St. Petersburg University

Graduate School of Management

**Master in Public Management**

**"BARRIERS TO PPP IN RUSSIAN ICT SECTOR: IDENTIFICATION AND POSSIBLE SOLUTIONS”**

Master’s Thesis by the 2nd year student

Concentration — MPM

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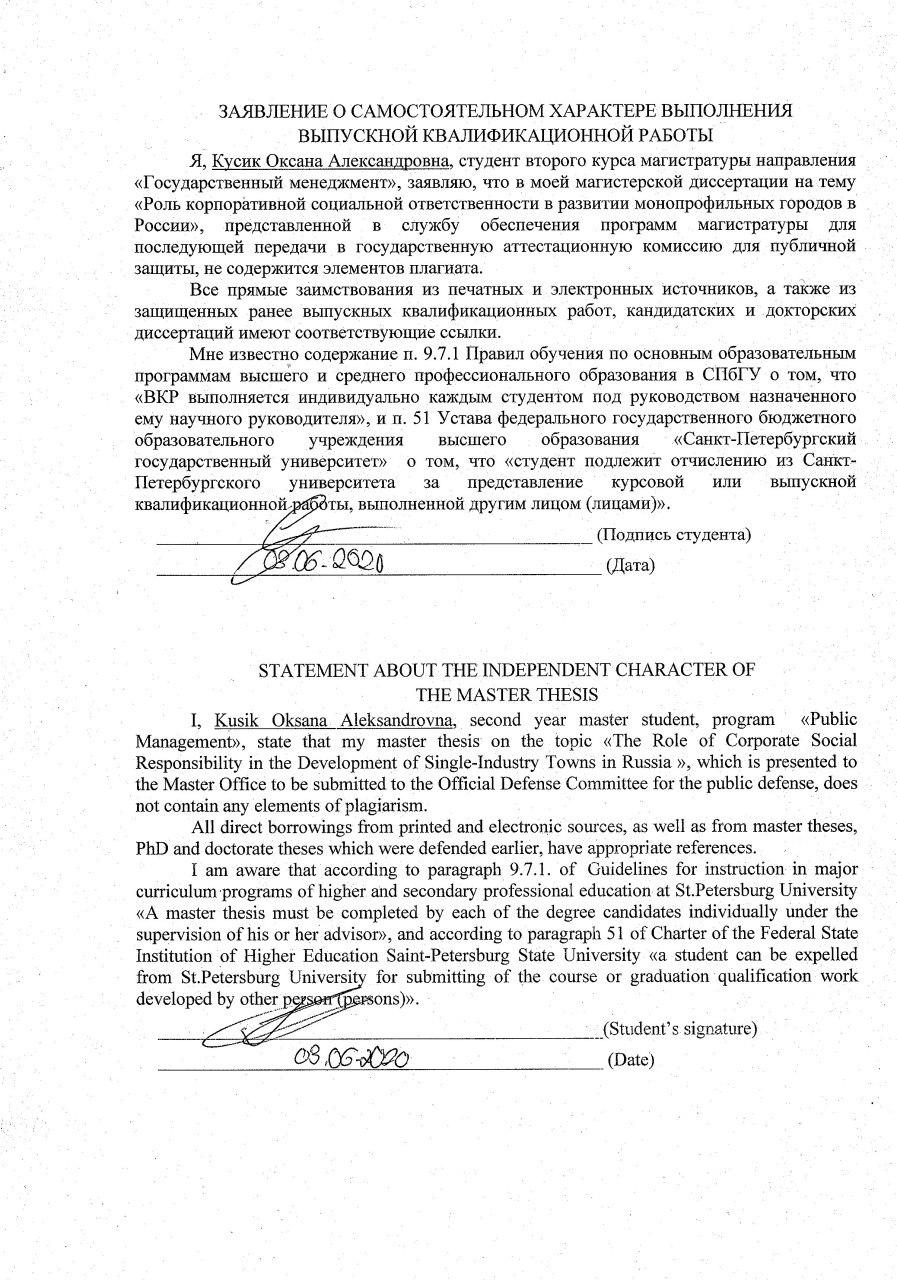
2020

**АННОТАЦИЯ**

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| --- | --- |
| Автор | Оксана Куски |
| Название магистерской диссертации | Барьеры для государственно-частного-партнерства в российском информационно-коммуникационном секторе: выявление и возможные пути решения |
| Факультет | ВШМ |
| Направление подготовки | Государственный менеджмент |
| Год | 2019 |
| Научный руководитель | Маслова Светлана Валентиновна |
| Описание цели, задач  и основных результатов | **Цель** - выявление барьеров и разработка рекомендаций по преодолению выявленных барьеров для ГЧП в секторе ИКТ. **Задачи:** определить основные черты ГЧП на основе анализа зарубежной и русской литературы; Определить концепцию ИКТ и выявить уровень интеграции ИКТ в государственном секторе; Исследовать, как проекты ГЧП реализуются в секторе ИКТ; Выявить барьеры с помощью обзора литературы, официальной документации, законнов; Провести анкетирование с существующими частными партнерами, участниками тендеров для компаний ГЧП и ИТ и финансовыми организациями для проверки значимости выявленных барьеров для проектов ИКТ ГЧП; Создать ранжированный пул барьеров для выявления важности барьеров с точки зрения компаний; Предоставить рекомендации по преодолению выявленных барьеров; **Результаты**: автор выявил барьеры для ГЧП в секторе ИКТ, получил оценку барьеров на основе мнения частных компаний и дал рекомендации наиболее значимым барьеров для ГЧП в секторе ИКТ. |
| Ключевые слова | Государственно-частное партнерство, ИКТ, барьеры, риски |

**ABSTRACT**

|  |  |
| --- | --- |
| Master Student's Name | Kusik Oksana |
| Master Thesis Title | "Barriers to PPP in Russian ICT sector: identification and possible solutions” |
| Faculty | GSOM |
| Main field of study | Public Management |
| Year | 2019 |
| Academic Advisor’s Name | Maslova Svetlana Valentinovna |
| Description of the goal, tasks and  main results | **The purpose** of master thesis is to reveal barriers and to give recommendations to overcome identified barriers to PPP in ICT sector. **Objectives:**To define main features of PPP based on analysis of foreign and Russian literature; To identify the concept of ICT and reveal the level of integration ICT in public sector;To investigate how PPP projects are implementing in ICT sector; To identify barriers through case-study method and literature review;To conduct questionnaire with existing private partners, bidders for PPP and IT companies, and financial organizations to test significance of identified barriers to ICT PPP projects;To make the ranked pool of barriers to identify the importance of barriers in companies’ perception; To provide recommendations to overcome revealed barriers; **Results:** author revealed barriers for PPP in ICT sector, got evaluation of barriers using opinion of private companies, and provided recommendations to revealed barriers to PP in ICT sector. |
| Keywords | PPP, ICT, barriers, risk |



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| Introduction |

Today business world and governments are more dependent on Information and Communication Technologies (ICT) resources. Cloud services, communication services and software services are most common resources, on which private and public sectors are spending tremendous amount of money. ICT integration in public service plays huge role development of provision of public services [Scupola and Zanfei, 2016; Mimbi and Bankole, 2016]. It allows to promote more efficient and cost-effective government, facilitate more convenient government services, allow greater public access to information, and make government more transparent and accountable to citizens [Asian Development Bank 2020].

Also, the outbreak and rapid spread of COVID-19, for many public sector organizations, is an unprecedented challenge. Local governments, administration and, in particular, health services are at the forefront struggling to find ways to survive and adopt providing public services throught Internet [ec.europa 2020]. Design of new platforms to connect with citizens take time and high effort in time restriction. It means that public sector should actively integrate ICT solution incrementally to ensure providing public services even in case of crises.

Integration ICT in public service requires high budget investments. The statistics of ICT expenditures that lay on regional budgets shows the positive trend from 2015 year. From this time the expenditure on ICT sector double in two times and now it is 161,4 billion rubles( growth 122% from 2015 to 2019 years)[CNew 2019]. In near future the development of ICT will increase the budget load.

One of effective mechanism of decrease the budget load is the application of PPP. This partnership between public and private sector not only decrease the budget expenditure but also bring the innovation technology and expertise in public sector.

Russian federal government attempts to develop PPP in ICT sector improving lawbase(Federal law 173), creating institute infrastructure, such as Research Institute “ Voshod”, PPP accelerators and organizing forums and conference as platform for communication with business. Also, Nasibulin Mikhail, director of the Department for the Coordination and Implementation of Projects in the Digital Economy, claims that to successful implementation national program “Digital Economy’ the public sector should attract private investment near 535 billion rubles, and PPP will be an important tool for this attraction.[Digital.gov 2019]

However, there is no fast growth of PPPs in Russian ICT sector. Analyzing shows that now there is only 36 projects implemented through concession and 7 projects implemented through agreement of PPP.

So, it is essential for the public sector to know what barriers exist in private sector perception to make efforts for overcoming such obstacles and by this to increase the attractiveness of PPP for business.

**The novelty** of this paper is that there is no research, which investigate the barriers to PPP in Russian ICT sector in terms of private companies’ perception. This research is based on huge amount papers that already revealed barriers to PPP projects both in the world and in Russia. However, this paper fill the gap in identification of barriers to Russian ICT sector.

**The purpose** of master thesis is to reveal barriers and to give recommendations to overcome identified barriers to PPP in ICT sector.

Though this paper will be solved the next objectives:

1. To define main features of PPP based on analysis of foreign and Russian literature
2. To identify the concept of ICT and reveal the level of integration ICT in public sector
3. To investigate how PPP projects are implementing in ICT sector

* To reveal the advantages of PPP mechanism over traditional procurement in implementing ICT projects

— To reveal the main fields where PPP ICT projects can be implemented

* Analyze the payment mechanisms of PPP projects in ICT sector with example of successful experience of PPP in ICT sector worldwide
* To reveal the key project risks through literature review and case-study

— To analyze PPP projects in ICT sector in Russian market

1. To identify barriers through case-study method and literature review
2. To conduct questionnaire with existing private partners, bidders for PPP and IT companies, and financial organizations to test significance of identified barriers to ICT PPP projects
3. To make the ranked pool of barriers to identify the importance of barriers in companies’ perception
4. To provide recommendations to overcome revealed barriers

This paper claims four **research questions**:

* What barriers in the view of private sector prevent PPPs implementation in Russian ICT?
* How to overcome existing barriers for PPP projects in Russian ICT sector?

**The object** is the barriers for successful PPPs implementation**.**

**The subject** is the perception of existing and potential private partners of existing barriers for successful PPPs implementation.

**Methods and Methodology**

The theory of constrains is used as methodology analysis. This approach claims that there is no systems, which do not have constrains, limiting the effective development of this system. Based on this author presumes that PPP in ICT sector have pool of barriers that hamper fast development of PPP in ICT sector.

Several types of methods are applied in this paper:

* critical review of previous research to construct research methodology and revealed common barriers
* content analysis of official documentary
* case method of PPP projects in ICT sector that is used to reveal potential barriers in Russian ICT sector for PPP implementation
* conducting questionnaire to identify perception of private sector to barriers and risks
* Semi-structured interviews with experts of PPP to design of recommendation for overcoming identified barriers for PPP in ICT sector

Therefore, identification and elimination barriers by the stakeholders in PPPs will allow the partnerships to function effectively and ensure successful implementation of present and future PPPs. However, it’s important to note that this research and choosed methodology have limitation that are fully describe in the end of paper.

1. Public-private partnership in ICT sector: theoretical approaches and current market situation

In order to start analyzing the barriers of PPP in the IСT sector, it is neccessery to consider modern approaches to PPP and ICT projects in public sector, then try to determine the need for the implementation of ICT projects using PPPs, and after this theoretical analysis to provide the assessment of current state of ICT PPPs implementation to illustrate underdeveloped PPP in ICT sector.

1.1 Concept of Public -Private Partnership and its main characteristics

Now there is no generally accepted definition of the concept of Public-Private Partnership both in the world and domestic literature, you can find many different approaches to the definition of PPP.

Among the publications of international organizations, PPPs are defined as follows.

*Department of PPP in European Investment Bank considers PPP as “ an arrangement between a public authority and a private partner designed to deliver a* ***public infrastructure project*** *and* ***service*** *under a l****ong-term contract”*** [European Investment Bank 2020].

European Investment Bank considers next features of PPP:

* a long-term contract between a public authority and a private partner focusing on the provision of services rather than assets;
* **the transfer of certain project risks** to the private partner, notably with regard to designing, building, operating/maintaining and/or financing the project;
* a focus on the specification of **project outputs** rather than project inputs, taking account of the whole life cycle implications for the project;
* the application of private financing (often “project finance”) to underpin the risks transferred to the private partner;
* the public authority makes **performance-based payments** to the private partner for the provision of the service (e.g. for the availability of a road) or grants the private partner a right **to generate revenues from the provision of the service** (e.g. tolls from users of a bridge).

The World Bank, Asian Development Bank, and Inter-American Development Bank defines PPP as *“****a long-term contract*** *between a private party and a government entity,* ***for providing a public asset or service****, in which the private party bears* ***significant risk*** *and management responsibility, and* ***remuneration is linked to performance”*** [The World Bank, Asian Development Bank, and Inter-American Development Bank 2014].

The Organisation for Economic Co-operation and Development assert that PPP is ***“an agreement between the government and one or more private partners*** *(which may include the operators and the financers) according to which the* ***private partners deliver the service*** *in such a manner that the* ***service delivery objectives*** *of the government are aligned with the* ***profit objectives of private partners*** *and where the effectiveness of the alignment depend on sufficient transfer of risk to the private partners”* [OECD 2008].

To obtain a complete picture of PPP definitions and its main features, this pool of definitions provided by global international institutes should be extended by the academic definitions of PPP.

British Professor of Strategy and Public Services Management at Bristol Business School from University of the West of England Tony Bovaird offers definition of PPP such as ***“****PPP is working arrangements based on a mutual commitment (over and above that implied in any contract) between a public sector organization with any other organization outside the public sector”* [Bovaird 2004]. This definition of PPP is simple, but at the same time is quite broad, because it embrace public sector partnerships with both business and organizations in civil society (including community organizations, voluntary organizations and NGOs).

Joop Koppenjan is Professor of Public Administration at Erasmus University Rotterdam offers the next definition of PPP**. “***PPP is a form of structured cooperation between public and private partners in the planning/construction and/or exploitation of infrastructural facilities in which they share or reallocate risks, costs, benefits, resources and responsibilities*” [Koppenjan 2005].

Darrin Grimsey, Partner of PricewaterhouseCoopers in Melbourne, and Mervyn K. Lewis, Professor of Banking and Finance in the School of International Business, University of South Australia defines PPP *“as arrangements whereby private parties participate in, or provide support for, the provision of infrastructure, and a PPP project results in a contract for a private entity to deliver public infrastructure-based services”* [Grimsey,Lewis 2007].

American scientists from Washington University Brinkerhoff D.W and Brinkerhoff J.M. identified PPPs through two main elements: Mutuality and Organization identity. Mutuality is considered as the commitment to a shared goal and the extent to which partners operate within the spirit of shared control and responsibility, andorganization identity captures the rationale for selecting particular partners according to their distinctive competences, capitalizing on and maintaining them constitute the basis of partnership’s value-added [Brinkerhoff, D.w., & Brinkerhoff, J.M. 2011].

The consortium of researchers from different universities Carter B. Casady, Kent Eriksson, Raymond E. Levitt & W. Richard Scottattempt to reidentify approach to PPP. They consider PPPs as a tool of NPG which public sector agencies use to activate third-parties for infrastructure project delivery, orchestrate and maintain relevant stakeholder networks across the project lifecycle, and modulate appropriate rewards and penalties through contracts in order to elicit cooperative behavior. They consider the development of legitimacy, trust, capacity as the main pillar for successful PPP implementation [Carter B. Casady, Kent Eriksson, Raymond E. Levitt & W. Richard Scott 2019].

Russian researchers offer the following definitions and characteristics of PPP. Nataliya Reznichenko, expert in supporting large-scale PPP projects in the field of infrastructure in Russia and the CIS countries, considers “*PPP is a long-term mutually beneficial contract between public authority and private sector, who is represented by special purpose vehicle, which aim is to create social infrastructure and (or) provide services on its bases.*

*The contract includes·*

* *the use of material and non-material resources of public and private sectors;*
* *sharing of risks, obligations, rights and benefits between public and private sector;*
* *the outcome requirements established by the government”* [Reznichenko, 2010].

M.U. Sokolov, Head of the Department of State and Municipal Administration, amd S.V. Maslova, Associate Professor, Department of State and Municipal Administration offer next PPP definition. “*Public-Private partnership is* long-term legal form *of government and business cooperation with the aim to address social challenges which is based on the combination of assets or other resources, which is realized by financing, creating, reconstructing, operating and maintaining of the publicly/municipally owned objects of transport, municipal, engineering and social infrastructure to ensure availability and improvement of quality of services/works which must be provided/carry out by the public/municipal authorities’* [Sokolov & Maslova, 2017].

To compare the above definitions, the table below summarizes the main components of PPP definitions.

**Main components of PPP provided by global institution**

|  |  |  |
| --- | --- | --- |
| **OECD 2008** | **The World Bank(2014)** | **European Investment  Bank 2020** |
| Agreement between the government and one or more private partners  Get profit from performing government objectives  Transfer of risk | Long-term contract  Aim: providing a public asset or service private party bears significant risk and responsibility  Remuneration is linked to performance | Long-term contract  Transfer of certain project risks  Focus project outputs |

*Table 1 Made by author*

**Main components of PPP definitions provided by academic researchers**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Tony Bovaird (2004)** | **Joop Koppenjan**  **(2005)** | **Darrin Grimsey and Mervyn K. Lewis(2007)** | **Brinkerhoff D.W and Brinkerhoff J.M.(2011)** | **Carter B. et al (2019)** | **Nataliya Reznichenko(2010)** | **M.U. Sokolov and  S.V. Maslova(2017)** |
| Working arrangements  Mutual commitment | Cooperation  in the planning/construction and/or exploitation of infrastructural facilities  Share risks, costs, benefits, resources and responsibilities | Support for, the provision of infrastru cture  Deliver public infrastructure-based services | Shared goal  Spirit of shared control and responsibility  Selecting particular partners according to their distinctive competences  Partnership’s value-added | Activate third-parties  Stakeholder networks  Cooperative behavior  Pillars for PPP:  Legitimacy, trust, capacity | Long-term contract  Mutually beneficial contract  Aim: social infrastructure and (or) services  Risk sharing obligation, rights and benefits | Long-term legal form  Address social challenge  PPP activities: financing, creating, reconstructing, operating and maintaining  PPP object: objects of transport, municipal, engineering and social infrastructure  Improvement of quality of services/work |

*Table 2 Made by author*

Through content analysis of PPP definitions, it is easily to notice that among the researchers and global institutes definitions of PPP are constructed differently. Some definitions are constructed in more complex way including details of public and private cooperation, others are characterized more accurate and capacious, but the main features of PPP are reflected in all definitions:

First, definitions underlines cooperation of some **durability.** The majority of PPPs have a long-term implementation period (typically 15–30 years).

Second, definitions emphasize **risk sharing** as a vital component and other factors to share as well. Both parties are equal in PPP, it means that both have to bear parts of the risks involved.

Third, parties **jointly produce a high quality product or a service and** both stand to gain from mutual effort.

One of the important differences in PPP definitions is integration in public and private communication the third-parties like citizens. It’s new approach to PPP, which arise in these latter days [Carter B. Casady, Kent Eriksson, Raymond E. Levitt & W. Richard Scott 2019].

1.2 Information and Communications Technology in Public Sector

In recent years, growth of the Information and Communication Technology (ICT) has had a substantial impact on the way local, state and national governments function. Information and Communication Technology (ICT) refer to technologies that cover the spectrum from basic infrastructure implementation to technologies that improve services and operations in an organization [Gupta, Dasgupta, Gupta 2008].

ICT is identified as "the array of primarily digital technologies designed to collect, organise, store, process and communicate information within and external to an organisation” [Ritchie and Brindley 2005].

Information and communications technology (ICT) is an broader than for informational technology(IT). It contains communication technology such as website, messaging, mobility, audio&web conference, the integration of telecommunication (telephone lines and wireless signals), computers, and necessary software, storage, and audiovisual systems, that enable users to access, store, transmit, and manipulate information.

Most studies in the field have indicated that information and communications technology is a key factor in the economic and social development of the countries because it has positive effects on economic growth, productivity, and employment [Toader al 2018]. Also, international organizations such as the United Nations, the International Telecommunications Union, the OECD, and the World Bank argue that the ICT sector is a key driver of sustainable development.

ICT helps Governments to become more effective and efficient in delivering information and services to the public; more transparent and accountable concerning their internal processes, auctioning and procurement; to increase citizen engagement in decision and policy making; and customizing public service to be more friendly towards to citizens.

ICT includes many components, which can be divided by 4 groups:

*Hardware systems:* current range of equipment such as mainframe computers, networks, servers, personal computers including input and output devices, satellite mapping and tracking systems.

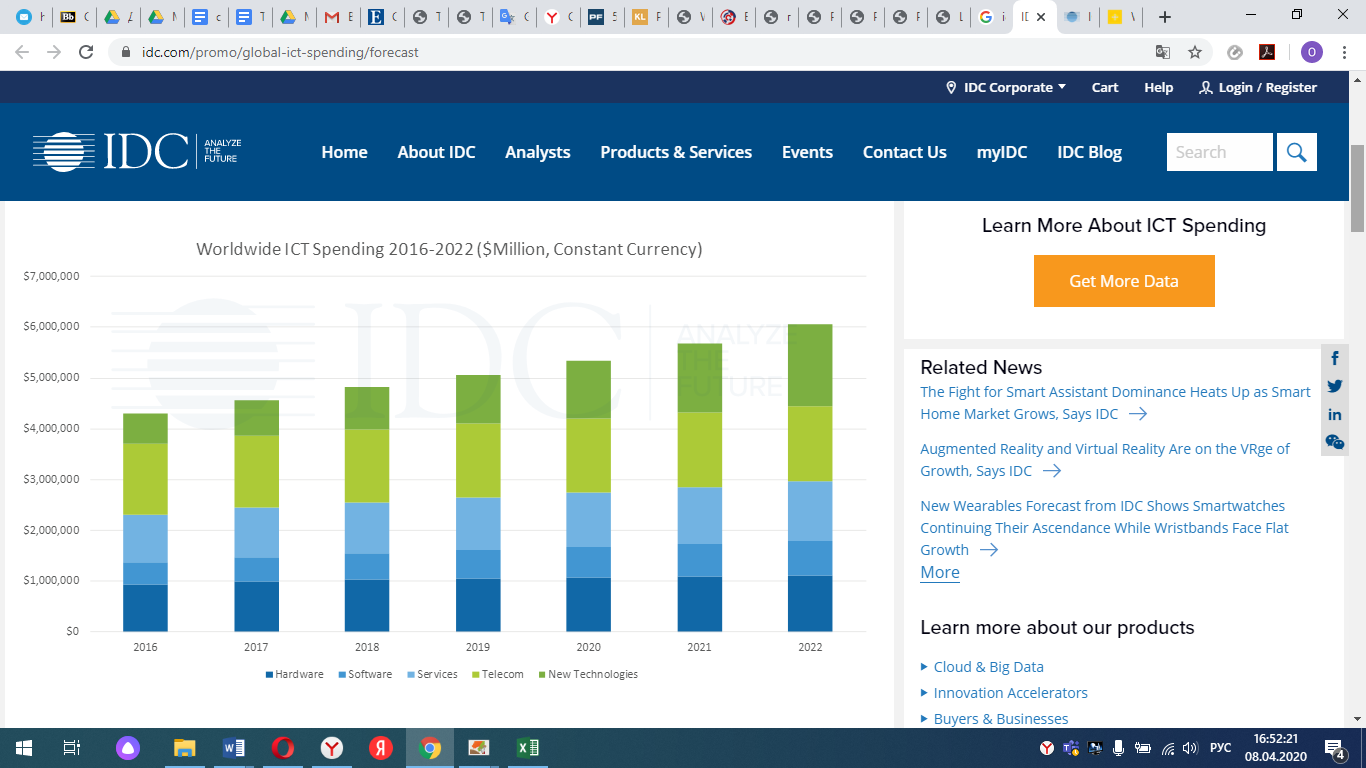
*Software systems:* generic applications and use across public services, word processing, spreadsheets, presentation software, email, databases, internet access; organisational-specific software; library resources databases; other software such as financial packages, payroll, stock control; databases of users and suppliers - electoral roll; shared public service systems.

*Monitoring systems:* CCTV; security to monitor entry and exit in public service, central and local government buildings, car parks; ICT identification systems such as passport scanning systems, fingerprint recognition

*Other public services use*: traffic management, surveillance systems, online payments

Identified the ICT definition, main components and its advantages, it is necessary to analyze the ICT market both in worldwide and in Russia to confirm the importance the development of ICT projects.

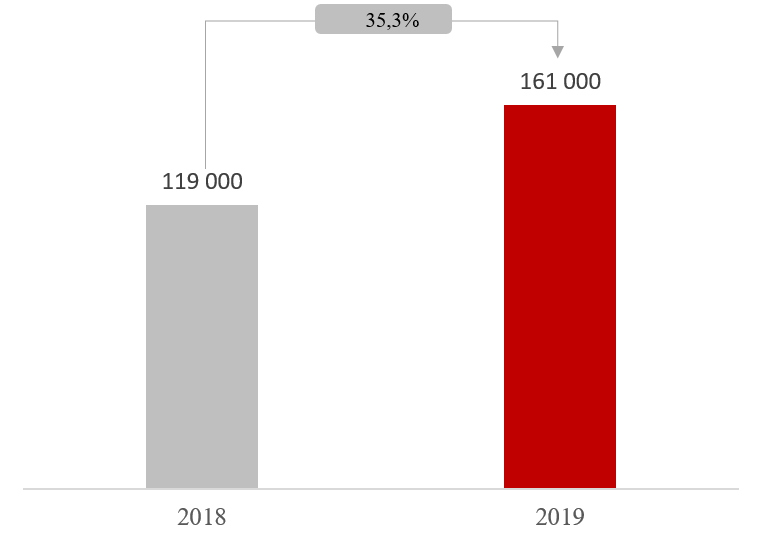
The high interest to ICT is observed all around the world. Worldwide ICT spending for traditional technology such as hardware, software, services and telecom is 4 211 785 mln. USD in 2020 year and has stable growth rate near 3% annually. But the tremendous growth in ICT sector is 17% annually for New Technology such AI, robotics and AR/VR and the spending is 1 130 615 mln.USD in 2020 year. The headliner of high ICT growth is business sector, which focus on adoption the new technology using of IoT and robotics solutions. Governments keen to drive investment in new technologies, leading smart city initiatives and integrating ICT with economic planning [IDC 2018].



*Graph 1 Worldwide ICT Spending 2016-2022 years. Made by IDC*

In Russian case, there is also an increase of interest to the integration of ICT in public sector. Expenditures of the regions of the Russian Federation in the ICT sector in 2019 year exceeded 161 billion. rub. The dynamics of total expenses from 2018 to 2019 years is positive and amounted to 35.3%.

*Graph 2 Total expenditure of Russian regions to ICT sector. Made by author*



Thus, we can conclude that the development of the ICT sector is a global trend and will develop rapidly in the next few years. The public sector in Russia is also interested in the development of the ICT sector, as reflected in their high expenditure to this sector. Also, the provision of accelerated implementation of digital technologies in the economy and social sphere is one of the main national goals, which was approved by the Decree of the President of the Russian Federation dated May 7, 2018 No. 204 “On National Goals and Strategic Tasks of the Development of the Russian Federation for the Period until 2024” [Kremlin 2018].

**1.3 Public Private Partnership in ICT sector**

Integration of ICT in public sector is quite difficult due to high risk of integration ICT, request for highly qualified managers, lack of digital infrastructure and heavy financial burden [Chen & Perry, 2003; Lavenue, 2007; Sharma, 2007]. These reasons propel government governments turn to private sector to carry out these ICT projects [Mazouz 2008]. Theoretically this collaboration should be more effective and efficiency in implementation of ICT project, but ICT PPPs is still risky and complex to manage it [ Al-Shqairat, Al Shra’ah, Al-rawad, & Al-Kilani, 2014; Dube, Facal, & Mazouz 2009].

There are tremendous amount of sectors where ICT PPP projects can be implemented.

Communal services

* Smart Lighting - energy-efficient urban lighting;
* Introduction of energy saving in state and municipal institutions - energy metering devices, automated individual heating points;
* Solid municipal waste system - automation of collection, export and sorting processes household waste;
* Equipping homes with automated reading systems temperature, pressure, volume of consumption from collective metering devices of water and heat supply;
* Automatic monitoring of municipal and road equipment;

Public safety

* Implementation of video surveillance systems (CCTV) for public spaces;
* System for informing the public about emergency situations;

Transport, road network and transportation

* Intelligent transport systems;
* Smart bus stops;
* Paid Parking Space;
* Traffic control systems for heavy and (or) oversized vehicles
* Automated system for photo-video recording of traffic violations(CCTV);;

Social sphere:

* Digital healthcare;
* Creating a citywide or regional system Digital school;
* Development of a regional tourism portal;

e-Government

* Digitalization of public services ( state information system);

ICT projects have different attributes from infrastructure projects. So, the collaboration between public and private sector should take into account new specific of these project to adopt new management practices.

The goals of PPPs in ICT are:

■ To mobilize new private sector investment to information and communications technology infrastructure and equipment, as well as to developing the public services;

■ To attract private sector experience, technology, and innovation in the design of electronic networks and services, and to benefit from private sector creativeness and ingenuity;

■ To utilize private sector marketing channels and customer service expertise in the commercial delivery of services to customers [World Bank 2009]

**Features of infrastructure and ICT projects**

|  |  |
| --- | --- |
| **Infrastructure project** | **ICT project** |
| * capital intensive [Guidance Notes 2017] * conventional technology [Guidance Notes 2017] * long period return on investment [Izmalkova, Golovina, Faustova, Tronina, Eletskaya, 2012 * complex and large-scale projects [Izmalkova, Golovina, Faustova, Tronina, Eletskaya, 2012] * high irreversible costs [ Kuvshinov, Lukashev 2009] | * highly technology [Guidance Notes 2017] * intellectual capital intensive [Guidance Notes 2017] * non-long contract durations, because of rapid technology changes and short lifespan of the IT infrastructure [European Court of Auditors 2018,Guidance Notes 2017] |

*Table 3 Made by author*

As we can see from Table N that infrastructure and ICT projects have different attributes. It mean that necessary to count of these new features for PPP implementation in ICT sector.

The duration of constriction is much shorter and intangible. Operation stage of ICT is much more fluid as in most cases the actual operation of information product means constant fine tuning(‘design’) and improvement ( create new versions, upgrades) of the original product.

ICT projects require a suitable strategic approach that can support: a) better risk-management to address multiple and complex risks, b) better access to multiyear project finance over the project period, and c) assembling an optimum mix of resources (including technological, organisational, financial, and human resources), and configuring them in unique and sustainable ways to maximise the project’s value. It is important to keep in mind that the implementation of complex PPPs in ICT sector requires the utmost commitment of all partners to the broader vision of improved efficiency and services to citizens. It also requires that all partners remain flexible to policy changes that may improve outcomes. Communicating continuously with the public and relevant stakeholder institutions throughout the project implementation process is key as well.[PPP Knowledge Lab 2020]

Thus, managing ICT projects requires a new management method that is more coordinate people, capital, objects, fast information transfer, real-time information, strong flexibility, make a quick decision and quickly implement the project implementation process.

**Advantages of public-private partnership in the implementation of ICT projects**

* Improved efficiency in the delivery of **citizen services** or the performance of administrative procedures;
* Expanded access to **citizen services** and to **public information;**
* Greater **transparency & reduced corruption** through improved access to public information;
* Improved **quality of service and** increased client satisfactionby both measuring and achieving key performance indicators;
* **Reduced costs for public sector in the delivery of citizen services** or the execution of administrative procedures;
* The sharing of **key risks** between partners;
* Improved competitiveness of the overall governance and economic framework;
* **Transfer of technology and improved capacity of the public sector** to better manage public services and administrative procedure
* To attract private sector expertise, experience, technology, and innovation in the design of electronic networks and services, and to benefit from private sector creativeness and ingenuity; [Guidance Notes 2017]

However, PPP is not a universal tool for implementing ICT projects. Based on Russian case experience, ICT projects can be implemented through the following mechanisms [ROSINFRA 2020]:

* budgetary investments;
* private investment(investment agreement);
* Long-term agreements with legal entities with the participation of public law entities (Federal Law 223)
* Corporate Partnership Form (joint legal entity)
* Lease agreement with investment obligations

At the moment, the authorities prefer the use of government contracts for ICT projects implementation, as there is a lot of experience gained in the application of this mechanism, and this mechanism has a simpler organization of interaction between the public and private sectors. Unlike traditional procurement contracts, PPP and concession agreements require a lot of preparatory work, highly qualified officials and strong political will.

However, PPPs have several advantages over traditional procurement in the ICT sector. The release of budget funds for socially significant initiatives, the "reservation" of funds for a project in the budget for a long period of time, the ability to combine different stages of a project within the framework of a single transaction, strictly fixing the terms, cost and quality of work, and others can be considered as advantages that PPP has.

In the absence of significantly effective experience among government officials, wide experience and high expertise of private business, developed during the long-term use of ICT solutions for their own business processes, would help to adapt the application of ICT infrastructure in the most efficient way. Experience of authorities in ICT sector is much less and not as productive as that of a private business. The private sector began to produce ICT technologies and implement them in their business processes much earlier than the public sector.

To better understand the difference batween PPP and traditional procurement, author creates the table that compares two mechanism of collaboration between authorities and private companies.

**Comparison of PPP and traditional procurement**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Government** | | **Private sector** | |
| **Traditional**  **procurement** | **PPP** | **Traditional procurement** | **PPP** |
| Work planning | | | | |
| Advantages | Govement can not conclude another contract in the lack of funds | Private partner who developed the ICT facility remains for a long time | Opportunity not to go to bidding when market conditions have changed | The state provides an order for many years. Stability in loading the executing company |
| Disadvantages | Private partner developing an ICT facility may not enter the next tender | A long-time of negotiation | Inability to calculate your download for a long time | The difficulty in revising of agreement and the inability to switch to more profitable orders |
| Project parameters: time, cost and quality | | | | |
| Advantages | //// | Terms, cost and quality of work are strictly fixed. | A shift in the timing, cost and quality of work may not have consequences for the contractor | //// |
| Disadvantages | Increase in terms of work | //// | //// | Failure to comply with the terms of the agreement entails the fines |
| Project commercialization | | | | |
| Advantages | //// | Less project investment due to commercialization of project and implementation project through installment plan | //// | The opportunity to make money on the commercial component of the project |
| Disadvantages | Fundamental impossibility to attract private funds to the project | //// | //// | //// |
| Project Phase Synchronization | | | | |
| Advantages | //// | State interacts with SPV and does not bear the risk of uncoordinated work | //// | //// |
| Disadvantages | State bears the risk of out of sync work on the ICT facility | //// | Need to "adapt" to the performer of the previous stage | //// |

*Table 4 Made by author*

Thus, we can conclude that PPP has an advantage in implementing ICT projects over traditional procurement. All described advantages make PPP the most attractive for both the public and private sectors.

Along with the positive aspects, PPP has a number of shortcomings that critics of PPP actively emphasize. The cost of capital of the private partner is usually higher than that of government, because private sector has high risk of defaults. As a result, PPP can be cost more in long perspective than traditional public procurement. Also, PPPs are much more complicated than ordinary contracts, and so the transactions costs(negotiation, monitoring) are expected to be higher. It’s also uncertainty as any contracts, any renegotiation in changed circumstances will be additional expenditure.[Hall 2008]

Thus, choosing PPP for a project, authorities should use analysis tools such as Value for Money (VFM) to determine the comparative advantage for each project. The purpose of Value for Money (VFM) analysis is to inform government's’ decision on whether to implement proposed projects as PPPs, or through other more “traditional” forms of public procurement. Typically, VFM consist of two types of analysis: qualitative and quantitative analysis.

Qualitative analysis of VFM/ using special criteria, focuses on sense-checking the rationale for PPP implementation — should be the private financing attracted to specific public project implementation or not?

Quantitative VFM analysis involves comparing the value for money of a proposed PPP (or actual bids received) with a “Public Sector Comparator” (PSC)—that is, a model of the project if implemented through traditional public procurement [World bank Institute 2013].

Not only PPP implementation helps ICT sector development, but also the using of ICT influences on PPP development in positive way. ICT opens possibilities for minimization of expenditure due to electronic tenders and maximization of result by electronic calculation and and electronic report on the course of implementation of PPP project, as well as electronic management peculiar for simplification and acceleration of management process [ Morozova 2019].

Thus, the development of the IСT sector through the applying of the PPP mechanism has several advantages that are difficult to obtain through other mechanisms for implementing projects in the public sector: the potential reduction of costs project for the public sector, the attraction of the necessary intellectual resources and technologies, as well as the distribution of risks with the private partner. But it is important to note that the PPP is not universal tool for public project implementation. Public sector should use analysis tools to identify the comparative advantage of PPP in the implementation of each specific project.

**1.4 Public Private Partnership in Russian ICT sector**

In the summer of 2018, Federal Law dated June 29, 2018 Federal Law 173 “On Amending Certain Legislative Acts of the Russian Federation” was adopted. It introduced important amendments to the legislation on PPPs and concession agreements - ICT facilities were added to the list of objects of these agreements that made possible to implement ICT projects both in the format of PPP agreements and in the format of concession agreements.

The absence of ICT facilities in respect of which it was possible to conclude concession agreements in accordance with Federal Law115 (Federal Law of July 21, 2005 No. 115 “On Concession Agreements”) and PPP agreements in accordance with Federal Law 224 (Federal Law dated July 13, 2015 No. 224 «On Public-Private Partnerships, Municipal-Private Partnerships in the Russian Federation and Amending Certain Legislative Acts of the Russian Federation») did not mean that PPP and concession projects in ICT sector did not exist. Since PPP agreements or concession could only be concluded toward to real estate or real estate and technologically related movable property, the ICT infrastructure was tied to the real estate. Thus, until recently, all agreements with ICT systems were structured as industry projects (transport, utilities, education, and others), and the ICT system itself was part of the facility, or had the nature of other property.

However, the lack of a legislative framework for the creation and operation of movable property precluded the possibility of creating agreements on a movable object. So, an example of an unrealized PPP project is a concession agreement on the creation and operation of elements for the arrangement of roads - stationary automatic photo-video recording systems for violations of traffic rules and a data center in the Udmurt Republic. In 2015, the Udmurt Federal antimonopoly service Russia found in the actions of the Ministry of Transport of the Udmurt Republic violations of the Federal Law 115 “On Concession Agreements” and the Law “On Protection of Competition”. In turn, the Arbitration Court in the case of N A71-7057 / 2015 recognized the conclusions of the commission of the Udmurt Federal Antimonopoly Service Russia that the hardware and software systems are not elements of the arrangement of highways and cannot be object of concessions. The competition was canceled, and the concession agreement was declared invalid [udmurtia.fas.gov 2015].

The adoption of Federal Law 173 legally expanded the pool of objects in respect of which concession agreements and PPP agreements can be concluded. Now, IСT objects include:

**Description of IСT objects**

|  |  |
| --- | --- |
| **Object** | **Description** |
| Programs for electronic computers (computer programs) | The totality of data and commands intended for the functioning of computers and other computer devices in order to obtain a certain result, including preparatory materials obtained during the development of a computer program and the audiovisual displays generated by it (Civil Code, Article 1261) |
| Database | A set of independent materials (articles, calculations, regulations, court decisions and other similar materials), systematized so that these materials can be found and processed using an electronic computer (computer). (Civil Code, Article 1260, paragraph 2) |
| Information systems, including state information systems (GIS) | The totality of the information contained in the databases and the information technology and technical means that ensure its processing(Federal Law 149 “On information, information technology and information protection” , Article 2, Clause 3)  GIS – Government information systems are created in order to exercise the powers of state bodies and ensure the exchange of information between these bodies, as well as for other purposes established by federal laws. (Federal 149, Article 14, Clause 1) |
| Sites in the information and telecommunication network "Internet" or other information and telecommunication networks | A set of programs for electronic computers and other information contained in an information system that can be accessed through the Internet information and telecommunication network using domain names and (or) network addresses that identify sites on the Internet (Federal 149 Art. 14, Clause 13) |
| Technical devisees of ensuring the functioning of information technology facilities | Information technology objects and property, technologically connected with one or several such objects and intended to ensure their functioning or other activities provided for by the agreement |
| Data processing center | The totality of buildings, parts of buildings or premises, combined for a single purpose with movable property, technologically connected with objects of information technology, and intended for automation using computer programs and databases of processes of formation, storage, processing, reception, transmission, delivery of information (data centers) |

*Table 5 Made by author*

In the event of the conclusion of a concession agreement, the parties to the agreement may be the following actors:

**Concedent**

а) Russian Federation

b) subject of Russian Federation

**Concessionaire**

а) individual entrepreneur

b) Russian legal entity

c) simple partnership

In the event of the conclusion of an agreement on PPP, the parties to the agreement may be the following actors:

**Public partner**

а) Russian Federation

b) subject of Russian Federation

**Private partner**

а) Russian legal entity

However, there are general restrictions for participants in PPP agreements and concessions in relation to the ICT facility. So PPP agreements cannot be concluded at the municipal level. Also, foreign investors (foreign individuals and (or) foreign legal entities), as well as legal entities controlled by a public partner (unitary enterprises, institutions, public law companies, societies located in the public sector) are not allowed to participate in PPP as a concessionaire or private partner.

It’s important to notice that PPP in ICT sector, as in other industries, can be implemented in many models. PPP model is a set of actions of public and private partners, the scope of powers and the level of involvement of these stakeholders towards to a PPP object [Sokolov and Maslova 2017]. The elements of PPP forms include: Design, Building, Reconstruction, Modernization, Operation, Maintenance, Management, Development, Financing, Ownership, Transfer, Leasing, Buy, Selling.

The World Bank defines this functions as follows[World Bank Institute 2014]:

**Design** (also called ‘engineering’ work) means developing the project from initial concept and output requirements to construction-ready design specifications.

**Build, or Rehabilitate**—when PPPs are used for new infrastructure assets, they typically require the private party to construct the asset and install all equipment. Where PPPs involve existing assets, the private party may be responsible for rehabilitating or extending the asset

**Finance**—when a PPP includes building or rehabilitating the asset, the private party is typically also required to finance all or part of the necessary capital expenditure.

**Maintain**—PPPs assign responsibility to the private party for maintaining an infrastructure asset to a specified standard over the life of the contract.

**Operate**—the operating responsibilities of the private party to a PPP can vary widely, depending on the nature of the underlying asset and associated service. In ICT sector private partner can be responsible for technical operation of an asset, such as paid parking, government informational site, CCTV and so on.

PPP forms are enshrined in two federal laws: Federal Law 115 “On Concession Agreements” and Federal Law 224 “On Public-Private Partnerships, Municipal-Private Partnerships in the Russian Federation and Amendment of Certain Legislative Acts of the Russian Federation”. Federal Law 173 does not amend the existing forms enshrined in the laws on concessions and PPP.

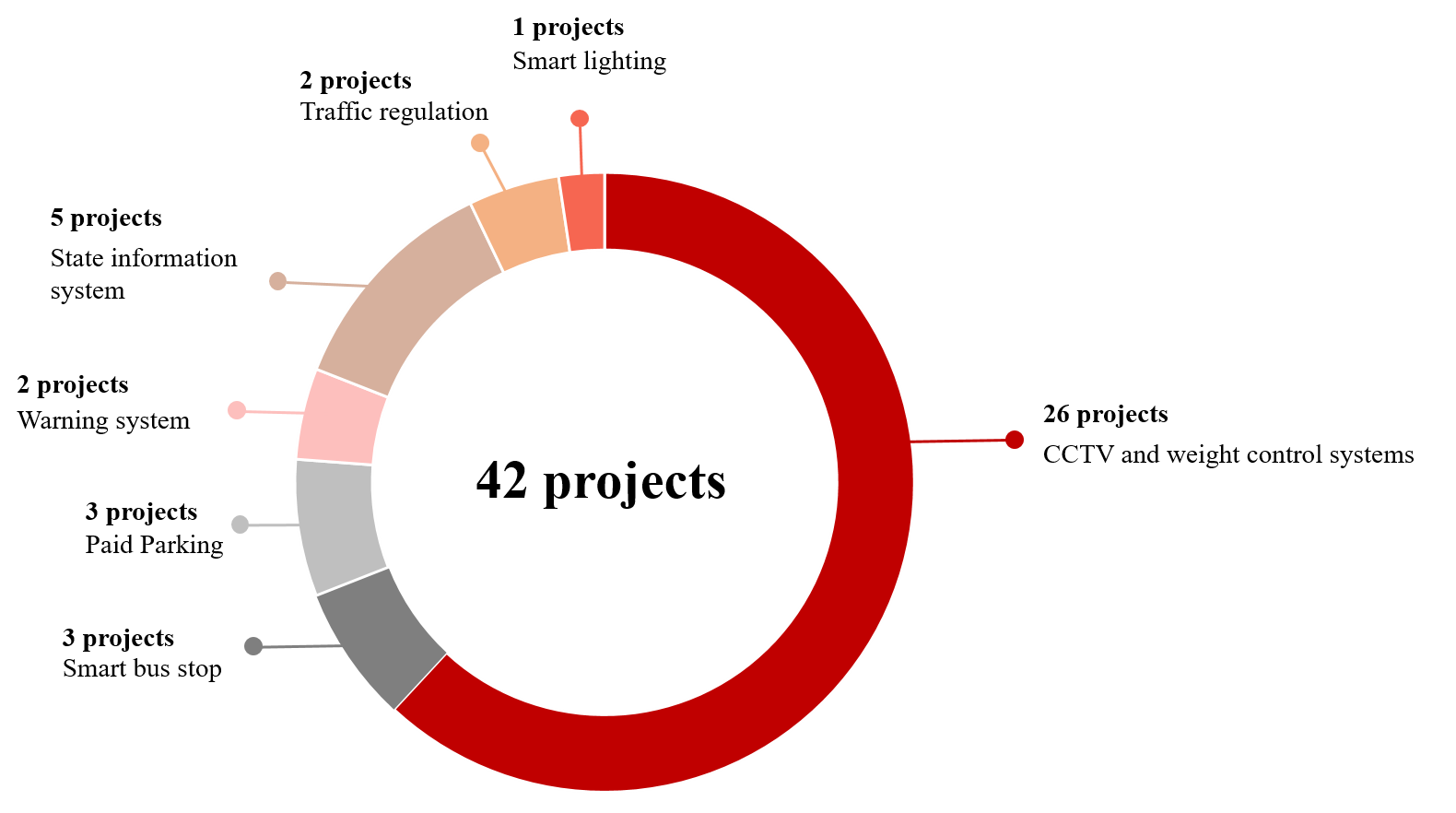
Concession in ICT can be implemented in the form of BTO (Building - Transfer - Operation), RTO (Reconstruction - Transfer - Operation), DBTO (Design - Building - Transfer - Operation) and DRTO (Design - Reconstruction - Transfer - Operation). Currently, in Russia, the most applicable model in concession agreements is BTO.

In a PPP agreement, participants can independently “design” a PPP form. Formats can be the following: BOT (Building - Operation - Transfer), DBOT (Design - Building - Operation - Transfer), BOMT (Building - Operation - Maintainance - Transfer), DBFM (Design - Buildign - Financing - Maintainance), DBFMO (Design - Buildign - Financing - Maintainance - Operation, BOO (Building - Operation - Ownership), BOOT (Building - Operation - Ownership).

All these forms can be divided into two more global groups - Greenfield PPP-projects '- projects that include construction, in the case of ICT, this is the creation of a new facility - the establishment of CCYV, the creation of a digital marking system; and “Brownfield PPP-projects' - projects where reconstruction is carried out - for example, reconstruction of a regional automated central warning system.

There is no complete and reliable statistics of ongoing projects in the field of ICT, as, however, in other areas. In order to provide an analysis of PPP projects in ICT, scattered information was collected from several sites: Torgi.ru, ROSINFA, Infaclub, PPP.RF, report of the Ministry of Economic Development.

The uniqueness of ICT PPP projects lies in the fact that they can be concluded in various industries - transport, security, e-government and more. However, the conclusion of concessions and PPPs in relation to the transport sector prevails at the moment in Russia.



*Graph 3 Distribution of ICT PPP projects by sector. Made by author*

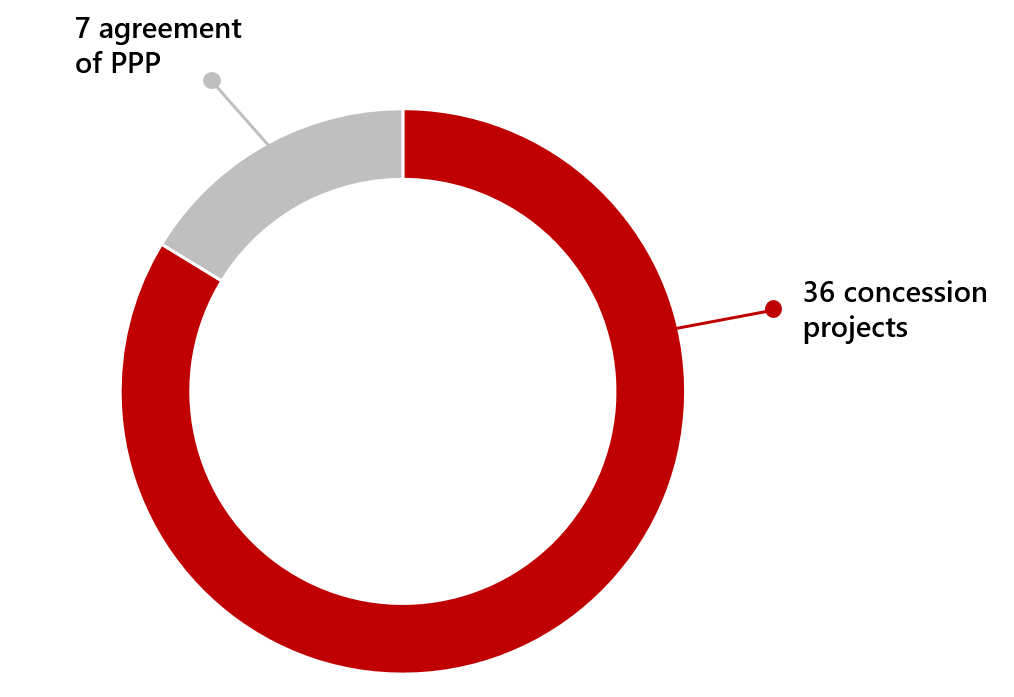
PPP in ICT in Russia includes 42 projects. The distribution by years is shown in the graph below, where we can see that the largest number of projects is 8 in 2020. However, it should be noted that in addition to projects that are in operation, projects that are still at the stages of structuring, initiation and competition are included.

*Graph 4 Distribution of ICT PPP projects by years. Made by author*

Currently, the total investment in PPPs in the ICT sector is 65,895 million rubles. As you can see from the graph, the structure of the distribution of investments by years is uneven, due to the fact that in 2014, 2016 and 2019 three major projects were launched: two federal ones - a digital marking system and a Plato system and a regional one - creating a system for video monitoring of the road situation and CCTV traffic violations, including automated weight control system.

*Graph 5 Distribution investments by years (mln rub). Made by author*

It is important to note that the average term for the implementation of ICT projects is less than infrastructure projects, so 15-30 years is a typical duration for infrastructure PPPs. The current average duration for ICT PPP in Russia is 11.5 years.



*Graph 6 Amount of PPP project by model. Made by author*

The format of concession agreements has become widespread in Russia due to a simpler procedure for concluding an agreement (there is no stage to assess the effectiveness of partnerships). Concession agreements in the ICT sector comprise 36 projects, and PPPs comprise 7 projects. Most PPPs were concluded with a private partner of Rostelecom.



*Graph 7 Geography of distribution PPP ICT projects. Made by author*

ICT PPP does not widely spread, as noted earlier, and mainly ongoing projects are being created in central Russia - Moscow, Moscow Region, Volgograd Region and Novgorod Region.

At the moment there are few ICT projects without real estate (GIS) because a bill that allows concession agreements and PPP agreements to be concluded with respect to ICT facilities was adopted only in 2018.

The largest project that became the flagship of the development of ICT PPP in Russia was the federal project for digital labeling of goods, concluded in 2018. Two projects - the Concession Agreement for the creation of a database and software for a database containing tax information in the city of about. Krasnogorsk in the Moscow Region and the creation of the KultPROsvet information system are at the stage of structuring are on structuring stages. The creation of a cashless payment system in educational institutions of the Moscow Region and the creation of a database and software on real estate and land in the Moscow Region are the initiation phase.

Most of the projects relate to the field of technological complexes for road construction, which includes photo and video recording of traffic violations and automated weight and dimensional control system. The number of projects in this area is 26 projects. Currently, there are 3 projects of paid parking and 3 projects of smart stops. Two projects also relate to public information and warning systems and one project to smart lighting

**1.4.1 Payment mechanism: traditional and new forms**

PPPs in the ICT sector are becoming even more unique in term of application of payment mechanisms. To ICT project traditional payment mechanisms can be applied, such as accessibility fees, direct user fees, efficiency fees, as well as new forms - subscription, microtransactions in such projects. However, it is not obvious to what type of payment mechanism can be applied to ICT PPP projects, that’s why it is necessary to describe payment mechanisms and consider the cases that one or another mechanism can be used[HSE 2018]. It is important to indicate that PPP projects are primarily investment projects and business comes to PPP with the main goal - to increase its capital. In this regard, it is necessary to identify possible forms of commercialization of PPP projects in ICT in order to identify options for project payback for a private investor.

There are several basic type of return on investment that are characteristic of infrastructure PPP projects, but that can also be used in ICT PPP projects.

The availability fee is one of the payment mechanisms in the field of PPP, where the public partner sends a payment to the private partner for the possibility of operating the facility. Payments to the private party depend on the quality and accessibility of the services provided, as well as on the quality of the PPP facility. Availability fee are not calculated taking into account consumer demand for the facility’s services. Deterioration in the quality of the service or facility provided by private partner will result to fines collection from the private partner or decreasing fee to the private partner [Service Works Global 2020].

The positive aspects of such a mechanism for a public partner are that payments begin to be deducted from the moment the facility is launched, so all financial risks associated with the creation of the facility are borne by the private partner; Also, if the mechanism includes charging users, then all transactions from users are under the control of a public partner; such a mechanism is more attractive to a wide range of stakeholders (investors and contractors) due to the high goverment guarantee. A positive aspect of such a mechanism for the private sector is the absence of a demand risk for an object or a provided service of a PPP project, that ensures constant, fixed, demand-independent cash receipts [KPMG 2009]. Such a mechanism of return on investment is in demand in PPP projects where the facility cannot be operated on a paid basis. Free roads, kindergartens, schools, sports facilities are infrastructure projects using this mechanism [Sokolov and Maslova 2017]. ICT facilities that use accessibility fees include photo and video systems for recording traffic violations(CCTV).

One of the most common payment mechanisms in PPP practice is direct collection from users [Sokolov and Maslova 2017]. Private partners ensure a return on investment by providing services to users for whom a fixed rate is set (toll road, waste recycling plant). The positive aspects of this payment mechanism for public partner include the lack of direct payments from the budget aimed at recouping the project, since payments to the concessionaire or private partner are received directly from the collection of fees for the service provided to users. For a private partner or concessionaire, an demand increasing will maximize the income received. Also, collecting fees from users is the easiest in terms of developing a payment mechanism [Department of the Environment and Local Government 2000]. Such a payment mechanism is already being implemented in paid parking projects. One of the new and progressive payment mechanisms is the payment for efficiency. Such a mechanism is similar to the availability fee mechanism, but it is an independent payment mechanism. In this payment mechanism, payments from a public partner are based on the achievement of indicators and quality standards established by the PPP agreement. The advantages of the mechanism are the income of a private partner does not depend on the demand or high quality of the PPP facility or the services provided, but income depends on on the achievement of indicators and standards agreed upon in the PPP agreement. Achieving the indicators set in the agreement can be direct, for example, reducing the time for receiving a service or shortening the construction time, or indirect, for instance, increasing the level of road safety) [Sokolov and Maslova 2017]. The advantage of the mechanism is the achievement of targets by a private partner or concessionaire.

Another payment mechanism that is already used in concessions and PPP agreements is income from other commercial activities (sublease, advertising, trade, etc.). Private partner or concessionaire can provide a return on investment through commercial activities in this type of payment mechanism. This type of return on investment is used in PPP projects to create smart stops. One example of another commercial activity as payment mechanism is the delivery of available advertising space. An advertising model is an indirect model of commercialization, in which a private partner receives income not from direct collection of fees from consumers, but from advertisers. This model involves showing ads on both online and offline platforms. Within the framework of the online, on the website or in the application, banners, text, contextual, video and audio advertising can be displayed in various forms.

An example is access to a wifi wireless network in public places where it is possible to use the wireless Internet access service after viewing advertisements or placing advertisements on tourist portals of the region from local advertisers. Commercialization is possible both when the advertisement is shown, where the customer’s advertisement is shown directly to the user, and when the user refuses it, in this case the user pays for the absence of the advertisement showing him.

The application of other commercial activities is available in Smart Stop projects, where a private partner can provide electronic displays to display advertisements for advertisers. This payment mechanism is already applied in Russia. The advantage of this model is that a private partner or concessionaire makes a profit from advertisers, and not directly from users. Potentially absence of direct user payment may reduce the social discontent of citizens. Also, with increasing of user number using the site, application, or with an increase in the number of citizens using public transport where advertisers place ads, advertisers are willing to pay more, as their advertisement will be available to more end users, which increases the profit for the concessionaire or private partner.

ICT projects such as goverment information systems, geoinformation resources have high potential for commercialization. Since the practice of developing such projects through PPPs almost does not exist, the existence of the possibility of commercializing such projects raises questions. Unambiguously, such projects can be concluded through PPP with the use of an accessibility fee, since by virtue of the law a public service is free (budget), and its costs are reimbursed from incoming taxes and fees. In this regard, the concessionaire’s investments are reimbursed by payments from the grantor (capital or operational grant), which are structured in the agreement as the fee of the grantor. However, availability fees are not the only payment mechanism for such ICT projects.

Government information systems are Internet resources that aggregate, store and provide data on a specific topic. Such projects may partially pay off if the authorities allow a private partner to use the data for commercial purposes. The access model to analytics is built on providing access to data (Big Data) and analysis tools. Many existing information systems collect information from users̆ that may be uniquĕ and demanded̆ by certain categories of business. In the context of PPP, it is meant that the government grants provide the right to use the data to a private partner or concessionaire. Data can be used for commercial purposes, that is, selling databases to third parties [You & Partners 2018, Infraone research 2019].

Data accessing can be organized through a subscription, that is, selling access to the contents of the database for a specific period of time. There are several subscription models:

* **Freemium model** in which users are offered free access to an incomplete version of the project with a proposal to switch to paid access to a resource with advanced functionality and content.
* **Testing,** in which the user is given a free test period for using all the functionality and content of the resource for a certain period of time, then it is proposed to switch to paid access
* **Fully paid access (PayWall) -** access to the resource only on a paid basis.

Also, a separate service may be the sale of analytics made on the basis of classified data, the monopoly of which belongs to the state.

The microtransaction model offers the user the opportunity to use the basic functionality of the project for free for an unlimited time, but it is also possible to purchase additional functionality or content as necessary, usually for a small fee. The main advantage of this model is the small one-time purchases are psychologically more comfortable for certain consumer groups. Microtransactions can be either an alternative to the subscription model, or complement it [You & Partners 2018].

One of the examples of data monetization is the City Data Exchange project implemented in Copenhagen. Since 2016, the City Data Exchange has been collecting various data not only from municipal information systems, but also from private companies (for example, in retail or construction) and ordinary residents. As a result, all information is depersonalized. The Hitachi company implementing the project accumulates this data and makes money by developing and selling applications that use this data, as well as by subscribing to this data.

**1.4.2 Identification of risks of PPP projects**

A key characteristic of PPPs is risk sharing. The existence of risks in PPP projects are determined by several indicators: the duration of the project, the presence of a large number of stakeholders, and the high capital intensity of the project. It is important to note that there are several approaches to the definition of risk concepts that can be divided into two groups. The first group defines risk as any deviation from predicted outcomes that may have a positive or negative effect [PMI, 2017; PPP Knowledge Lab 2020]. The second group defines risks as a potential threat or a negative outcome of events - damages, losses, losses. The risks that may entail financial losses, additional costs of PPP project participants, lack of revenue, compared with the forecast option, as well as delaying the project timelines, require the development of a risk management strategy [M.Yu. Sokolov & S.V. Maslova 2017, Bañuls, López, Turoff, & Tejedor, 2017, Hallikas, Karvonen, Pulkkinen, Virolainen, & Tuominen, 2004, Yu Sun, Dongping Fang, Shouqing Wang, Mengdong Dai, and Xiaoquan Lv. 2008].

Risk management is carried out throughout the project life cycle and is necessary to solve the problems of identifying and maintaining risks, preventing their occurrence and mitigation. Risk management takes place in several stages and the first important step is the identification and description of risks.

The risks inherent in PPPs in the ICT sector will analyzed. It is important to note that there are a large number of approaches to risk grouping: macro, micro, medium levels [Li et al. 2005]; external, internal and project risks [Shen et al. 2006]; commercial, technical, political and financial risks [Medda 2007] and others. In this work, two groups of risks will be considered: common risks inherent in all areas of PPP projects, including ICT projects, and specific / industry risks that are unique to the PPP sector in the ICT sector [Ng and Loosemore 2007; Sokolov and Maslova 2017]. Separately, the author analyzed the risks that were realized in ICT PPP projects in Russia using the case study method. An analysis of the cases of these risks will be presented as examples to describe the risks.

Common risks for PPPs in the ICT sector:

*Risk of social discontent*

Social discontent can be caused by various reasons - a change in the usual way of life of users when using new service, increase in tariffs, and also the perception of the introduction of ICT as a hang of state control over the population. This fear may arise because the state have a large amount of information about each citizen that they may use to establish excessive control and surveillance. The risk of leakage of personal data is also increased, since a large amount of data will be concentrated in a single system. As a result, the implementation of such a risk may lead to avoidance of the using of a new service if this service is provided on an optional basis. If the new service is obligatory for every citizen of the country, this risk can lead to distortion or concealment of these citizens. As a consequence of the implementation of this risk, it will lead to a drop in traffic, a decrease in project profitability and the inability to scale the project*.*

The risk of public discontent arose during the implementation of paid parking projects in the cities of Voronezh and Nizhny Novgorod. Paid parking is one of the tools to reduce traffic, as well as reduce traffic jams within the city. The development of paid parking in Russia became possible with the adoption of Federal Law No. 69 “On Amending Certain Legislative Acts of the Russian Federation”, which allowed the creation and using of parking on a paid basis [Consultant 2011]. The first project to create paid parking in Russia, implemented through the PPP mechanism, was a concession agreement between the Voronezh administration and City Parking.

A common problem for the implementation of paid parking, including through the PPP mechanism, is a high social risk. Car drivers in Nizhny Novgorod did not support the introduction of paid parking in the city. The City Council of Nizhny Novgorod on its website published a survey of citizens, the purpose of survey was to find out that, in the opinion of residents, unload the city center from parked cars. The introduction of paid parking was not the most popular measure and took only the third place [City Council of Nizhny Novgorod 2019]. And in Voronezh, citizens actively protested against paid parking lots and opposed the PPP mechanism to create paid parking lots, from which fees will go to business, and not to the municipal budget. In the framework of public discussions, the townspeople pointed to the unpreparedness of the city to introduce paid parking lots - the lack of comfortable public transport, transport interchanges, the high accident rate of public transport, the lack of intercepting parking lots and more. It is important to note that the townspeople are against the concession for the installation of paid parking lots, as they consider it economically disadvantageous for the city budget [voronezh-city 2019)]. A positive aspect for the development of PPP on the creation of paid parking is the development of the legislative framework. On March 12, 2020, Federal Law dated 01.03.2020 Federal Law No. 44 “On Amending Articles 26.10 and 28.1 of the Code of the Russian Federation on Administrative Offenses” (Official Internet Portal legal information 2020) came into force, allowing administrative commissions to request information on car owners .This law eliminates the imperfection of the legal system, which previously made it difficult to bring to administrative responsibility offenders for placing a vehicle in a paid parking lot without payment. Another project in which strong social resistance arose was Platon system. Drivers have declared an indefinite strike in which they oppose the introduction of tolls on federal highways, as such fees charged to end users make freight unprofitable for carriers [RBC 2016].

*Revenues risk*

The risk is caused by the occurrence when project becomes unprofitable for a private partner. In most cases, this risk is realized when direct fees from users the payment mechanism is applied as the payment mechanism Thus, the social risk realized in the Platon system concession, it forced the partners of the concession agreement in 2015 to reduce the tariff from 3.73 rubles / km to 1.53 rubles / km, which led to a low profitability of the project. As of January 15, 2019, the system for charging cars with a mass of over 12 tons collected almost 63.8 billion rubles. for the entire period of existence. Total fees of more than 20 billion rubles. less than the cost of maintaining the system, compensating the regions and the cost of emergency repairs of roads and bridges (84.2 billion rubles), that is, in fact, Platon system is currently a loss-making project [infra one 2019].

*Risk of a change in political conditions and managerial structure*

This risk arises when the political management of a public partner change. The updated political leadership may not see the value in the previously concluded PPP and oppose further implementation of the project.

The concession agreement concluded between the administration of Chelyabinsk and Administrator of the Chelyabinsk parking space is at the stage of the trial due to the realized risk of the project being inexpedient. In 2018, the Chelyabinsk administration entered into a concession agreement, and in 2019, the city administration announced about inadvisability of the idea of ​​creating paid parking lots for the city, as a result of which it proposed to terminate the concession agreement with the Administrator of the Chelyabinsk Parking Space. And acting of Chelyabinsk Mayor Natalya Kotova said that paid parking does not meet the requirements of the administration and citizens, and the city is not ready for the introduction of paid parking in terms of infrastructure [Kommersant 2019]. In this case, the concessionaire faced the risk of inconsistent actions by representatives of regional authorities, the reason for which was a weak study of the feasibility of the project before the conclusion of the agreement.

*Change in Law*

The risk of legislation change arises when new laws or new PPP policy are adopted that influence on the project operation management and revenue. Since PPP projects have a long-term relationship, the risk of legislative changes is highly relevant.

The risk of legislative changes is high for PPP projects on photo and video recordings. Representatives of the government are conducting active discussions regarding the mechanism for implementing public-private partnerships on projects for the creation and operation of photo and video recording systems. Now there is no single agreed position among government officials regarding the application of the PPP mechanism to projects for the creation and operation of photo and video recording systems. Deputy Prime Minister Maxim Akimov and Alexander Buksman, First Deputy Prosecutor General, said that traffic safety cameras are a source of income for business and not a tool to reduce accidents, so you should gradually abandon the system in which private businesses install and maintain photo and video systems CCTV [RBC 2019, Kommersant 2019]. In conditions of strong political opposition, there may be risks of legislative changes in which private partners may lose the ability to create and maintain photo and video recording systems for traffic violations. And the current concessionaires and private partners will suffer global losses, since when this risk is realized, agreements on such facilities will be closed.

*Constraction overcosts*

This risk may include two highly interrelated risks - the risk of delays and the risk of increased costs for the creation of the project. Delays in the creation of the agreement object means that construction time will take longer than predicted and risk of cost overrun means that during the construction stage private partner exceeded the costs included in the agreement.

As part of the concession agreement for the installation and operation of Smart Stops between Rostelecom PJSC and the administration of the city of Nizhny Novgorod, the risk of increasing the project timeline was realized. It was supposed that the concessionaire would equip 334 smart stops in Nizhny Novgorod by the end of 2018 for 1.6 billion rubles, but by the beginning of 2020 40% (134 stops) had been established. The delay was due to a change in the “smart” stop project, as well as the increase in terms was affected by the 2018 FIFA World Cup, when many construction and installation works in the city were suspended, the third reason for the increase in the terms of the project was the legal difficulties with transferring the old ones to Rostelecom stop pavilions so that the concessionaire can demolish them [Kommersant 2020].

*Risks of lack or insufficiency of project feasibility*

Each PPP project requires careful justification of the relevance or necessity of the project. The creation of ICT projects through PPPs requires special study, since the field is completely new for such a partnership format and many stakeholders do not fully understand the need to use PPPs for ICT projects to replace traditional public procurements, and the uniqueness and novelty requires careful study of the justification for the need for such a project for the economy .

*Risk of insufficiency or redundancy of project information disclosure*

In Russia, there is a trend of refusing to publish the texts of concession agreements and the PPP, which leads to a decrease in the disclosure of information about the project. Such a trend leads to a decrease in the transparency of projects for external stakeholders, which may cause oppositional moods and discredit the project. It is important to note that redundancy of information can also affect the public perception and important stakeholders of the PPP project in a negative way. Both partners should conduct a thorough analysis of the published documents for information and communication correctness of the wording in order to minimize the misinterpretation of the conditions of the projects or discredit its conditions.

*Environmental risk*

When creating real estate IT property, for example, data centers, the risk of negative impact on the environment may be realized, since such technological equipment requires high energy costs, which in case of failures in use can lead to fires, smoke, and even explosions.

*Negative Employment Risk*

If the objects are not created from scratch, the object is being modernized or reconstructed. It is highly likely that with a new private partner, the project will be optimized in terms of staff reduction, salary reduction, change of contractor organizations discussing this project.

*Risk of disinterest in the use of project services by users*

Such a risk lies in the unwillingness of potential users of the system to switch to new working mechanisms created by the PPP project. This risk was realized with the goods labeling system - a federal concession agreement concluded between Operator-MDC and the Russian Federation. The aim of the project is to create a system that will track all goods on the domestic market and reduce the turnover of illegal and low-quality products. The problems with the introduction of marking are that the market cannot quickly adapt to the new system, and the introduction of a new marking mechanism in business processes for market participants increases the cost of introducing electronic document management, purchasing registrars of issue codes and more

In the absence of risk management, PPP partners are faced with a lack of understanding of how to work with the public, with formal and informal business associations that oppose the introduction of labeling or reduce business requirements for this project. At the moment, the lack of a clear strategy to minimize the realized risk - compromise mechanisms or business proposals that would interest them in the faster integration of the new system into their business structures - leads to a delay in the launch of the marking project, which increases the financial costs of the project

.

ICT projects also aim to increase transparency and increase project openness. Restructuring on a new project management strategy may lead to increased dissatisfaction of some beneficiaries, as additional transparency may lead to higher transaction costs. As a result of increased transparency, it can lead to the identification of inefficient services provided to the population, which will lead to the elimination of these services from the market.

In Russia, there is still no detailed description of industry risks for PPP in ICT. By and large, this study is the first to identify the risks of PPPs in ICT projects, name them and describe them. PPP projects information on risks that are in the public domain does not contain specific risks for ICT. Thus, it is important to propose possible industry risks for PPPs in the ICT sector based on an analysis of current legislation and official documents. Since inadequate consideration of industry risks and their non-inclusion in the draft agreement may lead to high costs (losses or losses) for public and private partners. Industry risks are risks specific to a particular industry.

*Risk of leakage of information and / or personal data*

At any stage of the ICT project, there is a potential risk of information leakage, therefore it is very important to organize an effective system for monitoring and protecting data. The protection of information contained in information systems is an integral part of the creation and operation of information systems and should be ensured at all stages (stages) of its creation and during operation by taking organizational and technical measures to protect information aimed at blocking (neutralizing) security threats information in information systems [minstroyrf 2013].

Projects for the creation and operation of GIS are available for PPP in ICT. It is important to note that in April 2019, the government supplemented government order No. 676 “On requirements for the procedure for the creation, development, commissioning, operation and decommissioning of state information systems and further storage of information contained in their databases” with provisions on PPP . In the new version of the document, when creating a GIS using the PPP model, the requirements for the creation, development, commissioning, operation and decommissioning are available for a private partner. Which means that all requirements for protecting information contained in systems and requirements for protecting personal data should now be borne by a private partner or concessionaire when creating a project through PPP [Pravo.gov 2019] Thus, now this risk can be borne by a private partner or concessionaire.

*Technology obsolescence risk*

Technology obsolescence risk refers to the risk of any technologies being obsolete for service purposes and don't provide project efficiency and reduce the profitability of the PPP. Additional investments are required to integrate new technology to the projects. So, this risk should be considered as essential risk for PPP projects. Also, this risk may be implemented due to changing legislation that obliges private partner to change using technology. So, in this case it’s absolutely essential for effective continuation of work of PPP to include in contract public partner obligations and sharing expenditure between partners.

*Risk of damage to process equipment (fire, explosions, vandalism)*

The ICT facility of a PPP may include technological infrastructure - a data center. For the functioning of the data center requires a large amount of electricity. The risk of damage such as fire or smoke can occur in case of malfunctions in the functioning of the data centers and lead to partial damage to the equipment or its complete failure. In addition, a number of objects included in the PPP facility may or should be located in public places (in particular, we are talking about elements of the FVF systems - video cameras, or the equipment of “smart stops”), and thus are easily accessible for their illegal damage .

*Risk of the First Day*

This risk lies in the poor start of the project, that is, errors or equipment failure. For ICT projects, for example, GIS or other information resources, this is especially important, since malfunctions during the launch or in the early stages of the operation of the project can lead to a large outflow of users.

It is important to note that the risks considered are far from an exhaustive list of PPP risks in the ICT sector. Here we consider the risks that have either already been implemented in PPP projects, or the most relevant and are unique to ICT PPP projects. Risk identification is a critical step in risk management and the overall PPP of a project. Partners should devote much attention to identifying risks in each PPP project.

1. **Potential barriers for successful PPP implementation**

Worldwide, the role of information technology in the economy is increasing. The share and volume of information technologies in the GDP of countries is growing, and the dependence of transport, health care, education, the city economy and other areas on smart solutions is increasing. Therefore, the public sector in Russia is interested in the development of ICT solutions, including through the PPP mechanism. The analysis showed that the use of PPP in the ICT sector is a promising mechanism for interaction between the public and private sectors. However, an analysis of the current state of PPP in the ICT sector shows a lack of rapid growth in IT projects implemented through the PPP mechanism, from which it can be concluded that the business does not express a great interest in implementing such projects. However, the effectiveness of the few existing projects [RBC 2019], the high interest of the public sector expressed in the development of legislation, the opening of specialized institutions for development, as well as wide international experience prove that PPP is a necessary mechanism for implementing ICT projects in Russia.

Thus, identifying barriers to the implementation of PPPs in IT is a necessary step for the successful development of PPPs in this sector.

**2.1 Identification of barriers to PPP**

Identification of barriers will be based on an analysis of several sources. The first part of the analysis to identify barriers to the successful development of PPPs will be a literature review. As part of the content analysis of previous studies aimed at identifying barriers, a pool of barriers will be compiled, which is universal in nature for all PPP projects. The goal of including barriers identified by other researchers in the work is to fully cover the potential barriers that exist for the effective development of PPPs.

The next step will be an analysis of the identification of barriers characteristic of PPP in ICT in Russia. During the analysis, the following methods will be used: content analysis and case studies.

**2.1.1 Common PPP barriers**

An analysis of the literature showed that there are a large number of studies that focus on identifying barriers to the implementation of PPP projects.

The theory of constrains is used as methodology to support the analysis in this research. The theory of constraints developed by Goldratt in the early 1980s. The theoretical concept is sumarized as: each system must have at least one constraint; and and the existence of constraints represent opportunities for improvement [Goldratt, 1988]. Goldratt defined a constraint as “anything that limits a system from achieving higher performance versus its goal” [Goldratt 1988]. Thus, constraints can involve people, information, regulations, policies, laws, procedures, supplies and equipment [Dettmer, 2000]. The theoretical knowledge base has grown significantly since the 1980s

and has been applied successfully in various fields ranging from manufacturing, accounting / financing to the construction industry, particularly in project management

In this paper, the barriers are considered as constraints that limits a public-private partnership from effective development and achieving the goals.

Analysis of literature review shows that researchers name barriers in different way, but they put a single meaning such as circumstance that prevent the effective PPP implementation. So, barriers are considered as negative attractiveness factors [Li and al 2005], obstacles [Liu 2011] and even risk factors are considered as barriers that hamper of successful development of PPP [Chou, Pramudawardhani, 2015; Ghribi and al 2019].

Many paper are devoted to the identification of barriers to PPP implementation, there different methods and approaches are applied to identify barriers. All these papers, identified barriers for successful PPP implementation, can be divided to two parts. The first part primarily the early papers focused on revealing unique barriers applied qualitative research methods such as case study or expert interviews [Bing Li 2003, Ashwin Mahalingam, M.ASCE, 2010]. While the latest researches applied quantitative methods to identification barriers to PPP. They took already identified barriers and then collected data (opinions of stakeholders) as more as possible through questionnaire. The goal was to base on the huge massive of answers identify existing barriers.[Albert P. C. Chan; Patrick T. I. Lam; Daniel W. M. Chan, M.ASCE; Esther Cheung; and Yongjian Ke 2010; Solomon Olusola Babatunde, Srinath Perera, Lei Zhou and Chika Udeaja 2015].

After analyzing the methods, which were applied in papers, it becomes clear that the most optimal analysis tool according to the paper’s goal and objectives is to conduct quantitative research – collect the perception of business towards barriers to PPP implementation through the questionnaire, using Likert scale to identify the importance these barriers for private sector.

Using of frameworks for categorizing barriers has become widespread in recent papers dedicated identification of barriers [Babatunde, Perera, Udeaja, & Zhou 2015; Weththasinghe, Kumudu & Gajendran, Thayaparan & Brewer, Graham 2016]. One of the first attempts to categorize barriers were made by Lei Zhou [Zhang 2005]. He partially categorized his findings as social, political, and legal risks among others as a barrier to PPPs implementation. Using the framework such as PESLET or SLEEP is a useful strategic tool for understanding the growth or decline of the market, the position of the business, the potential and direction of activity [Kotler 1998]. Applied framework to categorize barriers helps to understand better complex and holistic PPPs environment.

The barriers are categorized by using SLEEPT approach, that includes; social, legal, economic, environmental, political, and technological factors. Many papers analyze similar barriers to PPP implementation, so the author of this study compiled a summary table indicating the unique barriers with reseachers, who considered it. The Table N below shows the barriers that are collected from previous research.

**Barriers to PPP in SLEEP approach**

|  |  |  |
| --- | --- | --- |
| **SLEEPT** | **Barriers** | **Source** |
| **Social** | Public resentment due to tariff increases | Chan et al. (2010); Akampurira et al. (2009); Mahalingam (2010), Gunnigan & Rajput (2010); |
| **Legal** | Lack of well established legal framework | Chan et al. (2010); Li et al. (2005), Babatunde, Perera, Udeaja, & Zhou (2015); Li et al. (2005b); Zhang (2005);  Akampurira et al. (2009); |
| **Economical** | Difficulties in seeking financial partners | Chan et al. (2010); Gidado (2010) |
| High transaction costs (bidding and contract negotiation costs) | KPMG Corporate Finance (2010);  Corbett and Smith (2006);  Chan et al. (2006); Hwang (2012) RESTAURA 2017; |
| **Ecological** | /// | /// |
| **Political** | Corruption(excessive restrictions on participation) | Babatunde, Perera, Udeaja, & Zhou (2015); Li et al (2005); Hwang 2012 |
| Lack of flexibility | Chan et al. (2010); Corbett and Smith (2006); |
| Lack of guarantees/incentives by governments(poor enabling policies) | Akampurira et al. (2009);  Mahalingam (2010); UNESCAP (2007); |
| **Technological** | Lengthy delays in negotiation | Li et al. (2005b); Chan et al. (2006, 2010); Akampurira et al. (2009)  Hwang 2012; |
| High risk relying on private sector  Misallocation risk | Chan et al. (2010); Li Bing(2003 Hwang 2012); Babatunde, Perera, Udeaja, & Zhou (2015); |
| Poorly designed and structured PPP projects  PPP process not clearly defined/lack of clarity | Ashwin Mahalingam, M.ASCE(2010); KPMG Corporate Finance (2010); Hwang 2012 Babatunde, Perera, Udeaja, & Zhou (2015); UNESCAP (2007); |
| High project values (cost) | Li (2005); Hwang (2012); |
| Lack of experience and appropriate skills of public actors | Li (2005), Chan et al. (2006); Corbett  and Smith (2006); Gunnigan and Rajput (2010); Hwang (2012); |

*Table 6 Made by author*

From analysing of common barriers to PPP in academic papers, the author retrieved 12 barriers that are divided to 5 groups. The 6th group is ecological barriers that does not include in this research, because there is no existing ecological barriers that hamper PPP projects. However, this group of barriers consider as potential direction of arising barriers to PPP. So it’s essential to apply this framework for revealing barriers to PPP to search and categorize barriers even if there is no barrier certain group now.

**Social group** of barriers refers to *public resentment due to tariff increases*. Public resentment is most likely to occur when consumers have to pay for service that initially were free or subsidized..

*Lack of well-established legal framework*refers to **legal barriers***.* PPPs must have clear strategies in order to remain optimistic and encourage private investors and commercial borrowers to participate. PPPs will only work if they are well organized and designed. Many researchers and official guidelines emphasize that clear legal and solid institutional basis is significant for successful PPP project [Grimsey and Lewis, 2004; Harris, 2004, United Nations, 2008; Mouraviev et al., 2012]. The main requirement for PPP development is adoption of national PPP law that set legal framework for public and private collaboration. But countries where PPP have already implemented generally have a well designed law basis. Here it is more relevant point that in the process of developing PPP is necessary to design new PPP amendments, which will respond new world changes

*Difficulties in seeking financial partners (Difficulties in securing credit facility from banks), high transactional costs for PPP projects is expensive* are considered as common **economic constraints** for PPP implementation. PPP project preparation has comprehensive nature due to multiplicity of interests and involved many stakeholders. This complexity increases transactional costs contained bidder and negotiation costs [Dudkin, Gerti & Välilä, Timo. 2005]. It is necessary for governments to create stable economic and financial supports to stimulate interest to PPP in private sector.

**Political environment** influence on PPP implementation significantly. Private sector is interested in stable public partners, who comply with all warranties during the PPP implementation. Lack of strong political commitment, lack of flexibility, uncertainty of political environment/political have affected as barriers to PPP that make this mechanism of collaboration public and private partners is less attractive for private sector. Political commitment is considered as crucial factor for developing successful PPPs projects [Dehli, Palukuri, & Mahalingam, 2010; Flinders, 2005; Johnston, 2010; Jooste et al., 2011]. The lack of political commitment, which is expressed in lack government supporting in PPP(Lack of guarantees/incentives by governments) discourage business in participation in PPP. Lack of transparency exists when public party in the partnership does not provide clarity about its expectations to the private partner and, reciprocally, the private partner does not provide insight on its performance to the public counterpart. Corruption behavior generates of distrust towards government of private sector and rise of unwillingness business become a partner of government. *The excessive restrictions* on participation in PPP arises when government create bidding that restrict the opportunity for business take part in competitions. Such corruption behavior of public actors may discourage private sector from participation in bargaining because of the absence of trust in fair bidding.

And the last group of barriers is **technological barriers.** These barriers correspond with technical internal part of the PPP project such as *lengthy delays in negotiation, inconsistent risk assessment and management, where high risk relying on private partners, poorly designed and structured PPP projects, where PPP process not clearly defined, high project value(cost) and lack of experience and appropriate skills of public actors. Shortage of professionals to handle PPP projects or lack of experience suggest that public partners* are still lacked expertise in PPP arrangement. PPP projects are usually complex, making the contractors more likely to incur losses without sufficient experience. So, it can make PPP projects is less attractive for private sector. *The lengthy delays in negotiation* is attribute PPP projects due to their high complexity and large-scale, it would discourage business from tendering for PPP projects. Misallocation risk can be a potential barrier because private partner can run the majority numbers of risks. However public and private partners should strive to equitable risk allocation to have opportunity to generate better outcomes[Sun et al. 2008] The wrong distribution of risk leads to PPP project fail [Chan et al 2010]. Poor structure or design PPP projects mean that it is not clear for private sector the main attributes of mechanism of PPP. It can be obscurity in financial and law models, and in payment mechanism. The next barrier for PPP implementation is *high project value(cost).* It’s true that PPP project generates high transaction costs, because supplementary cost such as advisors and others and higher financial cost due to private sector borrow money at higher interest rate than government does, because the government’s risk –free borrowing rate[RESTAURA 2017]. Also, the tendering for traditional procurement is quite less in term of cost than tendering for PPP [ Birnie, 1999]. Usually PPP contracts are used in circumstances of considerable ambiguity. Therefore, ensuring cost-effectiveness at all project levels and on budget, under rapidly changing circumstances is a major challenge in PPP's. One way to do this is by flexible contracting, proactively anticipating potential changes in the planning process and offering versatile contract frameworks for an successful response. But the *lack of flexibilit*y, using inflexible bureaucracy procedures that do not answer new challenge in PPP process may lead to less effectiveness and even fail of PPP project.

**2.2 Specific barriers for PPP in Russian ICT sector**

Critical review is carried out to identify existing barriers that may be an obstacle to the successful implementation of PPPs in the IT sector. Theoretically identified barriers will be applied to the analysis of ongoing PPP projects in IT in Russia. An analysis of the barriers specific to PPP IT projects in Russia will make the identification of barriers more accurate and detailed for the Russian market.

Legislative restrictions may be negative factors for the development of PPPs in the IT sector in Russia. So according to 115-ФЗ and 224-ФЗ there are restrictions for foreign investors to participate in PPP projects. This significantly narrows the range of potential projects, since the use of digital technologies of foreign “origin” is widespread in the private business environment. Also, the participation of municipal authorities is prohibited in 224-ФЗ and remains unregulated in 115-ФЗ. The inability for municipalities to act as a subject of public-private partnerships may be a potential barrier to the development of information and technological projects of PPPs. As part of the Smart City project, which is part of the national project Housing and Urban Environment, there is a big request from both the municipal authorities and the private sector to create IT projects through PPPs. According to the vice-speaker of the Federation Council Andrei Turchak, PPP at the municipal level has great potential for development in the framework of the Digital Region projects, the purpose of which is to develop digital technologies and solutions in Russian regions [RBC 2019].

The launch of IT projects can also inhibit the risk for the private side of the private initiative procedure, in which time and money invested in the development of a private initiative may not pay off. Since after submitting a private initiative, an obligatory step is to hold a tender for the conclusion of a PPP, where another company can win the tender for the conclusion of a PPP. Thus, a company developing a private initiative will incur losses because it will not be able to recoup the investment in developing a private initiative. Also, while there is currently no description of the procedure for assessing the comparative advantage of a PPP agreement over a state contract (when implementing the project under 224-FZ), which can also be a problem for the development of PPP in the IT sector.

Evgenia Zuisman, Deputy Director of the Center for Investment Analysis, ISSEK NRU HSE, noted that one of the most important barriers to the development of PPPs in the IT sector is the lack of methodological recommendations for the monetization of projects. The market still lacks an understanding of which IT projects could be launched as part of concessions and PPPs, how the model should be built for the return on investment from which the project will pay off [Issek.hse 2018].

A barrier can also be that it is still not legally defined which of the partners should be the owner of information in information systems. There is no legal framework for what and in what cases the information should belong to the concessionaire (private partner), and in which concessor (public partner) it causes uncertainty in determining the owner of the information between the partners. Such uncertainty affects the subsequent uncertainty of what type of information can be used and in what cases for additional commercialization of the project [infraone research 2019b].

Also, many digital projects are platform solutions, such as digitalization of regional and municipal public services, platform solutions for the development of the territory and more [Strategic development center 2018]. At the moment, it is unclear whether they can become objects of concessions and PPP agreements and how interaction between authorities should be organized if such projects turn out to be multifunctional - related to various industries. In light of the fact that many IT projects are implemented on the basis of platforms, it is not clear whether the “packaging” of platform solutions in concession and PPP is possible.

Since ICT are new facilities for which PPP agreements can be concluded, authorities, mainly regional ones, may have difficulty assessing the cost of creating IT facilities (results of intellectual activities and services for their creation. Lack of methodological recommendations for assessing the cost of creating an ICT project ( methodologies for determining the cost of development, operation and development) may impede the creation of PPPs in the ICT sector.

In Russia, PPP market participants characterize the existing procedure for assessing effectiveness as unsustainable and requiring improvement. Moreover, the compulsory nature of accounting for such an assessment, which is quite complex and time-consuming, is considered as one of the key barriers to launching PPP projects under the new legislation in the process of choosing the project implementation form [National PPP center 2018].

One of the barriers to the rapid growth of PPP projects in the IT sector in Russia may be the lack of a developed telecommunications network. According to the Russian infrastructure rating of 2019, the average index across the country is 6.45 out of 10. The most developed regions in terms of telecommunications infrastructure include Moscow (9.94), St. Petersburg (8.54), Sakhalin (7.86) , Nizhny Novgorod (7.75) and Novosibirsk regions (7.63). While 38 regions are below the midpoint [Infraone Research 2019]. For the implementation of most IT initiatives, broadband Internet access, developed mobile and fixed communications are required. For example, the lack of the necessary infrastructure "framework" will not allow to implement projects for the storage of large amounts of data, their transmission and processing, as well as for use in other, including related, industries without additional investment in infrastructure.

**Potential barriers in Russian ICT sector**

|  |  |
| --- | --- |
| **Group of barriers** | **Barrier** |
| **Legislation** | Limited participation in accordance with Federal Law 115 and Federal Law 224 of foreign investors and Russian, if the latter is influenced from abroad |
| A direct ban on concluding agreements on municipal-private partnership in the field of ICT in accordance with Federal Law 224 and legal uncertainty on concluding municipal-private partnership agreements in Federal Law 115 |
| Lack of description of the procedure for determining the holder of GIS information in concessions and PPPs |
| **Political** | The lack of a mechanism for interaction between authorities in the formation of unified architectures of IT solutions (development of information platforms) |
| **Technological** | Lack of methodological recommendations for monetization of IT project |
| Lack of methodological recommendations for assessing the cost of creating an ICT project |
| Lack of criteria for evaluating the effectiveness of ICT projects in 224 Federal Laws |
| Undeveloped telecommunications infrastructure |
| The “cost” of the private initiative procedure is too high |

*Tables 7 Made by author*

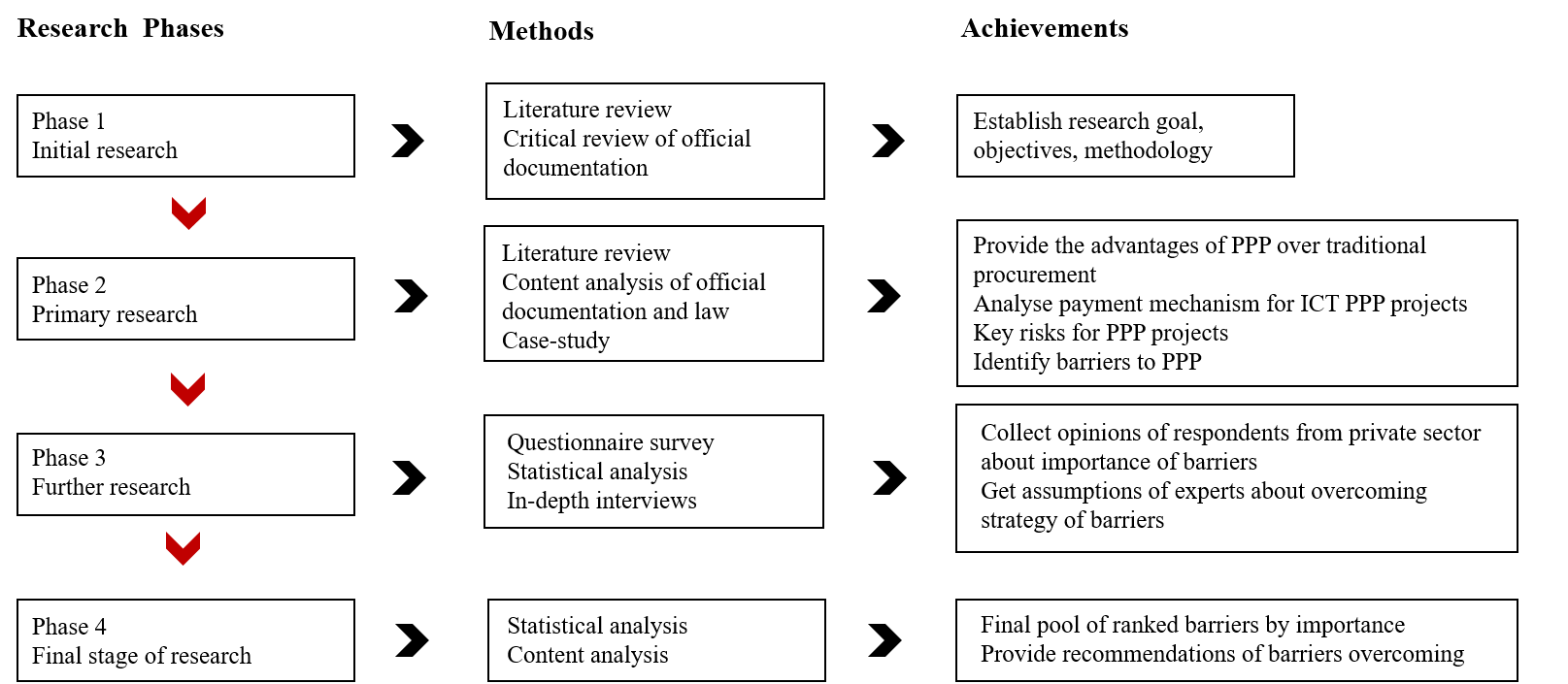
The identified barriers characteristic of Russia are included along with theoretical barriers in the questionnaire in order to assess the importance of these barriers from the point of view of the private sector.

1. **Evaluation of revealed barriers and providing recommendations**

In the last paragraph of this study, the author provides a description of the research design, as well as a detailed description of the empirical part of the work. The result of the empirical part of the work was the creation of barriers pool ranked by significance, as well as the provision of recommendations for overcoming the most significant of them.

**3.1 Research design**

To answer on research questions and identify important barriers author the next research structure was created.



*Figure 1 Research design. Made by author*

An opinion survey, using a questionnaire, was used to identify important barriers to PPP in ICT sector for private companies. The sampling technique is not randomly assigned, because there is no comprehensive database of all PPP in Russian ICT sector, which using to organize random sampling(To use random sampling would demand that the population is known). Also, a small amount of PPP in ICT is a high restriction for good randomly assigned sample. Since all the survey respondents are involved in PPP projects/traditional procurement, or have experience PPP bidding the validity of the survey response data can be reasonably inferred.

The first stage of questionnaire with identified barriers was tested. The questionnaire was sent to experts Alexandra Orekhovich - Director of Legal Initiatives and Nadezhda Kostryukova - Head of the Center for the Development of Investments and PPP in the Digital Economy (SRI "Voskhod") who gave comments on the identified barriers. All barriers were finalized according to expert opinion, so the questionnaire acquired a more finished look.

At the second stage of the research, the questionnaire was sent to the following groups of respondents.

Group of respondents consists four main actors:

* Existing private partners and concessionaire, who already involved in PPP
* Bidders, who take part in PPP bidding
* IT companies, which are providing technology for public sector through other mechanism of public and private collaboration
* Funding organizations

IT companies are include in the pool of respondents, because they already involve in collaboration with public sector, but in some reasons does not use PPP as mechanism for this collaboration. It means that they know about negative aspects of using PPP to providing technology. Funding organizations are included in pool of respondents because they are the most important actors that decide whether project would implement or not in terms of loan approval or disapproval.

Information about survey participants were sourced from different types of resource: form PPP bidder site – torgy.ru, then also from PPP database – ROSTINA and from the project of agreement of PPP or project of concession. The survey instrument was divided into two parts. The first section included question meant to profile the respondents and their companies. And the second part contain the 18 barriers to PPP in ICT sector.

Experts from Rostelecom, Megafon, Sberbank, Gazprombank, Promsvyaz bank and others took part. Experts were asked about importance of barriers in second stages of research. They should evaluated of 18 barriers using Likert scales where 1 point was insignificant barrier, 5 was significant barrier. Insignificant barrier meant the absence of a barrier to PPP in the ICT sector and significant barrier was a circumstance that impedes the development of such projects. More then 60questionnaires were sent out, and a total of 10 were returned. The overall return rate for the survey is therefore 16%. This response rate is not untypical for management research the average rate of return of questionnaires. Also, this management is pilot study that does not require the huge amount of answer of respondents. So, that’s why the final data received were considered sufficient for descriptive analysis.

The next step of research was the conduction of interviews with experts of PPP in ICT sector. Using this method two goals were managed to achieve. The first one is to test recommendations that author had already provided and the second one was to obtain the experts’ opinions about new strategies to overcoming revealed barriers.

Also, Sheglov Arthur, founder and Managing Partner of the Hyperion and Coordinator of InfraClub, in past Arthur was an expert of the largest centre of PPP in Russia – National centre of PPP, and Duban Anna – the head of legal department of High School of Economics acted as an experts in semi-structured interviews to providing the strategies of overcoming the most important barriers for PPP in Russian ICT sector. During semi-structured interviews, ranked barriers were provided to experts. The most important barriers were analyzed and expert provided effective mechanisms of overcoming these barriers. So, the recommendations are based on analysis of previous papers and experts’ opinion.

**3.1.2 Survey Results**

At table below the result of the first stage of research - questionnaire are showed. Two basic metrics was used to evaluate of answers of respondents – mean-score and standard deviation. Mean score helps to reveal significant barriers and standard deviation shows the dispersion of expert opinion toward to barriers.

**Estimated barriers to PPP in ICT sector**

|  |  |  |
| --- | --- | --- |
| **Barriers** | **mean** | **std deviation** |
| 1. Lack of flexibility (high level of bureaucracy) | 4,63 | 0,52 |
| 1. High transaction costs of the partnership (filing a private initiative, the cost of bidding and negotiating a contract) | 4,13 | 0,35 |
| 1. Insufficient incentive policy (difficulty in obtaining guarantees for the return of invested funds) | 4,00 | 0,76 |
| 1. Lack of experience and expertise with a public partner in PPP | 4,00 | 0,53 |
| 1. The lack of a mechanism for interaction between departments of authorities in the creating of unified architectures of ICT solutions (development of information platforms) | 3,75 | 1,04 |
| 1. Shifting greater risks to a private partner | 3,75 | 0,71 |
| 1. Lack of a PPP risk management strategy in the ICT sector | 3,63 | 0,74 |
| 1. The lack of methodological recommendations for assessing the cost of creating an ICT project (methods for determining the cost of development, operation and development) | 3,63 | 0,92 |
| 1. The lack of criteria for evaluating the effectiveness of IT projects in 224 Federal Laws | 3,63 | 0,92 |
| 1. Lack of clear financial structuring of PPP projects in the ICT sector (lack of clarity in the application of the payment mechanism, types of project financing and more) | 3,25 | 0,89 |
| 1. Lack of description of the procedure for determining the holder of GIS information in concessions and PPPs | 3,25 | 1,39 |
| 1. Unavailability of users to pay for the service | 3,13 | 1,13 |
| 1. Difficulties in finding financial partners and obtaining financing | 2,88 | 0,64 |
| 1. The high cost of a PPP project in the ICT sector | 2,88 | 1,36 |
| 1. A direct ban on concluding agreements on MCHP in the field of ICT in accordance with Federal Law 224 and legal uncertainty on concluding the municipal-private partnership agreements in Federal Law 115 | 2,75 | 1,04 |
| 1. Corruption behavior of authorities (restrictions on participation in tenders) | 2,13 | 0,64 |
| 1. The participation of foreign investors and Russian investors in accordance with Federal Law 115 and Federal Law 224 is limited if they are influenced from abroad | 2,13 | 0,99 |
| 1. Undeveloped telecommunications infrastructure | 2,13 | 0,64 |

*Table 8 Made by author*

**3.2 Recommendations to overcoming important barriers**

Recommendations for overcoming barriers are based on the results of the study, including a content analysis of theoretical and analytical materials, as well as several interviews with experts, representatives of the HSE, InfraClub, and Hyperion research institutes. In the interviews, the recommendations made were tested and expert comments were received that helped to refine recommendations on overcoming barriers to PPP in the ICT sector. The recommendations are designed for the most significant first seven barriers to the private sector.

**Barrier 1. High level of overregulation in creating and implementation project (low level of flexibility)**

A high level of bureaucracy applies to most public sector projects. Experts noted that bureaucratization is one of the characteristics of interaction with authorities, designed to establish a strict systematization and order of interaction between authorities and other stakeholders.

**Recommendation for overcoming**.

In general, at the current early stage of the development of PPP in ICT, it is still difficult to give recommendations for PPP in ICT on this barrier, since a sufficient number of projects have not been implemented to analyze the inefficiency of interaction procedures (high bureaucracy). But it is important to note that analytical institutions and the Ministry of Economic Development and the Ministry of Communications should conduct studies to evaluate the interaction of PPPs in ICTs. Since it is a retrospective analysis of interaction that can reveal unnecessary mechanisms, fragments in the cooperation of the public and private sectors, and on the basis of such an analysis, reduce the bureaucratic nature that, according to private business, exists. Such an analysis can be based on the use of case study techniques and in-depth interviews with participants in PPP ICT projects.

**Barrier 2. High transaction costs of the partnership (cost of design a private initiative, the cost of bidding and negotiation)**

There are several reasons why transaction costs in PPPs would be high, especially compared to traditional procurement of public investment projects. The main sources of higher transaction costs in PPPs are their long-term character, ownership and financing structures, and risk-sharing features. ICT PPP projects may create uncertainty due to novelty and lack of established practices of collaboration in such projects. Negotiation in circumstances of lack of established practices may increase transaction cost due to coordination of multiple interests of stakeholders.

**Recommendation for overcoming**

Experts noted that the ICT sector is characterized by a wide variety of potential projects that require an individual approach. This point supports that the high standardization of ICT projects will not get widespread development. The use of boxed solutions that could reduce transaction costs due to their high standardization is difficult in the ICT sector, since, unlike housing and public utilities and municipal solid waste, creating small standardized projects in this sector is not possible. However, the development of a template package of documents that can be used to conclude an ICT PPP project will reduce the costs of submitting a private initiative and participating in competitive procedures. Such recommendations on a standard set of documents for PPPs in ICT should be developed by regional governments, which will post on their information resources to facilitate the participation of a private partner in ICT PPPs.

The next recommendation, which will reduce transaction costs in PPP, is the transfer of pre-competitive and competitive procedures online. The submission of a private initiative, participation in competitive procedures for a private partner, as well as the initiation of a PPP project and the preparation of a competition for the public should be largely organized on online platforms. At the regional levels, GIS (digital platforms) should be developed where companies could register and provide most of the documents online that are required to participate in the competition for the conclusion of a PPP project. A bidder could interact directly with a public partner through this platform. Additionally, funding organizations, contractors, and the public can be included in such a platform. However, the possibility of including these stakeholders in such a system should be considered separately. Participants in public procurement use only online platforms, such as Birch, Sberbank-AST, RTS-Tender, and the National Electronic Platform to reduce the time and cost of competitive procedures. Translation of pre-competitive and competitive procedures online as a whole will reduce transaction costs for participation in PPPs and in PPPs in ICT.

At present, the issue of the right to reimburse a participant in the tender who has taken the initiative to conclude a concession agreement / PPP agreement but has not won the tender has not been closed. Such compensation is established in a certain amount of the total cost of the creation (reconstruction) of the object, which is a positive step for the development of PPP projects in the infrastructure market. The investor does not receive anything if they lose in bidding, even all project was developed by them. It reduces the motivation for developing projects. However, the development of ICT PPP projects by private initiative is extremely important since the development of innovative projects requires high expertise. Developing a broad expertise of a public partner is time consuming. Therefore, for the rapid growth of PPP projects in ICT, such a mechanism to reduce transaction costs is necessary.

**Barrier 3.** **Lack of incentive policy**

A high assessment of the significance of the insufficiency of incentive policies means that at the moment, according to private companies, authorities are organizing insufficient incentive measures - financial and non-financial incentives for private sector participation in PPPs.

Incentive measures are divided into two categories - financial and non-financial measures. It is important to note that such measures should be in balance. The recommendations examined proposal measures in these two areas.

**Recommendation for overcoming**

For the comprehensive development of PPPs in the regions, regional centers should have decisions on clear mechanisms for applying financial incentives to a private partner. Experts notices that federal subsidies, despite the difficulty of obtaining them, are necessary for the implementation of ICT projects in the regions. Regional budgets may not be ready to accept budgetary obligations that are necessary for the implementation of medium and large ICT projects. In such cases, the support of the federal center is important for the regions. However, obtaining subsidies for a PPP project is a difficult task for the region; therefore, facilitating and developing more transparent mechanisms for obtaining support for regions in the form of subsidies from the federal center can be an impetus in the development of ICT PPP projects outside federal centers in Russia. The Ministry of Construction’s initiative on the project of inter-budget transfers for projects implemented within the framework of the digital economy is under consideration. The adoption of such a project will facilitate the receipt of an inter-budget transfer for a project implemented within the framework of the digital economy in the form of subsidies for the regions. However, the Ministry of Economic Development and the Ministry of Communications should clarify the mechanism for providing regional authorities with subsidies from the federal budget specifically for PPP projects in the framework of new competitive procedures proposed by the Ministry of Construction [regulation.gov 2020].

One of the effective mechanisms for stimulating the creation PPP projects in the field of ICT is the redistribution of funds generated during the implementation of a large project to the implementation of small projects in the same field. As part of such a reallocation, a fund is being created whose main task is to provide support and provide funding for other projects. According to experts, such a large project could be a federal concession agreement on labeling of goods. Such a mechanism is attractive for business, since the fund is financing the PPP project.

The next recommendation on financial incentive policy is the legislative determination of grant of minimum guaranteed yield for PPPs in ICTs. At the moment, such a mechanism is legislatively fixed only for projects in the field of road construction. To improve the investment climate, legal certainty is needed, in which minimum guaranteed yield is fixed as a payment mechanism for PPP in ICT. Such a guarantee applies to the provision of paid services, in case the level of income or the volume of services provided is less than stipulated in the agreement. PPP makes it possible to commercialize ICT projects, so the guarantee of income reimbursement will be a good incentive for the development of such projects. The credit quality of the project is also improving due to the availability of minimal guaranteed income.

It is also important to ensure that clarity is achieved on the availability of financial and non-financial support for the private partner by the public partner before an agreement is reached. Extensive informational coverage of potential mechanisms of public partner support for a private PPP project will make this format of cooperation with the public sector more attractive for private investors. A potential stakeholder that could provide increased awareness of financial and non-financial measures to support PPPs is the National PPP Center, as well as a research institute, Voskhod. Since these institutions have wide experience in creating informational materials on PPPs - analytical materials, methodological recommendations. Information support should be provided in such a way that the types of support by a public partner are clear, which could stimulate investors to participate in PPPs.

**Barrier 4. Lack of experience and expertise with a public partner in PPP**

One of the main problems facing PPPs is a shortage of public sector resources and experience. The planning and management of PPP contracts, particularly those new to PPPs, can be a complex and resource-intensive undertaking for an authority. A range of different skills are also needed throughout the project cycle. This problem also can be compounded by resistance or inertia within the public sector to new and unfamiliar processes and approaches.

**Recommendation for overcoming**.

To develop the competencies of a public partner, it is necessary to develop specialized programs for retraining officials with the possibility of obtaining a diploma from leading universities in the country. On the basis of universities, programs can be developed with the involvement of experts from existing PPP centers, legal consulting companies and analytical agencies to conduct programs with the aim of re-qualifying authorities. So the HSE program on PPP in the Digital Economy already exists with the involvement of experts from the Internet Initiatives Development Fund, Hyperion. The Skolkovo Innovation Center also provides PPP training for regional authorities. And according to Arthur Shcheglov, their institute received applications from the authorities of the Siberian Federal District, who suggest organizing a regional PPP program in the ICT sector on the basis of Novosibirsk State University. Thus, universities, including SPbU, can become new platforms for training specialists in PPP.

Creation of retraining programs in all regions of Russia on the universities’ basis is impossible, since it will incur high costs. In this case, online training is also one of the possible channel for training specialists. Such courses can also be effective as offline if teaching methodology is build right, where the theoretical aspects of PPP can be presented in the framework of the recorded lectures, but practical skills should be organized using the case study method with feedback from PPP experts in ICT areas

The next mechanism for overcoming the lack of expertise among the authorities is the inclusion of research institutes as important stakeholders in the conclusion of PPPs. According to the laws Federal Law 115 and Federal Law 224, certain rights and obligations of a public partner can be exercised by authorized bodies and (or) legal entities.

In the situation of the novelty of ICT projects and the lack of wide pool of analogues, experts of special institutes can, at the request of regional authorities, conduct competitive procedures and act as an executor from the moment of documentary preparation for PPP to the moment of conclusion of an agreement, participate in negotiations, in the development of design estimates, provide a private partner assistance in obtaining mandatory permits and more. A similar system for attracting specialized organizations exists in the public procurement system, where such organizations act as stakeholders for government contracts. In the absence of competencies in both PPP and digital skills, regional authorities should focus on applying this mechanism.

The most important reason for the lack of expertise among government officials is the lack of understanding of the benefits of implementing an ICT project through a PPP mechanism. Since the current implementation of ICT projects through the public procurement mechanism is less complex and costly. It is necessary to develop methodological recommendations that indicate the benefits of implementing ICT projects through a PPP mechanism for the emergence of political will. In such methodological recommendations, it is important to fully reflect the roadmap of the project to provide officials with a full description of the strategy for creating an ICT project through PPPs. The creation of such methodological recommendations should be given to PPP experts in ICT who would have wide experience and expertise in this sector - the Voskhod Institute is such a stakeholder in Russia.

**Barrier 5.** **Misallocation of risks (shifting more risks to a private partner)**

There is no standard risk allocation for PPP projects in any sector, including the ICT sector. The distribution of risks between partners is always a matter of agreement between the two partners, based on understanding who of them is better able to manage the corresponding risk, who has the resources and expertise to manage this risk. The allocation of risks to private partners that are better handled by the public partner may result in low private sector interest in the PPP project or may even make the project unbankable. When these risks are agreed by the private party, this may result in higher costs than required to handle these risks, eventually resulting in the PPP failure.

**Recommendation for overcoming**

Correct template distribution of risks does not exist, since each project is unique. However, for more efficient risk sharing, methodological recommendations should be drawn up that reflecting the most widespread risk sharing practices for ICT projects. Such recommendations will reflect the general approaches to the distribution, however, the setting of the final pool of distributed risks will always remain a contractual part of the relationship of partners.

In this work, risks for PPPs in the ICT sector were identified and the most effective distribution of identified risks was provided as recommendations.

**Risk allocation in PPP in ICT sector**

|  |  |  |
| --- | --- | --- |
| **Risk** | **Public partner** | **Private partner** |
| Risk of social discontent | C:\Users\Оксана\AppData\Local\Microsoft\Windows\INetCache\Content.Word\confirm.png |  |
| Revenues risk | C:\Users\Оксана\AppData\Local\Microsoft\Windows\INetCache\Content.Word\confirm.png | C:\Users\Оксана\AppData\Local\Microsoft\Windows\INetCache\Content.Word\confirm.png |
| Construction overruns |  | C:\Users\Оксана\AppData\Local\Microsoft\Windows\INetCache\Content.Word\confirm.png |
| Change in Law | C:\Users\Оксана\AppData\Local\Microsoft\Windows\INetCache\Content.Word\confirm.png |  |
| Risks of lack or insufficiency of project feasibility | C:\Users\Оксана\AppData\Local\Microsoft\Windows\INetCache\Content.Word\confirm.png | C:\Users\Оксана\AppData\Local\Microsoft\Windows\INetCache\Content.Word\confirm.png |
| Risk of insufficiency or redundancy of project information disclosure | C:\Users\Оксана\AppData\Local\Microsoft\Windows\INetCache\Content.Word\confirm.png | C:\Users\Оксана\AppData\Local\Microsoft\Windows\INetCache\Content.Word\confirm.png |
| Environmental risk |  | C:\Users\Оксана\AppData\Local\Microsoft\Windows\INetCache\Content.Word\confirm.png |
| Negative Employment Risk |  | C:\Users\Оксана\AppData\Local\Microsoft\Windows\INetCache\Content.Word\confirm.png |
| Risk of disinterest in the use of project services by users | C:\Users\Оксана\AppData\Local\Microsoft\Windows\INetCache\Content.Word\confirm.png | C:\Users\Оксана\AppData\Local\Microsoft\Windows\INetCache\Content.Word\confirm.png |
| Risk of leakage of information and / or personal data |  | C:\Users\Оксана\AppData\Local\Microsoft\Windows\INetCache\Content.Word\confirm.png |
| Technology obsolescence risk |  | C:\Users\Оксана\AppData\Local\Microsoft\Windows\INetCache\Content.Word\confirm.png |
| The risk of a flammable situation at technological facilities (fire, explosions) |  | C:\Users\Оксана\AppData\Local\Microsoft\Windows\INetCache\Content.Word\confirm.png |
| Risks of the "first day" (putting the project into operation) |  | C:\Users\Оксана\AppData\Local\Microsoft\Windows\INetCache\Content.Word\confirm.png |

*Table 9 Made by author*

**Barrier 6. Lack of a PPP risk management strategy in the ICT sector**

The risk management strategy consists of several stages: identification of risks, assessment of the probability of occurrence and the corresponding consequences of risks, distribution of risks between project partners, development of protection mechanisms, risk mitigation strategies that reduce the likelihood of their occurrence, as well as monitoring risks throughout the project. The insufficiency of PPP risk management strategies in ICT means, firstly, that there is a lack of risk management measures / strategies for ICT PPPs, and the barrier also means that partners may not be aware of the application of certain risk management strategies for projects.

**Recommendation for overcoming**

To overcome this barrier, methodological recommendations on risk management should be developed: identification, distribution, and mechanisms to mitigate the consequences of risk. Such methodological recommendations should include an overview of the best Russian and world practices of managing risks in PPP projects. The risk management recommendations based on risks identified earlier in the work are presented in the table below as an example of the application of risk mitigation mechanisms. However, it is important to pay attention to expanding research on possible risks in ICT for PPPs and their management. Such studies should be conducted by expert research centers - National Center for PPP, Sunrise.

**Risk mitigation strategy for ICT PPP**

|  |  |
| --- | --- |
| **Risks** | **Risk mitigation strategy** |
| Risk of social discontent | - Involving potential users in the social assessment of the project in the first stage - the initiation of a PPP project  = Analysis of the needs of the population in the implementation of the project by conducting opinion polls  - Posting information about the planned project for implementation in public access  - Analysis of the level of satisfaction of the population with the quality of the services provided |
| Revenues risk | -Application of minimum guaranteed income |
| Construction overruns | - Adequate assessment of the creation of the project in terms of time and investment |
| Change in Law | - Compensation for losses from a public partner  - Extension of the term of the agreement for damages caused by changes in legislation |
| Risks of lack or insufficiency of project feasibility | *-* A thorough assessment of the effectiveness of the project according to 224 Federal Laws  - Obtaining expert assessment to create a concession |
| Risk of insufficiency or redundancy of project information disclosure | -Adaptation of project documentation for its use in public space |
| Environmental risk | - Control of technological equipment - placement of sensors for tracking equipment |
| Negative Employment Risk | - Compensation for downsized employees |
| Risk of disinterest in the use of project services by users | - Conducting a survey among potential users to assess the relevance of the project  - Development of special conditions for new users (for example, a labeling system should have developed a program of preferences / loyalty for the connected business to the new system) |
| Risk of leakage of information and / or personal data | - Development of administrative and organizational measures to protect information  - Implementation of special technical and software measures for data protection |
| Technology obsolescence risk | - Provide costs in the agreement for updating technological equipment  - Compensation from a public partner if technology obsolescence has occurred due to the adoption of new laws (law case) |
| Risk of damage to process equipment (fire, explosions, vandalism) | - Assessment of technological stability of equipment  - Installation of control systems for technological equipment |
| Risks of the "first day" (putting the project into operation) | - Test runs of the project, checking for potential problems at the start of the project (testing)  - Adequate assessment of the timing of the project |

*Table 10 Made by author*

It is important to note that following even a few recommendations will allow the comprehensive development of PPP in ICT. For example, increasing the competencies of officials and experts of regional PPP centers will indirectly affect the reduction of transaction costs of PPPs, as with an increasing participants expertise, the interaction mechanisms can be reviewed to more efficient way, also expertise of participants would influence on better risk allocation between partners. All recommendations are strongly intertwined, so when implementing recommendations for certain barriers, the likelihood of lowering another barrier to PPP in ICT is increased.

**Limitations and further research**

It is important to note that the study has a number of limitations that should be noted to describe the boundaries of the work.

The identification of PPP barriers in the ICT sector requires further research. This work considers general barriers such as financial, legislative, and managerial for PPP in the ICT sector. The focus of further work should be focused on the study of different types of barriers in more detail, for example, legal barriers for ICT PPPs or financial barriers for PPP ICT. Such narrowly focused studies will be able to elaborate barriers of the same type in more detail.

The lack of a sufficient number of cases explained the choice of methods of barrier of identification. Based on an analysis of analytical and theoretical materials, the author was able to identify barriers that were subsequently assessed by representatives of the private sector. However, barriers can be identified through the use of in-depth interviews of participants in several cases of PPPs, which can describe in more detail the barriers they faced during the implementation of projects. However, for such a research design, a sufficient base of PPP projects should be accumulated to consider in depth several cases in which difficulties arose during implementation. Thus, as PPP cases in ICT increase, barriers should be determined using expert assessment methods for case participants.

In the study, 10 experts were interviewed, 2 experts took part in a semi-structured interview. To obtain more accurate estimates of barriers and expand the range of opinions regarding significant barriers, the sample of respondents should be expanded.

A small number of cases does not allow to fully investigate the potential barriers of PPP in ICT, the increase in cases may reveal a wider pool of barriers, as well as risks for this sector. Therefore, research in this direction should be continued.

The author of the work focused on the study of significant barriers for the private sector. However, barriers should also be identified based on the opinions of representatives of the authorities. The development of PPPs in the ICT sector will make it possible to increase the sample of respondents, which means applying quantitative assessment methods, for example, factor analysis, or when several or more stakeholders are included in the survey, to evaluate their concordance coefficients relative to the significance of barriers, which will subsequently help develop more unique strategies for overcoming barriers for each of PPP partners.

**Conclusion**

This paper examines the barriers to successful PPP implementation in Russian ICT sector. Analysing consisted three main stages – revealing barriers, evaluating barriers by expert respondents and providing recommendation based on experts’ opinions.

Since the main goal of paper provides recommendation to overcoming barriers to PPP in Russian ICT sector, this paper started from analysing PPP concept and its main characteristics. Approaches different researches and global institutes were considered and the main features were defined in this paper. Then paper moved to revealing the role of ICT in public sector where author considered how ICT is being used in public sector now and also provided analysing of expenditures of both woldwide and Russian regions for integration of ICT in public process. As results this analysis illustrated that share of ICT in overall expenditures in Russian and in global is growing extremely fast that confirm the necessity of investment attraction beyond public budgets and subsidies. Examination of PPP implementation in ICT sector allowed to look at potential ways of using of PPP in new sector, to consider the advantages of using PPP in general and advantages in comparison with traditional procurement. In order to understand the current market situation for ICT PPP, author provided the analysis of investments to PPP, amount of projects, applied model and geography distribution of ICT PPP projects. The result of this analysis is to illustrate that there is no huge growth of PPP ICT project. However, the majority ICT PPP projects are being implemented in transport sector and not so many ICT PPP projects are being implemented in other sectors, for example, e-government. Also, two important features of PPP such as payment mechanism and risks are considered in the first chapter. It’s important to notice that this paper is the first research where risks to PPP ICT projects are described, that attach high value this research. All of this preliminary work helped to immerse deep into problematic using PPP on ICT sector.

The second chapter was dedicated to revealing of potential barriers. However, for barriers’ identification was important to define the concept of barrier because literature review showed that existing paper don’t provide the full explanation of barrier. Explanation that using in this paper was investigated based on choosing methodology – concept of constraints. So, this paper identified concept of barriers as *restrictions or circumstances that impede the financing, planning, execution and operation of facilities, the production and provision of public sector services under PPP*. Author chose a content analysis as a method for revealing of barriers. This choose was determined by lack of numbers of PPP projects in new sector. Author analysed theoretical and analytical documentation to disclose potential barrier. This analysis allowed to reveal 12 theoretical barriers to PPP and 9 barriers that specific for PPP Russian ICT sector. It was important to identify barriers through literature because using theoretical barriers helped author the specific barrier for Russian sector, for example, lack of legislation as theoretical barrier later was specified as *Lack of description of the procedure for determining the holder of GIS information in concessions and PPPs* or a *direct ban on concluding agreements on municipal PPP in the field of ICT in accordance with Federal Law 224 and legal uncertainty on concluding municipal PPP agreements in Federal Law 115.* The result of second chapter of research was to identification of potential barriers for PPP ICT sector on Russia.

All of revealed barriers were evaluated at the third stage of research. To form of ranked pool of barriers respondents from huge companies such as Rostelecom, Lanit, Megafon, Gazprombank, Promsvyazbank and other were invited to take part in survey. Compensation of amount of responds provides high level of expertise of interviewed respondents. Pavel Brusser, the head of PP department of Gazprom, Iskender Nurbekov, the head of digitalization and GR at Sberbank, Ivan Gushkov, the head of traditional procurement in Lanit, Nadeshda Kostrukova, the head of Smart city of Rostelecom and the head of developing PPP and investment centre in digital economy in Voshod, and others acted as expert respondents to evaluate barriers to PPP in ICT sector. Collection 10 expert responds allowed to rank the revealed barriers from the most significant to the least significant one. This evaluation showed the most significant barriers that hamper PPP development in ICT sector by experts evaluation.

To provide the managerial implications two expert semi structured interviews were conducted. These interviews approved recommendations provided by author and helped to modify recommendations. So, the main goal of research has been achieved because author provided recommendations as managerial implications that stackholders should apply to overcoming barriers to PPP in ICT sector. It has high managerial value because recommendations for overcoming these significant barriers were provided. Following these recommendation helps authority to increase the attractiveness of PPP for IT companies and financial organizations.

Also, author considers the limitations of this research and provides several idea for further research.

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