Justification of approach to classification of innovations in public-private partnership

Abstract. The relevance of the issue under consideration is driven by the use of public-private partnership (PPP) as the most efficient mechanism of contemporary social and economic system development. The aim of the article is to justify the authors’ approach to classification of innovations introduced in the course of or as a result of PPP projects’ implementation. The core of the approach is to systemise the results of theoretical and applied research conducted in the sphere of public and private sector interaction and PPP project management with an account of innovative factors. Case and system methods are applied to receive the main result of the research - classification of innovations. The data of PPP projects implementation on the territory of Samara region of the Russian Federation have been used as empirical evidence (case study). Samara region was ranked third in 2015 for PPP development after Moscow and St. Petersburg cities. The system method application allowed revealing the cause and effect relationship between PPPs and innovations, singling out classification bases and innovation types within the framework of PPPs. The ideas and conclusions provided by the authors may be useful in the academic sphere for further accumulation of knowledge in the PPP innovative content research sphere including practical application at development of managerial measures at PPP project implementation. The received results also aim at increasing the innovation process efficiency in new or existing PPPs. The results may be used in the public and private sectors, by PPP participants in the first place.

Keywords: Public-private Partnership; Innovations; PPP Project; Institutional PPPs; Contractual PPPs

JEL Classification: R48; D70; E61; O22

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1. Introduction

In the face of Globalisation and growing international competition, the new public and private sector cooperation paradigm or public-private partnership (PPP) has proven to be the best vector of a stable country’s or region’s development. World experience shows that the actors performing alone face a number of institutional or resource restrictions and the result may either be not achieved altogether or fail to comply with the social policy of the implementation determined by the principle of equal rights and opportunities for all participants. It is fair to say that PPP itself has become a large-scale innovation determining the transfer of the public and business community relations to a totally new level. The variety of PPP forms and implementation tools have significantly broadened upon their development; the received effects have become more and more diverse and the application spheres have long moved beyond the improvement of infrastructure. This circumstance gives a basis to put forward a hypothesis of the research - in the present context PPP serves as an innovation driver.

This angle of PPPs renders it necessary to comprehend the role of each participant - the public and private partner. The public partner plays a key role in a PPP being the most important actor (an initiator, a coordinator, a regulator, etc.). Its political and economic course governs the social package for society (a community), reference groups (stake holders); it should be interested in increasing the quality of the social package. The innovative sphere of the Russian Federation puts the issues of scientific and technical progress, and innovative capacity at the top of the creation of favourable infrastructure and development institutions for the inflow and implementation of investments in new developments (products) on the public partner agenda. Stimulation of innovation processes is required not only at the primary stage but also at all stages and based on the efficient state policy (Curatolo & Bryan, 2012) [1].

The state as an interested PPP party forms and coordinates the innovative program in general, as well as innovative programs for separate branches and spheres. The applied state PPP support tools and means may not be innovative themselves, but they facilitate introduction of innovations as a result of the private sector activity. A unique innovative climate forms a specific territory due to the implementation of the state (regional) policy and facilitates introduction of innovations including the ones in PPPs.

The private partner is interested in achieving greater business efficiency and gaining in the performance or new business line development. PPP perspectives add up to become possibilities to create new business models at public sector participation.

2. Brief Literature Review

Since the implementation of the first PPP projects, the issues reviewed in this sphere has varied from understanding the partnership essence and necessity (Moore & Pierre, 1988; Collin, 1998; Clifton & Duffield, 2006) [2-4], and stakeholder interest (El-Gohary, Osman & El-Diraby, 2006; Willems & Van Dooren, 2012; De Schepper, Dooms & Haezendonck, 2014) [5-7] to the improvement of the mechanism of project implementation (Zahariaoe, 2012; Clayton, 2013) [8-9] and state support (Wibowo & Alfen, 2014; Tseng et al., 2012) [10-11]. A systematic review of the literature in the PPP sphere is given in the work of Roehrich, Lewis & George (2014) [12]. Among the works of the last decade, the discussion is focused on the innovative public-private partnership (Samli, Wassenhove & Bhattacharya, 2002; Esteve, Ysa & Longo, 2012; Akhmetshina & Mustafin, 2015) [13-15].

The importance and relevance of the research has been proven by the fact that innovations and PPPs are key elements to the innovative programme in general, as well as innovative programs for separate branches and spheres. The applied state PPP support tools and means may not be innovative themselves, but they facilitate introduction of innovations as a result of the private sector activity. A unique innovative climate forms a specific territory due to the implementation of the state (regional) policy and facilitates introduction of innovations including the ones in PPPs.

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3. Research problem

In the context of the implementation of PPP, classification of innovations occurring in the course of their carrying out is viewed to be an important stage of analysis. This issue lies on the periphery and kindles our interest due to the difficulty and conceptual insufficiency of the interdisciplinary research. Science today has a lot of schemes due to which innovations can be classified by various criteria and grounds. All these approaches were developed long before the formation of PPP as an institute and a research sphere. However, many of the classifications have a polemic character. They have gained significance within separate spheres or designated purposes, thus they are not always universal. Keeping in mind the development and selection of the classification bases for innovations at the stage of implementation and as a result of PPPs, it has been defined that PPP is an efficient mechanism to ensure national or regional economy development (support) with a vast potential for innovations. The starting point here is the synergetic nature of PPPs.

4. Purpose of the research is to determine basic criteria for the classification of innovations occurring in the course of or as a result of the implementation of PPPs. The proposed classification scheme should make it possible to reveal the sufficiency and need of the innovation support means and tools, determine the gaps in the implementation of PPP projects and management. In terms of PPPs, the gaps may be institutional, legal and investment.

The following tasks have been set to achieve the purpose:
1) to define, research and systemise classification schemes for innovations, which will best fit the PPP management format;
2) to implement the existing schemes with the authors’ criteria that will be useful for structuring of PPP projects, making decision during the preparation of a project with regard to justification of the public partner and the need to implement it in the private sector;
3) to show what the main and supplementary PPP support forms, depending on the innovation type, are the most / least developed in terms of the regional practice.

The research is focused on the PPP projects implemented in Samara region of the Russian Federation. According to the GChP-START 2015 national rating, Samara region is ranked third in PPP development after the cities of federal importance - Moscow and St. Petersburg.

The subject of the research is innovations produced under PPP projects and mechanisms of their stimulation in the format of partner relations. The research value lies in the development of theoretical aspects of innovation management in PPPs, working out the maximum adapted approach to the classification of innovations, its applied review through the problematic context.

The following terms are used in the text:
- Innovations mean introduction of a new or significantly improved product (goods or service) or process, or a new marketing method, or a new organisational method in business practice or workplace or arrangement method or external relations. The minimum condition means that the product (process, marketing or arrangement method) is new (or significantly improved) for the specific practical area. The general attribute of all innovations is their introduction irrespective of the type (Oslo Manual, 2005) [17]. The main innovation types (forms, typology) are determined by the Organisation for Economic Cooperation and Development.
- PPP (definition pursuant to the legislation of the Russian Federation) is a cooperation of the public partner on the one hand and the private partner on the other hand, which is legally formalised for a specific period, based on pooling of resources and distribution of risks and carried out under a public-private partnership agreement or a municipal-private partnership agreement for the purpose of promotion of private investments to the economy, ensuring provision of goods, works, services to the government and local authorities, and improvement of the quality of such goods, works, services. PPP has various definitions in the international business practice, however the principles and understanding of the partnership are relatively close and differ according to the mentality, legal and economic restrictions.
- A PPP project is a project planned for collaborative implementation by a public and a private partner under the principles of public-private partnership, municipal-private partnership.
Speaking in general, institutional PPPs stipulate the establishment of a joint venture (or a special company) in the public and private sector or a new institutional structure under predominant control of the private partner. Contractual PPPs do not stipulate the incorporation of any new legal entity, the relations between the public and private partners are regulated by a contract (agreement).

5. Research Methods

The following methods were used in the course of the research: theoretical (analysis and synthesis, comparison, induction, deduction, etc.); empirical (measurement and summary of the research results, grouping and selection); experimental (configuration development, classification, etc.). The main research method was system analysis (at the stage of determination of the cause and effect relationships between PPPs and innovations, singling out of hierarchical levels and subsystems) and case study (at the stage of matching the impact of PPP on the innovation sector and the trends in regional development).

6. Experimental Base of the Research

The research of the issue was performed in four stages: Stage 1 - collection and processing of data on the state of developments in the PPP sphere; selection of approaches to the classification of innovations most developed in the domestic or foreign scientific literature, tried or recommended by the expert community, scientific and research institutions.

Stage 2 - analysis of the schemes of innovation classification and their correlation depending on the PPP implementation stage and other relevant grounds.

Stage 3 - development of an approach to classification of innovations in PPPs; determination of interrelation between the type of innovation and its support within PPPs based on the regional practice analysis.

Stage 4 - justification of criteria for the classification of innovations aimed at PPP project structuring and revelation of gaps at their implementation; development of recommendations for the use of the research results.

8. Results

Initially, all PPPs may be divided into two categories: contractual and institutional PPPs. In Russia such a division is nominal; the law requires that the agreement forms which are public-private partnership agreements and concessionary agreements. This is because PPPs in Russia are still at the genesis stage; the development institutes have not been formed in full and the legal regulatory framework has not been established yet.

In Belgium, PPPs are divided into object-based PPPs (e.g. concessions and DBFM) and area development PPPs. In Italy, PPPs are customarily divided into contractual PPPs (concession, sponsoring and financial lease) and institutional PPPs (Akintoye, Beck & Kumaraswamy, 2015) [18].

One of the most popular classifications of PPP forms in the world practice is the one offered by the World Bank (World Bank, 2012) [18]. The list of PPP forms is not final. We have compared every PPP form with regard to their innovation type and determined their maximum concentration potential (Table 1).

Table 1 reviews the PPP forms as contractual ones usually aimed at implementation of one project within one branch. The basis for contractual PPPs lies in implementation of one of the models: DBO (design-build-operate), BBO (buy-build-operate), LBO (lease-own-operate), DCMF (design-construct-manage-finance), etc. Let us interpret the data of Table 1.

Successful implementation of PPP (1) is largely dependent on the new methods of managerial business practice arrangement, use of new means of interrelations with the external environment that have to entail organisational changes. At the stage of transfer of state property to management or lease, the public partner should be selected from the list of potential partners, based on the extent to which the proposed management strategy is able to trigger organisational transformations.

In case of privatisation, divestiture (2) of assets of the public partner is applied in the electric power industry, telecommunications, utilities system, i.e. in the servicing spheres. Partnership only affects full or partial redistribution of assets in favour of the private partner. The public partner retains the control and regulatory functions. The potential of innovations at the joint enterprises of PPPs lies in the increase of the customer's satisfaction with the level of quality at no change of any consumer-oriented characteristics. In this regard, the attention in (2) should be more focused on marketing innovations, namely on innovations in pricing.

Concessions (3) stipulating reconstruction or expansion of the existing state property objects have more complex relations between the partners when compared to (1) and (2), since management, lease or other functions depending on the concessionary agreement content add up on the operation stage. An important place within the interaction mechanism at the stage of implementation of PPP projects is taken by process innovations related to significant changes in technologies, production equipment and/or software. Concessions are most often used in healthcare and transport infrastructure.

Greenfield Projects (4) are implemented in the Russian Federation under concessionary agreements (3). However, the boundaries between them are fundamental from the standpoint of the regional innovation policy. To explain why, let us have a look at the example of implementation of PPP projects in the healthcare sphere of Samara region, since the region is the leader in this sphere in the Russian Federation (Table 2).

26 PPP projects are implemented in the healthcare sphere in Samara region as of 01 July 2016, which is more than one half of all the PPP projects of the region (Figure 1).

Thus, new construction is mostly aimed at the development of product innovations, i.e. medical services not earlier rendered on the territory of Samara region or improving characteristics or quality. Thus, from the perspective of the strategy of territorial development, Greenfield Projects are points of product innovation appearance, while concession mostly concerns the process innovations.

All the reviewed innovation types may occur to a greater or lesser extent if combined with the PPP forms within the framework of specific projects. Speaking of the PPP implementation efficiency, a shift of focus in favour of a specific innovation type will be a prerequisite of the efficiency of implementation of the regional innovation policy. Thus, we believe that it is necessary to take innovative content into account at PPP project structuring and to keep in mind the boundary cases described in the Oslo Manual.

Structuring of contractual PPP projects allows determining whether a partnership has innovative content. We consider it reasonable and possible to use here the innovative component criteria (Kozlov, 2012) [20], where all projects are divided into three categories:

1) partnership aimed at reaching an innovative effect;
2) partnership evoking secondary innovative effect;
3) non-innovative (traditional) partnership.

For example, construction and commissioning of unique healthcare objects on the territory of Samara region under the PPP terms is a partnership aimed at reaching an innovative effect. Their operation will, at the same time, facilitate activation of new researches and developments in the sphere of IT medicine and pharmaceuticals industry, attract new or existing innovation-oriented production to the created innovative infrastructure (secondary innovative effect).
The following institutional PPPs are currently operating in Samara region:

1. Zhigulevskaia Dolina Technology Park in the area of high tech, which is a project aimed at creation of favourable environment for innovative development and update of the economy of Samara region; opening of new work places and diversification of the Tolgatti economy; integration of science, education, financial institutes, enterprises and entrepreneurs. The main objective of the technology park is to render support to the projects and companies operating at all stages of the innovation process and high technology sphere;

2. Tolgatti Synthesis Industrial Park, which is a complex of real estate objects managed by the same operator and consisting of industrial plots of land with production, warehouse, administrative and other premises and constructions having energy sources, engineering and transport infrastructure, and the required administrative and legal conditions to place production;

3. Tolgatti Special Economic Zone, which is a special economic zone of the industrial and production type, located in the north-west of Samara region on a 660 ha plot in the Stavropolskii municipal district near the border of Tolgatti in the immediate proximity to AVTOVAZ OJSC. The territory is occupied by production sites of the residents; the remaining part is aimed for the construction of the industrial infrastructure which includes engineering and transport infrastructure, as well as customs, administrative, utility and sanitary zones.

We refer the listed innovative infrastructure objects to institutional PPPs as they are incorporated under the Divestiture (2) form that stipulates joint ownership of the capital of these companies by the public partner represented by the Government of Samara region (or subordinate structures) and private partners. The objects are managed by executives of the joint-stock companies at the attraction of Expert Councils.

Let us analyse the interrelation between the contractual and institutional PPPs within the innovative development mechanism of Samara region (Figure 2).

The presented mechanism shows close interaction between the PPPs. The set of means and tools of state innovative activity support should be balanced, i.e. it should cover the needs of the companies creating innovations during the whole generation-adoption-implementation cycle. The institutional and financial support today is biased towards the innovation creation stage.

The reality is such that not all innovative ideas, which have active support at the beginning, are turned into projects or see actual development. Judging by the data of Figure 2, we see that the innovative potential of Samara region may be wasted due to certain regional policy gaps concerning PPPs among other factors:

1. A legislative gap is a violation of the homogeneity principle at forming PPP legislation. It stems from the fact that a law is first passed in Samara region, then at the national level when some PPP projects have already been launched. The Law of the Russian Federation on PPPs has introduced a number of significant restrictions related to regulations in the PPP sphere which required introduction of a public-private cooperation notion at the regional level.

2. An institutional gap is seen in the imbalance of the forms of innovative activity support. Thus, there are no dedicated innovation export support tools that are of crucial importance when the innovative products (services) are in demand abroad. Another constraining factor is the complicated geopolitical and economic situation.

3. An investment gap lies in the fact that, pursuant to the legislation of the Russian Federation, the list of potential private partners is closed. There are no non-resident companies in such list, which is a significant restriction. However, it only concerns contractual PPPs and not institutional PPPs. It should also be mentioned that the world practice has acknowledged that institutional PPPs at the participation of academic communities play the role of innovation guides. At the same time, as noted by Robin & Schubert (2013) [21], PPPs in the sphere of scientific research cannot support all innovation forms.

Having such an interpretation, we are sure that institutional PPPs are more positively connected to innovations than the contractual ones.

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Tab. 2: PPP projects implemented in the healthcare sphere in Samara region (the public partner is the Government of Samara region)

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Project name</th>
<th>Implementation term / Month and year of agreement signing</th>
<th>Investment volume, krRUB / PPP agreement</th>
<th>PPP form / Innovations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Construction of a positron-emission and computed tomography centre in Samara</td>
<td>7 years February 2014</td>
<td>325,000 Agreement on social and economic cooperation</td>
<td>Greenfield Project / Cutting-edge means of oncolgical, cardio and neurologial disease diagnosis (nuclear medicine)</td>
</tr>
<tr>
<td>2</td>
<td>Arrangement of clinical nutrition at State Government-Financed Healthcare Institution Samara Regional Clinical Hospital Named After M.J. Kalinin</td>
<td>15 years May 2016</td>
<td>50,000 Concessionary agreement</td>
<td>Greenfield Project / Incidental medical services in clinical nutrition</td>
</tr>
<tr>
<td>3</td>
<td>Reconstruction of a rehabilitation hospital in the Samara city district</td>
<td>49 years June 2015</td>
<td>352,245 Concessionary agreement</td>
<td>Concession / Purchase of modern equipment and technical re-equipping to comply with the up-to-date requirements</td>
</tr>
<tr>
<td>4</td>
<td>Creation of a diagnostic centre on the territory of State Government-Financed Healthcare Institution Samara City Hospital No. 10 of the Samara city district</td>
<td>26 years August 2015</td>
<td>100,000 Concessionary agreement</td>
<td>Concession / Construction of a block on the territory of the hospital</td>
</tr>
<tr>
<td>5</td>
<td>Arrangement of production of a series of new increased bioavailability drugs in the Samara city district</td>
<td>unlimited term August 2015</td>
<td>100,000 Agreement on social and economic cooperation</td>
<td>Greenfield Project / Production of new age drugs</td>
</tr>
<tr>
<td>6</td>
<td>Construction and equipping of a new cardiac surgery centre in the Samara city district</td>
<td>10 years January 2014</td>
<td>3,000,000 Investment memorandum</td>
<td>Greenfield Project / Unique centre in terms of format, scope and equipment level to enable improving the medical service quality and timeliness</td>
</tr>
</tbody>
</table>

Source: Compiled by the authors based on the data of the Unified Informational System of Public-Private Partnership in the Russian Federation

Fig. 1: Implementation of PPP projects in the healthcare sphere in Samara region

Source: Compiled by the authors based on the data of the Ministry of Economic Development, Investments and Trade of Samara region
contractual PPPs, while their combination provides additional competitive advantages for the regional development.

We believe that a structured classification by at least five grounds should be used in the general PPP context (Table 3).

For contractual PPPs, we suggest classification schemes based on the consolidated PPP project implementation stages (Table 4).

A close approach to the classification of innovations is classification by the novelty application field and the degree of innovation novelty (Khalabuda & Nikolaev, 2014) [23]. In the first case, innovations concern one or several processes and their result may be assessed by using quantitative and qualitative characteristics. This innovation type deals with the technological, technical, economic, management or organisational part of the project. Innovations of this type often play a key role for making a positive decision in respect of the implementation of a specific project at approval of the PPP project by the partners (participants). They are included in the feasibility study and their risks should be assessed. In the second case, innovations are not obvious, however they produce an indirect effect. Implementation of such innovations on a specific territory may result in the rise of life quality of the population, improvement of social services, budget increase due to new transport and logistic routes, inflow of foreign investments, etc.

Application of the classification format in order to manage innovations will make it possible to assess the impact of each innovation type on the region's economy.

9. Discussion

Comparison of various aspects of the definition of innovations and their classification is given in the work by Tabas, Polak & Beranova (2010) [24]. Approaches to classification and typology of innovations adopted in the world science are reviewed, studied and systematised in the extensive research (Kotsemir, Abroskin & Meissner, 2013) [22] which deals with the evolution of innovative concepts, analysis of the most popular traditional and contemporary approaches to classification. The authors of the abovementioned research have collected dual and multi-component classifications providing broad opportunities to select the optimal PPP classification grounds. A review of the innovation as an essential category in the contemporary economy and the innovation typology is given by Zizlavska (2014) [25]. He researches innovations from the standpoint of their application potential.

Among the applied works aimed at review of specific innovation types or their use, one should mention the works on the PPP project management subject. Taran, Boer & Lindgren (2015) [26] single out business models of the innovation types, their peculiarities and implementation problems. Mostafavi, Abraham & Sinfield (2014) [27] suggest an innovation locus conceptualisation typology from the standpoint of financing and execution of projects in the sphere of infrastructure. Innovations in the public sector and the best management practices are given in the works by Borins (2000) [28], Moore & Hartley (2008) [29], Wu, Ma & Yang (2013) [30], which is valuable for the development of managerial impact, formation and implementation of the innovative policy.

The authors of this research have used the Oslo Manual (2005) classification to establish interrelations between the PPP models and the innovation types, since this classification is fundamental for many experts.

Russian researchers have also made a scientific contribution to the development of classification of innovations. Let us mention some fundamental works used in this research to develop classification criteria.

T. V. Goldiakova (2006) [31] suggests using a classification attribute system at consolidation of the approaches to the classification of innovations. The system includes: (1) attributes characterising the objective of innovations; (2) external attributes reflecting the form of implementation of innovations; (3) structural attributes; (4) attributes characterising the scope and significance of innovations. For PPPs, we have added (5) attributes characterising

### Table 3: Classification of PPP innovations

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Purpose attributes</th>
<th>Structural attributes</th>
<th>External attributes</th>
<th>Attributes characterising significance and scope</th>
<th>Attributes characterising implementation stage</th>
</tr>
</thead>
<tbody>
<tr>
<td>By source of occurrence (initiation):</td>
<td>By implementation sphere:</td>
<td>- information society</td>
<td>- international</td>
<td>By region's needs:</td>
<td>- crisis</td>
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<td>- state</td>
<td>- utility</td>
<td>- national</td>
<td>- developing</td>
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<td>- private</td>
<td>- social</td>
<td>- regional</td>
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<td>- academic</td>
<td>- transport</td>
<td>- local</td>
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<td>By designation:</td>
<td>- electric power</td>
<td>- By transfer means:</td>
<td>- export</td>
<td>By region's project stage:</td>
<td>- project</td>
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<tr>
<td>- update</td>
<td>- healthcare</td>
<td>- international</td>
<td>- import</td>
<td>- investment</td>
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<td>- supplement</td>
<td>- culture</td>
<td>- national</td>
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<td>- operational</td>
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<td>- replacement</td>
<td>- sports</td>
<td>- regional</td>
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<td>- substitution</td>
<td>- amelioration</td>
<td>- local</td>
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<td>By content:</td>
<td>- water supply</td>
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<td>- By implementation documents:</td>
<td>- etc.</td>
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<td>- export</td>
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<td>- import</td>
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<td>By role in program documents:</td>
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<td>- strategic</td>
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<td>- current</td>
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<tr>
<td>By By application frequency:</td>
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<tr>
<td>- one-time</td>
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<td>- recurrent</td>
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Source: Compiled by the authors

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characterising the stage of introduction of innovations in the PPP implementation process.

A. A. Kozlov (2012) [20] suggests classifying PPP projects into (1) partnership aimed at reaching an innovative effect; (2) partnership evoking second-order innovative effect; (3) non-innovative (traditional) partnership. The article reviews the first two types as the ones having the largest innovation generation and adoption potential. Methodological approaches to the classification of innovations are also reviewed in the research conducted by Sosunova & Serper (2010) [32], Shilov (2007) [33], Sandu & Troshin (2010) [34] classify innovations with regard to their investment source. We used this approach while researching investment gaps in PPPs. Shilafman (2014) [35] considers the issue of innovation development for the implementation of cooperative relationship and singles out the necessary and sufficient conditions for the development of innovations in the integration processes.

The whole set of works proves the interdisciplinary and multidisciplinary nature of PPPs. However, the number of works reviewing innovations and analysed within the conducted research is notably smaller. The works on healthcare (Esteve, Ysa & Longo, 2012) [14], transport, communal infrastructure, etc. should be noted as valuable while researching the issues of adoption of innovations through PPP projects in the industry sector.

The subject of PPP project management is closely interrelated with project management (RM), which is seen in the conceptual works by Akintoye, Beck & Kumaraswamy (2015) [18], Devkar & Kalidindi (2013) [36], as well as when reviewing separate projects (one project or a group of projects within one industry branch). Recently, an approach stipulating the dependence of PPP efficiency on relationship management (RM) has gained popularity.

In particular, it is stated that the longer the PPP project implementation term is, the more significant is RM for its success (Zou et al., 2014) [37]. Earlier, based on the experience of Great Britain, Smyth & Edkins (2007) [38] justified the need of transfer to proactive relations in PPP project management. RM is analysed as a critical PPP success factor in the work by Osei-Kye & Chan (2015) [39]. S. Pedersen (2015) [40] reviews the specific aspects of cooperation between partners and knowledge management in PPPs at designing new or innovative products. Thus, scientific research of PPPs has not just an inter-disciplinary, but multi-disciplinary character.

The number of research works reviewing PPPs from the perspective of innovative development has grown in the last decades. The existing results of the mega- and meso-level PPP projects positively correlate with the investment climate. The research work conducted by A. Arundel, L. Casali and H. Hollanders, in which the authors analyse public sector innovations for the purposes of state management, is also worth mentioning [41]. Consistency of the innovative and investment policies is designed to foster development of competitive strengths of the region (or the state in general). The interrelations between innovations and competitive performance is also confirmed by the European research.

Special interest in our work lies in the research assessing innovations as indispensable PPP attributes in the modern conditions. We agree with the research position of Gonzalez & Garvin (2016) [42] synthesising archive research in their work and demonstrating a limited amount of PPP innovation evidence. Rouboutsos & Saussier (2014) [43] highlight extensive ability of PPPs to stimulate innovations, and we totally support this point of view. N. A. Vorobeva (2014) [44] classifies governmental means of innovation process encouragement, namely through PPP project implementation, which is also in line with our research.

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In particular, it is stated that the longer the PPP project implementation term is, the more significant is RM for its success (Zou et al., 2014) [37]. Earlier, based on the experience of Great Britain, Smyth & Edkins (2007) [38] justified the need of transfer to proactive relations in PPP project management. RM is analysed as a critical PPP success factor in the work by Osei-Kye & Chan (2015) [39]. S. Pedersen (2015) [40] reviews the specific aspects of cooperation between partners and knowledge management in PPPs at designing new or innovative products. Thus, scientific research of PPPs has not just an inter-disciplinary, but multi-disciplinary character.

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Shlafman (2014) [35] considers the issue of innovation development for the implementation of cooperative relationship and singles out the necessary and sufficient conditions for the development of innovations in the integration processes. The whole set of works proves the interdisciplinary and multidisciplinary nature of PPPs. However, the number of works reviewing innovations and analysed within the conducted research is notably smaller. The works on healthcare (Esteve, Ysa & Longo, 2012) [14], transport, communal infrastructure, etc. should be noted as valuable while researching the issues of adoption of innovations through PPP projects in the industry sector.

The subject of PPP project management is closely interrelated with project management (RM), which is seen in the conceptual works by Akintoye, Beck & Kumaraswamy (2015) [18], Devkar & Kalidindi (2013) [36], as well as when reviewing separate projects (one project or a group of projects within one industry branch). Recently, an approach stipulating the dependence of PPP efficiency on relationship management (RM) has gained popularity. In particular, it is stated that the longer the PPP project implementation term is, the more significant is RM for its success (Zou et al., 2014) [37]. Earlier, based on the experience of Great Britain, Smyth & Edkins (2007) [38] justified the need of transfer to proactive relations in PPP project management. RM is analysed as a critical PPP success factor in the work by Osei-Kye & Chan (2015) [39]. S. Pedersen (2015) [40] reviews the specific aspects of cooperation between partners and knowledge management in PPPs at designing new or innovative products. Thus, scientific research of PPPs has not just an inter-disciplinary, but multi-disciplinary character.

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Tab. 4: Classification schemes for the contractual PPPs

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<thead>
<tr>
<th>Classification scheme</th>
<th>PPP project implementation stages</th>
<th>Project closing</th>
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<tbody>
<tr>
<td>Jones and Johnson (multilayer classification) (1957)</td>
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Source: Compiled by the authors based on [22]