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## **TOOLS TO STIMULATE BLOCKCHAIN: APPLICATION OF REGULATORY SANDBOXES, SPECIAL ECONOMIC ZONES, AND PUBLIC PRIVATE PARTNERSHIPS**

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**ABSTRACT**

The Blockchain technology has significant and almost limitless potential. However, today their use for implementation is associated with the problems of lack of high-quality legal regulation of this technology; technical standards for its application; investments required for its development. These problems and the search for their solutions are especially relevant now, in the context of the financial crisis. In this regard, the purpose of the article is to analyse the legal mechanisms and tools that make up special and experimental regimes, the use of which contributed to the introduction of the Blockchain technology into industrial production, identifying their features in relation to individual countries, problems associated with their implementation and finding solutions. The research is based on comparative legal and system analysis, as well as methods of legal modelling and content analysis. The author comes to the conclusion that in order to increase the attractiveness of the legal climate for the implementation of the Blockchain technology, it is necessary to develop a “high-quality” legal regulation, standards for normative and technical regulation of this technology, and improve legislation on the main tools aimed at stimulating investment in the Blockchain technology.

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## 1. INTRODUCTION

The Blockchain technology (Blockchain) was first talked about in 2008, after the publication of the article “Bitcoin: A Peer-to-Peer Electronic Cash System”, written by a group of authors under the pseudonym S. Nakamoto (2009). This technology (Blockchain 1.0) was recommended to be used to verify Bitcoin transactions. Initially, this technology was used to verify financial transactions in operations with cryptocurrencies. However, afterwards, it found its application in the framework of registration of rights to real estate, medical data, etc. This technology can also be very effectively used for the development of the so-called “smart” industry. At present, a number of companies in the energy, mining and manufacturing industries are using this technology, among other needs, to ensure reliable supply chains. For the successful implementation of this technology in industrial production, states use special and experimental regimes (special and experimental regulation). Further, with the advent of self-executable contracts (smart contracts) in 2013, Blockchain technology is gaining even more popularity (Borg and Schembri, 2019). Smart contracts made it possible to implement through Blockchain technology (Blockchain 2.0) (Aggarwal and Kumar, 2021) a diverse set of business functions related to the transfer of information and/or values, while leaving transparent and reliably verifiable information flows<sup>1</sup>.

Over time, the capabilities of this technology made it possible to use distributed ledgers not only within the framework of cryptocurrencies. Since the records in the chain are stored and distributed across the nodes of the network, they are very difficult to falsify, which makes Blockchain a safe and transparent way to record transactions and service information. Therefore, today Blockchain is used in the field of trade, government services, healthcare, tourism and even music<sup>2</sup>. So, for example, the courts of the PRC use Blockchain to record court hearings (Tran, 2020). Japanese animation studios use Blockchain to combat anime piracy<sup>3</sup>. The Blockchain technology is actively used in various industries (smart, digital industry) (Xu et al., 2021). Programs such as IBM Blockchain are designed to improve supply chain, data identification and management. Blockchain Foundry focuses on Blockchain-based services for prototyping and industrial production. In manufacturing, 75% of industrial companies are expected to use distributed ledger systems by 2024. This will reduce the cost of controlling the quality of raw materials by 50%, and for document circulation by 40%. The share of successful cyber-attacks will be halved<sup>4</sup>. It is

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<sup>1</sup> White Paper «Blockchain in Trade Facilitation» ECE/TRADE/C/CEFACT/2019/9/Rev.1, available at: <https://unece.org/fileadmin/DAM/cefact/GuidanceMaterials/WhitePaperBlockchain.pdf> (accessed 28.01.2023).

<sup>2</sup> White Paper «Blockchain in Trade Facilitation» ECE/TRADE/C/CEFACT/2019/9/Rev.1, available at: <https://unece.org/fileadmin/DAM/cefact/GuidanceMaterials/WhitePaperBlockchain.pdf> (accessed 28.01.2023).

<sup>3</sup> Japan’s Blockchain Sandbox Is Paving The Way For The Fintech Future, available at: <https://www.forbes.com/sites/japan/2019/06/26/japans-blockchain-sandbox-is-paving-the-way-for-the-fintech-future/?sh=5ef085832795> (accessed 28.01.2023).

<sup>4</sup> Russian Blockchain, available at: [https://www.cnews.ru/articles/2019-08-27\\_rossijskim\\_blokchejnrazrabotchikam](https://www.cnews.ru/articles/2019-08-27_rossijskim_blokchejnrazrabotchikam) (accessed 28.01.2023).

expected that the third generation of the Blockchain technology (Blockchain 3.0) will allow the development of large-scale industrial applications capable of simultaneously managing many processes, processing and storing huge amounts of data, ensuring their consistency (Xu et al., 2021).

According to a survey conducted by the World Economic Forum, if in 2015 only 0.025% of global GDP was based on the use of Blockchain, then by 2027 this ratio is expected to jump to 10%<sup>5</sup>. According to the respondents of the Deloitte survey conducted in 2020, any state is capable of losing its competitive advantages if it does not use this technology and its implementation plays a very important role. The cost of quality control of raw materials will be reduced by 50%, and the cost of document flow - by 40%. The share of successful cyber-attacks will be halved<sup>6</sup>. The third generation of the Blockchain technology (Blockchain 3.0) allows the development of large-scale industrial applications that can simultaneously manage many processes, process and store huge amounts of data, ensuring their logical interconnection and consistency (Di Francesco and Mori, 2020).

However, today states are faced with universal problems that can level the potential of Blockchain. These are: lack of high-quality legal regulation of this technology; technical standards for its application; investments required for its development. These problems are the main barriers to its implementation, including in industrial production. Lack of regulatory clarity is one such barrier, according to Deloitte's 2020 Blockchain Survey<sup>7</sup>. Consequently, if states are unable to effectively implement this technology, they can lose their competitive advantages (Swan, 2015).

In this regard, the purpose of the article is to analyze the mechanisms and tools that make up special and experimental modes, the use of which would contribute to solving these problems. To achieve the goal of the study, the national regulation of the creation and implementation of the Blockchain technology in various areas, including industrial production, tools that help to improve the quality of legal (including regulatory and technical) regulation of this technology, as well as to attract investments in its development.

Currently, many scientific articles and monographs have been published on the Blockchain technology. These articles were written by representatives of various branches of science and touch on completely different aspects of the creation and implementation of this technology (Mohamad et al., 2017; Dong et al., 2018; Fan et al., 2018; Wu et al., 2021). The scientific works analyzed by the author can be conditionally divided into the following groups:

1. Legal regulation of creation and implementation of the Blockchain technology.

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<sup>5</sup> Global Agenda Council on the Future of Software & Society Deep Shift Technology Tipping Points and Societal Impact, available at: [http://www3.weforum.org/docs/WEF\\_GAC15\\_Technological\\_Tipping\\_Points\\_report\\_2015.pdf](http://www3.weforum.org/docs/WEF_GAC15_Technological_Tipping_Points_report_2015.pdf) (accessed 28.01.2023).

<sup>6</sup> Russian Blockchain, available at: [https://www.cnews.ru/articles/2019-08-27\\_rossijskim\\_blokchejnrazrabotchikam](https://www.cnews.ru/articles/2019-08-27_rossijskim_blokchejnrazrabotchikam) (accessed 28.01.2023).

<sup>7</sup> Deloitte 2020 Blockchain Survey, available at: [https://www2.deloitte.com/content/dam/insights/us/articles/6608\\_2020-global-blockchain-survey/DI\\_CIR%202020%20global%20blockchain%20survey.pdf](https://www2.deloitte.com/content/dam/insights/us/articles/6608_2020-global-blockchain-survey/DI_CIR%202020%20global%20blockchain%20survey.pdf) (accessed 28.01.2023).

2. Legal aspects of implementation of the Blockchain technology in certain areas of public life, sectors of economy and industrial production.

3. Ways to develop and implement the Blockchain technology.

A significant number of works by authors from different countries are devoted to the legal regulation of the Blockchain technology, which emphasizes the relevance of legal research on creation and implementation of the Blockchain technology. As a rule, these articles are devoted to the search for the optimal model of legal regulation for individual countries, their unions and integration formations. The works of other researchers are devoted to defining the legal essence of this technology, trying to form its definition, legal features and classification (Sultan et al., 2018; Bouraga, 2021).

A significant number of scientific articles are devoted to individual legal problems of creation and implementation of the Blockchain technology, for the most part – the problem of correlation with legislation on protection of personal data (Ivanc et al., 2016; Mohamad et al., 2017; Tatara et al., 2020; Campanile et al., 2021). Most of the published scientific papers on this technology aim to describe the role of the Blockchain technology in the financial market, cryptocurrencies and smart contracts (Alia et al., 2020; De Filippi et al., 2020; Elisavetsky and Marun, 2020). At the same time, some authors turn to the legal analysis of application of the Blockchain technology in other areas – medicine, public administration, etc. (Mohamad et al., 2017; Dong et al., 2018; Fan et al., 2018; Roman-Belmonte et al., 2018; Joppen et al., 2019; Balasubramaniana et al., 2021).

Some of the works analyzed by the author describe individual ways of developing and implementing this technology. As a rule, these articles are devoted to the issues of attracting investments in its development (Jani and Panda, 2019). Without diminishing the importance of the research carried out by the authors, it should be noted that at the moment the author did not find a comprehensive study of special and experimental legal regimes contributing to implementation of the Blockchain technology in various spheres of society, as well as in the industrial production industry, as well as their constituent legal instruments and mechanisms that would allow overcoming barriers that hinder its development and promote its implementation.

To achieve the goals of the article, the author applied a set of methods, which included the comparative legal and systemic method, as well as the method of legal modeling and content analysis. The comparative legal method was used to analyze approaches to the legal regulation of the Blockchain technology, the national legislation of the countries implementing this technology. The application of this method made it possible to identify tools and mechanisms that help to attract investments in the development of this technology, as well as best practices that contribute to improving the quality of legal, including regulatory and technical, regulation of this technology.

The systematic method made it possible to consider the legal instruments and mechanisms that contribute to creation and implementation of the Blockchain technology as a single system of techniques and methods, the use of which, in aggregate, will overcome the barriers that hinder the development and implementation of this technology. The method of content analysis made it possible to analyze the content of individual information resources to identify existing practices for the implementation of the Blockchain technology, as well as to attract investments in its development and state support of its developers.

## **2. TOOLS TO STIMULATE BLOCKCHAIN**

As a rule, when states seek to achieve certain goals in a certain area of development, they apply a special, different from the general, regulation (Podshivalov, 2018; Gromova, 2018; Ferreira and Filho, 2020; Kraljić, 2020; Nikitin and Marius, 2020; Ostanina and Titova, 2020). Introduction of a special regulation is due to the need to achieve certain goals that cannot be achieved through general regulation. In this regard, states use the so-called special legal regimes, which are a set of legal means aimed at achieving a certain result. In case when it comes to the creation and implementation of the Blockchain technology, states also apply special regulation (special and experimental regimes) that contribute to solving these problems. They consist in a certain set of tools and mechanisms that contribute to the achievement of the set goals and the solution of existing problems.

### **2.1 Experimental legal regimes (regulatory sandboxes) for Blockchain**

The regulatory sandboxes for Blockchain services are the experimental legal regimes used by many states today to create optimal regulation that facilitates implementation of the Blockchain technology. The significant potential of the Blockchain technology, as well as the possible danger of its improper use, raised the question of finding approaches to the legal regulation of this technology before modern states. The policy ecosystem is not fully adapted to this technology, and rules and regulations would have to be retrofitted (Gabison, 2016). In this regard, the governments of many countries have chosen an approach aimed at creating a “breakthrough” regulation of digital innovations. Its essence is that, even in the absence of legal regulation, business entities have the opportunity to “test” the capabilities of services and products based on digital technologies in a real market and under state control.

For this, the state began to use regulatory sandboxes. As such, an environment controlled by the regulator, in which entrepreneurs are given the opportunity to test the possibilities of innovative services or products when applying certain regulatory “indulgences”, is meant. These may be the non-application of licensing requirements, requirements for accreditation or certification to its participant. The purpose of the regulatory sandbox is to create an environment for testing digital innovations in the absence of proper

legal regulation. They are used in order, first of all, to check the “viability” of a digital innovative service (product), temporarily removing legislative barriers in the form of mandatory regulatory requirements.

The following factors are the advantages of regulatory sandboxes. First, their application enables business entities to test innovations in a safe environment. This, in turn, helps to minimize the risks of violating legal requirements. Second, the use of regulatory sandboxes allows regulators to examine the “work” of new technologies “from the outside,” in a low-risk environment. This presupposes the possibility of searching for the most appropriate ways of adapting legislation. And third, the use of regulatory sandboxes helps to minimize the harm that can be done to consumers. This becomes possible in connection with the provision of guarantees and additional protection methods. Thus, this mechanism is an example of abandoning traditional regulatory approaches in favor of more flexible regulation (Gromova and Ivanc, 2020).

Regulatory sandboxes were first introduced in 2015 as part of a government initiative to support British digital financial innovation companies (Arner et al., 2016). This initiative enabled companies to test the innovative products, services and business models they create in an isolated environment. The first experience with regulatory sandboxes has been positive. The British regulatory sandbox has contributed to the development of innovative activities of more than 500 companies, while in more than 40 of them it has received regulatory reinforcement (Global Regulatory Sandbox Review..., 2017). The success of the United Kingdom in creating sandboxes has led to their proliferation throughout the world. Currently, regulatory sandboxes are used in countries such as Singapore, UAE, Australia, EU countries, China, India, Russia, etc. The areas of application of regulatory sandboxes are usually Fintech (digital financial technologies). This is the case, for example, in the UK, Singapore, Australia, India and the UAE (Jenik and Lauer, 2017). Separate regulatory sandboxes in China, in turn, are created to develop not only Fintech innovations, but the InsurTech market (digital innovations in the field of insurance). Regulatory sandboxes in Russia can be used to test innovative services or business models in the field of medicine, transport, education<sup>8</sup>.

In order to be able to become a participant in the regulatory sandbox, a business entity must apply to a state-authorized body (regulator) and provide the so-called experimental regime program. It should

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<sup>8</sup> Global Regulatory Sandbox Review: An Overview on the Impact, Challenges, and Benefits of Regulatory FinTech Sandboxes, available at:

<https://financedocbox.com/Insurance/73322297-Global-regulatory-sandbox-review.html> (accessed 28.01.2021).

Regulatory Sandbox Review, available at: [https://digitalchamber.org/wp-content/uploads/2017/11/Regulatory-Sandbox-Review\\_Nov-21-2017\\_2.pdf](https://digitalchamber.org/wp-content/uploads/2017/11/Regulatory-Sandbox-Review_Nov-21-2017_2.pdf) (accessed 28.01.2021);

Regulatory Sandboxes and Financial Inclusion, available at:

<https://www.cgap.org/sites/default/files/researches/documents/Working-Paper-Regulatory-Sandboxes-Oct-2017.pdf>

(accessed 28.01.2023); Federal Law "On Experimental Legal Regimes for Digital Innovation" (in Russ.), available at:

<https://sozd.duma.gov.ru/bill/922869-7>; Global Regulatory Sandbox Review An Overview on the Impact, Challenges, and Benefits of Regulatory FinTech Sandboxes November 21th, 2017, available at:

<https://financedocbox.com/Insurance/73322297-Global-regulatory-sandbox-review.html> (accessed 28.01.2023).

present the very innovative business model (service or product) based on digital innovation, analyze its potential and possible risks, and identify ways to minimize them. If the submitted program is approved by the regulator, the participant of the experimental legal regime gets the opportunity to test it in a real market with real consumers, but with the application of certain regulatory indulgences (special regulation), within a certain period of time. Typically, this period is from 3 to 12 months (UK, China, India, Australia) (Jenik and Lauer, 2017). However, the legislation of certain countries, for example, the UAE, sets a period of up to 2 years (Global Regulatory Sandbox Review..., 2017); Russia – up to 5 years (Gromova and Ivanc, 2020).

Upon the expiration of this period, the authorized body, based on the results of monitoring and evaluating the effectiveness and efficiency of the experiment, draws conclusions about: the admissibility of giving special regulation the properties of general regulation; the admissibility of imparting the properties of general regulation to a special regulation in the event of amendments to the special regulation; the inadmissibility of imparting the properties of general regulation to special regulation.

One of the development trends of this tool is the creation of regulatory sandboxes aimed at testing services based on the Blockchain technology (Cheah et al., 2018). The World Association of Exchanges highlighted the importance of creating regulatory sandboxes for distributed ledger technologies in connection with the need to study the potential of this technology for the implementation of services based on Blockchain<sup>9</sup>. In this regard, in some foreign countries, there are so-called “thematic” regulatory sandboxes, the main purpose of which is to test innovative services, products and business models based on the Blockchain technology. For example, the Government of Japan has launched a regulatory sandbox for incubating Blockchain innovations<sup>10</sup>.

Thailand’s regulatory sandbox is also being applied to the development of the Blockchain technology. The examples of projects that are currently being tested in the sandbox are services using Blockchain for letters of guarantee and cross-border funds transfers, iris identification for identity verification, and QR code payment verification (Guide for Regulatory Sandboxes, 2018). Of particular interest is the regulatory sandbox of the International Civil Aviation Organization (ICAO). Its goal was the introduction of the Blockchain technology for the development of civil aviation. The ICAO Blockchain Sandbox (2021) is a cloud-hosted network enabling different partners to work on subjects on the same

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<sup>9</sup> Exchange Body Calls for Creation Of Regulatory Sandboxes for Distributed Ledgers, available at: <https://www.finextra.com/newsarticle/29390/exchange-body-calls-for-creation-of-regulatory-sandboxes-for-distributed-ledgers> (accessed 28.01.2023).

<sup>10</sup> Japans blockchain sandbox is paving the way for the fintech future, available at: <https://www.forbes.com/sites/japan/2019/06/26/japans-blockchain-sandbox-is-paving-the-way-for-the-fintech-future/?sh=5ef085832795> (accessed 28.01.2023).

platform. It is a blockchain infrastructure for the aviation sector. It empowers partners to create and test services, systems, or products on a decentralized platform.

The European Union expects to launch a regulatory blockchain sandbox by 2022. The project was initiated by the European Commission and the European Blockchain Partnership<sup>11</sup>. This sandbox will test the viability of Blockchain technologies in healthcare, environment, energy and other key sectors<sup>12</sup>. This means that, firstly, one of the trends in the use of regulatory sandboxes is the creation of specialized Blockchain sandboxes. And, secondly, and importantly, Blockchain sandboxes aim to introduce the Blockchain technology not only in the field of financial markets, but also in completely different areas. These trends should be assessed positively, since they will contribute to the creation of an adequate and effective legal regulation of this technology.

At the same time, the importance of correlating special regulation (granting regulatory concessions) with fundamental human rights and consumer protection legislation should be considered. It is no coincidence that critics of regulatory sandboxes see them as a means to circumvent consumer protection laws. This is due to the fact that regulatory indulgences applied in testing conditions may negatively affect the quality of services provided to consumers or otherwise violate their rights. However, as a rule, the only special protective measure is to obtain the consent of consumers to participate in the experiment. Only a few jurisdictions provide for liability insurance for sandbox participants and compensation in case of violation of consumer rights<sup>13</sup>.

In the case when it comes to testing services and products based on the use of the Blockchain technology, it is very important to integrate the rules for participation in regulatory sandboxes with legislation on the protection of personal data. The problem of personal data protection in the context of special regulation applied in the framework of the regulatory sandbox is already obvious. For example, in the Russian Federation there is an experiment on the development of artificial intelligence technologies in Moscow. As part of this experiment, anonymized personal data of Moscow residents are transferred for processing to artificial intelligence programs. The possibility of using anonymized personal data significantly reduces the cost of processing them. At the same time, to date, there is no clarification in Russian legislation about what “anonymized” personal data is and what is the mechanism of their depersonalization (Mavrinskaya et al., 2017).

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<sup>11</sup> European Commission Launch Blockchain Regulatory Sandbox, available at: <https://ec.europa.eu/digital-single-market/en/legal-and-regulatory-framework-blockchain> (accessed 28.01.2023).

<sup>12</sup> Legal and Regulatory Framework for Blockchain, available at: <https://ec.europa.eu/digital-single-market/en/legal-and-regulatory-framework-blockchain> (accessed 28.01.2023).

<sup>13</sup> Fintech regulatory sandbox, available at: <https://asic.gov.au/for-business/innovation-hub/fintech-regulatory-sandbox/> (accessed 28.01.2023).



In the case when it comes to the use of the Blockchain technology, the issues of personal data protection come first. After all, even outside the regulatory sandboxes, there are big problems of convergence between the Blockchain technology and legislation on the protection of personal data. In this regard, it is very important to work on improving the national regulatory framework and developing international legislation in this area<sup>14</sup>.

## **2.2 Special economic zones to attract investments in development of the Blockchain technology**

There is no doubt that implementation of the Blockchain technology may require significant investment. This is especially true for the introduction of such technology into industrial production. In this regard, it is very important to attract investments in its creation and implementation. That is why it is important for each country to create a favorable investment climate, including adequate legal conditions for attracting investments into the national economy. For this, countries around the world use various tools.

### **2.2.1 Special economic zones for Blockchain**

These are, first of all, special economic zones. According to statistics, there are more than 5400 such territories in 147 countries in the world (World Investment Report, 2019). Scientists note that these territories are recognized as factors of accelerated economic growth due to their ability to influence the intensification of trade, attracting investment, and deepening integration processes (Bost, 2019; Veselkova, 2019). Within the boundaries of such territories, representatives of the private sector are provided with tax and other preferences in order to stimulate investment and other entrepreneurial activities.

The most famous example of the successful creation and operation of special economic zones is undoubtedly China. The rise of the Chinese economy, associated, among other things, with the creation of special economic zones, is called the “Chinese economic miracle”. In order to attract private investors, residents were provided with various preferences, including inexpensive land, tax and customs benefits, the possibility of repatriating profits and capital investments, exemption from export tax and a limited license to sell goods in the domestic market [11] Creation of innovative products is the main goal of the establishment and High-Tech Industrial Development Zones. Today, 54 such zones are successfully operating in China. Their creation began in 1980 under the Program of the Ministry of Science and Technology of China. The main goal of the Program was to use the technological capacity and resources of research institutes, universities, and large and medium enterprises to develop new and high-tech products and to expedite the commercialization of research and development [36].

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<sup>14</sup> Blockchain: Playing in the regulatory sandbox, 07 September 2016  
<https://www.finextra.com/blogposting/13055/blockchain-playing-in-the-regulatory-sandbox> (accessed 28.01.2023).

Today, some countries are considering the possibility of creating and implementing the Blockchain technology within the boundaries of special, free economic zones. For example, the Central Committee of the Chinese Communist Party recently announced that research into the creation and implementation of the Blockchain technology for the digital currency market will be supported within the Shenzhen special economic zone. The Chinese government intends to use the Shenzhen special economic zone as a pilot demonstration zone for supporting innovative applications such as digital money research and mobile payment in Shenzhen [40].

Special conditions for the implementation of the Blockchain technology are envisaged in Georgia. Thus, the Gldani Free Industrial Zone guaranteed the UK-based company access to electricity at discounted rates for a brand-new, power-thirsty 40-megawatt datacenter devoted to the mining of cryptocurrencies. Other special economic zones providing tech-companies with the special regulatory environment they need to thrive are springing up across the globe, particularly in countries that have embraced blockchain and cryptocurrencies. The Cagayan special economic zone in the Philippines has licensed as many as 37 crypto exchanges since receiving a special mandate to develop the “Crypto Valley of Asia” in May 2018.

Note that in the Russian Federation it is also planned to create a Blockchain cluster within the free economic zone of the Republic of Crimea and the federal city of Sevastopol. The purpose of creating such a cluster will be to attract investment in the implementation of Blockchain projects. For the development of cryptocurrencies and Blockchain projects, they plan to use the Russian part of the territory of the Bolshoi Ussuriysky Island (2019). It is planned to create a special administrative region with preferential conditions for international companies planning to operate in this area<sup>15</sup>. It is believed that the creation of clusters within the boundaries of special, special and free economic zones will contribute to the development of the Blockchain technology. The operation of geographically related companies carrying out complementary activities will have a positive effect on creation and implementation of this technology, including in industrial production. Being a member of a cluster is strongly believed to enhance local productivity and competitiveness. No wonder that policymakers are concerned to create, establish, promote or just label existing interfirm networks or agglomerations of firms or industries as a cluster [23].

### **2.3 Public-private partnership for Blockchain projects**

Public-private partnership (hereinafter – PPP) is an important tool that helps to attract investment in the development of socially significant projects. This tool is actively used all over the world. There is even a term “innovative public-private partnership” (Innovative PPP) for the creation and implementation of

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<sup>15</sup> Why Blockchain Developers are being given the VIP treatment, available at: <https://www.fdiintelligence.com/article/75453> (accessed 28.01.2023).

digital innovations. The European Union is actively using the mechanisms of public-private partnership for the development of infrastructure projects. EU legislation also provides for the possibility of creating innovations such as robotics and supercomputers under contractual forms of innovative PPP. So, for example, creation and development of robotics and artificial intelligence is one of the key areas for development of the digital economy, it is actively taking place in foreign countries precisely on the basis of PPP (Cyman et al., 2020). In the European Union, in particular, research in the field of robotics received the largest funding under the innovation program Horizon 2020 based on PPP projects – about €190 million. Under another European robotics development program, SPARC, EU states are investing €700 million, and the private sector – €2.1 billion<sup>16</sup> in the creation of industrial robotics. In addition, the development of another breakthrough direction of the digital industry – supercomputers (high performance computing) in the EU countries is also carried out on the basis of PPP<sup>17</sup>.

Note that in the United States there is a separate research development program in the field of implementing the Blockchain technology in the electoral process. This program is based on the principles of public-private partnership. It was initiated by the Government Blockchain Association in the USA. The program GBA Public-Private Partnership (PPP) objectives include researching the technological, regulatory and political issues associated with Blockchain and voting. The second phase of the program includes developing the requirements, implementing, and deploying Blockchain-based voting solutions<sup>18</sup>.

Another PPP project in the field of creation and implementation of the Blockchain technology has also been launched in the United States. The Security and Software Engineering Research Center at Georgetown University (S2ERC). S2ERC is a great example of a public-private partnership that seeks to merge interest of the federal government and commercial innovation<sup>19</sup>. Another example of PPP in the field of creation and implementation of Blockchain projects is the infrastructure project of the US government and DeFi to create toll roads, payments for the use of which are saved under the Blockchain program<sup>20</sup>. The Chinese government is also actively developing public-private partnerships in creation and implementation of Blockchain technologies. So, one of these projects was the creation of a fund (Xiong'An Global Blockchain Innovation Fund) for the development of Blockchain startups. At the same

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<sup>16</sup> Is Europe investing in robotics? (In Russ.), available at: <http://www.robo geek.ru/analitika/evropa-vkladyvaet-dengi-v-robototekhniku> (accessed 28.01.2023).

<sup>17</sup> Contractual forms of PPP for high performance computer, available at: <https://ec.europa.eu/digital-single-market/en/high-performance-computing-contractual-public-private-partnership-hpc-cppp> (accessed 28.01.2023).

<sup>18</sup> Government Blockchain Association (GBA), available at: <https://www.gbaglobal.org/blockchain-voting-public-private-partnership-ppp-forming-now/> (accessed 28.01.2023).

<sup>19</sup> Public Private Partnerships for Innovation Blockchain, available at: <https://federalnewsnetwork.com/federal-tech-talk/2018/01/public-private-partnerships-innovation-blockchain/> (accessed 28.01.2023).

<sup>20</sup> DeFi Blockchain contract, available at: <https://www.ledgerinsights.com/us-space-force-awards-blockchain-contract-to-xage-security/> (accessed 28.01.2023).

time, the state's share was 25%, the remaining \$ 1.2 billion are private investments of Tunlan Investment Company<sup>21</sup>.

With regard to the Russian Federation, it should be noted that in 2018 alone, the Federal Law "On Public-Private, Municipal-Private Partnership" (2015) (hereinafter referred to as the Law on PPP) was amended to allow the creation of information technology objects within the framework of PPP. The introduction of these changes should be assessed positively. Since in the previous edition, the creation of information technology objects was not allowed within the framework of PPP. Meanwhile, the fact that only information technology objects can be created on the basis of PPP limits the possibility of implementing PPP in the field of innovation. According to Art. 2 of the Federal Law "On Information, Information Technologies and Information Protection" dated July 27, 2006 No. 149-FZ (2006), "information technologies – processes, methods of searching, collecting, storing, processing, providing, disseminating information and ways of implementing such processes and methods". It seems that the term "information technology objects" chosen by the legislator significantly limits the potential of PPPs in the field of creating innovations. Note that within the framework of the Federal Program "Digital Economy" it is proposed to develop a number of "end-to-end digital technologies: big data; neurotechnology and artificial intelligence; distributed ledger systems; quantum technologies; new production technologies; industrial internet; robotics and sensorics components; wireless technology; technologies of virtual and augmented reality". This list is not exhaustive and can be expanded as new technologies appear and develop.

At the same time, if such digital technologies as artificial intelligence, neurotechnologies, wireless communication technologies, virtual reality can be considered information technologies, and, accordingly, created within the framework of PPP, then referring to information technology objects a whole range of end-to-end digital technologies, such as new production technology, as well as the components of robotics, is highly controversial. This, in turn, may affect the development opportunities within the framework of PPP of the Blockchain technology itself. The fact is that a project implemented within the framework of a PPP may be associated with not one, but several digital innovations. And in the event that one of them does not "fall" under the regulation of this act, then the creation and implementation of the rest may be questionable. It seems that the current legislation on PPP and its legal forms should be amended to allow the creation of digital technologies within the framework of PPP. Such changes, it seems, would be more conducive to the development of innovation and the digital economy on the basis of PPP, and, thereby, would improve the country's competitiveness in the digital technology market (Ertz and Boily, 2019).

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<sup>21</sup> China invests \$ 16 billion to develop Blockchain PPP, available at: <https://cryptor.net/news/kitay-investiruet-v-blokcheyn-tehnologii-16-mlrd-v-ramkah-gosudarstvenno-chastnogo-partnerstva> (accessed 28.01.2023).

## 2.4 Other tools to stimulate Blockchain

### 2.4.1 Standardization for Blockchain

In the context of intensive digitalization, the most important component of state innovation policy today is the creation of standards in the field of digital technologies, consolidating in them the technical aspects of the functioning of such technologies [8]. Standardization in the field of the Blockchain technology will allow developing a universal terminology associated with this technology; will ensure the safe use of technologies based on artificial intelligence. Moreover, the standardization of this technology will increase the level of its interoperability with other digital technologies, which, in turn, will have a positive impact on the development of scientific and technological progress<sup>22</sup>. At the same time, the development and adoption of “ineffective” standards can constrain the development of digital technologies. In this regard, global international cooperation and coordination on the development of standards in the field of distributed ledger technology will be critical for the successful standardization of digital technologies in general, ensuring fair competition, removing trade barriers and the flourishing of innovation<sup>23</sup>.

Today, there is an intensive development of standards in the field of the Blockchain technology. International organizations for standardization, as well as authorized bodies of many foreign countries, are actively involved in this process. The International Organization for Standardization (ISO) established an international technical committee for the standardization of Blockchain and Distributed Ledger Technologies in 2016 (ISO/TC 307 Blockchain and Distributed Ledger Technologies)<sup>24</sup>. The committee includes five working groups: on Blockchain architecture and ontology, scope, security and privacy, identification and smart contracts. The committee included 35 states, led by Australia. In March 2017, the first Blockchain standardization roadmap was published. Standards in the field of this technology are developed by standardization bodies of certain foreign countries. For example, in 2020, a focus group on the application of distributed ledger technology (FG DLT), established by the International Telecommunication Union (ITU-T) Standardization Sector, completed its work in Geneva. The Institute of Electrical and Electronics Engineers (IEEE) is working on a series of standards for general purpose frameworks and architectures, interoperability, core technology components, and Blockchain industry specifications (P2418) (Blockchain standards, 2020).

<sup>22</sup> Artificial Intelligence’s standardization helps create innovation friendly framework conditions for the technology of the future, available at: <https://www.din.de/blob/306690/f0eb72ae529d8a352e0b0923c67b6156/position-paper-artificial-intelligence-english--data.pdf> (accessed 28.01.2023).

<sup>23</sup> U.S. leadership in AI: A Plan for Federal Engagement in Developing Technical Standards and Related Tools, available at: [https://www.nist.gov/sites/default/files/documents/2019/08/10/ai\\_standards\\_fedengagement\\_plan\\_9aug2019.pdf](https://www.nist.gov/sites/default/files/documents/2019/08/10/ai_standards_fedengagement_plan_9aug2019.pdf) (accessed 28.01.2023).

<sup>24</sup> Blockchain standards, available at: <https://blockchain.ieee.org/standards> (accessed 28.01.2023).

The National Institute for Standardization (NIST), within the framework of the doctrine of US leadership in the field of digital technologies, approved the "Plan for state involvement in the development of technical standards and related tools" in 2019 (U.S. leadership in AI..., 2019) and is actively working to create an international standard for the Blockchain technology. So, in the fall of 2020, NIST posted the Draft Standard NISTIR 8301, Blockchain Networks: Token Design and Management Overview, which provides a high-level technical overview and conceptual framework of token designs and management methods. The Draft Standard for the Application of the Blockchain Technology in Industry is also important. The Blockchain Project for Industrial Applications Community of Interest is providing guidelines to create a (better) synergy between end users, research community, and solution providers to reduce complexity, cost, and delay of adoption of Blockchain technologies<sup>25</sup>.

In modern conditions, Russia also does not stay away from world trends. To date, it has adopted two strategically important documents in the field of technical regulation of digital technologies. One of these is the Passport of the Digital Economy Program<sup>26</sup>. It provides for the development of a federal project "Normative regulation of the digital environment", including with a view to improving standardization mechanisms in the field of digital technologies. In turn, in the Action Plan for "Normative Regulation" of the "Digital Economy of the Russian Federation" program dated December 18, 2017 a set of measures is envisaged to improve the mechanisms for standardizing digital technologies to eliminate barriers to their use. Among the activities of this plan is amending the current legislation in order to simplify the procedures for developing standardization documents, shorten the time for their development, accelerate the adoption of national standardization documents based on or taking into account the standards of the most authoritative associations and organizations.

The measures proposed in the Plan cannot be assessed unambiguously. So, on the one hand, the establishment of the possibility of adopting standards based on or taking into account the standards of the most authoritative associations and organizations, will contribute to a better "filling" of such documents with technical requirements already tested in practice. On the other hand, simplifying the standardization procedure and shortening its time frame will not in itself contribute to the development and adoption of "working" standards in the field of the Blockchain technology. In this case, it is necessary to revise not the quantitative, but the qualitative aspects of standardization.

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<sup>25</sup> NIST Blockchain Standardization, available at: <https://www.nist.gov/blockchain>

<sup>26</sup> Russia's National Program For Digital Economy, available at: <https://ac.gov.ru/en/projects/project/digital-economy-program-implementation-42> (accessed 28.01.2023); "Plan of measures for the direction "Regulatory regulation" of the program "Digital economy of the Russian Federation" 2017 г., available at: <http://static.government.ru/media/files/P7L0vHUjwVJPINcHrMZQqEEeVqXACwXR.pdf> (accessed 28.01.2023).

The need for standardization in the field of digital technologies predetermined the creation of a technical committee for Blockchain standardization. The committee was named “Distributed Ledger Technologies and Blockchain Hardware and Software”. Its main task is to increase the efficiency of work on the development of the domestic regulatory and technical base in the field of distributed ledger and Blockchain technologies. Within the framework of TC 26, methodological recommendations on terminology were issued – MR 26.4.001-2018 “Terms and definitions in the field of chain data recording technologies (Blockchain) and distributed ledgers” (2018).

One of the strategically important directions of the committee's work is participation in the international standardization process on behalf of the Russian Federation, including the consideration of application of international standards in the field of distributed ledger technology at the national level. This is important, since the participation of this Russian committee in international standardization will contribute to a greater extent to ensuring national interests than the usual adherence to the International Standard, developed without the participation of representatives of the country. According to experts, today it is obvious that there is a need to move from passive assimilation of foreign experience to the stage of active construction of domestic developments in the field of standardization, which should significantly strengthen Russia's position in the field of high technologies<sup>27</sup>.

It seems that when preparing standards in the field of the Blockchain technology, a number of important points should be taken into account. First, it is imperative for the international community to continue to work together to standardize digital technologies. Second, at the national level, it is worth actively involving the private sector in the standardization process; but, at the same time, not only large and medium-sized businesses, but also small businesses. It should be remembered that small businesses can also be actively involved in the development and application of the Blockchain technology, and, as a rule, are more “mobile” in these matters. Third, it is recommended to involve leading research universities and research organizations in the digital standards development process. And finally, fourthly, in order to stimulate the participation of these entities in the development of standards in the field of the Blockchain technology, it is also necessary to create a mechanism to compensate the costs of the latter for participation in the development of international and national standards.

#### *2.4.2. Governmental support for Blockchain companies due to COVID-2019.*

In the pandemic, programs to support business entities engaged in the creation and implementation of digital technologies, including Blockchain technologies, are of particular importance. At the moment, there are practically no government support programs for Blockchain companies. The US is an exception.

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<sup>27</sup> Standardization of the Digital Economy, available at: <http://www.connect-wit.ru/standartizatsiya-tsifrovoj-ekonomiki-rossii.html> (accessed 28.01.2023).

So, U.S. Small Business Administration (SBA) launched the Paycheck Protection Program (PPP). Under this Program, more than 75 companies in the Blockchain industry received government loans totaling \$ 30 million. The PPP Program was created by the Trump administration during the COVID-19 outbreak to help businesses pay their employees during the ongoing economic crisis<sup>28</sup> (Market Wrap..., 2021).

Note that in other countries the situation is diametrically opposite. So, for example, in the Russian Federation, the Blockchain projects industry has not yet received any financial support from the state (subsidies, compensation for lost rental income) (Blockchain has officially become..., 2020). According to experts, at the moment, the infrastructure for supporting distributed ledger systems is insufficient to ensure continuous improvement of relevant solutions. This is especially true today, in the context of the financial and economic crisis, the imposed trade restrictions on certain technological components or ready-made solutions, the inaccessibility of foreign capital markets and the lack of opportunities for exchanging experience with foreign experts, as well as insufficient demand for solutions in the domestic market, provided that foreign markets are not accessible (Blockchain will bring..., 2019)<sup>29</sup>.

In this regard, the author believes that in order to support the developers of Blockchain services that can find their application in industry, a number of government support measures should also be developed, similar to the United States. If talk about Russian legislation, then it seems possible to give the opportunity to such developers, small and medium-sized businesses, the right to receive financial, property and other support measures in accordance with the legislation on small and medium-sized businesses.

### 3. RECOMMENDATIONS

The recommendations for improving the special and experimental modes are as follows.

First, with regard to experimental legal regimes (regulatory sandboxes), it is important to integrate the rules of participation in Blockchain sandboxes with legislation on the protection of personal data, as well as on the protection of consumer rights. In this regard, it is very important to work on improving the national regulatory framework and the development of international legislation in this area, since now many states are considering the possibility of creating interstate regulatory sandboxes in the field of testing Blockchain services.

Second, it is very important to improve the Blockchain technology standardization process, again, both at the international and national levels. At the state level, it is important to involve small and medium-sized businesses and other business representatives, as well as leading research universities and research

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<sup>28</sup> Market Wrap: Bitcoin Hovers Around \$34.2K While Options Traders Pay Up for Possible ETH Upside, available at: <https://www.coindesk.com/market-wrap-bitcoin-hovers-35k-options-traders-pay-eth-upside> (accessed 28.01.2023).

<sup>29</sup> Blockchain will bring 16 bill to the Russian Economy, available at: [https://www.cnews.ru/news/top/2019-07-17\\_blokchejn\\_prineset\\_rossijskoj\\_ekonomike\\_16\\_trillionov](https://www.cnews.ru/news/top/2019-07-17_blokchejn_prineset_rossijskoj_ekonomike_16_trillionov) (accessed 28.01.2023).



organizations in the development of the standard. In order to stimulate their participation in the development of standards for the Blockchain technology, it is also necessary to create a mechanism to compensate the costs of the latter for participation in the development of international and national standards. If talk about the international level, then the joint efforts of states to create universal, understandable and, most importantly, working standards are also very important.

Third, attention should be paid to improving legislation on special regimes aimed at attracting private investment in the creation of Blockchain technologies for smart industry. So, it is necessary to legally provide the possibility of creating Blockchain clusters within such territories. In addition, it seems necessary to develop public-private partnerships in creation and implementation of the Blockchain technology. This contributed to the development of innovation and the digital economy on the basis of PPPs, and, thereby, made it possible to increase the competitiveness of each country in the digital technology market. To support the developers of Blockchain services that can find their application in industry, a number of government support measures should also be developed, including financial, property and other.

## 5. CONCLUSIONS

Thus, for the legal support of the implementation of the Blockchain technology, including in industrial production, states apply special and experimental regimes. As a rule, such regimes are generally universal for most states. In this regard, it can be concluded that for successful implementation of the Blockchain technology in industrial production, states should use certain tools and mechanisms that make up the content of these modes. This will allow not only determining the national legal framework for implementation of the Blockchain technology. It will also allow us to work together to create international regulation for implementation of the Blockchain technology in industrial production, develop cooperation in this area, share and develop the best world practices. The latter is especially important given the fact that the instruments and mechanisms used by states that make up the content of these regimes are not without drawbacks. These shortcomings, in turn, are due to the lack of quality legal regulation of such instruments. It also requires a concerted effort to eliminate them, both nationally and internationally.

The combined use of these special and experimental regimes (special and experimental regulation) will increase the attractiveness of the state jurisdiction by creating more adequate legal conditions for the implementation of activities by investors and developers of services and products based on the Blockchain technology. The conclusions reached by the author can be used in the development of international and national legal foundations for the implementation of the Blockchain technology in industrial production. In addition, the results of the study can be used as a basis for further scientific research in the field of legal regulation of the creation and implementation of the Blockchain technology and other digital technologies.

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