

Article

Efficiency Assessment of Public-Private Partnership (PPP) Projects: The Case of Russia

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Abstract: The most recent international experience shows that public-private partnership (PPP) is a public procurement that improves the management of public and municipal property in the construction sector. This article proposes a method for ranking countries by the probability of being successful in implementing a PPP. The new methodology is based on a system of indicators to assess the quality of the institutional environment, the experience of project implementation, the state readiness, private organizations, and the society for the effective implementation of PPP projects. We develop a new method to gauge challenging Russia's new legislation that, although having been introduced in 2015, has already boosted a tumultuous number of new PPP projects and it is expected to enhance PPP opportunities in the country further.

Keywords: sustainable development; infrastructure projects; rating; algorithm for evaluation; public-private partnerships; private sector; state; economic development

1. Introduction

After the introduction of the federal law of 13 July 2015, "On public-private partnership (PPP), municipal private partnership in the Russian Federation and making changes in separate legislative acts Russian Federation", PPP projects in Russia skyrocketed to 2183 projects in 2016 from 873 in 2015. Private investment in these projects was 1038.6 bln rubles in 193 projects at the regional level, 182.4 bln rubles in 15 projects at the federal level, and 144 bln rubles in 1975 projects at the municipal level, for a total market value of \$24.5 bln. According to Dealogic Projectware, the total number of PPPs in the European Union was 1184 from 2000 to 2015, with a cumulative value of 270 bln EUR. The exchange rate on 27 January 2018 was 1 USD = 55.83 rubles. The adoption of Russia's political course to improve the social and economic conditions of the society, the development of infrastructure, and the implementation of socially significant innovative projects led to the development of a regulatory and legal framework for the creation and operation of integrated structures with state participation provided an opportunity. In particular, from 1 January 2016 came into force a special federal law 224-FZ "On public-private partnerships." This gave a new impulse to the development of such an institution as PPP in the construction industry, in healthcare and in the provision of educational services. Legal conflicts and lack of experience in implementing projects under PPP conditions dictate the need for research in this area.

The PPP concept is often used as "the collaboration between a public sector (government) entity and a private sector (for-profit) entity to achieve a specific goal or set of objectives" [1]. A PPP is a specific type of governance network, which can be defined as "more or less stable patterns of

social relations between mutually dependent actors, which form around a policy program and/or a cluster of means, and which are formed, maintained and changed through series of games" [2]. A governance network embraces all relevant stakeholders in the network concerning the development and/or implementation of a policy program or project [3]. Analysis of international experience shows that the rate of development of specific sectors to a considerable extent depends on trends of national economic policy that is the basis of the efficient functioning of a national economy. The following methods may be applied for the management of economic processes [4].

1. Direct impact: the introduction of new rules of conduct by setting them as legal regulations, for example, the establishment of algorithms of financial support for individual economic entities. The government control in the market economy should be aligned with market forces and applied within the proper regulatory framework, the extent of which is one of the issues disputed in contemporary science.

2. Indirect impact: influence on the economic conduct of entities by the actions of the government carried out within the set rules of conduct. For example, public authority can give financial support to individual economic entities that supply essential goods for the public procurement system.

Direct and indirect impact methods mutually supplement each other and are based on the principle of economic efficiency. Moreover, application of either method must keep the balance in the economic system. The strengthening of many administrative methods of direct impact (for example, legal restrictions) may decrease initiatives of economic entities, while abuse of indirect methods (for example, unreasonable financial support of some entities) weakens market mechanisms [5].

Besides the above-mentioned methods of governmental control, one more special form is the government entrepreneurship where the state acts as a direct participant of socio-economic processes [6–10]. The goal of the government entrepreneurship is to solve socio-economic issues rather than to make a profit: achievement of economic growth, higher employment rates, environment protection, and support for vital knowledge and capital-intensive industries [11]. PPP differs from traditional and innovative forms (Design and Construct arrangements) of public-private contracting in that private parties are expected to contribute financially to the PPP mission [12–14]. Network performance depends on the societal context, the institutional design, and the political struggles that decide their form and functioning [15].

Advantages of market competition and practice of execution of contracts are recognized, but the scientific literature analyzes the experience of legal conflicts and failures in development and signing of contracts [16]. Marques and Berg discuss the practice of legal regulation of PPP, strengths, and limitations of the application of the contract system, classification of contracts, an analysis of the development of the contract system. Marques and Berg [16] developed a model for private partner participation in the implementation of PPP projects (BOOT or BOT contracts). The Rui Cunha Margues and Berg [16] pay particular attention to the process of managing and distributing risk among the project participants within the framework of PPP, including identification and grouping of the principal risks of private contracts, as well as monitoring the execution of contracts. Authors emphasize contractual PPPs along with institutional PPPs.

Kivleniece and Quelin [17] emphasize the importance of governance structure and raising efficiency through the theoretical basis of two conceptual public-private structural alternatives: autonomous mode and integrative model for PPPs governance each are related to different value creation abilities, considerations, and conclusions.

Mahoney and McGahana [18] focus on private or public institutions without continually taking into account their interdependencies. The focus on private or public interests has intensified with the deepening of disciplinary and professional knowledge: for example, academic managers tend to view the corporation as a unit of analysis, while public policy scientists often analyze government, multilateral, community, and non-profit organizations [18] protect the partial merging of these research programs because private and public interests cannot be fully understood if they are conceived independently.

Barlow and Roehrich [19] emphasize limitations on the national budget: European governments are more likely to cooperate with the private sector to ensure that the costs for construction and operation hospitals and other medical institutions, public-private partnerships help the government to avoid initial capital costs and use-effectiveness of the private sector, while private sector partners get return on investment. Private actors are increasingly developing and enforcing standards [20].

As a rule, the government entrepreneurship acts in the spheres related to the function of the state, including creation and maintenance of socially critical infrastructural objects, and their prompt and proper provision need substantial capital investments from the government [21]. In Russia, the least requirement for investments that are meant for development of transport, power, social, and utility infrastructure make up about 3.5% of GDP [22]. To reach this level, investment in Russia must edge up 6–10% a year during the next 5–7 years. This almost corresponds to world estimates (3.8% of the global GDP per year on average). The existing body of research focuses on the cash flow assessment of future PPPs' projects, and there is significant room for research of factors that form an operational environment for PPPs.

According to [17], the existing body of research body has three main limitations. Public-private cooperation requires further theoretical conceptualization. A broader effort may be required to understand the exact value creation mechanism in public-private ties, again, about alternative forms of economic organization and boundary choices between sectors. Existing research on value distribution and capture mechanisms in public-private ties tend to focus on significant economic and nonpecuniary benefits accruing to the private actors from public sector ties, bypassing broader organizational and managerial dilemmas inherent in such collaboration and any potentially adverse effects on private sector outcomes [17].

Essig, Glas, Selviaridis, and Roehrich [23] emphasize that existing body of research in performance-based contracts (PBCs) lacks theoretical or conceptual grounding (Gap A). Overall, the cross-disciplinary research PBC classified regarding the three levels of analysis: the firm (which also includes the level of individual managers within organizations), the (buyer-supplier) dyad, and supply/chain network level [23].

Cruz and Marques [24] emphasize that PPP arrangements are particularly vulnerable to uncertainty that comes from several factors [25,26]. A variety of risks contributed to the possibility of renegotiation [27]. Barlow and Roehrich [19] reported that the innovation capacity of PPP projects in the United Kingdom health care sector was not encouraged by during Private Finance Initiative Program. With the adoption of the Russian state's policy for the development of the digital economy and the urgent need to develop breakthrough technologies in all spheres of society, to realize the concept of information and smart technologies, the focus on research on the effectiveness of implementing innovative projects within the framework of PPP mechanisms becomes even more urgent. Under the innovation term, authors imply a PPP project management system based on the information approach and innovative technologies: the use of new nanomaterials that implement the principles of energy saving and energy efficiency of processes, which allows to increase the productivity of objects, investment attractiveness and competitiveness of products, the efficiency of cargo traffic, to predict and minimize the negative consequences of risky events, as well as to create a comfortable environment for the and infrastructure. These principles also form a foundation for green growth that is based on the theory of green economics, or greenomics in short, and it represents the fourth wave followed by the agricultural, industrial and IT industrial (or Internet-oriented) revolutions in world history [28]. According to Choi, greenomics is not just based on economics and interdisciplinary study, but based on innovative even creative multi-disciplinary studies, because greenomics, as a core of sustainable development, resulted from revolutionary technological innovation.

Our goal is to further enhance the theoretical foundation of public-private cooperation through the formulation of new superior methodology than currently formulated and applied. This new methodology should allow the estimation of innovation levels in PPP projects and value for money in propositions for public and private partners.

After this introduction, paragraph two elaborates on policy transfer, the third paragraph addresses the formulation of our new procedure for assessing successful innovation projects implementation, and the fourth paragraph enlightens on testing the new method. Final remarks are given in the fifth paragraph.

2. Materials and Methods

In order to assess the effectiveness of the management of PPP, the authors developed a software product that allows the use of proposed techniques to implement public-private monitoring of the effectiveness of management decision-making processes of implementing priority investment projects. This section discusses a new approach that was developed after federal law on PPP in 2015.

Preliminary factors assessment would allow potential participants to forecast the probability of successful implementation of innovations projects. A detailed algorithm proposed by authors would rate countries on the bases of the probability of successful implementation of innovation projects. This unique integrated system of indicators enables a simultaneous assessment of five fundamental factors that influence the success of PPP projects: institutional environment quality, existing practice of innovation projects implementation, level of readiness of government authorities, private organizations, and population for successful implementation of public-private partnership implementation.

The proposed algorithm has the following steps that help create rating: 1. determination of the assessment indicators list; 2. expert's choice; 3. peer review of indicators; 4. coordination assessment; 5. calculation of average values for each indicator; 6. calculation of probability of successful implementation; 7. assessment of IP_i (partnership index) integrated indicator; 8. creating ranking; and 9. interpretation of ranking.

Then, a panel of 17 experts from countries with the most developed PPP institutions, namely Australia, USA, Canada, Japan, several EU countries (Great Britain, France, Spain, Germany, Bulgaria, and Croatia), Albania, China, Iraq, and Russia will rate proposed projects based on the 5 group of indicators.

The following stages represent a summary of international experience for assessment methodologies in PPP projects with introduction novels of Russian legislation.

The way to obtain comparative assessments of the level of partnerships in the implementation of innovative and infrastructure PPP projects is identified here as an IP. This index is determined by the set of 98 indicators mentioned above, which assess the degree of interaction within the PPP in the countries analyzed by authors. At this stage, the method of summarizing a set of criteria into one integral indicator is applied, which consists of the following steps.

Step 1. Creation of a list of particular criteria, which are grouped into two classes. Criteria for one class are characterized by various factors affecting the level of interaction (partnerships, integration), the other is the impact of the level of integration on the effectiveness of PPP projects.

For each class, the expert group determines the significance of the overall balance sheet, and this significance is shared between the groups of criteria. It is suggested for the first class to expertly determine the significance equal to 0.4 (conditionally cause), for the second—0.6 (conditionally effect). In turn, each particular criterion receives significance within the group to which it refers.

Step 2. The determination of the significance of the criteria within the group is carried out expertly on the proposed scale in the range from 1.0 to 2.0. A fraction of one determines the priority of one indicator over another. After the classes, groups and their particular criteria have been singled out, and their particular importance is identified, the absolute values of the criteria are calculated from the point system from 0 to 5.

Step 3. Rationing of the absolute values of each criterion. The best value is taken as 1.0, the worst—for a fraction of one (in proportion to the absolute values of the corresponding pairs of criteria).

$$b_{ij} = a_{ij} / (\max (a_{ij})) \quad (1)$$

If the growth of the absolute value improves the control

$$b_{ij} = \min(a_{ij}) / (\max(a_{ij})) \quad (2)$$

If an increase in the absolute value worsens control. Where b_{ij} is the normalized value of a specific criterion; a_{ij} is its absolute value.

The normalized value of some particular criteria can lie in the range from 0 to 1.0 (5 points are taken for 1.0, 4 points for 0.8, 3 points for 0.6, 2 points for 0.4, 1 point for 0.2, 0 points, respectively, 0).

Step 4. Obtaining the normalized indicator taking into account its significance. Multiplying the normalized value of each particular criterion (one of 98 indicators) by its significance g_{ij} we get:

$$B_{ij} = b_{ij} g_{ij} \quad (3)$$

where B_{ij} is the normalized value of the criterion, taking into account its significance.

Step 5. Calculation of the integral index for the group by adding all the values of B_{ij} within each group, we obtain the value of the integral indicator for each group of criteria (K_j):

$$K_j = \sum B_{ij} \quad (4)$$

Step 6. Rationing of the group integral index for two control systems: the best value is taken as unity, the worst is for the share of unity:

$$K_{jn} = K_j / (\max(K_j)) \quad (5)$$

where K_{jn} is the normalized integral exponent of the group.

After that, the normalized integral indicator is multiplied by the importance of the group (G_j).

Step 7. Calculate the level of partnerships in the implementation of innovative and infrastructure projects after processing the information collected and standardize as IP (partnership index) for the countries in question:

$$IP = \sum K_j \text{ and } G_j \quad (6)$$

The amounts obtained are dimensionless generalized indicators, and their ratio allows one to judge the level of integration of the state and the private sector (the level of partnerships) in a particular country.

The level of partnerships in the implementation of innovative and infrastructure projects after processing the collected information and standardization will be denoted as IP for the countries under consideration (See Figure 1).

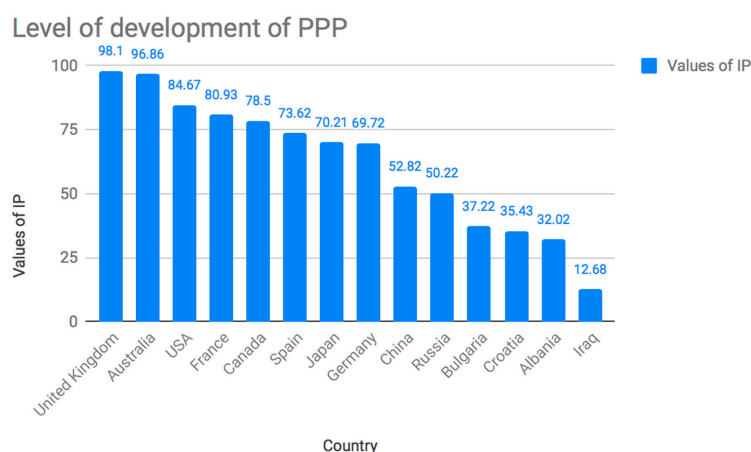


Figure 1. Representation of Values of partnership index (IP) that measures level of development of public-private partnership (PPP).

3. Discussion

3.1. Infrascopes Index

Infrascopes [29] index is a tool for comparative analysis, which assesses the ability of countries to implement financially sustainable and effective partnerships between the public and private sectors (public-private partnerships—PPP) in the key infrastructure sectors, mainly in the field of transport, electricity, water supply and management (processing) of solid waste. The infrascopes index is designed to help state authorities identify the problems of the private sector in infrastructure.

This technique has been applied in Eastern Europe, Central Asia [30], and the Southern and Eastern Mediterranean to assess the partnership of efficiency of public-private partnerships (PPP) for the development of infrastructure (in particular in Albania, Belarus, Bulgaria, Egypt, Georgia, Jordan, Kazakhstan, Morocco, Romania, Serbia, Slovakia, Turkey, and Ukraine).

The methodology was developed in 2016. The Infrascopes methodology applied to statistical data from September 2016 to March 2017. The index was built by the Economist Intelligence Unit and received financial support from the European Bank for Reconstruction and Development (EBRD) to assess the opportunities for countries around the world to establish public-private partnerships (PPPs) in infrastructure sectors. The list of countries, including Morocco, Kazakhstan, the regions of Eastern Europe, Central Asia, and the Southern and Eastern Mediterranean (EECA-SEMED) represents an economically diverse group of countries with different levels of cultural development: Bulgaria and Albania are aimed at aligning with political and market systems with the EU. Kazakhstan focuses on Russia [31,32] and China. Some countries are experiencing profound internal changes (e.g., Turkey). The economic landscape in the regions mentioned above varies considerably. In Albania, Bulgaria, Romania, and Slovakia, real GDP grew by more than 3% in 2016. However, political and economic turmoil affected the economic performance of Ukraine and Turkey, putting pressure on their currency. The World Economic Forum estimates the global deficit of infrastructure financing at about \$1 trillion a year, which is 1.4% of GDP. This problem is especially acute in emerging markets and new EU members. The European Commission estimates that in the EU until 2020, it will take up to \$220 billion of investments in infrastructure in the EU, based on investments in transport and energy infrastructure, which in recent years have been sent to the new EU member states. The Asian Bank for Reconstruction and Development forecasts that the countries of Central Asia will need 492 billion US dollars for investment in infrastructure in the period 2016–2030, which is almost 7% of GDP.

According to the World Bank, the Middle East and North Africa will need more than 100 billion US dollars per year. Investment and effective infrastructure programs can make a significant contribution to long-term development, which will lead to a reduction of unemployment and the promotion of sustainable economic growth. In essence, PPPs are just another form of raising funds [19].

Systematization and analysis of the necessary and sufficient volume and large international statistics show that PPPs can be an effective way to overcome the infrastructure deficit in developing countries and developed countries. PPPs combine government oversight and a long-term perspective with private capital and experience. PPPs are also potential tools in the provision of public services, such as health and education.

It should be noted that this technique (Infrascopes) [29] is unique, as it uses an updated and expanded methodology for the first time. The new indicator structure was commissioned and funded by the World Bank and developed as part of a joint process that includes the Economist Intelligence Unit, ADB, the Inter-American Development Bank (IDB), the European Bank for Reconstruction and Development (EBRD) and the World Bank. Using in aggregate 66 qualitative and 12 quantitative sub-indicators and based on studies in legal and policy documents and in-depth interviews with country experts, the methodology allows analyzing the effectiveness of countries throughout the life cycle of PPPs, including: the legal and regulatory framework for the country, private partner in infrastructure; design and responsibility of institutions that prepare, award and control projects;

experience in implementing PPP projects and the government's ability to comply with laws and regulations; business, political, and social environment for investment; funds to finance infrastructure.

The methodology assumes the set of indicators, converts the data of raw indicators to a common block so that the integral index can be aggregated: integer estimates are converted to 0–100 points. Quantitative indicators, when a higher value indicates better performance, were normalized based on: $x = (x - \min(x)) / (\max(x) - \min(x))$, where $\min(x)$ and $\max(x)$ are respectively the smallest and highest values in 13 countries for any given indicator. The normalized value is then converted to 0–100 points to make it directly comparable with other indicators. This means that the country with the highest raw data value will score 100 points, and the lowest will be 0. Weigh the results on the index. Upon completion of the assessment and normalization of the indicator, The Economist Intelligence Unit selected a series of weighted by default for the census to calculate the overall index. These weights are not intended to represent a final decision regarding the importance of the relative indicator. Simulation and weighting of indicators and categories in the index lead to estimates of 0–100 for each country, where 100 is the highest quality and productivity, and 0 is the lowest.

This methodology allows assessing the efficiency and sustainability of PPPs: sustainability (by the SDG), budgetary control/budgeting, transparency and accountability, and new financing instruments; this helps to resolve cost overruns and capital cost uncertainties related to PPP [24]. The study showed that most countries use PPP as a mechanism for investment in transport, water, and energy, as well as solid waste management. At the same time, there is a serious interest in studying PPP models in the management of healthcare and educational institutions. Strong political support of most countries on the part of the state allows developing PPP models, and in several countries, including Belarus, Jordan, Kazakhstan, Morocco, and Romania, there has been a significant improvement in existing legislation on PPP issues.

This index is designed to become a tool for training and diagnosis, which helps developers identify the problems, which, if they are overcome, can contribute to the development of PPPs and presents significant development from previous classifications presented by Thunnissen 2003 [25], Moses 2004 [33], Lessard and Miller 2001 [26].

The Index Evaluating the Readiness and Capacity on Placing the Life Cycle of the PPP Project in Five Components.

List of components (groups) of indicators:

1. Development of the regulatory and legal framework (8 main subgroups, 35 quality indicators)
 - 1.1. A favorable regulatory environment; 1.2. criteria for selection of PPP; 1.3. fairness/openness of proposals and changes in contracts; 1.4. reconciliation schemes; 1.5. record of the report on the risks of regulatory bodies; 1.6. coordination between government bodies; 1.7. revision; 1.8. sustainability.
 2. Development of institutional environments (4 major subgroups, 15 quality indicators)
 - 2.1. Institutional framework for PPP; 2.2. stability from a specialized PPP agency; 2.3. project preparation tools; 2.4. transparency and accountability.
 3. Operational maturity (experience in project implementation) (3 main subgroups of indicators, 7 qualitative, 2 quantitative indicators)
 - 3.1. Experience with infrastructure contracts for PPP; 3.2. risk of expropriation; 3.3. termination of the contract
 4. Investment and business climate (4 main subgroups of indicators, 4 qualitative, 2 quantitative indicators)
 - 4.1. Political efficiency; 4.2. business environment; 4.3. political will; 4.4. competition in the local industry.
 5. Financing of infrastructure facilities (4 main subgroups of indicators, 5 qualitative, 6 quantitative indicators).
 - 5.1. State payment risk; 5.2. capital market for financing private infrastructure; 5.3. institutional investors and insurance market; 5.4. currency risk.

3.2. PPP in Russia and International Experience

Proposed authors' methodology has 5 main groups of indicators: (1) the degree of favored environment for the successful implementation of innovative projects (28 indicators), assessing the quality of the institutional environment, the degree of the favored environment (economic, financial, political influence); (2) the quality and effectiveness of integration processes in the region (19 indicators assessing the level of balance of responsibility and risk-taking by the public and private sectors, the level of economic and social efficiency of projects, the quality, and timeliness of project implementation); (3) the degree of preparedness of the state authorities of the subject of the Russian Federation for the successful implementation of projects (20 indicators assessing the competence, skills, and quality of work of government officials); (4) the degree of preparedness of private sector representatives for the successful implementation of projects (23 indicators assessing the competence, skills, quality, and performance of representatives of the private sector); and (5) level of population support for projects (8 indicators). These set of indicators represent comprehensive list of factors that affect operational environment for PPPs, with attention to population support. Methodology closes theoretical Gap A identified by [23]. While 3 methodologies presented in Table 1, and discussed in this section have similarities. Authors' methodology for the first time emphasizes population support as contributing factor to execution of the PPP projects.

According to experts' estimates, in most countries in the world, an annual deficit of financing for infrastructural objects is at 20–40% [22]. Deficit of financing for infrastructure result in overload of the transport network, pure conditions of public buildings for schools, hospitals, water purifying systems, and other infrastructure objects; unfavorable condition of public buildings leads to negative demographic events, including lower birth rate, accidents growth, deterioration of human health, and lower life expectancy [34,35]. One public policy response is to create a sector regulator with the responsibility for promoting better performance and meeting social concerns: ideally, to achieve levels of allocative efficiency comparable to those arising in the competitive marketplace and to achieve public policy goals. International experience is essential for proving the administrative process of who learns how and when from whom abroad, about what is good practice or a promising policy model or program, doubts have appeared about the analytical clarity of the concept on many aspects [36].

To solve those issues, the governments around the world work to attract private investments [37], and involvement of private partners has become a crucial matter for national policy [38,39]. In theoretical terms, the proposition of better value for money under PPP is broadly in accordance with the neo-classical view of markets, where firms are assumed to maximize profits, individuals are assumed to be self-seeking and rational, and there is perfect information [40,41] claims that "a mixed capital structure allows to internalize both the cost of the capital advantage of the public sector and the knowledge advantage of the private sector."

Table 1. Our Comparative Technique vs. the Methodological Recommendations of the Russian Federation Government vs. Methodology for Calculating the Infrascopie Index.

No П/П	Comparison Criteria	Author's Technique	Methodological Recommendations of the Government of the Russian Federation	Methodology for Calculating the Infrascopie Index
1	Purpose of the methodology	Increasing the efficiency of implementation of priority innovative and infrastructural PPP projects		
2	The criterion for ranking regions	The level of successful implementation of innovative projects in the region	Level of development of interaction between the state and private business in the region	
3	Method for estimating indicators	Assessment of the consensus of experts on the Kendall Concordance Ratio standardization	Method of expert evaluation, questioning, and telephone survey	
4	Number of evaluation indicators	98 indicators	22 indicators	66 qualitative indicators, 12 quantitative sub-indicators
5	Main groups of valuation indicators	(1) The degree of favored environment for the successful implementation of innovative projects (28 indicators), assessing the quality of the institutional environment, the degree of the favored environment (economic, financial, political influence)	(1) The development of the institutional environment (10 indicators assessing the availability and quality of government bodies, information resources, specialists, strategy and programs of the region, the effectiveness of various measures to support private business	1. Development of the institutional environment. 4 main subgroups: 1.1. institutional framework PPP; 1.2. stability of the specialized agency PPP; 1.3. means of project preparation; 1.4. transparency and accountability. Total 15 quality indicators, including a special agency for PPP reporting, independence, coordination, transparency, means of project preparation, project development fund, availability of PPP registers, national monitoring, and reporting, regulations, periodic reporting, public-private monitoring of project results.
		(2) The quality and effectiveness of integration processes in the region (19 indicators assessing the level of balance of responsibility and risk-taking by the public and private sectors, the level of economic and social efficiency of projects, the quality, and timeliness of project implementation)	(2) Regulatory and legal support for the implementation of projects (5 indicators that assessed the existence and quality of the order of inter-agency interaction at all stages of the life cycle of the project)	2. Development of the regulatory and legal framework. (35 indicators describing public procurement contracts and PPPs, codification, length of appeals in contract disputes, contract bidding procedures, principles for selecting PPP projects, (including cost-benefit analysis, cost-benefit analysis, publicity, availability of undesirable bids, the ratio of unsolicited proposals, the existence of reconciliation schemes, the availability of arbitration, contingent liabilities, the National Infrastructure Plan, coordination, review procedures, transparency, independent oversight, environmental protection investigation, consultation, investment, and risk-sensitive disaster consistency with national policies
		(3) The degree of preparedness of the state authorities of the subject of the Russian Federation for the successful implementation of projects (20 indicators assessing the competence, skills, and quality of work of government officials)	(3) Experience in the implementation of innovative projects (integrated indicator, consisting of an assessment of 7 characteristics of projects: the ownership of projects in two or more industries, the stage of the project, the amount of private investment, duration and complexity of projects)	3. Operational maturity (experience in implementing PPP projects). Three subgroups of indicators: 3.1. experience in working with infrastructure contracts for PPP; 3.2. risk of expropriation; 3.3. termination of the contract. A total of 9 indicators (7 qualitative, 2 quantitative), including: the number of PPP projects in transport, water and energy that have reached financial closure in the past five years, with a small amount of PPP investments in transport, water and energy as a percentage of GDP for the last five years, changing the level of the disaster, expropriation, prudential changes in prices, and the termination of the contract.

Table 1. Cont.

No III/II	Comparison Criteria	Author's Technique	Methodological Recommendations of the Government of the Russian Federation	Methodology for Calculating the Infrascopes Index
5	Main groups of valuation indicators	(4) The degree of preparedness of private sector representatives for the successful implementation of projects (23 indicators assessing the competence, skills, quality, and performance of representatives of the private sector)	-	4. Investment and business climate—4 main subgroups of indicators: 4.1. political efficiency; 4.2. business environment; 4.3. political will; 4.4. competition in the local industry. A total of 6 indicators (4 qualitative, 2 quantitative), including political efficiency, business environment, political will, attitude to PPP, concentration level in the industry).
		(5) Level of population support for projects (8 indicators)	-	5. Financing of infrastructure projects—4 subgroups of indicators: 5.1. national payment risk; 5.2. capital market for financing private infrastructure; 5.3. institutional investors and insurance market; 5.4. currency risk. Total 11 (5 qualitative, 6 quantitative), including: sovereign risk, government payments, state guarantees, state support, market debt, a source of financing for PPPs, availability of sustainable financing, availability of sustainable financing, institutional investors, (pension funds, insurance companies), guarantee fund, currency risk).
Counted by all indicators				
6	Accounting for the performance of indicators	Assignment to the indicator value according to the matrix of expert decisions, where $0 < k < 7$	Assignment of lowering coefficients, where $0.5 < k < 1$	Assignment of a qualitative indicator value: no = 0, yes = 1. Assignment to a quantitative indicator value from 0 to 100 points. Rationing: $x = (x - \min(x)) / (\max(x) - \min(x))$, where $\min(x)$ and $\max(x)$ are respectively the smallest and highest values for any given metric.

International experience shows that innovation projects are implemented in the following spheres: transport (motor roads and railways, airports, pipelines, seaports) [42]; social sphere (healthcare, education, tourism); and housing and utilities (water supply and water disposal, heating and power supply, water purification, gas supply) [43]. Currently, Great Britain, Germany, Canada, France, Australia, Japan, USA, and Spain have a significant knowledge base in the introduction of innovative technologies to solve ongoing problems [44]. Also, developing countries and transition economy countries, such as Russia and China, are advanced in the application of innovations [30,45]. The availability and influence of many factors determines the level of innovations in those countries: quality of formal and informal institutional environment [46,47] (including legal framework and methodical support for entities' activity), development of general environment (economic, financial, political influence), skillset of administrators and managers within governmental authorities and private sector, level of society support and involvement in innovation projects implementation, etc. According to Schaeffer and Loveridge (2002) [48], the differences in characteristics of PPP arrangements that are important to their success or failure are overlooked. The availability of information does not mean that decision maker or/and stakeholders will be able to assess information and extrapolate underlying subliminal trends [49,50].

The proposed methodology allows:

- To quantify and analyze the level of integration in the territory of a particular region (country).
- Determine the possible economic effect of the level of integration processes.
- To carry out constant monitoring of the efficiency of the functioning of integration entities (PPPs), including in the investment and construction complex.
- To carry out a quantitative assessment of the effectiveness of the management of integrated structures taking into account the specifics of state participation, to make timely and informed management decisions, determine the possible economic effect from their implementation, and carry out permanent state and corporate monitoring of the effectiveness of PPP management.

Further research should pay attention to firm level perspective and further analyze networks of PPPs to further enhance qualitative and quantitative methods for PPPs assessment along with institutional development. It should be noted that to date the progressive development of investment legislation in Russia is hindered by the unsystematic and fragmentary nature of its formation, characterized by:

- A collision of existing norms;
- Inadequate regulation of the procedure for concluding, amending, executing and terminating contracts/contracts (in particular, with the participation of the state) [51];
- The declarative nature of the secured guarantees for investors;
- The lack of a complete and sufficient conceptual apparatus that makes it difficult to delimit investment relations from related civil and other relations.

In addition, there is an increase in the tendency for investors to act to circumvent the law by introducing regulation of investment relations outside of Russian law.

In this regard, it is necessary to rethink and improve the existing legal regulation of investment relations, taking into account the balance of private and public interests, observance of the principles of freedom of investment, legal equality, and autonomy of the will of investors. It is necessary to develop new approaches that take into account the balance of interests of society, the state, and private business while simultaneously observing the market conditions for the functioning of the economic sectors, which becomes possible on the principles of public-private partnership. Special attention should be given to possible renegotiations of PPP's contracts and performance of future infrastructure. These problems should be addressed to ensure that PPP will help to overcome the large-scale deficit in infrastructure investments [52,53].

3.3. Sustainable Development

From the perspective of sustainable development, economic growth and environmental protection cannot be integrated easily (coupling issue), and thus, it should be multidimensional and interdisciplinary at its core [28]. However, the technical revolution has filled this missing link between economic demands and environmental protection, resulting in the feasibility of decoupling great potential for higher economic development and a better quality of life [54,55].

The modern stage of evolutionary processes confronts the public conscience of the citizens with the problem of determining the further path of development of Russian society, because today there is an urgent need to rethink the accumulated experience and the corresponding transformation of the country's economic management system towards sustainable development. This makes the energy saving problem extremely urgent, and such urgency has recently been frequently discussed in Russia [56].

In our opinion, such elements as state, society, people, economy, information technologies, ecology should be included in the system of sustainable development of the country. These elements combine an institution such as PPP.

In this regard, in order to improve the quality of life of general society, it is necessary to develop a new effective scientific management tool for the most accurate forecasting of possible negative risk events and their minimization in the process of implementing innovative PPP projects. At the same time, the process of planning for sustainable development calls for new theoretical approaches, methodology and technology.

The model representation of the elements of the sustainable development economy (Figure 2) makes it possible to identify the main factors of sustainable economic development:

1. Highly efficient economy and effective management [57].
2. High level of quality of life [51].
3. Mobility and adaptability to rapidly changing external conditions and factors [51].
4. Active participation of the population in the life and functioning of the city.
5. Preservation of the environment.

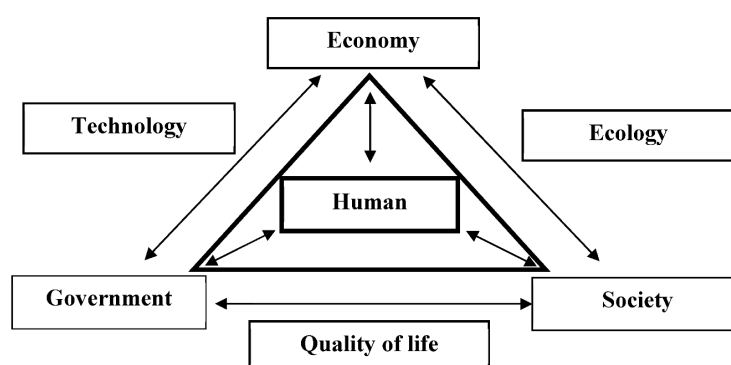


Figure 2. Model representation of the elements of a sustainable development economy.

In order to obtain a quantitative indicator of the assessment of the analyzed processes, the so-called sustainable development index was introduced, which was obtained on the basis of statistical indicators characterizing the sustainable development of the region, the megacity, PPPs grouped into the following main blocks: economic, social, environmental, level and quality of the city's economic base, the state of urban communal, and engineering and social infrastructure. Our methodology also takes into account these groups of factors and allows us to determine an alternative index of sustainable development of IPI.

The use of the author's methodology allows an evaluation of the effectiveness of the policy of municipal authorities, to identify problems and prospects for the development of the city; to determine

the disparities in the development of the city, the region as a whole. This is the goal of our further research [57].

The transition of Western countries to a new technological order has shown the urgent need to change the business-oriented economy in Russia, characterized by the formation of conditions and prerequisites for private business, the key goal of which is to maximize profits, then stable operation of the company in the market, as well as the development of the stock (speculative) to the next phase: the economy of sustainable development. Thus, we note the need to change the “raw economy” paradigm, characterized by the ineffectiveness of the owner (state and private business) to the paradigm “innovative economy of sustainable development with the use of PPP mechanisms”.

The model of evolutionary development of the interests of state economic policy and the formation of a new theoretical approach to the creation of a sustainable economy based on the innovative foundation of PPP projects is presented in Figure 3.

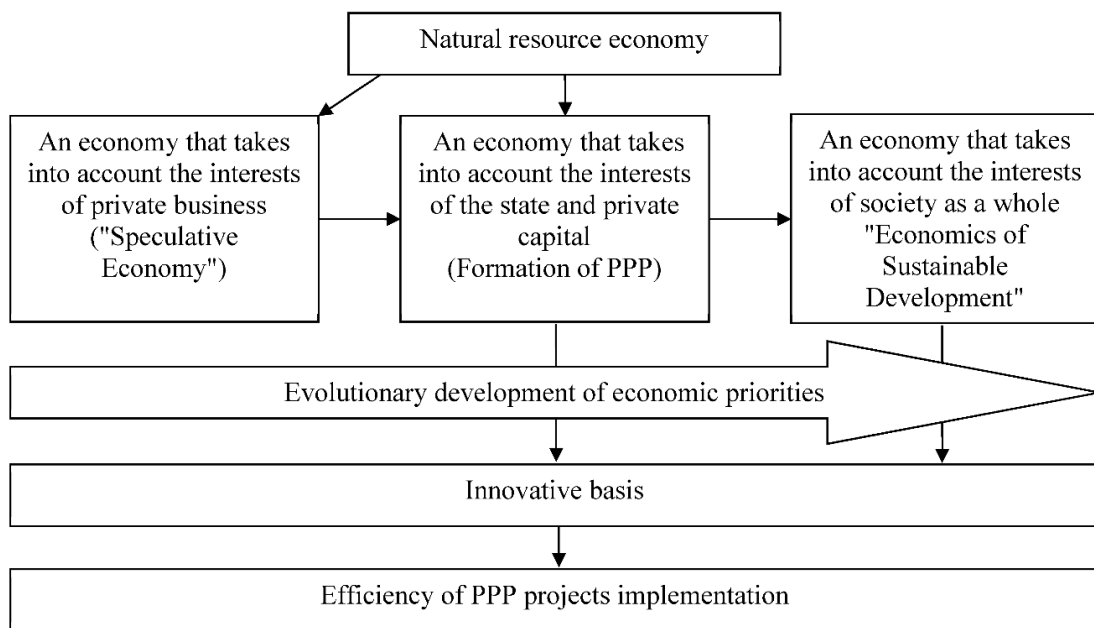


Figure 3. Model of the evolutionary development of state economic policy.

Schematically, the transition to a new social formation, the priority of which for the state is the quality of life of Russian society as a whole, as the main goal of the sustainable development economy, is shown in Figure 4.

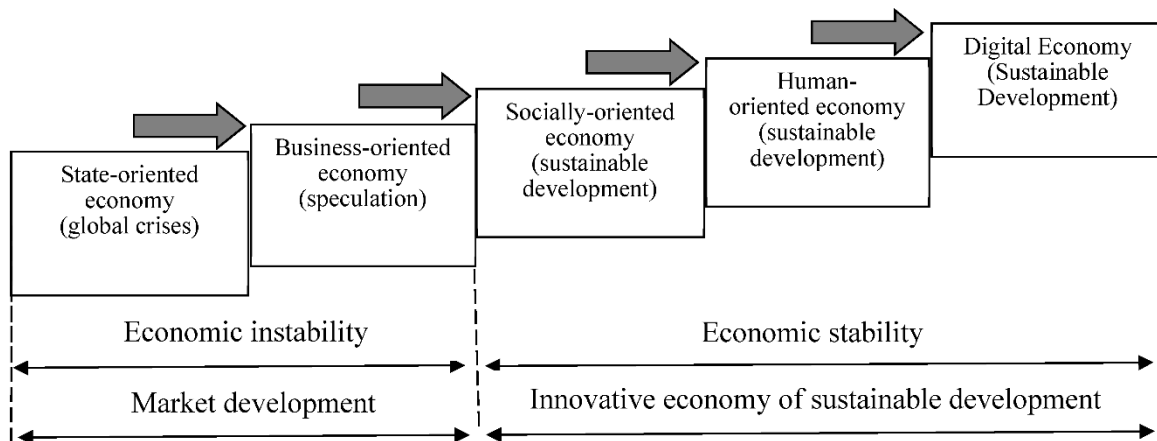


Figure 4. Model of the transition from the paradigm of a business-oriented economy to the paradigm of a sustainable development economy.

It is widely known that public policy is inseparably linked with social policy [20,51,52]. In this regard, the state in the new economic conditions is a global function and occupies a special place in the evolution of state and public formations. While functions of private actors continuously develop in different forms, from purely financing provisions to standard development. Ultimately, a private actor can benefit from all functions of government because experts from the private sector can analyze problems of the government sector in different countries and provide policy recommendations through scientific and expert networks that include government officials. Public and private interests coordinate, form hybrid forms of government, complement each other, and interact with each other. In addition, the experience of implementing public-private interaction is integrated into international and national public legislation [20]. At the same time, the combination of public and private interests through the creation of a unified legal framework is not an easy task, which is connected with the complexity of social relations that are to be settled [53].

4. Results

Value of integrated indicator across Russia shows that probability of successful implementation of innovation projects is at the medium level; the internal environment is characterized by moderate uncertainty which degree depends on the selected variant of the project financing. Expert assessment of each group of indicators is shown in Figure 2. Standard values for each group are based on the medium level of assessing 6 points indicators.

To assess the probability of successful implementation of innovation projects, the authors selected representatives of developed countries (Australia, USA, Canada, Japan, and several EU countries: Great Britain, France, Spain, Germany, Bulgaria, and Croatia) as well as representatives of developing countries (Albania, China, Iraq, and Russia). The average number of experts involved in the assessment of each country is 17. Experts are selected by criteria listed in the authors' technique (stage 2). Calculations of concordance coefficient show that experts' opinion is agreed to the sufficient degree ($0.5 \leq W$). Basing on the assessment held, we have rated countries by the level of probability of successful implementation of innovation projects (Figure 5).

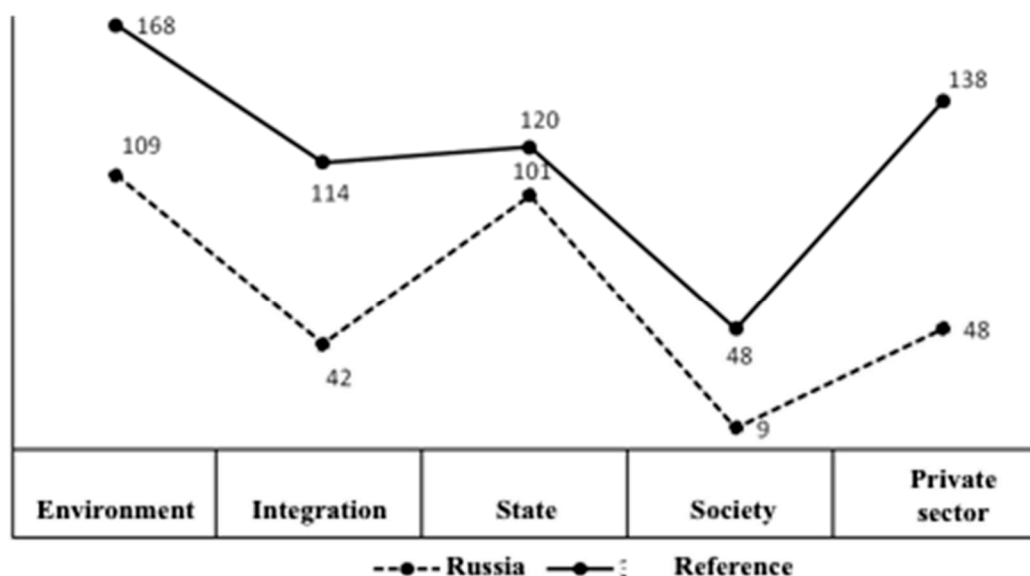


Figure 5. Experts' assessment of indicators groups for innovation projects in Russia.

The IPI integral indicator in Russia proves the existence of the following trends:

- Reforming legislative basis in the sphere of innovation projects implementation;
- Developing specialized structures (Department for Investments Policy and Public-Private Partnership Development at the Russian Federation Ministry of Economic Development);

Department for Investments and Public-Private Partnership Coordination of the Ministry of Investments and Development for the Sverdlovsk Region; National Center for PPP, Autonomous Non-profit Organization, etc.);

- Testing some mechanisms of projects financing [22,30] and developing conceptually new financial models [31]:
- Implementing many innovation projects; however, the most of projects are at the approval stage [32]. According to the National Center for Public-Private Partnerships, 2.446 infrastructure projects, 2.200 of which are concessional projects, are approved for implementation in Russia as at the beginning of 2017.

Based on this new technique, which is an alternative to the recommendations developed by the Russian Federation Government (see Table 1), we rated Russian regions by the level of probability of successful projects implementation in the innovations area.

According to Table 1, the main difference of this paper's technique from the methodological recommendations of the Russian Federation Government is the development of the indicators system that enables assessment not only the institutional environment quality and experience in innovation projects implementation but also readiness of authorities, private companies, and population for successful implementation of prioritized projects. This article's more comprehensive method of assessment allows representatives of government, business, science, and community to obtain a fundamental estimate of developing state innovation projects and justification of measures aimed at increasing efficiency of prioritized projects in the innovative area [58].

5. Conclusions

The government should play a more important role in mitigating risk in order to foster the financial viability of projects that are good for society [59]. Many countries strive to develop and implement various mechanisms for attracting private investments in socially important public projects [54]. The new technique introduced here enables a proper assessment of the overall influence of external and internal factors, and rate countries (regions) by the level of probability in the successful implementation of innovation projects. This paper makes up the basis of a new assessment of existing processes in the sphere of interaction between the state and private business in infrastructure projects. We can conclude that the Russian case presented above can be of interest to countries with a similar institutional environment, such as the Commonwealth of Independent States. Subject to data obtained after testing the technique by an example of fourteen countries, we may conclude that innovative basis of projects is a specific feature of the economy in several developed countries; therefore, the probability of successful implementation of such projects is much higher when managers have the necessary tools to assess basic factors that influence the success of PPP project. Analysis of Russian experience shows positive trends in the sphere of formation and maintenance of infrastructure objects [60,61]; the probability of successful projects implementation can be improved through the application of experience of countries with a similar institutional environment [60,61]. The technique developed by the authors constitutes a part research tools for assessing the efficiency of smart projects implementation. This study can be utilized for calculation of Infrascopie index [29] for Russia and comparison of other countries.

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