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## INTRODUCTION

Digital transformation is the flagship of the development of 21st century society. This trend has especially intensified due to the consequences of the COVID- 19 pandemic, when digital channels and online communication have become a full-fledged format. While in 2015 the usage of blockchain technology was seen in national practice as a distant prospect, from 2016-2018 the situation has changed dramatically, with an increasing number of national technology leaders moving from discussing the issue to developing their own blockchain-based technological prototypes and platforms.<sup>1</sup>

The development strategies of many states include the transition to a digital economy (hereinafter – DE). So, in the Russian Federation the Digital Economy program is being actively implemented, designed to transform this sphere of social life by the end of 2024. The Digital Economy Agenda program was announced also in the United States, aimed at developing the DE in the following areas: “promoting a free and open Internet worldwide; promoting trust online; ensuring access for workers, families, and companies; and promoting innovation”.<sup>2</sup> The European Union also focuses on improving the digital networks and services environment as part of the European Digital Single Market strategy.<sup>3</sup>

Blockchain technology is young, but it has a wide range of applications – the financial sector, procurement, government, the implementation of intellectual property rights, business, healthcare, science and other areas.

The use of blockchain technology is primarily associated with cryptocurrencies, the most famous of which is bitcoin. However, the scope of blockchain is much wider. This is a universal technology with tremendous opportunities for secure information

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<sup>1</sup> Bulyga R.P., Safonova I.V. Blockchain as a Tool for Increasing Information Transparency of the Business Ecosystem // Accounting. analysis. Auditing. 2021. No 8(4). P. 6-17.

<sup>2</sup> Digital Economy U.S. Department of Commerce // URL: <https://2017-2021.commerce.gov/tags/digital-economy.html> (accessed: 07.05.2023).

<sup>3</sup> A Digital Single Market Strategy for Europe // eur-lex.europa.eu URL: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:52015DC0192> (accessed: 07.05.2023).

exchange without intermediaries, the implementation of which helps to make payments online, as well as to register transactions and maintain register of them, reflecting various information about transactions within the supply chain.<sup>4</sup>

As the author A. A. Garaev points out, the new blockchain technology, thanks to the mathematical algorithm that has been created, makes it possible to create trust between unknown parties in relations without a governing intermediary, while the possibilities of the technology make it possible to change the existing system of governance, including with the participation of the state.<sup>5</sup>

Thus, with the benefits of transparency, openness, security and safety, this modern technology has the potential to improve many areas of life. However, the legal framework governing blockchain technology needs to be worked through in detail. Law often lags behind the realities of life and the relationships that are actually being shaped by new technologies.<sup>6</sup> In particular, the field of private law has witnessed many fascinating phenomena related to blockchain, including smart contracts, cryptotokens and intellectual property (IP) protection. Thus, there is a related question – can all these blockchain phenomena be related to any one option of legal qualification? These factors substantiate *the relevance* of the problem covered by this study.

*The object* of research is private law relations. *The subject* of the study is the norms of Russian and foreign legislation, scientific research and practical implementation in the field of using blockchain technology in private law relations.

*The research goal* of the study is to generalize and systematize approaches to the legislative regulation of blockchain technology, as well as mark regulative problems, formulate approach to legal regulation of different blockchain phenomena and suggestions on the regulation of this technology in the Russian Federation.

To achieve the goal of the study, the following *objectives* were set for the study:

1) to learn the technological aspects of blockchain,

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<sup>4</sup> Bulyga, *ibid.* P. 6-17.

<sup>5</sup> Garaev A.A. Blockchain as a source of legal facts // Administrative and municipal law. 2018. N. 8. P. 7 - 16. DOI: 10.7256/2454-0595.2018.8.27301 URL: [https://nbpublish.com/library\\_read\\_article.php?id=27301](https://nbpublish.com/library_read_article.php?id=27301)

<sup>6</sup> Nam K. V. Legal problems associated with the use of blockchain // Judge. 2019. No2. P. 1.

2) to analyze domestic and foreign legal sources and scientific literature to form an understanding of the current state of blockchain technology concept and its domestic and foreign legal regulation in the field of private legal relations,

3) to analyze foreign and domestic implementations of blockchain technology in the field of private law to get an idea of the current prospects for using this technology in the field of study,

4) to formulate approach to different blockchain phenomena legal regulation,

5) to formulate proposals for regulating blockchain technology in domestic private law.

*The theoretical basis* of the study consists of studies by Russian (M.P. Voronov, M. E. Beglaryan, N. Y. Dobrovolskaya, A. V. Salnikova, V. B. Nagrodskaya, I. E. Mikheeva, L. V. Sannikova, Yu. S. Kharitonova, A. A. Garaev, Yu. V. Brisov, A. A. Inyushkin, A. V. Tokolov, M. A. Egorova, V. S. Belykh, S. B. Reshetnikova, W. Sh. Broy, A. Saveliev) and foreign (N. Satoshi, K. V. Nam, J. Bacon, J. D. Michels, G. Patrick, A. Bana, Z. Zheng, S. Xie, H.-N. Dai, W. Chen, X. Chen, J. Weng, M. Imram, D. Macrinici, C. Cartofenau, S. Gao, H. Taherdoost, M. Swan, S. Rouhani, R. Deters, K. S. Nichiporov, D. D. Tout) scientists from various fields of scientific activity.

Within the framework of the presented study, legal acts and official documents of various countries were also used, including: Russian Federation, USA, Kazakhstan and others.

*Informational base* of research includes Cyberleninka, eLibrary, SCOPUS and other Internet-resources.

*The significance* of the study is expressed in the generalization and systematization of scientific knowledge related to blockchain technology and innovative ways to use blockchain-based systems to solve various legal issues. This knowledge can be used as a basis for future research and development in this area. Overall, the significance of this study is multifaceted in nature, with equal emphasis placed on both theoretical and practical considerations. As such, it represents an important step forward in our collective understanding of the complex and rapidly-

evolving world of blockchain technology, and provides valuable insights for anyone interested in developing or implementing these systems in a legal context.

*The following methods* were used in this research: 1) general scientific methods: a) formal logical methods such as analysis, synthesis, deduction; b) dialectical methods; 2) special legal methods: a) formal legal method, b) comparative legal method.

*The structure* of the research includes: introduction, 3 chapters, conclusions.

# CHAPTER 1. ANALYSIS OF THE CONCEPT OF BLOCKCHAIN TECHNOLOGY

## §1.1. Blockchain technology from a technical point of view

On 31 October 2008, Satoshi Nakamoto published "Bitcoin: A Peer-to-Peer Electronic Cash System". There is still debate in academic circles on the subject who Satoshi Nakamoto is and whether he was indeed the first person to outline the basic principles of blockchain and to launch its protocol. For example, the article raised questions about the lack of need for intermediaries in the form of banks when making payments electronically. It also outlined the basic rules of such a system: 1) information about each transaction is transmitted through the system and is available to all participants; 2) the currency is decentralised (i.e. not managed by central banks like fiat money); 3) transactions are irreversible; 4) transactions can be performed anonymously; 5) control over the decentralized ledger is carried out by specialized computers called nodes (or nodes).<sup>7</sup>

In order to understand the concept of blockchain technology from a technical point of view, it is necessary to consider the characteristics of the main components of this technology, including: cryptocurrency, crypto-encryption, transaction, hash function, hash value, data structure, distributed systems, peer-to-peer systems, system integrity. It is this approach, as noted by the researchers M.P. Voronov and V.P. Chasovskikh, will allow for a detailed understanding of Blockchain technology.<sup>8</sup>

Cryptocurrency is a virtual currency (for example, Bitcoins, Ethereum, Ripple and others). It was developed as a means for making electronic payments without the mediation of financial institutions. Within the framework of blockchain technology, cryptocurrency is used not only as an electronic means of payment, but also as a means for the automated implementation of rewards and penalties for participants for their

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<sup>7</sup> Satoshi Nakamoto. Bitcoin: A Peer-to-Peer Electronic Cash System // bitcoin.org URL: <https://bitcoin.org/bitcoin.pdf> (accessed: 05.10.2022).

<sup>8</sup> Voronov M.P., Chasovskikh V.P. BLOCKCHAIN - BASIC CONCEPTS AND ROLE IN THE DIGITAL ECONOMY // Fundamental Research. 2017. N.9-1. P. 30. URL: <https://fundamental-research.ru/ru/article/view?id=41699> (accessed: 05.10.2022).

contribution to the development of technology (ensuring the integrity of the technology; ensuring openness technology; support for the distributed “nature” of technology; development of the philosophy of technology).<sup>9</sup>

Another important component of blockchain technology is cryptography (crypto-encryption), which is the encryption of the original message into a secret code or cipher and its subsequent decryption. One of the methods of modern cryptography is encryption, which transforms information into a code that can only be decrypted using a suitable key.<sup>10</sup> Thus, this field of knowledge gives an opportunity to provide confidentiality (protection from viewing by third parties), integrity (protection from third-party change of information), authentication (authentication of parties) of information and also guarantees impossibility of denial of authorship by parties of information interaction. In blockchain technology it is carried out through cryptographic hash functions.<sup>11</sup>

In this regard it is necessary to note the concept of a hash function, which is an algorithm that allows the transformation of information into a short string of a certain length (hash value).<sup>12</sup> Due to properties of cryptographic hash functions, such as quick computation of hash value for any type of data; correspondence of hash value with source data (determinism); unpredictability of hash value changes with even slight changes in source data (pseudorandomness); impossibility of conversion of hash value to source data (irreversibility); low probability of selection of two different values of source data, for which calculated hash value turns to be the same (contradictory stability); high level of reliability of source data identification is provided. In this

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<sup>9</sup> Voronov M.P., *ibid.* P. 31.

<sup>10</sup> What is cryptography and how it became a part of our lives Read more at RBC: <https://trends.rbc.ru/trends/innovation/63120ea49a7947ccdd023670> // trends.rbc.ru URL: <https://trends.rbc.ru/trends/innovation/63120ea49a7947ccdd023670> (accessed 07.10.2022).

<sup>11</sup> Voronov M.P., *ibid.* P. 31.

<sup>12</sup> What is a hash and what is it for? // [www.securitylab.ru](http://www.securitylab.ru) URL: <https://www.securitylab.ru/blog/personal/shaurojen/22829.php> (accessed 07.10.2022)



regard, hash values are actively used in blockchain technology to identify data, in particular, to confirm consent for transactions.<sup>13</sup>

Transactions should be understood as the operation of storing data in the blockchain, during which crypto assets or other information is transferred between virtual wallets.<sup>14</sup> Each transaction is defined as follows: the account identifier of the account whose owner transfers ownership; the account identifier of the account whose owner receives ownership; the amount of goods (cryptocurrency) for which ownership is transferred; the time at which ownership is to be transferred; the fee charged for performing the transaction in the technology; the confirmation of consent (signature) of the transferor's consent (signature) to the execution of the transaction.<sup>15</sup>

Generally, data structures are a fundamental concept in computer science and programming that refers to the way data is stored, organized, and manipulated in a computer system. In essence, data structures simply represent a collection of variables that are combined in such a way as to optimize their processing, manipulation, and access. However, when it comes to the realm of blockchain technology, the concept of data structures takes on a different meaning and application. In simple terms, a data structure in blockchain is the mode by which data is structured into individual elements called blocks, and these blocks are connected or linked to each other through a principle referred to as the chain or blockchain. When a transaction is initiated, it is included in a block, which becomes a part of the chain. This makes blockchain an immutable, decentralized, and secure distributed ledger that can be used for various applications in finance, healthcare, supply chains, and other spheres.<sup>16</sup>

Data structures are very closely linked to the algorithms that will be used to process and analyze this information; the type of data structure used by an algorithm will determine how it performs overall. Within the context of blockchain technology, algorithms are the set of operations or rules by which the data stored in a data structure

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<sup>13</sup> Voronov M.P., *ibid.* P. 31.

<sup>14</sup> Transaction // bits.media URL: <https://bits.media/transaktsiya/> (accessed 07.10.2022).

<sup>15</sup> Voronov M.P., *ibid.* P. 31.

<sup>16</sup> Blockchain as a Data Structure // medium.com URL: <https://medium.com/@juliomacr/blockchain-as-a-data-structure-3bd125d8ddda> (accessed: 24.04.2023).

is consistently validated, verified, and updated with new blocks through a consensus mechanism. An algorithm can be thought of as a sequence of operations that work together to ensure that the information contained within a set of data structures is consistent with one another. By using these algorithms, blockchain technology is able to create a distributed ledger that is both secure and reliable. Thus, the integrity and efficiency of blockchain technology's data structures and algorithms play a significant role in maintaining its trustworthiness, decentralization, and security. Not only do they help to ensure that transactions are properly validated and recorded, but also they enable the creation of a secure network that is able to withstand hacking attempts and malicious activity.<sup>17</sup>

Distributed system (distributed computing or distributed databases) imply portioned (distributed) storage of data on personal computers of users that are interconnected and therefore are part of a single system, in contrast to a centralized system in which all data is stored on a server with which each user is connected systems.<sup>18</sup>

In this context, peer-to-peer systems (P2P) are distributed systems consisting of nodes (personal computers) that provide other nodes in the system with access to their computing resources. It allows nodes of the system to communicate directly, without intermediaries.<sup>19</sup>

To conclude the list of basic components of blockchain technology, it is important to mention system integrity, which consists of the following components: data integrity - ensuring completeness, correctness and consistency of data created, corrected and stored in the system; behavioral integrity - ensuring absence of logical errors in system operation, full compliance of system behaviour with planned scenarios

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<sup>17</sup> Relationship between Algorithms and Data Structures in Programming // medium.com URL: <https://medium.com/@babjun/relationship-between-algorithms-and-data-structures-in-programming-cf3705492e> (accessed: 24.04.2023).

<sup>18</sup> Voronov M.P., *ibid.* P. 31.

<sup>19</sup> What is Peer-to-Peer Network, and How Does It Work? // blockchain-council URL: <https://www.blockchain-council.org/blockchain/peer-to-peer-network/> (accessed: 24.04.2023).

of its development and use; security - access to system data only for registered users, protection against unauthorised use of system data.<sup>20</sup>

Foreign researchers often point out that a blockchain is a self-sustaining database that usually has a functional shell or platform for developing applications.<sup>21</sup> However, according to some researchers, the blockchain is only a database, but not a self-regulatory system that checks all data for correctness.<sup>22</sup>

The UK Government's Chief Scientific Adviser noted that a blockchain is a type of database in which records are grouped into blocks, each block linked to the next using a cryptographic signature. But the author pointed out that unlike conventional databases, in which rules are often set at the level of the entire database or application, but not per transaction, blockchain technology can set rules for a transaction (business logic) that are associated with the transaction itself, it contrasts with conventional databases.<sup>23</sup>

Thus, blockchain technology is a decentralized and distributed ledger technology that has no central authority. The registry is used to record (and store) the same information in an encrypted block of data on many computers, these blocks are linked together in a chain. Its users can directly interact with stored data in real time without the need for an intermediary to authenticate transactions, which ensures the secure storage, transmission and processing of confidential information.

To sum up, it should be reiterated that the main advantage of using blockchain technology is the security of transactions. All transactions are subject to multiple copying, they are transparent, any participant in the process has the ability to view information from other transactions, the entire chain of transactions is duplicated and

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<sup>20</sup> Voronov M.P., *ibid.* P. 31-31.

<sup>21</sup> BLOCKCHAIN: BACKGROUND, PROBLEMS AND LEGAL ISSUES. DLA PIPER // [inform.dlapiper.com](https://inform.dlapiper.com)  
URL: [https://inform.dlapiper.com/43/531/uploads/excellence--client-paper--blockchain-\(2\).pdf](https://inform.dlapiper.com/43/531/uploads/excellence--client-paper--blockchain-(2).pdf) (accessed: 07.10.2022) .

<sup>22</sup> Blockchain is an amazing solution, but for what? // [habr.com](https://habr.com) URL:  
<https://habr.com/ru/company/flant/blog/516314/> (accessed: 07.10.2022).

<sup>23</sup> Report of the Chief Scientific Adviser to the UK Government. Distributed Ledger Technology: Beyond the Blockchain. // URL: [assets.publishing.service.gov.uk](https://assets.publishing.service.gov.uk):  
[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/492972/gs-16-1-distributed-ledger-technology.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/492972/gs-16-1-distributed-ledger-technology.pdf) (accessed: 07.10.2022).

stored in an encrypted form by each participant, but only the owner of the block has the ability to change information. Blockchain technology is decentralised, i.e. it has no single control center that can be compromised. And thanks to multiple replication, even if most computers are compromised, at least one will still have information about the entire blockchain. The simultaneous storage of blocks by all participants in the process prevents unauthorised changes to one of the blocks, which is a clear advantage of this technology in the field of information security.<sup>24</sup>

### **§1.2. Blockchain technology as an element of legal reality**

The blockchain's fundamental innovation lies in its architecture, which enables decentralised transactions that do not require specific checks and "trust" in the transaction partner. The notion of "trust", as in the case of a business intermediary or business partner, has been replaced by the availability of all transactions, decentralisation, and a globally distributed database.<sup>25</sup>

As researchers M.E. Beglaryan and N.Y. Dobrovolskaya note, blockchain technology, using bitcoin or other cryptocurrency as an example, now demonstrates in the global economic information space "a completely new vision of supporting secure financial transactions as instant payments in the form of a universal information object - cryptocurrency. And the possibilities of using a decentralised model for all kinds of interactions in the world on a global scale will open up new structures and ways of organising society. The decentralised model of blockchain technology allows the phenomenon of "intermediation" to be discarded as a relic of the past. And, of course, such changes, despite their progressive nature, require the reaction of legal science, the state and society as a whole."<sup>26</sup>

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<sup>24</sup> Beglaryan M. E., Dobrovolskaya N. Y. Blockchain technology in the legal space // Bulletin of the KRU of the Ministry of Internal Affairs of Russia. 2018. N. 2 (40). P. 108. URL: <https://cyberleninka.ru/article/n/blokcheyn-tehnologiya-v-pravovom-prostranstve> (accessed: 25.09.2022).

<sup>25</sup> Beglaryan M. E., *ibid.* P. 109.

<sup>26</sup> Beglaryan M. E., *ibid.* P. 109.

Blockchain technology is relevant in the field of protection against fraudulent activities, as well as in those areas where work with large databases is required. It is applicable not only for making transactions, but also for fixing, tracking, monitoring and performing transactions with any assets.<sup>27</sup>

Researcher A. V. Salnikova, considering blockchain as a tool for copyright protection, pointed out that there are a number of problems that are mainly in the legal field and are mainly related to the novelty of this technology.<sup>28</sup> In particular, there is a shortage of qualified blockchain specialists and complete information about both the technology itself and its potential in various sectors of the economy. The development of a blockchain standard and its approval at the legislative level is legally significant. Moreover, it is also important to regulate the transfer of information in cross-border relations.<sup>29</sup>

K. V. Nam writes that there is no legal concept of blockchain. In his view, a legal definition of technical solutions may not always bring certainty to legal regulation.<sup>30</sup>

In particular, researchers highlight that there is no legal definition of blockchain at the level of federal laws in the Russian Federation. The definitions and descriptions in RF regulations suggest that blockchain is a distributed data registry, and distributed registry technologies are algorithms and protocols for decentralised storage and processing of transactions that are structured as a sequence of linked blocks without the possibility of their subsequent modification.<sup>31</sup>

Researcher V. B. Nagrodskaya said that it is especially important for the field of intellectual property that each of the records of previous transactions contains data on all previous transactions. Blockchain establishes confirmation of a particular fact

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<sup>27</sup> Salnikova A.V. Blockchain technology as a tool for copyright protection // Actual problems of Russian law. 2020. V. 15, N. 4. P. 86. doi:10.17803/1994-1471.2020.113.4.083-090

<sup>28</sup> Salnikova, *ibid.* P. 88.

<sup>29</sup> Salnikova, *ibid.* P. 88.

<sup>30</sup> Nam K. V. Legal problems associated with the use of blockchain // Judge. 2019. No2. P. 1.

<sup>31</sup> What are smart contracts and how to conclude them // SPS ConsultantPlus URL: <https://www.cons.ru/informer-news/42-rukovoditel/18050-cto-takoe-smart-kontrakt-i-kak-ego-zaklyuchit> (accessed: 07.10.2022).

(confirmation of the existence of a work at a certain moment, confirmation of the fact of alienation of an exclusive right at a specific moment in time, etc.). Thus, the technology does not allow to interfere with previously made records and change them, both at the initiative of users and at the initiative of any intermediary.<sup>32</sup>

И. Е. Mikheeva mentioned that blockchain is a type of distributed registry, so we can conclude that the concept of "distributed registry" in Article 1 of the RF Law "On Digital Financial Assets" does not fully disclose the content of blockchain technology.<sup>33</sup>

Scientists L.V. Sannikova and Y.S. Kharitonov speak of the need to define the legal nature of distributed registers and objects created using distributed registers technology (of which blockchain is a variant), noting that this will make it possible to develop a legal regime for certain types of digital assets and, in the future, to develop a legal regime for taxing digital assets in the financial sphere (tokens and cryptocurrencies), transactions involving them and activities associated with their creation.<sup>34</sup> Thus, in a study on the current legal approach to distributed registry technology, the authors note that the purely digital nature of the new objects of property turnover generates most of the issues related to the protection of their owners. In the legal sense, various manifestations of information field participants' activity have not been qualified by lawyers so far. Researchers think that actions in terms of jurisprudence are expressed in the performance of certain acts of will aimed both at transferring information and achieving legal consequences or representing legal deeds. In this case a transaction in the distributed registry system is to be understood as a complex legal structure consisting of a unilateral transaction and legal acts. A unilateral transaction as a volitional purposeful legal act is carried out by a transaction initiator

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<sup>32</sup> Nagrodskaya V. B. New technologies (blockchain/artificial intelligence) in the service of law. Scientific and methodological manual More details: <https://www.labirint.ru/books/673406/>. 1 ed. Moscow: Prospect, 2022. P. 2.

<sup>33</sup> Mikheeva I.E. An alternative view on the legal regulation of blockchain technology // Lawyer. 2021. N 11. P. 13.

<sup>34</sup> Sannikova L.V., Kharitonova Yu.S. New technologies and law: a modern legal approach to distributed ledger technology // Actual problems of Russian law. 2019. N. 4. P. 62.

who makes an entry into the register. Acts confirming the entry can be qualified as legal acts, a legal act differs from a transaction by the criterion of will.<sup>35</sup>

Another scientist A. A. Garaev, while studying blockchain as a source of legal facts, also makes an important conclusion for law enforcement that the data contained in blockchain blocks can be objects of civil law transactions. This is possible when an agreement is reached between the participants in the transaction on the grounds for the emergence of legal relations: the data obtained from the blockchain technology is recognized as a legal fact. Moreover, a prerequisite is that the consent of the participants in the transaction is required only in the absence of legislative regulation of the use of blockchain technology. When the state recognizes the force of legal facts created by the blockchain, the consent of the participants is not required, and in this case, a legal fact from the world of blockchain technology arises and is applied by law.<sup>36</sup>

Scientist A. Savelyev in developing a legal definition of blockchain technology said that the key importance for the purposes of legal regulation is not so much the technology itself, as the distributed registry itself with the relevant information and relations on its use, so giving a legal definition of technology is not quite correct and is highly likely to lead to an extremely unsuccessful for the purposes of legal regulation definition. Moreover, in developing a legal definition of distributed registry, it is advisable to refer to terminology that already exists in the law in order to more easily introduce new terms into the current legislation. Thus, the author proposed the following definition: a decentralised data register is an information system comprising a database of a distributed type that contains information about certain facts and (or) records of the right to certain property, the validity of which is confirmed by means of predetermined algorithms.<sup>37</sup>

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<sup>35</sup> Sannikova L.V., *ibid.* P. 63.

<sup>36</sup> Garaev A.A. Blockchain as a source of legal facts // *Administrative and municipal law.* 2018. N. 8. P. 7-16. DOI: 10.7256/2454-0595.2018.8.27301 URL: [https://nbpublish.com/library\\_read\\_article.php?id=27301](https://nbpublish.com/library_read_article.php?id=27301)

<sup>37</sup> Part 2. Legal definition of a blockchain (more precisely, a distributed data registry) // *zakon.ru* URL: [https://zakon.ru/blog/2017/10/30/chast\\_2\\_yuridicheskaya\\_definiciya\\_blokchejna\\_a\\_tochnee\\_-\\_raspredelennogo\\_reestra\\_dannyh](https://zakon.ru/blog/2017/10/30/chast_2_yuridicheskaya_definiciya_blokchejna_a_tochnee_-_raspredelennogo_reestra_dannyh) (accessed: 07.10.2022).

Thus, in the above definition, the registry is classified as an information system, the key element of which is a distributed database. It is important to note that the terminology of the Federal Law of the Russian Federation dated July 27, 2006 N 149-FZ (as amended on July 14, 2022) "On Information, Information Technologies and Information Protection" was used. The central element of the database is information about certain facts, while the terminology is also based on the current legislation - the concept of information as information given in the above law.

However, the comment of A. V. Savelyev is important that the main facts that will be reflected in such databases will be information about the rights to property, but it is inappropriate to limit the scope of decentralized registries only to information about rights, since they may also contain information about certain facts of reality, documents and any other information, the reliability of which must be ensured. In this regard, it is inappropriate to use the term "transaction" in the definition, since: 1) this term is not defined in the legislation (we are talking about the legislation of the Russian Federation) and 2) based on existing ideas about the content of this concept, which largely equates it to transactions, the use of this term would reduce the scope of the concept of decentralized registries to property rights. In addition, the above definition is not tied to a specific data verification method (proof of work, proof of stake, PBFT or otherwise) in order to ensure its technological neutrality. Due to this, the development of decentralized ledger technology is not limited to existing blockchain prototypes (many of which differ mainly in the consensus model). Moreover, it is noted that most of the blockchains that will be built into legal regulation will have a private (permissioned) character, and therefore will have some degree of centralization, which will depend on the architecture. In this regard, the unconditional sign of blockchain technology is its distributed nature, but not decentralization.<sup>38</sup>

Another researcher, lawyer D. Lugovoy, when considering the essence of blockchain technology, pointed out that the blockchain is understood as a distributed database consisting of a continuous chain of interconnected blocks. Decentralization

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<sup>38</sup> Part 2. Legal definition of a blockchain, *ibid.*



of technology is due to the fact that the said database is stored simultaneously by all participants in the system. Anyone can access information about any transaction in this ledger. An interesting analogy of the author is that users act as a "collective notary", which confirms the truth of the information in the database.<sup>39</sup>

When discussing blockchain from a legal point of view, V.B. Nagrodskaya pointed out that based on its technical characteristics, blockchain can be seen as a database - a computer technology built on a special encryption system, i.e. an information base that is built on the principle of adding blocks.<sup>40</sup>

The Bank of Russia in its report considers blockchain as a variant of the implementation of a network of distributed registries, in which data on completed transactions are structured in the form of a chain (sequence) of related blocks of transactions.<sup>41</sup>

There is a position of foreign researchers of blockchain technology that a universal legal analysis of blockchain is impossible due to the variety of possible blockchain platform designs. It is noted that from a legal point of view, closed centralized platforms entail fewer risks compared to open distributed platforms. Distributed ledger technology or a group of trusted nodes can coordinate compliance, limit the visibility of records, and if necessary, reverse past transactions, but within open distributed platforms, due to the absence of a central administrator who controls the ledger, the above actions are complicated. The study highlights that users of blockchain platforms are involved in various areas of law, such as the creation of smart contracts or ICOs, with characteristics reminiscent of already established legal

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<sup>39</sup> Blockchain technology as a mechanism for ensuring the reliability of information about objects of intellectual property // zuykov.com URL: <https://zuykov.com/ru/about/articles/tekhnologiya-blockchain-kak-mekhanizm-obespecheniya-dostovernosti-svedenii-ob-obektakh-intellektualnikh-prav/> (accessed: 07.10.2022).

<sup>40</sup> Nagrodskaya V. B. New technologies (blockchain/artificial intelligence) in the service of law. Scientific and methodological manual More details: <https://www.labyrinth.ru/books/673406/>. 1 ed. Moscow: Prospect, 2022. P. 11.

<sup>41</sup> Report for public consultation. Development of distributed ledger technology. Bank of Russia. December 2017. // [www.cbr.ru](http://www.cbr.ru) URL: [http://www.cbr.ru/content/document/file/50678/consultation\\_paper\\_171229\(2\).pdf](http://www.cbr.ru/content/document/file/50678/consultation_paper_171229(2).pdf) (accessed: 07.10.2022).

concepts - contracts and securities. And such participation can have serious legal consequences, which largely depend on the blockchain platform's design.<sup>42</sup>

Another author, reviewing the key legal issues of blockchain, pointed out that blockchain can be best described as a digital platform or database for securely storing information and recording transactions. However, it is important to say that there is no single or definitive "blockchain", i.e. there can actually be an infinite number of blockchains, and anyone with the necessary coding skills can create them. Moreover, a blockchain can be private (for example, to store company documents) or public (for example, to trade stocks). The author also says that regardless of whether the blockchain is private or public, limiting the group of users who will have access to information in the blockchain is possible in all cases. In addition, the study states that there is no universally established and accepted definition of a smart contract, a term that almost always comes up when referring to legal issues and blockchain. Smart contracts often use blockchain technology to record and execute transactions. According to the author, smart contracts are coded instructions that are uploaded to a ledger (blockchain) instead of simpler passive data records.<sup>43</sup>

Another definition of blockchain technology is a corruptible string of registry entries shared across a network by multiple parties.<sup>44</sup>

Nevada's Uniform Electronic Transactions Act provides a blockchain definition. Thus, blockchain refers to an electronic record of transactions or other data that is (1) uniformly ordered; (2) redundantly maintained or processed on one or more computers or other devices to ensure consistency and security of the recorded transactions or other data; and (3) authenticated through cryptography.<sup>45</sup>

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<sup>42</sup> Bacon J., Micheles J. D., Millard C., Singh J. Blockchain Demystified: A Technical and Legal Introduction to Distributed and Centralised Ledgers // 25 Rich. J.L. & Tech. 2018. No 1.

<sup>43</sup> An introduction to Blockchain: the key legal issues // [www.osborneclarke.com](http://www.osborneclarke.com) URL: <https://www.osborneclarke.com/insights/an-introduction-to-blockchain-the-key-legal-issues> (accessed: 07.10.2022).

<sup>44</sup> Patrick G., Bana A. Rule of Law Versus Rule of Code: A Blockchain-Driven Legal World.1 ed.IBA Legal Policy & Research Unit, 2017. P. 5.

<sup>45</sup> New nevada legislation recognizes blockchain and smart contract technologies // [www.nvbar.org](http://www.nvbar.org) URL: [https://www.nvbar.org/wp-content/uploads/NevadaLawyer\\_Aug2017\\_Blockchain-1.pdf](https://www.nvbar.org/wp-content/uploads/NevadaLawyer_Aug2017_Blockchain-1.pdf) (accessed 07.10.2022).

Thus, blockchain technology is being actively researched both in Russia and abroad, as evidenced by a large number of studies in this area. In particular, there are a large number of studies aimed at understanding blockchain as a technology, considering further prospects for using this technology in various fields. At the same time, the analysis of domestic and foreign literature led to the conclusion that there are few studies distinguishes between the notion of blockchain technology from a technical and legal perspective. It is important to note that a comprehensive study of blockchain technology will allow developing an appropriate approach to the legal regulation of this technology in various areas of society.

## CHAPTER 2. MODERN IMPLEMENTATIONS OF BLOCKCHAIN TECHNOLOGY IN THE FIELD OF PRIVATE LAW

### §2.1. Smart contracts and its application in the field of private law

Blockchain is a distributed software system that allows transactions to be processed without the need for a trusted third party.<sup>46</sup> In real life, transactions take longer, are more expensive than blockchain transactions, and can lead to security issues because they represent a single point of failure.<sup>47</sup> Thus, certain business activities can be completed faster and cheaper.

Moreover, the immutability of blockchains also provides trust, since it is almost impossible to fake any transactions stored on blockchains, and all historical transactions are auditable and traceable. In this way, blockchain replaces the need for intermediaries by redirecting trust towards decentralized systems. For example, smart contracts can build trust between parties in the face of distrust. It is noted that in this respect there is a "revolution" in the established ways of doing business.<sup>48</sup>

The concept of smart contracts is constantly evolving and becoming more and more popular. They were first proposed in the 1990s as a digital transaction protocol to fulfill the terms of an agreement.<sup>49</sup>

Smart contracts are “a value flow” based on certain conditions. The only difference with real contracts is that they are completely digital, that is, they are a small program code stored inside the blockchain.<sup>50</sup>

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<sup>46</sup> Zheng, Z.; Xie, S.; Dai, H.-N.; and others. An overview on smart contracts: Challenges, advances and platforms. *Future Gener. Comput. Syst.* 2020, 105, 475–491. URL: <https://www.sciencedirect.com/science/article/abs/pii/S0167739X19316280> (accessed: 22.04.23).

<sup>47</sup> Macrinici, D.; Cartofeanu, C.; Gao, S. Smart contract applications within blockchain technology: A systematic mapping study. *Telemat. Inform.* 2018, 35, 2337–2354. URL: <https://www.sciencedirect.com/science/article/abs/pii/S0736585318308013> (accessed: 22.04.23).

<sup>48</sup> Taherdoost, H. Smart Contracts in Blockchain Technology: A Critical Review. *Information* 2023, 14, 117. <https://doi.org/10.3390/info14020117>

<sup>49</sup> Taherdoost, H., *ibid.*

<sup>50</sup> Macrinici, D.; Cartofeanu, C.; Gao, S. Smart contract applications within blockchain technology, *ibid.*

Moreover, it is noted that a smart contract is a part of advanced technology that can be used in the blockchain ecosystem to mechanically negotiate, execute and enforce the terms of a legally binding agreement.<sup>51</sup>

Thus, a smart contract is a program code contained in a blockchain that logically inherits and reproduces the terms of real agreements.

Contracts are a legally binding agreement between two or more parties, with each party committing to fulfill its obligations. It is important to note that the agreement must be enforceable, often through a centralized legal body (organization). However, smart contracts replace trusted third parties or intermediaries between contracting parties by executing code that is automatically distributed and verified by network nodes on a decentralized blockchain.<sup>52</sup>

Thus, it is repeatedly emphasized that a smart contract is a program that is stored on the blockchain, like other transactions, and automatically enforces its terms without the help of trusted intermediaries.<sup>53</sup>

Contract clauses written in computer programs will be automatically executed if predetermined conditions are met. Smart contracts, which are made up of transactions, are primarily stored, replicated, and updated on distributed blockchains. Compared to conventional contracts, which must be executed centrally by a trusted third party, resulting in long execution times and additional costs.<sup>54</sup>

A clear example of the above features of smart contracts is the following example of a smart contract between a supplier and a buyer. The supplier first sends the product catalog to the buyer via the blockchain network. This catalog includes product descriptions such as features, quantity, price and availability, as well as

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<sup>51</sup> Taherdoost, H., *ibid.*

<sup>52</sup> Swan, M. *Blockchain: Blueprint for a New Economy*; O'Reilly Media, Inc.: Sebastopol, CA, USA, 2015. URL: [https://books.google.ru/books?hl=ru&lr=&id=RHJmBgAAQBAJ&oi=fnd&pg=PR3&ots=XRyCC2XUj8&sig=iWXg8LxFEF9Tg83tvCvuRcsa7Kk&redir\\_esc=y#v=onepage&q&f=false](https://books.google.ru/books?hl=ru&lr=&id=RHJmBgAAQBAJ&oi=fnd&pg=PR3&ots=XRyCC2XUj8&sig=iWXg8LxFEF9Tg83tvCvuRcsa7Kk&redir_esc=y#v=onepage&q&f=false) (accessed: 22.04.2023).

<sup>53</sup> Rouhani, S.; Deters, R. Security, performance, and applications of smart contracts: A systematic survey. *IEEE Access* 2019, 7, 50759–50779. doi: 10.1109/ACCESS.2019.2911031.

<sup>54</sup> Zheng, Z.; Xie, S.; Dai, H.-N.; and others. An overview on smart contracts, *ibid.*

shipping and payment terms. It is stored and distributed on the blockchain so that the buyer can obtain information about the product and verify the authenticity and reputation of the supplier. The buyer then submits the order with the specified quantity and due date via the blockchain. As a result, a contract of sale is formed. It is important to note that the entire procedure is carried out between the buyer and the supplier without the intervention of a third party. After the execution of the contract, in order to complete the delivery stage, it will be necessary to look for the carrier in the blockchain. Thus, the carrier also publishes the description of the delivery (for example, transport fees, destination, load capacity and delivery time), as well as the terms and conditions of delivery on the blockchain. In the event that the supplier accepts the contract issued by the carrier, the goods will be delivered to the carrier, who will eventually send the goods to the buyer. Thus, the whole procedure is exactly the same without the intervention of a third party. In addition to the automatic execution of contracts, payment procedures, including payment from the supplier to the carrier and from the buyer to the supplier, are also carried out automatically. For example, once the buyer confirms receipt of the goods, the payment between the buyer and the supplier will be initiated automatically when a predefined condition is met. Financial settlements between the buyer and the supplier are carried out using cryptocurrencies. Unlike conventional transactions, the entire process is performed in a peer-to-peer network without the intervention of third parties such as banks. So, the turnaround time and cost of transaction can be significantly reduced. Thus, the above example illustrates the following advantages of a smart contract:<sup>55</sup>

1) Risk reduction. Due to the immutability of blocks in the blockchain, smart contracts cannot be arbitrarily altered by anybody once it has been issued. Moreover, all transactions that are stored and duplicated throughout the distributed blockchain system can be tracked and verified. As a result, malicious activities such as financial fraud can be significantly reduced;

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<sup>55</sup> Zheng, Z.; Xie, S.; Dai, H.-N.; and others. An overview on smart contracts, *ibid.*

2) Reducing administration and maintenance costs. Blockchains ensure the trust of the entire system through distributed consensus mechanisms without the participation of an intermediary. For example, smart contracts stored on blockchains can be automatically launched in a decentralized way. Therefore, administration and maintenance costs due to the intervention of a third party can be significantly reduced;

3) Improving the efficiency of business processes. Eliminating the dependency on the intermediary can significantly improve the efficiency of the business process. The financial settlement will be automatically completed after a predefined condition is met, for example, when the buyer confirms receipt of the goods. Thus, the processing time can be significantly reduced.

It is important to note that a smart contract is described as “computer code that does not represent any legal contract, but merely executes predefined logic”.<sup>56</sup>

There are several existing blockchain-based platforms that can be used for private law purposes.

One of the blockchain-based platforms is OpenLaw.<sup>57</sup> It is a blockchain-based platform that allows lawyers to create and execute legal agreements using smart contracts. It also provides tools for digital signatures, escrow services, and other legal functions. OpenLaw provides users with a speedy and secure way digitally sign and store legal agreements.<sup>58</sup> It has lots of features, including:<sup>59</sup>

- 1) Automatic creation and execution of legal agreements;
- 2) Secure and confidential storage of legal documents on a decentralized blockchain;
- 3) Smart agreements are programmable and can be easily updated if necessary;

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<sup>56</sup> Taherdoost, H. Smart Contracts in Blockchain Technology, *ibid*.

<sup>57</sup> The official web-site OpenLaw // URL: <https://www.openlaw.io/> (accessed: 22.04.2023).

<sup>58</sup> OpenLaw Tutorial: Blockchain-Enabled, Legally Enforceable Smart Contracts // [medium.com](https://medium.com/@OpenLawOfficial/openlaw-tutorial-blockchain-enabled-legally-enforceable-smart-contracts-24d5654050fa) URL: <https://medium.com/@OpenLawOfficial/openlaw-tutorial-blockchain-enabled-legally-enforceable-smart-contracts-24d5654050fa> (accessed: 22.04.2023).

<sup>59</sup> OpenLaw business solutions // [businessblockchainhq.com](https://businessblockchainhq.com) URL: <https://businessblockchainhq.com/blockchain-business-applications/openlaw/> (accessed: 22.04.2023).

4) Signatures are stored on the blockchain for later use and to facilitate digital signature.

Another blockchain-based platform is Agrello. Agrello is a platform that uses smart contracts to automate legal agreements and contracts. It provides a user-friendly interface to create and execute legally binding contracts without the need for intermediaries.<sup>60</sup> Отмечается, что данная платформа используется во многих отраслях, в частности, HR, Sales, Legal, Logistics, Real Estate, Education.

So, for example, working with various personnel documents is important for every company. Usually for each employee it is necessary to create, sign and store several documents. Automating employment contracts or confidentiality agreements, as well as other personnel documents, allows you to speed up the entire process of paperwork from preparation to signing and avoid errors associated with the human factor. In this regard, the Agrello platform for document management and electronic signature can significantly reduce the time spent on paperwork.<sup>61</sup>

Agrello is actively used in various business areas. For example, Pidula WakePark is one of the best wake parks in the Baltics and Northern Europe. During the high season, the wake park is very crowded, and due to the weather conditions in Estonia, the high season is short, but there are a lot of customers. Before visiting the wake park, each client must sign the terms of use of the wake park. To do this, it was necessary to print contracts, sign them on paper, and then manage and store the signed documents. In this regard, the park manager was looking for an easier and faster way to conclude contracts with customers. Moreover, some people often visit the wake park and it makes no sense to sign a new contract every time, so signed contracts should be organized and stored in such a way that they can be easily retrieved when needed. Pidula WakePark uses an online booking system where visitors can select and book a suitable time on the website. An effective solution was the integration of Agrello and the booking system through Zapier. Now the process looks like this: the client enters

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<sup>60</sup> The official web-site Agrello // URL: <https://www.agrello.io/> (accessed: 22.04.2023).

<sup>61</sup> Speed up you HR contract process // Agrello.io URL: <https://www.agrello.io/automate-company-employment-contracts> (accessed: 22.04.2023).



his data in the booking form, he receives an invitation to sign the document by e-mail, after which he must open the invitation by logging into the Agrello platform and sign the document with a digital signature. So, all these documents are stored on the Agrello platform, and the name of the document automatically becomes the name of the client. Thanks to this, you can easily search for documents, as well as keep track of which customers have already signed the terms of use and which have not.<sup>62</sup>

Among the platforms based on blockchain technology, the Contract Vault platform can be distinguished. It is a blockchain-based platform that provides templates for creating legal documents such as employment agreements, non-disclosure agreements, and other contracts. This platform also allows users to track changes and revisions to their contracts.<sup>63</sup>

Corda should also be noted, which is a decentralized platform for managing financial contracts. It is a distributed ledger technology that streamlines and automates the reconciliation process by providing an immutable, tamper-proof 'single source of truth' among multiple parties. This means that parties involved in transactions have access to a complete, synchronized view of all relevant information without the need for third-party interventions, thus saving time, effort, and cost. By leveraging cryptographic signatures, Corda ensures that data is secure, confidential, and accessible only by authorized parties. Furthermore, Corda grants each party absolute control over its data storage and management, thereby preventing the data from being exposed to unauthorized actions or manipulations. All these features together result in a transparent, efficient, and secure platform for complex financial transactions such as trade finance, asset management, and capital markets operations, as well as other industries, including healthcare, real estate, and government services.<sup>64</sup>

Thus, there are a large number of platforms based on blockchain technology. Blockchain technology provides a secure and efficient way of conducting transactions

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<sup>62</sup> Case study: creating contracts based on a booking system // Agrello.io URL: <https://www.agrello.io/case-study-creating-contracts-based-on-a-booking-system> (accessed: 22.04.2023).

<sup>63</sup> The Contract Vault // thelegalpreneur.com URL: <https://thelegalpreneur.com/thecontractvault/> (accessed: 22.04.2023).

<sup>64</sup> The official web-site Corda // URL: <https://corda.net/> (accessed: 22.04.2023).

without the need for intermediaries. It offers quicker and cheaper transaction processing while reducing security risks and ensuring data integrity through its immutable nature. Although it is still a relatively new technology, its potential applications in various industries could potentially simplify business processes, streamline supply chain management, and enhance data privacy and security.

Blockchain technology, and smart contracts in particular, can have a significant impact on various areas of private law relations. Smart contracts are self-executing contracts that use blockchain technology to automatically enforce the terms of the contract. This eliminates the need for intermediaries, for instance, such as lawyers and banks, which can reduce costs and increase efficiency. Overall, blockchain technology and smart contracts have the potential to revolutionize private law relations, reducing costs, increasing efficiency, and providing greater security and transparency in various areas of life.

## **§2.2. Ways of use of blockchain tokens**

In today's ever-evolving technological society, digital assets serve a crucial role within our daily lives. As advancements in technology continue to rapidly progress, the use of digital assets is becoming increasingly relevant. They serve many purposes and are an essential element of modern society. Digital assets can be used as valuable items themselves, as a form of payment, or even to represent or be linked to other things or rights. With an expanding variety of uses, digital assets are being utilized more than ever before and in growing volumes. The rise of electronic signatures, smart contracts, distributed ledgers, and associated technologies have significantly broadened the ways in which digital assets can be created, accessed, used, and transferred.

Crypto-assets can be described as a type of digital asset which is electronically represented and stored, typically with the help of distributed ledger technology (DLT) such as blockchain. They represent value or rights that are able to be transferred from one party to another in a secured, transparent and immutable fashion. This means that transactions involving crypto-assets are typically tracked and recorded on an open and

decentralized ledger, making it incredibly difficult for anyone to tamper with or alter records without detection. Crypto-assets also can provide additional advantages to users such as low transaction fees, quick and reliable transfers across borders, and minimal reliance on third parties for record keeping. These assets offer numerous beneficial characteristics that are often unavailable through traditional finance systems. Consequently, they have become an increasingly popular option for investors worldwide who are looking for low cost and efficient ways of transferring value and rights on a global scale.<sup>65</sup>

As the technological development continues, the ways in which we use digital assets will also continue to expand. With constant innovation, digital assets have the potential to revolutionize industries and change the way we live our daily lives. In particular, crypto tokens play a major role in digital assets and are becoming increasingly popular. With unique properties and capabilities, crypto tokens have transformed the way businesses operate, creating new revenue streams and monetization strategies.<sup>66</sup>

Tokens are the digital representations of a particular asset or utility in a blockchain. So, the term "crypto token" refers to a digital asset built for a decentralized project that operates on an existing blockchain, like Ethereum or Bitcoin. These tokens come into existence with the development of smart contracts on blockchain networks, from which they derive their features such as immutability, security transparency, traceability, and decentralization. In technical terms, crypto tokens are a code attached to a user's public wallet address. They authenticate and regulate transactions on the blockchain network. Individuals can utilize these tokens to purchase something or buy or sell them, like stocks, bonds, etc., to make a profit.<sup>67</sup>

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<sup>65</sup> Blockchain and crypto assets // eiopa.europa.eu URL: [https://www.eiopa.europa.eu/browse/digitalisation-and-financial-innovation/blockchain-and-crypto-assets\\_en](https://www.eiopa.europa.eu/browse/digitalisation-and-financial-innovation/blockchain-and-crypto-assets_en) (accessed: 05.05.2023).

<sup>66</sup> Cryptos on the rise 2022. A complex regulatory future emerges // thomsonreuters.com URL: <https://www.thomsonreuters.com/en/reports/cryptos-on-the-rise-2022.html> (accessed: 07.05.2023).

<sup>67</sup> Crypto Token // Wallstreetmojo Team, wallstreetmojo.com URL: <https://www.wallstreetmojo.com/crypto-token/> (accessed: 07.05.2023).

There are several different types of blockchain-tokens that apply as digital assets, each has its own unique characteristics and functions.

For instance, security tokens are tokens that used to invest in projects or companies, and their price depends on the success or failure of these projects. A security, in its most basic sense, is an instrument that memorializes and evidences an ownership interest and provides various legal rights, such as a right to a share of earnings, property distribution, or debt. The issuance of securities is the means by which many companies, trusts, governments, or other legal entities finance their operations or projects. Securities come in various forms and types, including but not limited to bonds, debentures, notes, options, shares, warrants, and more, and can be traded freely amongst investors. However, with the recent advancement in blockchain technology, security tokens have emerged as a new type of security. While not yet ubiquitous, security tokens may serve as direct, on-chain representations of traditional securities or as on-chain instruments serving a similar purpose for blockchain projects and digital assets. Security tokens may represent different types of ownership interests in various assets or projects.<sup>68</sup>

For instance, investors on the Meridio platform can seamlessly trade tokens representing real estate shares and pay in Dai (a stablecoin pegged to the U.S dollar), facilitating more efficient transactions than the traditional real estate market. Similarly, Fluidity Factora provides opportunities for people to invest in a real estate project in Brooklyn, New York, by paying with Dai.<sup>69</sup>

Thus, while securities have been around for many years, the emergence of security tokens marks an exciting turning point for the financial industry, offering a novel and innovative way to invest in traditional assets and blockchain projects. Security tokens can bring greater efficiency, transparency, and accessibility to the market while benefiting both the issuers and investors.

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<sup>68</sup> The Different Types of Cryptocurrency Tokens Explained // [blog.makerdao.com](https://blog.makerdao.com) URL: <https://blog.makerdao.com/the-different-types-of-cryptocurrency-tokens-explained/> (accessed: 07.05.2023).

<sup>69</sup> Meridio Integrates Maker's Dai Stablecoin // [blog.makerdao.com](https://blog.makerdao.com) URL: <https://blog.makerdao.com/meridio-maker/> (accessed: 07.05.2023).

Payment tokens are a type of digital asset that can be used to facilitate transactions and payments on digital platforms without the need for intermediaries as is required in traditional banking and financial arenas. These tokens are designed to function as digital currencies, providing a means of exchange for goods and services in an efficient and secure manner. Unlike traditional securities, payment tokens do not give the holder any rights or ownership over the underlying asset or product, nor do they represent a claim on any future profits or revenues. While payment tokens may not offer the same level of guarantees or protections as traditional financial assets, they have gained popularity as a means of facilitating fast and secure transactions online, particularly in regions where traditional banking infrastructure is limited or unreliable. Some examples of popular payment tokens include Ethereum, Monero, and Bitcoin.<sup>70</sup>

As we continue to see the growth of digital finance, payment tokens are likely to play an increasingly important role as a means of facilitating transactions and enabling greater economic freedom and access to financial services for individuals and businesses around the world.

Utility tokens are digital units that do not represent ownership but rather provide certain access to a product or service offered by the token issuer. It's similar to having coupons or vouchers that grant discounted or free access to these products or services as long as you hold the tokens. These tokens are not considered investment products and their value can fluctuate or even become worthless. From a regulatory standpoint, they are not assumed to be regulated, unlike traditional assets like stocks or bonds. Some example applications of utility tokens include access to decentralized storage, rewards programs, and as a form of currency in a blockchain network. Tokens such as Funfair, Basic Attention Token, Brickblock, Timicoin, Sirin Labs Token, and Golem fall under the category of utility tokens.<sup>71</sup>

Thus, due to their revolutionary features such as greater efficiency, reduced transaction costs, increased transparency, and accessibility, tokens are becoming

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<sup>70</sup> Different types of cryptocurrency and tokens with examples // softwaretestinghelp.com URL: <https://www.softwaretestinghelp.com/types-of-cryptocurrency/> (accessed: 07.05.2023).

<sup>71</sup> Different types of cryptocurrency and tokens with examples, *ibid.*

increasingly adopted by businesses and individuals. The potential applications of crypto tokens have expanded multifold and could lead to further innovation and development in the future. The possibilities which this technology offers will continue to unlock many untapped, or previously unfeasible potentials. Thus, tokens will play an increasingly important role in shaping the future of business relations and society as a whole.

### **§2.3. Application of blockchain technology in the protection of intellectual property rights**

Blockchain technology is being applied in the field of intellectual property rights protection to enable secure and transparent management of intellectual property rights. This technology allows for transparent and tamper-proof recording of ownership and usage rights of digital assets, ensuring that creators get credit for their work and are compensated appropriately.

Due to the fact that intellectual property rights are subject to different regulatory frameworks and legal systems in various jurisdictions throughout the world, it can be extremely challenging for individuals or entities seeking to make claims regarding intellectual property on an international level. This continuing lack of uniformity and compatibility of global systems in relation to intellectual property has led to inefficiencies and impediments affecting progress, innovation, and optimization of the entire sphere. In this respect among the many benefits of blockchain is its ability to provide a unified platform where all parties involved in an intellectual property dispute or agreement can work together to create a framework that all parties agree on. By utilizing this technology, individuals or entities can claim intellectual property rights in a transparent, secure, and tamper-proof manner, which ultimately provides a more efficient and effective overall system for managing intellectual property rights. It is noted that blockchain leads for significant improvements in ensuring the

comprehensive protection of intellectual property rights at both national and international levels.<sup>72</sup>

One example of a platform that uses blockchain technology for intellectual property rights protection is IPCHAIN. It is a blockchain-based platform that was created to protect, manage and share intellectual property (IP) rights. The platform also includes tools for resolving disputes and facilitating licensing agreements between owners and users of intellectual property. Users on the IPChain platform can register their IP assets, which may include patents, trademarks, copyrights or trade secrets, and create smart contracts to define ownership and licensing terms. These smart contracts enable automatic execution of transactions once certain predetermined conditions are met, leading to increased efficiency and cost savings.<sup>73</sup> In addition, IPChain also provides an ecosystem for IP-related services, such as legal and financial support, token issuance, and crowdfunding, among others. This enables users to access a range of services without having to leave the IPChain platform. Thus, the IPChain platform aims to create a secure and efficient marketplace for the exchange of IP rights that benefits creators, innovators, and businesses, while also promoting innovation and protecting the global IP system.<sup>74</sup>

Another platform that uses blockchain technology for intellectual property rights protection is known as Authoreon. Authoreon's platform provides a decentralized and secure way for users to verify and protect their digital identities, assets, and information. The platform uses smart contracts to ensure that all transactions and actions taken on the network are secure and transparent, making it an ideal platform for businesses looking to protect their intellectual property. Thus, Authoreon provides a solution for securely storing, sharing, and managing their data.<sup>75</sup> The platform is designed to provide a wide range of functionalities related to identity and authorization verification. These functionalities include managing user accounts and access,

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<sup>72</sup> Blockchain and Intellectual Property Rights Protection Technology // [originstamp.com](https://originstamp.com) URL: <https://originstamp.com/blog/blockchain-and-intellectual-property-rights-protection-technology/> (accessed: 22.04.2023).

<sup>73</sup> The official web-site IPChain // URL: <https://ipchain.ru/> (accessed: 22.04.2023).

<sup>74</sup> About Vois // [rosvois.ru](https://rosvois.ru) URL: <https://rosvois.ru/en/main-page-en/> (accessed: 22.04.2023).

<sup>75</sup> The official web-site Authoreon // URL: <https://www.authoreon.io/about/> (accessed: 22.04.2023).

managing digital assets, managing permissions for different types of records, managing user authentication and authorization requests, among others.<sup>76</sup> The platform is built on the Ethereum blockchain, which ensures complete decentralization as well as security, privacy, and immutability of data records.<sup>77</sup>

It is also worth noting the Mattereum platform, which allows users to create and manage digital assets using blockchain technology. Moreover, the platform provides legal tools to protect and manage the rights to digital assets.<sup>78</sup> Being a platform that provides a way to turn physical assets into digital assets, this platform enables those assets to be traded, tracked and transferred digitally. It allows users to create unique digital identities for each physical asset, which serves as a certificate of ownership that can be transferred easily and securely. Additionally, the platform provides tools to manage ownership, access, and permissions for these digital assets. It aims to reduce the friction involved in buying, selling, and transferring physical assets, while also increasing transparency and security. Thus, Mattereum is focused on bringing the benefits of blockchain technology to the world of physical assets., making them more liquid, transparent, and accessible to everyone.<sup>79</sup>

Thus, the use of blockchain technology in the field of intellectual property rights protection offers numerous benefits, including transparency, security, and efficiency. Blockchain technology is a decentralized digital ledger that provides secure, transparent and tamper-proof transactions. By using blockchain technology, IP owners can register their work in the form of digital assets that can be traced through the blockchain. This ensures that their ownership and authenticity can be verified easily, providing a much better level of security for intellectual property rights. Apart from this, blockchain technology provides transparency, allowing every transaction to be recorded in a public ledger. This enables better tracking of IP rights infringement and makes it easier to hold infringers accountable. The use of blockchain technology also

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<sup>76</sup> Authoreon whitepaper, V. 4, 06.2019, p. 6 // URL: <https://www.authoreon.io/Authoreon-Whitepaper.pdf>

<sup>77</sup> Authoreon whitepaper, *ibid*, p. 8.

<sup>78</sup> The official web-site Mattereum // URL: <https://mattereum.com/> (accessed: 23.04.2023).

<sup>79</sup> Mattereum whitepaper. The Mattereum Team, London, 10.2018, p.6-7 // URL: [https://mattereum.com/wp-content/uploads/2020/02/mattereum-summary\\_white\\_paper.pdf](https://mattereum.com/wp-content/uploads/2020/02/mattereum-summary_white_paper.pdf)



eliminates the need for intermediaries and third parties, which reduces the cost of administering intellectual property rights. This makes it easier for small businesses and individuals to protect their intellectual property.

In conclusion, the use of blockchain technology has the potential to revolutionize the field of intellectual property rights protection, offering benefits, particularly in terms of efficiency, transparency, and security at a lower cost. However, adoption of these systems is still in its early stages and their full potential has yet to be realized.

## CHAPTER 3. ANALYSIS OF SOURCES ON THE LEGAL REGULATION OF BLOCKCHAIN TECHNOLOGY

### §3.1. Domestic legal regulation of blockchain technology

The regulation of blockchain technology causes active controversy in different countries, and Russia is no an exception.

Many researchers argue about the need for legal regulation of technologies, including blockchain.

R. Jankowski, an IP/IT lawyer, said that legal regulation is needed not only for the state, but also for the participants in the system. When discussing Russia's private law system, which includes civil law as well as financial market regulation, the researcher concluded that it has its origins in the German legal system. This system is characterised by a high degree of conservatism, to the extent that new rules of law at certain periods are only permitted to be deduced from previous ones and not created to regulate actual relations; and also by a tendency to systematise meticulously: "the whole system of rules must be clearly arranged on the shelf without unnecessary details or meaningful phenomena". Thus, by the end of the twentieth century, the only intangible subject matter that was specifically regulated was intellectual property. Money and stocks, meanwhile, were settled roughly analogous to things. Nowadays, for example, cryptocurrencies constitute a qualitatively new phenomenon that needs to be legally regulated.<sup>80</sup>

Another domestic author also writes that the Russian Federation needs to define a legal regime that will comprehensively regulate digitally enabled economic relations. It is also interesting to note that law enforcement practice is evolving in such a way that current legislation is perceived by law enforcement to be against the development of blockchain technologies.<sup>81</sup>

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<sup>80</sup> Why lawyers won't agree on cryptocurrencies // [habr.com](https://habr.com/ru/post/405199/). URL: <https://habr.com/ru/post/405199/> (accessed: 07.10.2022).

<sup>81</sup> Brisov Yu. V. Development of norms of contract law in the field of technology application blockchain // Actual problems of Russian law.2020. T.15. N 5. P. 97.DOI: 10.17803 / 1994-1471.2020.114.5.096-106.

A. A. Garayev emphasised that the legislator should not regulate technology by law. Technologies, including blockchain technology, should be regulated by the Federal Agency for Technical Regulation and Metrology (Rosstandart) by creating standards, technical regulations and technical conditions. And legal norms can already be applied to technologies that comply with these standards.<sup>82</sup>

A. A. Inyushkin opined on the application of the legal regime of databases for blockchain technology, since the use of such a regime for regulating the blockchain makes it possible to guarantee the protection of the interests of participants in relations using distributed ledger technologies through the time-tested mechanisms provided for by part four of the Civil Code of the Russian Federation. Clear and familiar legal structures will minimize the negative consequences of the introduction of this technology, as well as ensure maximum efficiency of its usage.<sup>83</sup>

It is important to highlight that the goals of any form of regulation of blockchain technology should be: 1) creating technical standards that will ensure interoperability and protect end-users (interoperability goal); 2) ensuring that vulnerable people are protected and protected from criminals (protection goal); and 3) ensuring good governance to protect investors as well as end-users from fraud, mismanagement and gross negligence (governance goal).<sup>84</sup>

Thus, there is a Strategy for the Development of Information Society in the Russian Federation for 2017 – 2030 years, which provides for the active implementation of information and communication technologies, as they "have a significant impact on the development of traditional sectors of the economy and

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<sup>82</sup> Garaev A.A. Blockchain as a source of legal facts, *ibid.*

<sup>83</sup> Inyushkin A.A. Legal regime of databases for the use of blockchain technologies (blockchain) in civil circulation // *Information law*. 2018. N 1. P. 45 - 48.

<sup>84</sup> Tokolov A.V. Features of the legal regulation of blockchain technology // *Bulletin of the Moscow University of the Ministry of Internal Affairs of Russia*. 2020. N. 1. P. 150.

increase the competitiveness of the state economy at the global level. Moreover, the formation of the digital economy is one of the key national interests.<sup>85</sup>

M.A. Egorova noted that the use of new technologies, including blockchain, at both public and private levels is essential to achieve the goals and priorities of the above-mentioned Strategy.<sup>86</sup>

Moreover, the Russian Digital Economy Program, approved by Decree of the Government of the Russian Federation of July 28, 2017 N 1632, is in force, the purpose of which is to create an ecosystem of the digital economy of the Russian Federation, in which digital data is a key factor in production in all areas of socio-economic activities, increasing competitiveness in the global market of the Russian economy, as well as removing obstacles to the creation and development of high-tech businesses.<sup>87</sup>

I. E. Mikheeva said that the legislator in Russia is taking certain steps to improve the current legislation on digitalization. For example, special laws were adopted to regulate certain issues of the application of new technologies, namely, Federal Law N 259-FZ of July 31, 2020 "On Digital Financial Assets, Digital Currency and on Amendments to Certain Legislative Acts of the Russian Federation". In Art. 1 of the above Law, the concept of "distributed registry" was enshrined, which means a set of databases, the identity of the information contained in which is ensured on the basis of established algorithms (algorithm). And given that the blockchain is a type of distributed ledger, the author concludes that with the adoption of this law, Russia has actually recognized the "blockchain" technology at the legislative level. At the same time, this definition does not fully disclose the content of blockchain technology, in connection with which the author proposes to supplement Article 1 of the Federal Law of July 31, 2020 N 259-FZ "On digital financial assets, digital currency and on

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<sup>85</sup> Decree of the President of the Russian Federation of May 9, 2017 N 203 "On the Strategy for the Development of the Information Society in the Russian Federation for 2017 - 2030" // SZ RF. 2017. N 20. URL: <https://base.garant.ru/71670570/>

<sup>86</sup> Egorova M.A., Belykh V.S., Reshetnikova S.B. Blockchain technology: prospects for application and significance for the development of the information society // Lawyer. 2019. N. 7. P. 5.

<sup>87</sup> Decree of the Government of the Russian Federation of July 28, 2017 N 1632-r "On approval of the program "Digital Economy of the Russian Federation" // SZ RF. 2017. N 32. URL: <https://base.garant.ru/71734878/>

amendments to certain legislative acts Russian Federation" with the following definition of blockchain: "Blockchain is a type of distributed ledger, consisting of linked blocks, which stores confirmed and verified groups of transactions that are immutable, and in which each block contains the hash of the previous block in the chain."<sup>88</sup>

The term "distributed registry" is found in single acts emanating from the public authorities of the Russian Federation. The order of the Ministry of Communications of Russia approved the form of an agreement on granting a grant for the implementation of projects to develop technological solutions for the creation of federal and regional state information resources using distributed registry technology, the introduction of methods and technologies for processing and storing information.<sup>89</sup>

Moreover, there is a "Roadmap for the development of "end-to-end" digital technology "Distributed Registry Systems", which is a strategic tool outlining the priorities and prospects for the development of this technology in Russia. It is pointed out that distributed registry technology is a new approach to creating databases, the key feature of which is the absence of a single control center.<sup>90</sup>

E. G. Bagoyan notes that the blockchain, being an information technology, falls under the definition enshrined in the Federal Law of July 27, 2006 N 149-FZ (as amended on July 19, 2018) "On Information, Information Technologies and Information Protection "- "... the totality of the information contained in the databases and the information technologies and technical means that ensure its processing."<sup>91</sup>

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<sup>88</sup> Mikheeva I. E. An alternative view of the legal regulation of blockchain technology // Lawyer.2021. N. 11. P. 5-7.

<sup>89</sup> Order of the Ministry of Telecom and Mass Communications of Russia of December 2, 2019 N 800 "On approval of the form of an agreement on granting a grant for the implementation of projects to develop domestic software and increase its share in the digital economy, as well as to develop technological solutions for the creation of federal and regional state information resources with the use of distributed ledger technology, the introduction of methods and technologies for processing and storing information" // SPS ConsultantPlus.

<sup>90</sup> Roadmap for the development of "end-to-end" digital technology "Distributed registry systems". // SPS ConsultantPlus.

<sup>91</sup> Bagoyan E.G. Information security and the use of blockchain technology: foreign experience and the need for legal regulation in the Russian Federation // Lawyer. 2019. N 3. P. 42 - 49.

A. A. Inyushkin studied the system of legal acts aimed at regulating blockchain technology in the context of digitalization of the information field. He pointed out that problems in the systemic nature of the legal regulation of advanced technologies are especially observed when they are introduced into civil circulation. The basis of legal regulation of blockchain is the regulatory framework in the field of databases. The researcher writes that the legislation on databases includes several levels: 1) norms of civil law that determine the place of databases in the system of objects of civil rights, as well as the categories of entities that have exclusive rights to them; 2) special legal acts in the field of public law regulating the circulation of special databases developed for state tasks (in particular, the Federal Law of the Russian Federation of January 10, 2003 N 20-FZ "On the State Automated System of the Russian Federation" Elections "<sup>92</sup>, Federal Law of July 27, 2006 N 149-FZ "On Information, Information Technologies and Information Protection",<sup>93</sup> as well as legislative acts in the field of personal data, commercial and state secrets); 3) by-laws regulating the procedure for using databases and promising technologies in certain areas (for example, Resolution of the Central Election Commission of Russia dated March 20, 2020 N 244 / 1813-7 "On Instructions for Placing Data of the State Automated System of the Russian Federation" Elections "in information - telecommunications network Internet in the preparation and conduct of the all-Russian vote on the approval of amendments to the Constitution of the Russian Federation"<sup>94</sup>).<sup>95</sup>

V. B. Nagrodsкая writes about the need for standardization in the field of blockchain. The author says that the understanding of blockchain and other concepts

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<sup>92</sup> Federal Law of January 10, 2003 N 20-FZ "On the State Automated System of the Russian Federation "Elections" // Collection of Legislation of the Russian Federation. 13.01.2003. N 2.

<sup>93</sup> Federal Law of July 27, 2006 N 149-FZ "On Information, Information Technologies and Information Protection" // Collected Legislation of the Russian Federation. 31.07.2006. N 31 (part 1).

<sup>94</sup> Decree of the CEC of Russia of March 20, 2020 N 244/1813-7 "On the Instructions for Placing Data of the State Automated System of the Russian Federation "Vybory" in the Information and Telecommunications Network" Internet "in the Preparation and Conduct of the All-Russian Voting on the Approval of Amendments to the Constitution of the Russian Federation" // Bulletin of the CEC of Russia. 2020. N 3.

<sup>95</sup> Inyushkin A. A. Research of the system of regulatory legal acts aimed at regulating blockchain technology in the conditions of digitalization of the information field // Modern lawyer. 2020. N 4. P. 74.

related to this technology is somewhat different depending on each jurisdiction. Thus, blockchain standardization will not take place in the classical way, since the unification of the technical features of blockchain technology is impossible and not necessary. According to the researcher, when developing national standards, international standards can be used as a basis, unless such use is recognized as impossible due to non-compliance with the requirements of international standards. At the same time, Rosstandart previously announced the formation of a technical committee for standardization “Hardware and software for distributed ledger technologies and blockchain” .”<sup>96</sup> The author concludes that the integration of blockchain technology processes should follow the path of soft law harmonisation, for example, through the EAEU, BRICS or SCO, which would attract new investments in the development of business projects and establish international cooperation. At present, it is more effective to create norms of a recommendatory nature that do not oblige states to strictly implement them and apply liability for non-compliance with them. Thus, attachment to a certain strict model of legal regulation should be avoided.<sup>97</sup>

There is also an approach to creating a special legal regime - regulatory sandboxes - for developers and blockchain projects to operate without the risk of legal infringement. Some researchers point out that Russia may be among the countries where blockchain is actually developing within regulatory sandboxes. There is no legal regulation of blockchain technology in the country, but blockchain projects are being implemented in certain areas. In particular, in the banking sector, in the issuance of bank guarantees; in the identification of banks' clients; in the settlement of payments using letters of credit.<sup>98</sup>

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<sup>96</sup> Blockchain mechanisms are being standardized in Russia // [www.nsopb.ru](http://www.nsopb.ru) URL: [https://www.nsopb.ru/news/v-rossii-nachinajut-standartizirovat-mehanizmy-blokchejna\\_6286](https://www.nsopb.ru/news/v-rossii-nachinajut-standartizirovat-mehanizmy-blokchejna_6286) (accessed: 07.10.2022).

<sup>97</sup> Nagrodsкая V. B. New technologies (blockchain/artificial intelligence) in the service of law. Scientific and methodological manual More details: <https://www.labirint.ru/books/673406/>. 1 ed. Moscow: Prospect, 2022. P. 13.

<sup>98</sup> Nichiporov K.S., Tovt P.D. INTERNATIONAL EXPERIENCE IN LEGAL REGULATION OF BLOCKCHAIN TECHNOLOGY // [libelloc.bsuir.by](http://libelloc.bsuir.by) URL: [https://libelloc.bsuir.by/bitstream/123456789/44056/1/Nichiporov\\_Mezhdunarodnyy.pdf](https://libelloc.bsuir.by/bitstream/123456789/44056/1/Nichiporov_Mezhdunarodnyy.pdf) (accessed 07.10.2022).

### §3.2. Foreign legal regulation of blockchain technology

On 21 December 2017, President of the Republic of Belarus Alexander Lukashenko signed Decree N 8 "On the Development of the Digital Economy".<sup>99</sup> According to him, "Belarus is actually becoming the first state in the world that opens up wide opportunities for the use of blockchain technology. In particular, the document defined such key concepts as "blockchain", "cryptocurrency", "mining", "smart contract" and others.<sup>100</sup>

The Republic of Belarus has adopted a number of regulatory legal acts regulating blockchain technologies, in particular, the Instruction on the general principles of the functioning of an information network built using blockchain technology, approved by the Decree of the Board of the National Bank of the Republic of Belarus dated July 14, 2017 N 280, provides that blockchain technology is a technology for the formation of a distributed database, consisting of blocks of information containing records created to solve applied problems.<sup>101</sup> Thus, the blockchain network in the banking system of Belarus has made it possible to transfer the bank guarantee itself. The aforementioned Instruction of the National Bank of the Republic of Belarus stipulates the main rules of interaction and the main requirements for the persons who can participate in the guarantee issuance procedure.<sup>102</sup>

In the Republic of Kazakhstan, the concept of blockchain is established in the Law of the Republic of Kazakhstan "On Informatization"<sup>103</sup>, according to which blockchain is an information and communication technology that ensures the

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<sup>99</sup> On the development of the digital economy Decree N. 8 of December 21, 2017 // president.gov.by URL: <https://president.gov.by/ru/documents/dekret-8-ot-21-dekabrja-2017-g-17716> (accessed: 07.10.2022).

<sup>100</sup> Cryptocurrencies and blockchain as attributes of the new economy. Development of regulatory approaches: international experience, practice of the eaeu member states, prospects for application in the eurasian economic union // eec.eaeunion.org URL: <https://eec.eaeunion.org/upload/medialibrary/704/Doklad> (accessed: 07.10.2022).

<sup>101</sup> Mikheeva I.E. Blockchain as a tool to protect against fraud when issuing digital bank guarantees // Actual problems of Russian law. 2020. N. 15(7). P. 43.

<sup>102</sup> Mikheeva I.E., *ibid.* P. 43.

<sup>103</sup> Law of the Republic of Kazakhstan dated November 24, 2015 N 418-V ZRK "On Informatization" // Gazette of the Parliament of the Republic of Kazakhstan. 2015. N. 22-V. Art. 155.



immutability of information in a distributed data platform, based on a chain of interconnected data blocks, given integrity confirmation algorithms and encryption tools. Moreover, in Kazakhstan, there is a certain revitalization of the activities of national regulators and the Astana International Financial Center (AIFC) on the development of financial technologies, within which a FinTech regulatory sandbox (hub) has been launched with a special legal regime that allows legal entities involved in the development of new financial products and services, to conduct experiments in a limited environment on their implementation without the risk of violating the current legislation. Within the framework of the regulatory sandbox, regulatory legal acts are being developed to regulate activities in the field of blockchain and cryptocurrencies, including as part of the development of cooperation between the Kazakhstan Association of Blockchain and Cryptocurrencies with the AIFC.<sup>104</sup>

Speaking of Armenia, currently the country has not adopted official documents, regulations in the field of blockchain. However, the expert community is developing recommendations for the formation of a national legal environment in the field of cryptocurrencies and blockchain. Thus, there is an analysis of international experience, first of all, of neighboring and partner countries, an assessment of their approaches in relation to the functioning of the Armenian market; consultations with the business community. In addition, educational activities are carried out, a balance is being sought between the freedom of movement of market participants and the protection of citizens and investors. It is noted that the Republic of Armenia intends to create a free economic zone for the development of blockchain projects, which will contribute to the development of high-tech projects in the country, attract investment and create new jobs.<sup>105</sup>

The Kyrgyz Republic is also monitoring state regulation of blockchain in EEU member states. At the same time, the governor of the National Bank of Kyrgyzstan said that there are no plans to hinder the development of the cryptocurrency market, but

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<sup>104</sup> Cryptocurrencies and blockchain as attributes of the new economy, *ibid.* P. 44.

<sup>105</sup> Cryptocurrencies and blockchain as attributes of the new economy, *ibid.* P. 43.

noted the high risks of losing investors' funds, so he recommends using time-tested financial instruments.<sup>106</sup>

The European Commission emphasizes the importance of legal certainty and a clear regulatory regime in the field of blockchain. In order to avoid legislative and regulatory fragmentation, common European rules should be followed. Thus, the commission adopted a package of proposals for the regulatory regulation of crypto assets, which updates certain financial market rules for crypto assets, and also creates a legal basis for the regulatory sandboxes of financial supervisors in the EU for the use of blockchains in trading and post-trading in securities. Moreover, the European Blockchain Partnership is planning a pan-European regulatory sandbox for use cases in the European Blockchain Service Infrastructure (EBSI) and beyond, including for data portability, smart contracts, and more that will cover healthcare, environment, energy and much more.<sup>107</sup>

In the United States, legal regulation of blockchain technologies has been consistently carried out for more than 10 years. It is noted that the experience of American lawyers is considered and analyzed everywhere.<sup>108</sup> Starting in 2016 various US states have defined blockchain law as a legal matter<sup>109</sup>.

Thus, Vermont became the first state to include blockchain in legislation in 2015, by commissioning a report to the General Assembly on the opportunities and risks of creating a presumption of reliability of electronic facts and records that use blockchain technology. Subsequently, in 2016, the Vermont General Assembly developed

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<sup>106</sup> Will cryptocurrency be banned in Kyrgyzstan? — response of the head of the National Bank // ru.sputnik.kg URL: <https://ru.sputnik.kg/20180117/zapretyat-li-kriptovalyutu-v-kyrgyzstane-answer-glavy-nacbanka-1037290672.html> (date of access: 07.10. 2022).

<sup>107</sup> Legal and regulatory framework for blockchain // digital-strategy.ec.europa.eu URL: <https://digital-strategy.ec.europa.eu/en/policies/regulatory-framework-blockchain> (accessed 07.10.2022)

<sup>108</sup> Brisov Yu. V. Development of contract law in the field of application of blockchain technology // Actual problems of Russian law.2020. T. 15. No 5. P. 98.DOI: 10.17803 / 1994-1471.2020.114.5.096-106

<sup>109</sup> Blockchain law // www.pcmag.com URL: <https://www.pcmag.com/encyclopedia/term/blockchain-law> (accessed: 07.10.2022).

evidentiary standards to determine the authenticity of records using blockchain technology as part of the state's rules on evidence.<sup>110</sup>

In 2017, four states, including Arizona, Delaware, and Nevada, passed blockchain legislation. Arizona passed two bills: the first (House Bill 2417<sup>111</sup>) established guidelines for electronic signatures and records using blockchain technology; in the second bill (House Bill 2216<sup>112</sup>) the legislature has declared it illegal to require or be subjected to electronic firearm tracking technology, including blockchain and distributed ledger systems. In the state of Delaware, it has been accepted that corporations formed in that state have the right to use the blockchain to create and maintain corporate records.<sup>113</sup> Nevada enacted a law that recognized blockchain technology as a type of electronic record, which prohibits local governments from taxing or imposing restrictions on the use of blockchain.<sup>114</sup>

It is important to note that a large analysis of the US states was carried out regarding the legal regulation of blockchain technology. Therefore, seventeen states have introduced legislation relating to blockchain in 2021.<sup>115</sup>

The experience of self-regulation of blockchain market participants in Switzerland is interesting. In January 2018, the Swiss Crypto Valley Association (CVA) published the ICO Code of Conduct for Switzerland<sup>116</sup>. Moreover, the Minister

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<sup>110</sup> Heather Morton. Blockchain Technology: An Emerging Public Policy Issue // [www.ncsl.org](http://www.ncsl.org) URL: <https://www.ncsl.org/research/fiscal-policy/blockchain-technology-an-emerging-public-policy-issue.aspx> (accessed: 07.10.2022).

<sup>111</sup> Arizona House Bill 2417 // [www.azleg.gov](http://www.azleg.gov) URL: <https://www.azleg.gov/legtext/53leg/1R/laws/0097.pdf> (accessed: 07.10.2022).

<sup>112</sup> Arizona House Bill 2216 // [www.azleg.gov](http://www.azleg.gov) URL: <https://www.azleg.gov/legtext/53leg/1R/laws/0165.pdf> (accessed: 07.10.2022).

<sup>113</sup> Delaware Senate Bill 69 // [legiscan.com](http://legiscan.com) URL: <https://legiscan.com/DE/bill/SB69/2017> (accessed: 07.10.2022).

<sup>114</sup> New Nevada legislation recognizes blockchain and smart contract technologies // [www.nvbar.org](http://www.nvbar.org) URL: [https://www.nvbar.org/wp-content/uploads/NevadaLawyer\\_Aug2017\\_Blockchain-1.pdf](https://www.nvbar.org/wp-content/uploads/NevadaLawyer_Aug2017_Blockchain-1.pdf) (accessed 07.10.2022).

<sup>115</sup> Heather Morton. Blockchain 2021 Legislation // [www.ncsl.org](http://www.ncsl.org) URL: <https://www.ncsl.org/research/financial-services-and-commerce/blockchain-2021-legislation.aspx> (accessed: 07.10.2022).

<sup>116</sup> Everything you need to know about crypto-currency hedge funds // [bitcryptonews.ru](http://bitcryptonews.ru) URL: <https://bitcryptonews.ru/analytics/vse-cto-nuzhno-znat-o-kriptovalyutnyix-xedzh-fondax> (accessed: 07.10.2022).

of Economy and Education of Switzerland emphasized: “Blockchain technology has become important not only for cryptocurrencies, but also for many other areas. All we need today for projects built on it is liberal regulation, which opens up a range of opportunities for Switzerland while reducing possible risks.”<sup>117</sup>

The study of the legislation of various countries leads to a conclusion that there is no unified approach to the regulation of blockchain technology. Some states establish the blockchain at the legislative level, while others within the framework of regulatory sandboxes. So, some states establish the concept of "blockchain" in the legislation, others only determine the vector of development of countries based on information technology. There are those who only observe the situation, analyze the experience of the countries of the world. It is also important to note the approach according to which the regulation of technologies, including blockchain, requires “soft” regulation.

Thus, law often lags behind the realities of life, from relations that are actually developing under the influence of new technologies. Blockchain creates prospects for legislative regulation, and due to the specifics of the technology - decentralized and autonomous technology, its structure, independence from state institutions and governments, there are hidden difficulties for regulation both at the state and international levels. So, as W. Sh. Broy notes, blockchain technology requires a revision of existing legal structures, while the legal regulation of this technology, of course, should take into account the positive effect of economic development, and not reduce it.<sup>118</sup>

### **§3.3. Prospects for legal regulation of blockchain technology in the Russian Federation**

Based on the study that has been conducted, it can be concluded that blockchain technology is rapidly evolving and progressing, due to the fact that numerous and

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<sup>117</sup> Everything you need to know about crypto-currency hedge funds, *ibid.*

<sup>118</sup> Broy W. Sh. Blockchain and cybercurrencies: is a new legal framework needed? // *urfac.ru* URL: <https://urfac.ru/?p=535> (accessed: 07.10.2022).

various solutions are being developed and implemented across different industries and sectors all over the world. One of these spheres that have been immensely impacted by this innovative technology is the field of private law. With the utilization of blockchain technology, private law practitioners can now effectively carry out their duties, such as secure storage of contracts and other sensitive data, creating tamper-proof records that provide transparency and credibility while ensuring that there is zero or minimal risk of discrepancies, fraud or errors, thereby significantly reducing the need for intermediaries in contractual relationships. It is evident that with the integration of blockchain technology in private law, legal professionals can enjoy benefits such as improved efficiency, cost-effectiveness, and higher compliance standards, ultimately leading to more trust and transparency within the legal ecosystem.

One way or another, due to the rapid development of blockchain technology, legislators need to pay special attention to the regulation of this technology in Russia, since its novelty entails certain risks associated with the following factors:

- 1) insufficient knowledge of this technology,
- 2) insufficient regulation at the legislative level due to the lack of specific formulations that take into account the subtleties of this innovative technology and, most importantly, opportunities.

Taken together, these factors make the legal understanding of this technology ambiguous both among participants in civil transactions and among arbitrators who resolve disputes arising from the use of blockchain technology in commercial activities and in the field of private law relations. In doing so, all parties involved will be able to more confidently interact with each other within the framework of transactions, without fear of negative consequences caused by the ambiguous nature of this new technology.

In connection with the above, these problems associated with the increase in the number of decentralized applications should be addressed in a comprehensive manner at different levels, including the following:

- 1) science,
- 2) education (including legal, financial, etc.),

- 3) media,
- 4) legislation.

At the moment, the field of science is most effective in trying to solve the problems posed. However, during the analysis, it was found that research in the field of blockchain technology lacks some specifics that would help improve the general understanding of this technology by the general public. This issue could be resolved by interdisciplinary research that would expand the mutual understanding of blockchain technology between representatives of various scientific fields. Also, interdisciplinary research would help to speed up and simplify the understanding of the nuances by representatives of business and public administration. Thus, it is necessary to create groups consisting of researchers from various fields of scientific activity to solve specific research problems, including support for such activities from the state, universities and research centers.

The work programs of educational institutions currently do not include the mandatory study of blockchain technology, even at the most basic level. For the best understanding and perception of the technology under study, the curriculum of schools and colleges should include the formation by students of a basic understanding of the blockchain, including its technological and social aspects. At the level of higher education, previously acquired knowledge should be expanded, as well as deepened into specific nuances related to the specialty of students.

Taking into account the fact that at the level of education the problem is solved only for the young population, it is necessary to expand their knowledge, as well as to form knowledge about the blockchain among the older population who graduated from educational institutions. The state and enterprises using blockchain technology in their activities, as well as providing services on this platform, should use the media to form an understanding of this technology among the general public, as well as explain the nuances of its functioning using examples of their developments.

Thus, it will be possible to form a general idea of the blockchain among the population, which will entail the following advantages:

- 1) increase the overall level of financial literacy,

- 2) increase overall confidence in the technology,
- 3) reduce the level of fraud in this area,
- 4) increase the professional level and awareness in the field among graduates of higher educational institutions (including legislators, law enforcers and participants in civil circulation),
- 5) lower the threshold for entering the use of technology and research activities in this area.

In 2019 the Russian State Duma passed the Federal Law of July 31, 2020 N 259-FZ "On Digital Financial Assets, Digital Currency and on Amendments to Certain Legislative Acts of the Russian Federation"<sup>119</sup> that includes provisions related to blockchain technology. The act defines digital assets, including cryptocurrencies, as property rights, and regulates the issuance, circulation, and storage of these assets. However, it does not cover all aspects of blockchain technology, and there is currently no comprehensive regulatory framework for blockchain in Russia.

Thus, there is insufficient specification of some legal aspects related to the technology under study in Russia. At the same time, the lack of a certain level of specificity at the legislative level entails a limitation in the certainty of the legal regulation of this area, which in turn can lead to discrepancies both on the part of regulatory bodies and on the part of participants in civil law relations. Thus, it is necessary to pay special attention to the following aspects of the legislation:

1. Define and clarify the legal status and legal definitions of blockchain technology. It also would involve defining what types of activities can be conducted using blockchain technology, as well as outlining the legal framework for transactions that use blockchain technology.

2. Regulate the use of smart contracts. Legal regulations could outline the requirements for such contracts and ensure their enforceability. Thus, it is necessary to formulate explanations on the issues of resolving disputes involving smart contracts,

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<sup>119</sup> Federal Law of July 31, 2020 N 259-FZ "On Digital Financial Assets, Digital Currency and on Amendments to Certain Legislative Acts of the Russian Federation" // SPS ConsultantPlus.

and it is also necessary to improve the legislation of the Russian Federation by pointing to specific requirements for the execution of smart contracts.

3. Develop anti-money laundering (AML) regulations. Of course, like any technology, blockchain can be used for illegal purposes. Blockchain technology can be used for anonymous transactions, which can make it difficult to track illegal activities. AML regulations could require certain identification requirements for users of the blockchain platform. Also, the regulation of money laundering through the blockchain will help market participants to protect themselves from potentially dangerous transactions. Privacy is a key concern when it comes to blockchain technology. Regulations could outline how privacy concerns are addressed when using blockchain-based systems.

4. Creating a regulatory sandbox. This would allow startups and businesses to test innovative blockchain solutions in a controlled environment before launching them into the market, allowing regulators to evaluate the impact and potential risks of new technologies.

5. Fix in judicial practice responsibility for the abuse of errors in the program code. A smart contract is primarily a computer program, which today is the result of human work.<sup>120</sup> In this regard, certain errors may occur in the smart contract, which the party can abuse to obtain certain benefits. Therefore, it is necessary to additionally protect the parties from such actions of unscrupulous counterparties.

Thus, if the above conditions are met, the blockchain will become more accessible for use in the field of private law relations, and will also expand its applicability.

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<sup>120</sup> Bizyarkin I. An example of the implementation of automatic testing of a smart contract in the Solidity language// Scientific and technical innovations and web technologies. 2022. N. 2. P. 49-53.



## CONCLUSION

Analysis has revealed that blockchain technology is being actively researched both in Russia and abroad, as evidenced by a large number of studies in this field. It showed that there are a huge number of scientific works devoted to understanding the blockchain from a technical point of view, as well as the prospects for applying it in various fields. At the same time, there is much less research that has focused on understanding blockchain technology as a legal element. It is highlighted that scientific research that comprehensively considers the concept of blockchain technology will allow to develop an appropriate approach to legal regulation.

The study of the legal regulatory experience of various countries allows to conclude that there is no unified approach to blockchain legal regulation. Undoubtedly, blockchain technology poses new challenges for existing legislation both at the national and international levels. Because of the specific nature of this technology, the development of the approach to blockchain legal regulation requires detailed study. At the same time, it is necessary to take into account the prospects for the economic development of countries so as not to limit it through legal mechanisms.

It is important to note that Russia lacks a legal framework for the application of blockchain technology. It is a problem as projects involving the application of blockchain technology in both private law relations and the public sector are "outside the legal framework".<sup>121</sup>

Thus, there is a need for detailed elaboration and legislative approval of the rules governing blockchain-related relationships.

Due to the rapid development of blockchain technology, legislators need to pay special attention to the regulation of this technology in Russia, since its novelty entails certain risks associated with the following factors:

- 1) insufficient knowledge of this technology,

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<sup>121</sup> Salnikova A.V. Blockchain technology as a tool for copyright protection // Actual problems of Russian law. 2020. V. 15, N. 4. P. 88. doi:10.17803/1994-1471.2020.113.4.083-090

2) insufficient regulation at the legislative level due to the lack of specific formulations that take into account the subtleties of this innovative technology and opportunities.

These associated with the increase in the number of decentralized applications problems should be addressed in a comprehensive manner at different levels, including the following:

- 1) science,
- 2) education (including legal, financial, etc.),
- 3) media,
- 4) legislation.

It is noted that the development of a terminological framework is a priority, as definitions are the supporting structures of the relevant legal regime (civil, tax, currency, etc.). And in the absence of a clear definition of the legal phenomenon, there is uncertainty about the scope of the legal regime pertaining to it. Moreover, the absence of a defined term in a law or regulation may give rise to disputes regarding the legality of a particular phenomenon, the legitimacy of actions with it, which may have a negative impact on the implementation of blockchain-related technologies.<sup>122</sup>

Hence, the elaboration and in-depth analysis of the definition of blockchain will allow the development of adequate legal regulation that takes into account the specifics of this technology, as well as economic and social factors.

Blockchain technology offers secure transaction processing without intermediaries, reducing security risks and improving data integrity. Potential applications could simplify business processes, streamline supply chain management, and enhance data privacy.

Thus, there are many different blockchain phenomena in various fields. Smart contracts use blockchain technology to automatically enforce contract terms,

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<sup>122</sup> Saveliev A. Part 1. Legal definition of cryptocurrency (updated version based on the results of discussions and discussions) // zakon.ru URL: [https://zakon.ru/blog/2017/10/30/chast\\_1\\_yuridicheskaya\\_definiciya\\_kriptovalyuty\\_obnovlennyy\\_variant\\_po\\_rezultata\\_m\\_obsuzhdenij\\_i\\_disk](https://zakon.ru/blog/2017/10/30/chast_1_yuridicheskaya_definiciya_kriptovalyuty_obnovlennyy_variant_po_rezultata_m_obsuzhdenij_i_disk) (accessed: 07.10.2022).

eliminating the need for intermediaries like lawyers and banks. This could revolutionize private law relations, increasing efficiency and transparency while reducing costs.

Digital assets are also crucial in today's technology-driven world as they serve many purposes. They can be used as valuable items themselves, as a form of payment, or even to represent or be linked to other things or rights. Crypto tokens have unique properties and capabilities that have transformed the way businesses operate. They offer greater efficiency, reduced costs, increased transparency, and accessibility. As a result, they are becoming more popular among businesses and individuals and have the potential for further innovation.

Moreover, the use of blockchain technology in the field of intellectual property rights protection offers numerous benefits, including transparency, security, and efficiency. It eliminates intermediaries, reduces admin costs, and offers public tracking of infringement, better responsibility and accountability. Though full potential remains unrealized, adoption can also revolutionize IP rights protection.

Despite the fact that the various phenomena of blockchain technology have the same technological basis, it is important to note that there is no single approach to the legal qualification of such phenomena. Blockchain technology represents a revolutionary development in the field of decentralized computing, offering numerous opportunities for innovation and progress across a diverse range of industries and sectors. Thus, it seems that blockchain phenomena, particularly, tokens are qualified either as objects of civil rights (for instance, such as property), or as legal facts or other phenomena (for example, as a way of fulfilling an obligation or a form of a transaction) depending on how they are used, namely, which known object they are most similar to in terms of their functions and features.

To conclude, insufficient legal specification for blockchain in Russia causes uncertainty in regulation, leading to potential issues. Thus, it is necessary to pay special attention to the following aspects:

1. Clarifying legal status and definitions of blockchain and activities conducted with it,

2. Regulating smart contract use and enforceability, with guidance on dispute resolution and specific requirements for execution,
3. Developing anti-money laundering regulations that address privacy concerns and require user identification,
4. Creating a regulatory sandbox for testing blockchain solutions before launching,
5. Ensuring responsibility for abuse of errors in program code, protecting parties from unscrupulous counterparties.

Therefore, in terms of the theoretical meaning behind the study, generalization and systematization of scientific knowledge is one of the key features of the present work. Particularly, this refers to the process of taking various pieces of information relating to blockchain technology and combining them into a cohesive whole that can be used as a foundation for future research and development in this area.

Additionally, the study's theoretical significance can also be attributed to its contributions to private law relations. By exploring how blockchain technology can be applied in this context, the study provides insights into new and innovative ways of utilizing blockchain-based systems to handle various legal issues. This information, in turn, can be used by other researchers and developers to advance the state of this field even further.

As for the study's practical significance, it lies in its ability to be used for further research and development in this area. Specifically, the insights gained through the exploration of blockchain technology's application in private law relations can be used to develop new technologies, processes, and systems that can improve the efficiency and effectiveness of private law practices.

Through a detailed examination of the relevant legal frameworks and existing practices, this research makes valuable contributions towards improving the legal culture of participants involved in civil law relationships by providing fresh insights and alternative proposals for the development of more effective and robust legislative frameworks that deal with blockchain technology and its associated challenges.

Moreover, the study does not merely focus on identifying these challenges but also delves into the necessary steps that can be taken to address them. To achieve this end, this study identified specific aspects of the topic at hand that require legislative intervention and proposes effective measures that can be taken to address these concerns.

Thus, this study has vast practical significance as it provides valuable recommendations that have the potential to shape future regulatory approaches to the ever-evolving landscape of blockchain technology. Therefore, its findings represent a critical reference point and a valuable resource that can be leveraged by various stakeholders, policymakers, and scholars concerned with the legal implications of blockchain technology.

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