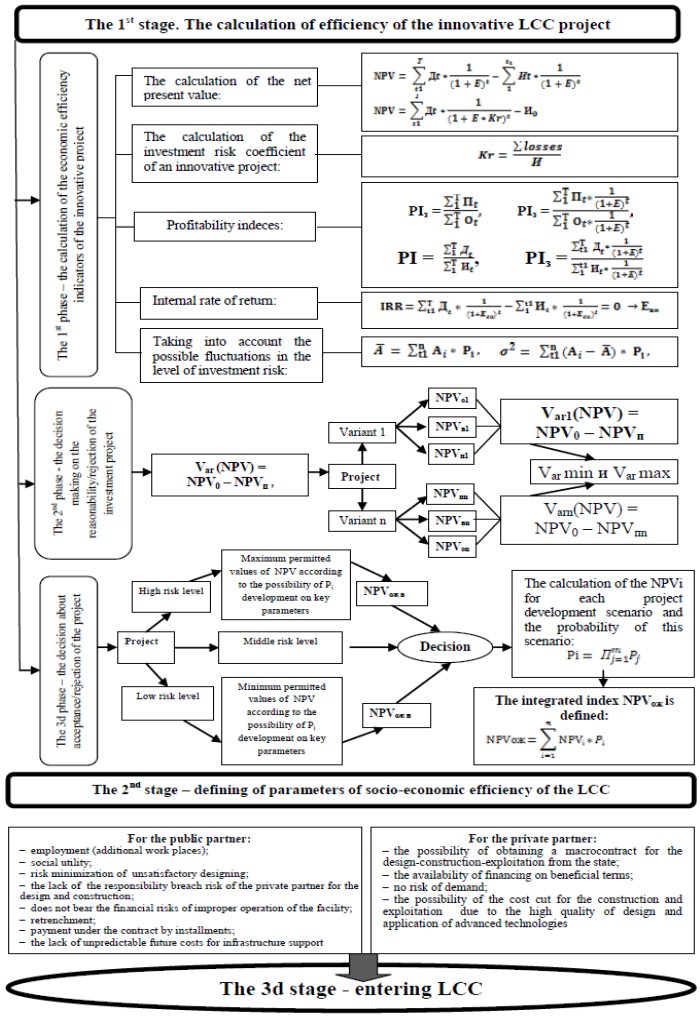

Fig. 3. The evaluation technique of the economic efficiency of investment projects based on PPP and LCC

On the first stage of the project, there should be pre-investment researchers, project planning, the forecast study, the analyses of the conditions for the implementation of the original idea, the concept development, the pre-investment feasibility study, the advance estimation of the costs, the study of possible risks, the choice of and the negotiations on the location, the ecological justification, and the expertise [27].

Then it is necessary to make calculations of the project cost efficiency based on the net present value [21]. This calculation characterizes the common absolute result of an investment project in the current prices [8]. This is a value on which "the firm value" can change in the result of the realization of the given investment project.

Next, it is necessary to make calculations of the economic efficiency of the suggested investment project taking all possible risks into consideration. In the process of evaluation of the investment project efficiency for taking the factors of uncertainty and risks into account the method called *Project Sensitivity Analyses* is used. This method reveals the most critical factors of result reliability of the calculations and allows evaluating the possible influence of risks on the project efficiency.

The authors suggest updating the calculation of the net present value (NPV) of the project considering possible fluctuations of the investment risk:

$$\mathbf{NPV} = \mathbf{Eint} = \sum_{t1}^{T} \mathbf{R}t * \frac{1}{(1+E*Kr)^t} - \mathbf{I_0} \qquad (1)$$

Where R_t – cash inflows (revenue) at the stage of the calculation period. While forecasting the revenue it is necessary to consider all kinds of inflows, which can be associated with the given project, both of production and non-production nature. For example, if upon completion of the period of the project realization there can be the receipt of money in the form of the disposal value of the equipment or the release of the part of the current assets, they should be counted as the revenue from the relevant periods;

I_t – investments (outflows) according to the steps of the calculation period;

I_0 – non-recurrent investments in the time zero;

E – discount rate (rate of investment return). It is set while calculating NPV;

K_r – risk ratio. Since the project is new, maximum value is used while calculating.

T – time horizon (the number of years of the project life cycle).

The suggested technique of the LCC performance evaluation was piloted at the municipal enterprise. The cost advantage of this technique was 1 325 299 rubles.

The dynamics of the NPV value is shown in figure 4.

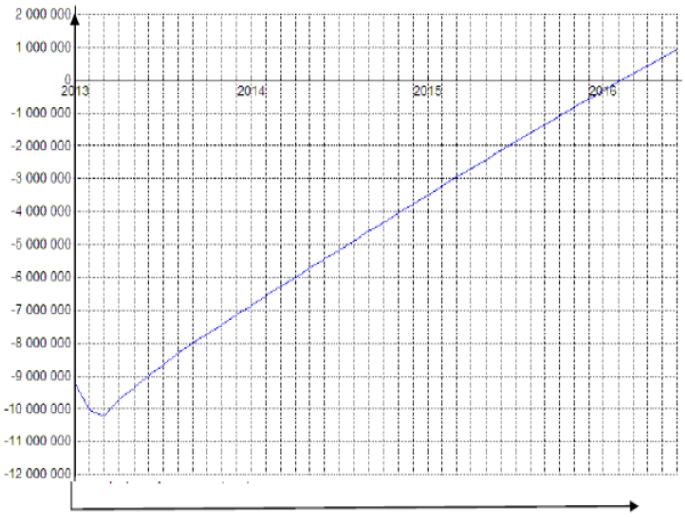

Fig. 4. The diagram of recoupment

From the diagram given above it is clear that the project takes effect after the space of three years. The discounted pay-back period comes in three and a half years where the net present value is above zero and the profitability index is greater than "1".

In the life cycle process of the project based on LCC, the methods of the investments efficiency evaluation according to the cash flow are taken into consideration [16]. Life cycle contracts let private capital take part in mutually beneficial projects together with the state, and ease the expenses burden of the latter. However, this instrument is hardly in demand on the innovative market in Russia. It is connected with weak legal regulation [8].

Most innovative enterprises have restricted liquid resources for renewal and service extension which causes difficulties with their implementation [23]. At the same time, the necessity of innovations in different sectors of economy requires the usage of new technologies in financing, and it defines the innovativeness of the suggested technique.

III. Conclusion

In conclusion, it should be noted that because of the difficult economic conditions in the regions and at the municipal levels, the study of this topic is urgent for any entity and municipality of the Russian Federation. At the same time, it is important to define the indicators of formation and efficient usage of the innovative development of a municipality and the management ways of these processes, to evaluate the investment efficiency, and to define the development prospects of the municipality on this base.

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