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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

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Обґрунтування підходу до класифікації інновацій у державно-приватних партнерствах

Анотація. Актуальність досліджуваного питання обумовлена застосуванням державно-приватного партнерства (ДПП) як найбільш ефективного механізму розвитку соціально-економічних систем. Метою статті є обґрунтування авторського підходу до класифікації інновацій, що здійснюються в процесі або в результаті реалізації ДПП-проектів. Суть підходу полягає в систематизації результатів теоретичних і прикладних досліджень, що проводяться в області взаємодії публічного та приватного секторів, управління ДПП-проектами з урахуванням інноваційних факторів. Для отримання головного результату дослідження – класифікації інновацій – було застосовано ситуаційний і системний методи.

В якості емпіричних даних (практичних прикладів) використовувалися дані реалізації проектів на території Самарської області Російської Федерації. Запропоновані авторами ідеї та висновки можуть бути корисними в академічному середовищі для подальшої еволюції знання у сфері вивчення інноваційного змісту ДПП, у тому числі й для його практичного використання при виробленні управлінських впливів при реалізації ДПП-проектів.

Ключові слова: державно-приватне партнерство; інновації; ДПП-проект; інституційні ДПП; договірні ДПП.

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Обоснование подхода к классификации инноваций в государственно-частных партнерствах

Аннотация. Актуальность исследуемого вопроса обусловлена применением государственно-частного партнерства (ГЧП) как наиболее эффективного механизма развития современных социально-экономических систем. Целью статьи является обоснование авторского подхода к классификации инноваций, осуществляемых в процессе или в результате реализации ГЧП-проектов. Суть подхода заключается в систематизации результатов теоретических и прикладных исследований, проводимых в области взаимодействия публичного и частного секторов, управления ГЧП-проектами с учетом инновационных факторов. Для получения главного результата исследования – классификации инноваций – были применены ситуационный и системный методы.

В качестве эмпирических данных (практических примеров) использовались данные реализации проектов на территории Самарской области Российской Федерации. Представленные авторами идеи и выводы могут быть полезными в академической среде для дальнейшего приращения знаний в сфере изучения инновационного содержания ГЧП, в том числе для практического использования при выработке управленческих воздействий при реализации ГЧП-проектов.

Ключевые слова: государственно-частное партнерство; инновации; ГЧП-проект; институциональные ГЧП; договорные ГЧП.

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 society requirements.

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 promotion, innovative capacity build-up by means 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 (Zaharioaie, 2012; Clayton, 2013) [8-9] and state support (Wibowo & Alfen, 2014; Tserng 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 (Samii, 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 for supporting the UN 2030 Agenda for Sustainable Development (UNECE, 2016) [16].

3. Research problem

Presentation of innovations from different angles and multitude of their implementation spheres stipulate the necessity of the correct selection of innovation management methods and tools from both PPP sides. In this connection, PPP aims at ensuring integrity of the innovation generation, adoption and implementation processes, cushioning the impact of the ambiguity factor in managerial decision making. Innovations within the framework of PPP projects have a number of peculiarities which are under-researched in our opinion.

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 bear a polemical 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 supplement 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 article:

- 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 consists of PPP projects implemented on the territory of Samara region of the Russian Federation, their technical and economic justification, data on project structuring on the regional level.

7. Research Stages

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 regulates 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) [19]. 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), LOO (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, a private partner should be selected from the list of potential partners, based on the extent to which the proposed

Tab. 1: Management focus on the innovation types depending on the PPP form

Innovation type	PPP form			
	Management and lease contracts (1)	Divestiture (2)	Concession (3)	Green field Projects (4)
Product innovations				✓
Process innovations			✓	
Marketing innovations		✓		
Organizational innovations	✓			

Source: Made by the authors

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).

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

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

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

The following institutional PPPs are currently operating in Samara region:

1. Zhigulevskaja 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 Togliatti 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. Togliatti 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. Togliatti 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 Stavropol'skii municipal district near the border of Togliatti 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

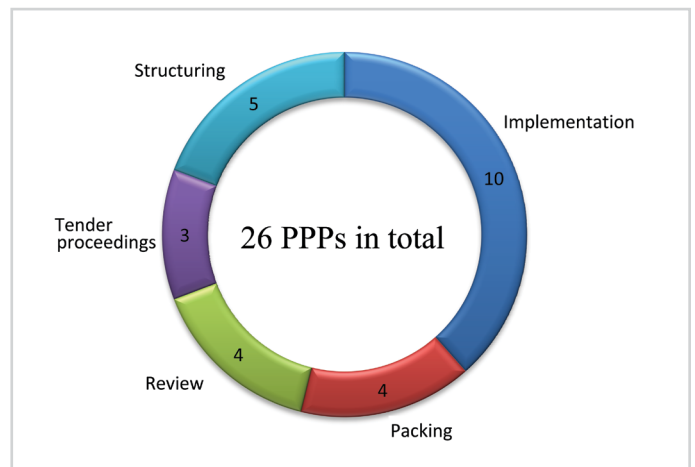


Fig. 1: Implementation of PPP projects in the healthcare sphere in Samara region

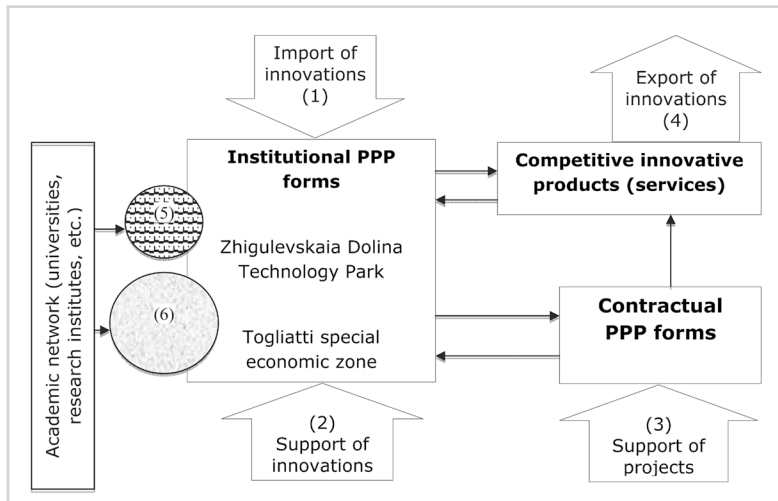
Source: Compiled by the authors based on the data of the Ministry of Economic Development, Investments and Trade of Samara region)

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



Notes: Innovation support institutes of Samara region:
 (1) Investment Attraction Agency;
 (2) Coworking Centre, Shared Knowledge Centre, Seed Funds, Venture Fund, Innovation Fund of Samara region;
 (3) Regional PPP Centre (its functions are performed by the Ministry of Economic Development, Investments and Trade);
 (4) No regional support institute;
 (5) Association of Small Innovative Enterprises, small innovative enterprises by the universities of Samara region;
 (6) Business incubators.

Fig. 2: Circulation of PPP innovations in the innovation development mechanism of Samara region and support institutes
 Source: Made by the authors

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 Zizlavsky (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

Tab. 3: Classification of PPP innovations

Classification attributes					
	Purpose attributes	Structural attributes	External attributes	Attributes characterising significance and scope	Attributes characterising implementation stage
Criteria	By source of occurrence (initiation): - state - private - academic	By implementation sphere: - information society - utility - social - transport - electric power	By transfer means: - international - national - regional - local	By region's needs: - crisis - developing	By PPP project stage: - project - investment - operational
	By designation: - update - supplement - replacement - substitution	By implementation sector: - healthcare - culture - sports - amelioration - water supply - etc.	By content: - export - import	By role in program documents: - strategic - current	

Source: Compiled by the authors

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 secondary 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.

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 (PM), 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 problematic 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 interrelation 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. Roumboutsos & 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.

Earlier Gunnigan & Eaton (2008) [45] conducted a series of in-depth interviews on this subject with the participants of the

Tab. 4: Classification schemes for the contractual PPPs

Classification scheme	PPP project implementation stages			
	Design	Investment	Creation (construction / reconstruction)	Project closing
OECD methodology (classical) (2005)	Organizational Innovation		Process innovation	Product Innovation Marketing Innovation
Jones and Johnson (multilayer classification) (1957)	X	X	No market change	Strengthened market
	X	X		New market
Zawislak (2011)	Management Innovation	Transaction Innovation	Operations Innovation	Technological Innovation
Walker, Avellaneda and Berry (2011).	Ancillary Innovations	Service Innovations	Process innovation Organization innovations Marketisation innovation Technological innovations	X

Source: Compiled by the authors based on [22]

related PPP projects and revealed obstacles preventing wide use of innovations in the PPP projects.

The authors of this article have made an attempt to adapt and use the classification of innovations and management schemes within the framework of PPPs. We emphasise the efficiency of PPP project structuring based on their innovative level, which is extremely important for the most advanced regions. The obtained results differ from those provided in the earlier performed researches in the alignment of means of the region's innovative policy and PPP projects. We believe that justification of the need to approve the contractual and institutional PPP forms in the implementation of a unified innovative policy mechanism requiring elimination of any gaps in the state support forms (institutional, legal, investment) is an important result.

5. Conclusions

The importance of the results outlined in the article lies in justification of the approach to the classification of innovations in PPPs for the purposes of making an adequate management impact on the innovative sphere of the region. The accomplishment of the research has made it possible to outline a large sphere of interdisciplinary and applied issues connected to PPP management. The conclusions of the work have been supplemented with the examples from the practice of PPPs in Samara region of the Russian Federation. The joint review of the contractual and institutional PPP forms has allowed making a conclusion regarding the necessity of their complex development, so that the unified mechanism of the development of the regional innovative policy does not waste the innovative potential due to some institutional, legislative and investment gaps. The received results aim at increasing the efficiency of innovative processes in the new or existing PPPs. The conclusions and recommendations may be used in the public and private sectors by PPP participants.

The given classification of innovations implemented through PPPs provides the following practical opportunities:

- to align PPP projects with an innovation type at project structuring, to keep this aspect in mind in the course of the feasibility study (on the part of the private partner), partner selection on the part of the public partner;
- to simplify the innovative component revelation process in the course of implementation of the PPP projects defined as a competitive advantage of the region;
- to update the innovation support mechanism and the organisational forms of innovation management through the determination of gaps in the operational process;
- to define the means and forms of innovation application;
- to create conditions for the establishment of a bank of innovative decisions in demand in other regions;
- to optimise the innovative infrastructure of the region;
- to activate introduction of innovations in the poorly developed branches.

The provided classification of innovations, as well as the list of criteria and grounds for the revelation of the most significant attributes in the implementation of PPP, is not exhaustive and may be updated according to the specifics of an industry or a region.

References

1. Curatolo, C., & Bryan, V. (2012). *Public-private partnerships (P3s) between businesses and adult education providers*. Handbook of Research on Technologies for Improving the 21st Century Workforce: Tools for Lifelong Learning, 1, 192-209.
2. Moore, C., & Pierre, J. (1988). Partnership or privatisation? The political economy of local economic restructuring. *Policy & Politics*, 16(3), 169-178.
3. Collin, S. (1998). In the twilight zone: a survey of public-private partnerships in Sweden. *Public Productivity & Management Review*, 21(3), 272-283. doi: <https://doi.org/10.2307/3380859>
4. Clifton, C., & Duffield, C. F. (2006). Improved PFI/PPP service outcomes through the integration of Alliance principles. *International Journal of Project Management*, 24(7), 573-586. doi: <https://doi.org/10.1016/j.ijproman.2006.07.005>
5. El-Gohary, N. M., Osman, H., & El-Diraby, T. E. (2006). Stakeholder management for public private partnerships. *International Journal of Project Management*, 24(7), 595-604. doi: <https://doi.org/10.1016/j.ijproman.2006.07.009>
6. Willems, T., & Van Dooren, W. (2012). Coming to Terms with Accountability: Combining multiple forums and functions. *Public Management Review*, 14(7), 1011-1036. doi: <https://doi.org/10.1080/14719037.2012.662446>
7. De Schepper, S., Dooms, M., & Haezendonck, E. (2014). Stakeholder dynamics and responsibilities in Public-Private Partnerships: A mixed experience. *International Journal of Project Management*, 32(7), 1210-1222. doi: <https://doi.org/10.1016/j.ijproman.2014.01.006>
8. Zaharioaie, M. (2012). Appropriate financial instruments for public-private partnership in European Union. *Procedia Economics and Finance*, 3, 800-805. doi: [https://doi.org/10.1016/S2212-5671\(12\)00233-X](https://doi.org/10.1016/S2212-5671(12)00233-X)
9. Clayton UTZ (2013). *Improving the outcomes of Public Private Partnerships*. Retrieved from <https://www.claytonutz.com/ArticleDocuments/178/Clayton-Utz-Improving-The-Outcomes-Of-Public-Private-Partnerships-2013.pdf.aspx?Embed=Y>
10. Wibowo, A., & Alfen, H. W. (2015). Government-led critical success factors in PPP infrastructure development. *Built Environment Project and Asset Management*, 5(1), 121-134. doi: <https://doi.org/10.1108/BEPAM-03-2014-0016>
11. Tserng, H. P., Russell, J. S., Hsu, C.-W., & Lin, C. (2012). Analyzing the role of national PPP units in promoting PPPs: Using new institutional economics and a case study. *Journal of Construction Engineering and Management*, 138(2), 242-249. Retrieved from <http://ascelibrary.org/doi/10.1061/%28ASCE%29CO.1943-7862.0000398>
12. Roehrich, J. K., Lewis, M. A., & George, G. (2014). Are public-private partnerships a healthy option? A systematic literature review. *Social Science & Medicine*, 113, 110-119. doi: <https://doi.org/10.1016/j.socscimed.2014.03.037>
13. Samil, R., Van Wassenhove, L. N., & Bhattacharya, S. (2002). An innovative public-private partnership: New approach to development. *World Development*, 30(6), 991-1008. doi: [https://doi.org/10.1016/S0305-750X\(02\)00015-3](https://doi.org/10.1016/S0305-750X(02)00015-3)
14. Esteve, M., Ysa, T., & Longo, F. (2012). The creation of innovation through public-private collaboration [La generacion de innovacion a traves de la colaboracion publico-privada]. *Revista Espanola de Cardiologia*, 65(9), 835-842. doi: <https://doi.org/10.1016/j.recsep.2012.04.007>
15. Akhmetshina, E. R., & Mustafin, A. N. (2015). Public-Private Partnership as a Tool for Development of Innovative Economy. *Procedia Economics and Finance*, 24, 35-40. doi: [https://doi.org/10.1016/S2212-5671\(15\)00609-7](https://doi.org/10.1016/S2212-5671(15)00609-7)
16. UNECE (2016). *Innovation and Public-Private Partnerships - key elements for supporting the UN 2030 Agenda for Sustainable Development*. Retrieved from <https://www.unece.org/info/media/news/general-unece/2016/innovation-and-public-private-partnerships-key-elements-for-supporting-the-un-2030-agenda-for-sustainable-development/doc.html>
17. OECD (2005). *Oslo Manual Guidelines for Collecting and Interpreting Innovation Data*, 3rd Edition. doi: <https://doi.org/10.1787/9789264013100-en>
18. Akinloye, A., Beck, M., & Kumaraswamy, M. (2015). *Public private partnerships: A global review*. Routledge, Taylor & Francis Group.
19. International Bank for Reconstruction and Development / The World Bank, Asian Development Bank, and Inter-American Development Bank (2014). *Public-Private Partnerships Reference Guide: Version 2.0*. Retrieved from <https://ppp.worldbank.org/public-private-partnership/library/public-private-partnerships-reference-guide-version-2-0>
20. Kozlov, A. A. (2012). State-Private Partnership: The Essence, Classification. *Management of Economic Systems*, 38(2). Retrieved from <http://cyberleninka.ru/article/n/gosudarstvenno-chastnoe-partnerstvo-suschnost-klassifikatsiya> (In Russ.)
21. Robin, S., & Schubert, T. (2013). Cooperation with public research institutions and success in innovation: Evidence from France and Germany. *Research Policy*, 42(1), 149-166. doi: <https://doi.org/10.1016/j.respol.2012.06.002>
22. Kotsemir, M. N., Abroskin, A. S., & Meissner, D. (2013). *Innovation Concepts and Typology - an Evolutionary Discussion*. Basic Research Program. Working Papers. Series: Science, Technology and Innovation. WP BRP 05/STI/2013. doi: <https://doi.org/10.2139/ssrn.2221299>
23. Khalabuda, Y., & Nikolaev, M. (2014). Increase of Efficiency of Industrial Enterprises Activity on the Basis of Innovations of Various Types. *Procedia Economics and Finance*, 16, 299-302. doi: [https://doi.org/10.1016/S2212-5671\(14\)00805-3](https://doi.org/10.1016/S2212-5671(14)00805-3)
24. Tabas, J., Polak, J., & Beranova, M. (2010). Evaluation of approaches to definition of innovations. *Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis*, 58(6 part 2), 563-570. Retrieved from <https://www.cabdirect.org/cabdirect/abstract/20113063633>
25. Zizlavsky, O. (2014). An analysis of innovation classification and typology: A literature review. Proceedings of the 24th International Business Information Management Association Conference - Crafting Global Competitive Economies: 2020 Vision Strategic Planning and Smart Implementation, 1295-1308.
26. Taran, Y., Boer, H., & Lindgren, P. (2015). A business model innovation typology. *Decision Sciences*, 46(2), 301-331. doi: <https://doi.org/10.1111/deci.12128>
27. Mostafavi, A., Abraham, D., & Sinfield, J. (2014). Innovation in infrastructure project finance: A typology for conceptualization. *International Journal of Innovation Science*, 6(3), 127-143. Retrieved from <http://www.emeraldinsight.com/doi/pdfplus/10.1260/1757-2223.6.3.127>
28. Borins, S. (2000). What border? Public management innovation in the United States and Canada. *Journal of Policy Analysis and Management*, 19(1), 46-74. doi: [https://doi.org/10.1002/\(SICI\)1520-6688\(200002\)19:1<46::AID-PAM4>3.0.CO;2-Z](https://doi.org/10.1002/(SICI)1520-6688(200002)19:1<46::AID-PAM4>3.0.CO;2-Z)
29. Moore, M., & Hartley, J. (2008). Innovations in governance. *Public Management Review*, 10(1), 3-20. doi: <https://doi.org/10.1080/14719030701763161>
30. Wu, J., Ma, L., & Yang, Y. (2013). Innovation in the Chinese public sector: Typology and distribution. *Public Administration*, 9(2), 347-365. doi: <https://doi.org/10.1111/j.1467-9299.2011.02010.x>
31. Goldiakova, T. V. (2006). Essence and classification of innovations. Russian Foreign Economic Bulletin, 2, 20-27. Retrieved from <http://eng.rfej.ru/rvv/id?open&page=2F7D1A>
32. Sosunova, I. A., & Serper, E. A. (2010). Methodological approaches to the classification of innovations. *Vektor nauki Tolyatinskogo gosudarstvennogo universiteta. Seriya: ekonomika i upravlenie (Vector of Science of Togliatti State University. Series: Economics and Management)*, 2, 74-77 (in Russ.).
33. Shilov, K. V. (2007). Classification of innovations. *Innovatsii v obrazovanii (Innovation in Education)*, 3, 52-58 (in Russ.).
34. Sandu, I. S., & Troshin, A. S. (2010). Classification of sources of investment in innovation. *APK: ekonomika, upravlenie (AIC Economics and Management)*, 8, 38-41 (in Russ.).
35. Shlafman, A. I. (2014). Necessary and sufficient conditions to promote innovations in integration processes. *Zhurnal pravovykh i ekonomicheskikh issledovaniy (Journal of Legal and Economic Studies)*, 2, 22-26 (in Russ.).
36. Devkar, G. A., & Kalidindi, S. N. (2013). Modeling and assessment of competencies in urban local bodies for implementing PPP projects. *Built Environment Project and Asset Management*, 3(1), 42-57. doi: <https://doi.org/10.1108/BEPAM-07-2012-0041>
37. Zou, W., Kumaraswamy, M., Chung, J., & Wong, J. (2014). Identifying the critical success factors for relationship management in PPP projects. *International Journal of Project Management*, 32(2), 265-274. doi: <https://doi.org/10.1016/j.ijproman.2013.05.004>
38. Smyth, H., & Edkins, A. (2007). Relationship management in the management of PFI/PPP projects in the UK. *International Journal of Project Management*, 25(3), 232-240. doi: <https://doi.org/10.1016/j.ijproman.2006.08.003>
39. Osei-Kyei, R., & Chan, A. P. C. (2016). Implementing public-private partnership (PPP) policy for public construction projects in Ghana: critical success factors and policy implications. *International Journal of Construction Management*, 1-11 doi: <https://doi.org/10.1080/15623599.2016.1207865>
40. Pedersen, S. (2015). The sensory delivery rooms of the future: Translating knowledge across boundaries in a public-private innovation partnership. *Proceedings of the International Conference on Engineering Design*, 3, 387-396. Retrieved from https://www.researchgate.net/publication/281061260_THE_SENSORY_DELIVERY_ROOMS_OF_THE_FUTURE_TRANSLATING_KNOWLEDGE_ACROSS_BOUNDARIES_IN_A_PUBLIC-PRIVATE_INNOVATION_PARTNERSHIP
41. Arundel, A., Casali, L., & Hollanders, H. (2015). How European public sector agencies innovate: The use of bottom-up, policy-dependent and knowledge-scanning innovation methods. *Research Policy*, 44(7), 1271-1282. doi: <https://doi.org/10.1016/j.respol.2015.04.007>
42. Gonzalez, E. E., & Garvin, M. J. (2016). Synthesis of Innovation Research in Public-Private Partnership Projects. Construction Research Congress 2016: Old and New Construction Technologies Converge in Historic San Juan - Proceedings of the 2016 Construction Research Congress, CRC 2016, 428-437.
43. Roumboutsos, A., & Saussier, S. (2014). Public-private partnerships and investments in innovation: the influence of the contractual arrangement. *Construction Management and Economics*, 32(4), 349-361. doi: <https://doi.org/10.1080/01446193.2014.895849>
44. Vorobeva, N. A. (2014). Public-private partnership as an effective tool for supporting the innovation process. *Life Science Journal*, 11(9 Special Issue), 42, 216-220.
45. Gunnigan, L., & Eaton, D. (2008). *Barriers to innovation in Public-Private Partnership COBRA 2008 - Construction and Building Research Conference of the Royal Institution of Chartered Surveyors*. Retrieved from <http://arrow.dit.ie/beschrecon/87>

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