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DIGITAL ASSETS AND THEIR ECONOMIC AND LEGAL REGULATION IN THE LIGHT OF THE BLOCKCHAIN TECHNOLOGY DEVELOPMENT

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The monograph examines the issues of nature and purpose of digital assets as a fundamental economic and legal phenomenon, the emergence and use of which have become possible due to the development of a distributed ledger technology (blockchain) in response to the global digitalization of the socioeconomic system. The research work presents a wide range of current legislative trends observed all over the world, the analysis of which allows drawing an objective conclusion that the topic is relevant.

The monograph is addressed to specialists in fields of information and digital economy, lawyers, financial organizations and representatives of business communities.

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CONTENTS

NOTES FOR REVISED EDITION .................................................................7
INTRODUCTION ..............................................................................................10

SECTION 1
THEORETICAL AND METHODOLOGICAL FOUNDATIONS
OF THE BLOCKCHAIN TECHNOLOGY

1.1. Technological Aspects of Blockchain .........................................................11
   1.1.1. Foundations and Principles of the Blockchain Technology ..........11
   1.1.2. Evolution of the Blockchain Technology ........................................14
   1.1.3. Classification of Blockchains .........................................................40
1.2. Units of Account in Blockchain .................................................................47
   1.2.1. The Term “Blockchain Token” ....................................................48
   1.2.2. Nature of a Blockchain Token: Technical Aspect .......................49
   1.2.3. Types of Blockchain Tokens ......................................................54
   1.2.4. Economic and Legal Nature of a Blockchain Token ...............71

SECTION 2
PRACTICAL ASPECTS OF USING
THE BLOCKCHAIN TECHNOLOGY

2.1. Blockchain as a New Way of Regulating Relations ....................................77
   2.1.1. Building Trust-Based Relations Using the Blockchain Technology ..........78
   2.1.2. The Principle of Equality in Public Relations Based on the Blockchain Technology .................................................................80
   2.1.3. Comparison of the Terms “Anonymity” “Identification” and “Verification” Based on the Dialectical Approach .....................82
2.2. Public Administration Sector ....................................................................89
   2.2.1. Blockchain as an Innovative Technology for Transparent Voting .................................................................93
   2.2.2. Application of Blockchain in the Public Sector:
           Registries, Notariat ............................................................................98
   2.2.3. Digital Currencies of Central Banks ............................................104
2.3. Financial Sector .......................................................................................111
   2.3.1. Application of Blockchain in the Banking Sector ....................113
   2.3.2. Use of a Digital Asset in the Context of Cross-Border Capital Flows .................................................................121
2.3.3. Evolution of Crowdfunding ............................................................ 122
2.3.4. Prospects of Using a Blockchain Token as a Potential Financial Law Object ................................................ 128
2.4. Promising Fields of Application of the Blockchain Technology .......... 135

SECTION 3
FINANCIAL AND LEGAL REGULATION OF VIRTUAL CURRENCIES IN THE ASPECT OF THE BLOCKCHAIN TECHNOLOGY DEVELOPMENT

3.2. Currency Values in the Context of Ukrainian Legislation .................. 146
3.3. Currency Convertibility in the Context of Ukrainian Legislation ........ 148
3.4. Currency Transactions and Their Regulation ........................................ 151
3.5. Financial and Legal Regulation of Virtual Currency Circulation .......... 156
  3.5.1. Legal Nature of Virtual Currencies ................................................ 156
    3.5.1.1. Advantages and Disadvantages of Virtual Currencies .......... 158
    3.5.1.2. Peculiarities of Legal Regulation of Relations Connected to the Circulation of Virtual Currencies ..................... 159
  3.5.2. Approaches to Defining Virtual Currencies ...................................... 165
    3.5.2.1. Virtual Currency as a Kind of Money ..................................... 165
    3.5.2.2. Virtual Currency as a Medium of Circulation and a Unit of Value .......................................................... 169
    3.5.2.3. Virtual Currencies as a Kind of Currency Values ..................... 170
    3.5.2.4. Virtual Currencies as Securities ........................................... 170
    3.5.2.5. Virtual Currencies as Property, Items ..................................... 171
    3.5.2.6. Virtual Currency as a Deal .................................................. 175
  3.5.3. Types of Virtual Currencies .......................................................... 175
  3.5.4. Virtual Currency as an Object of Relations .................................... 176
    3.5.4.1. Unique Features of an Object in the Conditions of Private Legal Regulation .................................................. 178
    3.5.4.2. Unique Features of an Object in the Conditions of Public Legal Regulation .................................................. 179
  3.5.5. Legal Regulation of Virtual Currency Circulation .......................... 183
  3.5.6. Subject Composition of Relations in the Field of Circulation of Virtual Currencies .................................................. 184
  3.5.7. Comparison of Domestic and International Regulation of Circulation of Virtual Currencies .................................................. 190
3.6. Analysis of Examples of Legislative Regulation of Cryptocurrencies and Digital Assets in Separate Jurisdictions.............191
3.6.1. European Union Law .................................................................191
3.6.2. Practice of the European Court of Human Rights and European Court of Justice .........................................................198
3.6.3. Republic of Cyprus ......................................................................202
3.6.4. Republic of Malta ........................................................................204
3.6.5. Federal Republic of Germany .......................................................205
3.6.6. Kingdom of Sweden .....................................................................208
3.6.7. Swiss Confederation ....................................................................210
3.6.8. Ukraine .......................................................................................212
3.6.9. Republic of Belarus .......................................................................216
3.6.10. Russian Federation .....................................................................218
3.6.11. Republic of Moldova ...................................................................221
3.6.12. United States of America ...........................................................223
3.6.13. Islands of Bermuda .....................................................................235
3.6.15. Kingdom of Thailand ...................................................................237
3.6.16. Republic of Singapore ...................................................................238
3.6.17. Japan ..........................................................................................240
3.6.18. Commonwealth of Australia .......................................................242

SECTION 4
LEGAL ASPECTS OF THE BLOCKCHAIN TECHNOLOGY

4.1. Legislative Initiatives to Regulate the Blockchain Technology:
Global Experience .....................................................................................245
4.1.1. Ukraine .......................................................................................245
4.1.2. European Union ...........................................................................252
4.1.3. Great Britain ................................................................................254
4.1.4. Commonwealth of The Bahamas ..................................................256
4.1.5. Eastern Europe .............................................................................258
4.1.6. United States of America ..............................................................262
4.1.7. The Asia-Pacific Region ...............................................................266

4.2. Legal Relations Arising from the Use of the Blockchain Technology
Ensuring Legal Relations ........................................................................271
4.2.1. Ensuring Legal Relations ...............................................................273
4.2.2. Applied Nature of Ensuring Relations ...........................................275
4.2.3. New Technology for Accounting and Circulation of Rights ........279
SECTION 5
FUNDAMENTAL PRINCIPLES OF A DIGITAL ASSET’S FUNCTIONING

5.1. Conceptual Purpose of a Digital Asset .......................................................... 283
5.2. The Term “Digital Asset” in Economic and Legal Aspects .......................... 284
5.3. Economic Aspect ....................................................................................... 286
5.4. Legal Aspect .............................................................................................. 289
5.5. Information Aspect .................................................................................... 292
5.6. Value Aspect .............................................................................................. 294
5.7. Digital Asset as a Way of Recording Obligation Legal Relations ............... 296
5.8. Legal Regime of Assets, Information Resources and Digital Assets ....... 299
5.9. Legal Doctrine of a Digital Asset ............................................................... 307
5.10. Basic Property of a Digital Asset .............................................................. 315
5.11. Tasks of a Digital Asset ........................................................................... 316

SUMMARY .................................................................................................... 319

REFERENCES .............................................................................................. 321
NOTES FOR REVISED EDITION

The revised edition of the monograph under the new name “Digital Assets and Their Economic and Legal Regulation in the Light of the Blockchain Technology Development” is related to the need for a more extensive study of international initiatives on integrating distributed ledger technologies into various types of activities.

The constantly changing and supplemented international legislation, as well as expansion of areas for the potential implementation of the blockchain technology and digital assets, has justified the need to add several important sections and supplement the existing ones in the second edition of the monograph:

- **1.2.2. Nature of a Blockchain Token: Technical Aspect**: due to the fact that today there is no generally accepted definition of a blockchain token, this section explains its nature, creation process, distinctive functional features and key components.

- **1.2.3. Types of Blockchain Tokens**: this section has been supplemented with information on new approaches to classifying blockchain tokens that were proposed in the FINMA Stablecoin Guidelines and the MFSA Guidance Note to the Financial Instrument Test. The description of the criteria in the Methodology for Determining Whether a Blockchain Token Corresponds to a Digital Asset has been expanded.

- **1.2.4. Economic and Legal Nature of a Blockchain Token**: this section contains the characteristic of the economic and legal nature of a blockchain token; describes the economic, technical and legal components of the balance accounting of digital assets, which allows accounting any values using the blockchain technology and estimating the main economic activity indicators.

- **2.1.3. Comparison of the Terms “Anonymity” “Identification” and “Verification” Based on the Dialectical Approach**: by distinguishing the terms of anonymity, identification and verification, the need to implement the legal norms is proven that would oblige various platforms and services based on the blockchain technology to conduct the processing of users’ data.

- **2.3.4. Prospects of Using a Blockchain Token as a Potential Financial Law Object**: this section describes a unique feature of a blockchain token not only to act as a means of exchange, but also to perform the function of recording the transfer of the right to a value, which allows keeping its balance accounting. A blockchain token is positioned as an object of financial and legal relations, which requires securing this object at the legislative level.
• **3.5.1. Legal Nature of Virtual Currencies:** this section contains an analytical review of all current regulatory acts (in particular, the new FATF Guidelines, Uniform Money Services Act, European Central Bank reports, Decree of the Republic of Belarus and others), the results of which determined that only in case of securing the clear definition of virtual currency at the legislative level by a specific state, the legal nature of this object and its legal regulation will be formed.

• **3.5.2. Approaches to Defining Virtual Currencies:** this section discloses complexity and variety of relations connected to the circulation of virtual currencies; various approaches to their definition have been considered, in particular, as a type of money, means of circulation, unit of value, a variety of currency values, securities, property, items, deals.

• **3.5.3. Types of Virtual Currencies:** existing classifications of virtual currencies have been reviewed.

• **3.5.4. Virtual Currency as an Object of Relations:** the analysis of existing approaches to the definition of virtual currencies as an object of regulation has been conducted; the features of this object have been revealed in the conditions of private law and public law regulation, in particular areas of control, accounting and taxation of performance results related to the circulation of virtual currencies.

• **3.5.6. Subject Composition of Relations in the Field of Circulation of Virtual Currencies:** in this section, the analysis of the existing approaches, of FATF and ECB (European Central Bank), to defining the participants in the relations of the use and circulation of virtual currencies has been conducted.

• **3.5.7. Comparison of Domestic and International Regulation of Circulation of Virtual Currencies:** the need for the implementation of international standards in national legislation to regulate the circulation of virtual currencies has been disclosed.

• **3.6. Analysis of Examples of Legislative Regulation of Cryptocurrencies and Digital Assets in Separate Jurisdictions:** in this section, the comprehensive analysis of regulatory acts aimed at legislative regulation of cryptocurrencies, virtual currencies and digital assets in various countries has been conducted.

• **4.1.1. Ukraine:** this section describes new legislative initiatives: Provisions on the Ministry of Digital Transformation of Ukraine have been adopted, the Research Center of Legal Solutions in the Area of Application of
Distributed Ledger Technologies has been created, which will allow integrating the blockchain technology into various fields of state regulation.

- **4.1.4. Commonwealth of The Bahamas**: this section contains the analysis of the documents on regulating the implementation of the blockchain technology, payment systems and issue and sale of digital tokens, which allowed stating that the Commonwealth of The Bahamas effectively integrates the blockchain technology into the operation of various state institutions.

- **4.1.5. Eastern Europe**: this section has been supplemented with information on the digital rights law, which normatively secures the terms “digital asset” and “digital rights” and confirms the evident trend towards integrating the blockchain technology into various segments of economy.

- **4.1.6. United States of America**: this section describes the initiatives of the congressmen of the USA on creating their own digital currency — a digital dollar.

- **5.7. Digital Asset as a Way of Recording Obligation Legal Relations**: in this section, the need to introduce the term “digital asset” into the legal practice as a way of recording the legally binding relations by using the blockchain technology has been analyzed.

- **5.8. Legal Regime of Assets, Information Resources and Digital Assets**: this section contains the systematic analysis of the terms “asset”, “information resource” and “digital asset”, over the course of which it has been established that all these terms are independent objects of legal relations, the special significance of regulating the legal relations arising as a result of circulation of digital assets is emphasized.
INTRODUCTION

The dynamic development and implementation of advanced technologies set in motion the expected transformation of social relations. Thus, the rapid development of the blockchain technology as an entirely new way of resource accounting and ensuring the highest level of transparency, security and trust, as well as its active integration into various fields of activity, served as a starting point for the formation of a new type of socioeconomic relations, the regulation of which should be carried out in the legal field.

The above-mentioned information is evidence in favor of the need to create a legislative framework for the enforceability of a new type of socioeconomic relations. In this regard, there is a need to consider the mechanisms of operation and principles on which the blockchain technology is based, for a deep and correct understanding of the essence and practical usefulness of this technology.

Despite the active introduction of the blockchain and tokens to various areas of public life, their capabilities and advantages have not been sufficiently explored yet. Discussions are ongoing among theorists and practitioners on the prospects of the blockchain technology application in the financial, banking and social fields, as well as in the public sector.

This research focuses on a comprehensive analysis of the blockchain technology and new social relations arising from the use of products and services based on this technology. A special section of the monograph is dedicated to legal aspects of the application of this technology. In particular, legislative initiatives to regulate this phenomenon in Ukraine, the European Union, Great Britain, Eastern Europe, the United States, and the Asia-Pacific region have been considered. Special attention has been paid to the legal aspect of relations arising from the use of the blockchain technology, which is due to the emergence of new models of relations and new forms of contractual relations.

The section of the monograph dedicated to the study of the fundamental principles of a digital asset’s functioning reveals its essential features and objectives, as well as explains the appearance of the theory of securing digital assets as new objects of legal regulation in scientific publications.

This research highlights topical issues related to the operation principles of the technology, the evolution of blockchain and practical aspects of its use, as well as the establishment of the approach to understanding the essence of the technology and such tools as blockchain tokens, in particular, digital assets, in the legal doctrine.
Section 1

THEORETICAL AND METHODOLOGICAL FOUNDATIONS OF THE BLOCKCHAIN TECHNOLOGY

1.1. Technological Aspects of Blockchain

Blockchain is a multifunctional and multi-level information technology designed for reliable storage, recording and transmission of diverse information. The potential of using this technology covers all areas of society and has many fields of application. Blockchain creates new opportunities to search, organize, evaluate and transfer any discrete units. In fact, this is a new organizational paradigm for coordinating any type of activity.

In order to understand the potential of the blockchain technology and the prospects for its use, it is important to understand the technological aspects of blockchain and its nature.

1.1.1. Foundations and Principles of the Blockchain Technology

The essence of the blockchain technology needs to be disclosed in terms of such a concept as “registry”. The registry (from the Latin words “regestrum”, “registrum” — list) is a form of systematization and recording of any information. Thus, the registry in its original form was used as a basis for commercial activity in ancient times to record and store various information, mainly about money or property. First, clay tablets, then papyrus, parchment and paper were used for recording. However, the turning point was the introduction of computer technology, which was initially used to convert information from paper into digital code.
Nowadays, algorithms have made it possible to create digital distributed registries (ledgers) that have properties and capabilities that go far beyond traditional paper and electronic registries\(^1\).

Distributed ledger is a database that is distributed among several network nodes, each of which receives data from other nodes and stores a full copy of the ledger. These nodes are updated independently of each other. A key feature of a distributed ledger is its decentralization, i.e. the absence of a single data center. Moreover, the information in all nodes of the distributed ledger must be valid and up to date, which is only possible by reaching an agreement between all nodes of the ledger. Each node compiles and records ledger updates independently of others. Then the nodes vote for updates to ensure that most nodes agree with the final version. Reaching an agreement on a copy of the ledger is called consensus, and the process is performed automatically using a consensus algorithm. Once consensus has been reached, the distributed ledger is updated, and the latest agreed version of the ledger is stored in each node. An example of the general structure of the distributed ledger is shown in Fig. 1.

Blockchain is a type of distributed ledger that uses a chain of blocks to achieve consensus between network nodes. The blocks are organized in chronological order, are connected to each other, and are protected by cryptographic methods, as can be seen in Fig. 2. Each such block contains its hash code\(^2\) calculated from the previous block, and a payload. Information on transactions, concluded contracts, entering into the ledger of data on an individual, a business entity, property, etc. may be a payload. In other words, almost any information can be a payload. Essentially, blockchain is a constantly growing ledger with records where one can only add data but cannot delete or modify data stored in previous blocks.

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\(^2\) Hash is a fixed-length number that is mapped to data of arbitrary length in such a way that the probability of the appearance of different data with the same hash would tend to zero, and it would be hard to recover the data on their hash.
Thus, it can be said that the blockchain technology is based on several fundamental principles that can be attributed to the main advantages of blockchain:
1. Blockchain is a distributed ledger and will function until the last active network node exists.

2. All participants in the network have access to the transaction chain history of blockchain, but no one has full control over it.

3. There is no hierarchy in the blockchain network, i.e. there is no main node among the entire set of network nodes.

4. By its nature, blockchain is able to provide a unique combination of openness and security for user data. A high degree of security is achieved through advanced encryption methods.

5. Data on a blockchain network cannot be deleted or replaced since they are confirmed by multiple network nodes.

6. The blockchain technology provides absolute transparency since information about all transactions is publicly available and anyone can verify its validity.

7. The blockchain network is a “trust” system, as transactions are carried out directly between its participants, are automatically verified and confirmed by multiple nodes of the network and do not require intermediaries, which completely excludes distrust of a single intermediary organization. As a result, this leads to a significant reduction in transaction costs by reducing transaction (commission) costs and leads to an increase in transaction speed due to reduced time costs as well.

**Conclusion**

Based on the nature and properties of the blockchain technology, we can state that this technology is a mechanism that provides the highest degree of safety, recording, transmission and identification of data, which makes blockchain popular and promising in virtually all areas.

### 1.1.2. Evolution of the Blockchain Technology

One of the first blockchain technology ideas was formulated and presented at the end of the XX century. It belongs to the physicist W. Scott Stornetta and his colleague cryptographer Stuart Haber, who worked at the Bellcore Research Center. Their activities were aimed at building a
cryptographically secure archive that would provide a way of storing records without disclosing their contents.

In 1991, Haber and Stornetta presented their discovery in the paper “How to Time-Stamp a Digital Document”\(^1\) published in a journal dedicated to cryptography. The technology was called blockchain because a distributed digital ledger stores data items in digital groups with time stamps called blocks. Each block includes an alphanumeric code called “hash” and summarizes its own data. The hash of each completed block also appears in the next block, which means that all associated blocks must be changed in order to change one block. These cryptographic “dominos” function together to protect blocks against counterfeiting or fraud\(^2\).

The system used a cryptographically linked chain of blocks to store documents with a time stamp, and in 1992, Merkle trees\(^3\) were included in the development, making it more efficient by allowing multiple documents to be collected in a single block. However, the introduction of this technology has not taken place yet.

In 2004, Hal Finney (Harold Thomas Finney II) introduced a system called Reusable Proof of Work (hereinafter — “RPoW”). The system worked with a non-interchangeable Hashcash token based on proof-of-work and signed in RSA\(^4\), which could then be transferred from person to person\(^5\).

The RPoW system solved the double spending problem by retaining ownership of tokens registered on a trusted server, which was designed

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\(^{3}\) Merkle tree, or hash tree, is a binary tree whose leaf nodes are transaction hashes, and internal vertices are the results of adding the values of the associated vertices // Testova A. Kak eto rabotaet: Derevya Merkla v bitkojn seti [How it works: Merkle trees in the bitcoin network]. URL: https://habr.com/ru/company/bitfury/blog/346398/.

\(^{4}\) RSA (abbreviation for Rivest, Shamir and Adleman) is an algorithm used by modern computers to encrypt and decrypt messages // Implementation of Rivest-Shamir-Adleman (RSA) algorithm. URL: https://github.com/dindhino/Rivest-Shamir-Adleman.

to enable users around the world to verify its correctness and integrity in real time.

On October 31, 2008, at 2:10 p.m., New York time, several hundred cryptographers included in a closed mailing list received an e-mail1 from an unknown person named Satoshi Nakamoto2.

The original text of Satoshi Nakamoto’s e-mail

From: Satoshi Nakamoto <satoshi <at> vistomail.com>
Subject: Bitcoin P2P e-cash paper
Newsgroups: gmane.comp.encryption.general
Date: 2008-10-31 18:10:00 GMT (4 years, 8 weeks, 1 day, 8 hours and 48 minutes ago)

I’ve been working on a new electronic cash system that’s fully peer-to-peer, with no trusted third party.

The paper is available at:
http://www.bitcoin.org/bitcoin.pdf

The main properties:
Double-spending is prevented with a peer-to-peer network.
No mint or other trusted parties.
Participants can be anonymous.
New coins are made from Hashcash style proof-of-work.
The proof-of-work for new coin generation also powers the network to prevent double-spending.

Bitcoin: A Peer-to-Peer Electronic Cash System

Abstract. A purely peer-to-peer version of electronic cash would allow online payments to be sent directly from one party to another without the burdens of going through a financial institution. Digital signatures provide part of the solution, but the main benefits are lost if a trusted party is still required to prevent double-spending. We propose a solution to the double-spending problem using a peer-to-peer network. The network timestamps transactions by hashing them into an ongoing chain of hash-based proof-of-work, forming a record that cannot be changed without redoing the proof-of-work. The longest chain not only serves as proof of the sequence of events witnessed, but proof that it came from the largest pool of CPU power. As long as honest nodes control the most CPU power on the network, they can generate the longest chain and outpace any attackers. The network itself requires minimal structure. Messages are broadcasted on a best effort basis, and nodes can leave and rejoin the network at will, accepting the longest proof-of-work chain as proof of what happened while they were gone.

Full paper at:
http://www.bitcoin.org/bitcoin.pdf

Satoshi Nakamoto

__________________________________________________________
The Cryptography Mailing List
Unsubscribe by sending “unsubscribe cryptography” to majordomo <at> metzdowd.com

The e-mail contained a link to the nine-page text of the paper¹, which described a peer-to-peer electronic network for direct online payments from one party to another without going through financial institutions, and

which solved the double spending problem. This network was called a bitcoin. It is noteworthy that Satoshi Nakamoto’s paper contained only eight sources in the reference list, three of which were written by Stuart Haber and W. Scott Stornetta.

The original Satoshi Nakamoto’s paper

**Bitcoin: A Peer-to-Peer Electronic Cash System**

Satoshi Nakamoto
satoshin@gmx.com
www.bitcoin.org

1. Introduction

Commerce on the Internet has come to rely almost exclusively on financial institutions serving as trusted third parties to process electronic payments. While the system works well enough for most transactions, it still suffers from the inherent weaknesses of the trust-based model. Completely non-reversible transactions are not really possible, since financial institutions cannot avoid mediating disputes. The cost of mediation increases transaction costs, limiting the minimum practical transaction size and cutting off the possibility for small casual transactions, and there is a broader cost in the loss of ability to make non-reversible payments for nonreversible services. With the possibility of reversal, the need for trust spreads. Merchants must be wary of their customers, hassling them for more information than they would otherwise need. A certain percentage of fraud is accepted as unavoidable. These costs and payment uncertainties can be avoided in person by using physical currency, but no mechanism exists to make payments over a communications channel without a trusted party.

What is needed is an electronic payment system based on cryptographic proof instead of trust, allowing any two willing parties to transact directly with each other without the need for a trusted third party. Transactions that are computationally impractical to reverse would
1.1. Technological Aspects of Blockchain

protect sellers from fraud, and routine escrow mechanisms could easily be implemented to protect buyers. In this paper, we propose a solution to the double-spending problem using a peer-to-peer distributed timestamp server to generate computational proof of the chronological order of transactions. The system is secure as long as honest nodes collectively control more CPU power than any cooperating group of attacker nodes.

2. Transactions

We define an electronic coin as a chain of digital signatures. Each owner transfers the coin to the next by digitally signing a hash of the previous transaction and the public key of the next owner and adding these to the end of the coin. A payee can verify the signatures to verify the chain of ownership.

The problem of course is the payee can’t verify that one of the owners did not double-spend the coin. A common solution is to introduce a trusted central authority, or mint, that checks every transaction for
double spending. After each transaction, the coin must be returned to the mint to issue a new coin, and only coins issued directly from the mint are trusted not to be double-spent. The problem with this solution is that the fate of the entire money system depends on the company running the mint, with every transaction having to go through them, just like a bank.

We need a way for the payee to know that the previous owners did not sign any earlier transactions. For our purposes, the earliest transaction is the one that counts, so we don’t care about later attempts to double-spend. The only way to confirm the absence of a transaction is to be aware of all transactions. In the mint-based model, the mint was aware of all transactions and decided which arrived first. To accomplish this without a trusted party, transactions must be publicly announced [1], and we need a system for participants to agree on a single history of the order in which they were received. The payee needs proof that at the time of each transaction, the majority of nodes agreed it was the first received.

3. Timestamp Server

The solution we propose begins with a timestamp server. A timestamp server works by taking a hash of a block of items to be timestamped and widely publishing the hash, such as in a newspaper or Usenet post [2-5]. The timestamp proves that the data must have existed at the time, obviously, in order to get into the hash. Each timestamp includes the previous timestamp in its hash, forming a chain, with each additional timestamp reinforcing the ones before it.
4. Proof-of-Work

To implement a distributed timestamp server on a peer-to-peer basis, we will need to use a proof-of-work system similar to Adam Back’s Hashcash [6], rather than newspaper or Usenet posts. The proof-of-work involves scanning for a value that when hashed, such as with SHA-256, the hash begins with a number of zero bits. The average work required is exponential in the number of zero bits required and can be verified by executing a single hash.

For our timestamp network, we implement the proof-of-work by incrementing a nonce in the block until a value is found that gives the block’s hash the required zero bits. Once the CPU effort has been expended to make it satisfy the proof-of-work, the block cannot be changed without redoing the work. As later blocks are chained after it, the work to change the block would include redoing all the blocks after it.

The proof-of-work also solves the problem of determining representation in majority decision making. If the majority were based on one-IP-address-one-vote, it could be subverted by anyone able to allocate many IPs. Proof-of-work is essentially one-CPU-one-vote. The majority decision is represented by the longest chain, which has the greatest proof-of-work effort invested in it. If a majority of CPU power is controlled by honest nodes, the honest chain will grow the fastest and outpace any competing chains. To modify a past block, an attacker would have to redo the proof-of-work of the block and all blocks after it.
it and then catch up with and surpass the work of the honest nodes. We will show later that the probability of a slower attacker catching up diminishes exponentially as subsequent blocks are added.

To compensate for increasing hardware speed and varying interest in running nodes over time, the proof-of-work difficulty is determined by a moving average targeting an average number of blocks per hour. If they’re generated too fast, the difficulty increases.

5. Network
The steps to run the network are as follows:
1) New transactions are broadcast to all nodes.
2) Each node collects new transactions into a block.
3) Each node works on finding a difficult proof-of-work for its block.
4) When a node finds a proof-of-work, it broadcasts the block to all nodes.
5) Nodes accept the block only if all transactions in it are valid and not already spent.
6) Nodes express their acceptance of the block by working on creating the next block in the chain, using the hash of the accepted block as the previous hash.

Nodes always consider the longest chain to be the correct one and will keep working on extending it. If two nodes broadcast different versions of the next block simultaneously, some nodes may receive one or the other first. In that case, they work on the first one they received, but save the other branch in case it becomes longer. The tie will be broken when the next proof-of-work is found and one branch becomes longer; the nodes that were working on the other branch will then switch to the longer one.

New transaction broadcasts do not necessarily need to reach all nodes. As long as they reach many nodes, they will get into a block before long. Block broadcasts are also tolerant of dropped messages. If
a node does not receive a block, it will request it when it receives the next block and realizes it missed one.

6. Incentive

By convention, the first transaction in a block is a special transaction that starts a new coin owned by the creator of the block. This adds an incentive for nodes to support the network, and provides a way to initially distribute coins into circulation, since there is no central authority to issue them.

The steady addition of a constant amount of new coins is analogous to gold miners expending resources to add gold to circulation. In our case, it is CPU time and electricity that is expended.

The incentive can also be funded with transaction fees. If the output value of a transaction is less than its input value, the difference is a transaction fee that is added to the incentive value of the block containing the transaction. Once a predetermined number of coins have entered circulation, the incentive can transition entirely to transaction fees and be completely inflation free.

The incentive may help encourage nodes to stay honest. If a greedy attacker is able to assemble more CPU power than all the honest nodes, he would have to choose between using it to defraud people by stealing back his payments, or using it to generate new coins. He ought to find it more profitable to play by the rules, such rules that favour him with more new coins than everyone else combined, than to undermine the system and the validity of his own wealth.

7. Reclaiming Disk Space

Once the latest transaction in a coin is buried under enough blocks, the spent transactions before it can be discarded to save disk space. To facilitate this without breaking the block’s hash, transactions are hashed in a Merkle Tree [7][2][5], with only the root included in the block’s
hash. Old blocks can then be compacted by stubbing off branches of the tree. The interior hashes do not need to be stored.

A block header with no transactions would be about 80 bytes. If we suppose blocks are generated every 10 minutes, 80 bytes * 6 * 24 * 365 = 4.2MB per year. With computer systems typically selling with 2GB of RAM as of 2008, and Moore’s Law predicting current growth of 1.2GB per year, storage should not be a problem even if the block headers must be kept in memory.

**8. Simplified Payment Verification**

It is possible to verify payments without running a full network node. A user only needs to keep a copy of the block headers of the longest proof-of-work chain, which he can get by querying network nodes until he’s convinced he has the longest chain, and obtain the Merkle branch linking the transaction to the block it’s timestamped in. He can’t check the transaction for himself, but by linking it to a place in the chain, he can see that a network node has accepted it, and blocks added after it further confirm the network has accepted it.
As such, the verification is reliable as long as honest nodes control the network, but is more vulnerable if the network is overpowered by an attacker. While network nodes can verify transactions for themselves, the simplified method can be fooled by an attacker’s fabricated transactions for as long as the attacker can continue to overpower the network. One strategy to protect against this would be to accept alerts from network nodes when they detect an invalid block, prompting the user’s software to download the full block and alerted transactions to confirm the inconsistency. Businesses that receive frequent payments will probably still want to run their own nodes for more independent security and quicker verification.

9. Combining and Splitting Value

Although it would be possible to handle coins individually, it would be unwieldy to make a separate transaction for every cent in a transfer. To allow value to be split and combined, transactions contain multiple inputs and outputs. Normally there will be either a single input from a larger previous transaction or multiple inputs combining smaller amounts, and at most two outputs: one for the payment, and one returning the change, if any, back to the sender.
It should be noted that fan-out, where a transaction depends on several transactions, and those transactions depend on many more, is not a problem here. There is never the need to extract a complete standalone copy of a transaction’s history.

10. Privacy
The traditional banking model achieves a level of privacy by limiting access to information to the parties involved and the trusted third party. The necessity to announce all transactions publicly precludes this method, but privacy can still be maintained by breaking the flow of information in another place: by keeping public keys anonymous. The public can see that someone is sending an amount to someone else, but without information linking the transaction to anyone. This is similar to the level of information released by stock exchanges, where the time and size of individual trades, the “tape”, is made public, but without telling who the parties were.
As an additional firewall, a new key pair should be used for each transaction to keep them from being linked to a common owner. Some linking is still unavoidable with multi-input transactions, which necessarily reveal that their inputs were owned by the same owner. The risk is that if the owner of a key is revealed, linking could reveal other transactions that belonged to the same owner.

11. Calculations

We consider the scenario of an attacker trying to generate an alternate chain faster than the honest chain. Even if this is accomplished, it does not throw the system open to arbitrary changes, such as creating value out of thin air or taking money that never belonged to the attacker. Nodes are not going to accept an invalid transaction as payment, and honest nodes will never accept a block containing them. An attacker can only try to change one of his own transactions to take back money he recently spent.

The race between the honest chain and an attacker chain can be characterized as a Binomial Random Walk. The success event is the honest chain being extended by one block, increasing its lead by +1, and the failure event is the attacker’s chain being extended by one block, reducing the gap by -1.

The probability of an attacker catching up from a given deficit is analogous to a Gambler’s Ruin problem. Suppose a gambler with unlimited credit starts at a deficit and plays potentially an infinite number of trials to try to reach breakeven. We can calculate the probability he ever reaches breakeven, or that an attacker ever catches up with the honest chain, as follows [8]:

\[
q_z = \begin{cases} 
1 & \text{if } p \leq q \\
(q/p)^z & \text{if } p > q 
\end{cases}
\]

\[p = \text{probability an honest node finds the next block}\]
\[q = \text{probability the attacker finds the next block}\]
\[q_z = \text{probability the attacker will ever catch up from } z \text{ blocks behind}\]
Given our assumption that $p > q$, the probability drops exponentially as the number of blocks the attacker has to catch up with increases. With the odds against him, if he doesn’t make a lucky lunge forward early on, his chances become vanishingly small as he falls further behind.

We now consider how long the recipient of a new transaction needs to wait before being sufficiently certain the sender can’t change the transaction. We assume the sender is an attacker who wants to make the recipient believe he paid him for a while, then switch it to pay back to himself after some time has passed. The receiver will be alerted when that happens, but the sender hopes it will be too late.

The receiver generates a new key pair and gives the public key to the sender shortly before signing. This prevents the sender from preparing a chain of blocks ahead of time by working on it continuously until he is lucky enough to get far enough ahead, then executing the transaction at that moment. Once the transaction is sent, the dishonest sender starts working in secret on a parallel chain containing an alternate version of his transaction.

The recipient waits until the transaction has been added to a block and $z$ blocks have been linked after it. He doesn’t know the exact amount of progress the attacker has made, but assuming the honest blocks took the average expected time per block, the attacker’s potential progress will be a Poisson distribution with expected value:

$$\lambda = z \frac{q}{p}$$

To get the probability the attacker could still catch up now, we multiply the Poisson density for each amount of progress he could have made by the probability he could catch up from that point:

$$\sum_{k=0}^{\infty} \frac{\lambda^k e^{-\lambda}}{k!} \begin{cases} (q/p)^{(z-k)} & \text{if } k \leq z \\ 1 & \text{if } k > z \end{cases}$$

Rearranging to avoid summing the infinite tail of the distribution...
1.1. Technological Aspects of Blockchain

\[
1 - \sum_{k=0}^{z} \frac{\lambda^k e^{-\lambda}}{k!} \left(1 - \left(\frac{q}{p}\right)^{z-k}\right)
\]

Converting to C code...

```c
#include <math.h>

double AttackerSuccessProbability(double q, int z)
{
    double p = 1.0 - q;
    double lambda = z * (q / p); double sum = 1.0;
    int i, k;
    for (k = 0; k <= z; k++)
    {
        double poisson = exp(- lambda);
        for (i = 1; i <= k; i++)
        {
            poisson *= lambda / i;
        }
        sum -= poisson * (1 - pow(q / p, z - k));
    }
    return sum;
}
```

Running some results, we can see the probability drop off exponentially with z:

<table>
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<tr>
<th>z</th>
<th>P</th>
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<tr>
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<td>0.2045873</td>
</tr>
<tr>
<td>2</td>
<td>0.0509779</td>
</tr>
<tr>
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<td>0.0009137</td>
</tr>
<tr>
<td>6</td>
<td>0.0002428</td>
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</table>
### Section 1. Theoretical and Methodological Foundations of the Blockchain Technology

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$q = 0.3$

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Solving for $P$ less than 0.1%...

$P < 0.001$

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12. Conclusion
We have proposed a system for electronic transactions without relying on trust. We started with the usual framework of coins made from digital signatures, which provides strong control of ownership, but is incomplete without a way to prevent double-spending. To solve this, we proposed a peer-to-peer network using proof-of-work to record a public history of transactions that quickly becomes computationally impractical for an attacker to change if honest nodes control a majority of CPU power. The network is robust in its unstructured simplicity. Nodes work all at once with little coordination. They do not need to be identified, since messages are not routed to any particular place and only need to be delivered on a best effort basis. Nodes can leave and rejoin the network at will, accepting the proof-of-work chain as proof of what happened while they were gone. They vote with their CPU power, expressing their acceptance of valid blocks by working on extending them and rejecting invalid blocks by refusing to work on them. Any needed rules and incentives can be enforced with this consensus mechanism.

References
Section 1. Theoretical and Methodological Foundations of the Blockchain Technology


On January 3, 2009 at 18:15:05 GMT, the Bitcoin network was launched, and a genesis block mined by Satoshi Nakamoto was created. The first recipient of Bitcoin was Hal Finney, who received 10 Bitcoins from Satoshi Nakamoto in the world’s first Bitcoin transaction on January 12, 2009.

The Bitcoin network was the first practical implementation of a blockchain network in the modern sense of this technology. It has been over 10 years since it was launched. During this period, the blockchain technology significantly evolved and went through several stages, the so-called generations: Blockchain 1.0, Blockchain 2.0 and Blockchain 3.0.

Blockchain, which was the basis for the implementation of the Bitcoin network, belongs to the generation of Blockchain 1.0, which is a peer-to-peer decentralized electronic network designed for direct exchange of virtual money (cryptocurrency). Despite the “revolutionary” nature of its technology, Blockchain 1.0 has significant limitations: difficult integration with external systems, relatively low bandwidth and narrowness of practical use. The main purpose of Blockchain 1.0 is to be

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1 Jamie Redman. 10 Years Ago Bitcoin’s Genesis Block Changed the Course of History. URL: https://news.bitcoin.com/10-years-ago-bitcoins-genesis-block-changed-the-course-of-history/.

2 History of Blockchain. URL: https://www.binance.vision/blockchain/history-of-blockchain.

used as a payment system with no intermediaries, and virtual currencies (cryptocurrencies) are the units of transactions.

A distinctive feature of Blockchain 2.0 is the integration of the smart contract model. A smart contract is a digital protocol that automatically executes predefined transaction processes and does not require the involvement of a third party (e.g. a bank). Indeed, blockchain 2.0 networks are blockchain platforms for creating and implementing smart contracts.

Blockchain 3.0 is a stage in the development of technology with further elaboration of the smart contract concept in order to create decentralized, autonomous organizational units that are governed by their own laws and operate almost autonomously.⁴

For example, the blockchain technology, like any other technology in the world, is constantly evolving, while expanding its use and integration.

Despite more than 10 years of history, blockchain is one of the most popular, interesting and promising technologies since the emergence of the Internet. At the same time, the popularity of the technology began to grow in 2013. Based on the statistics of Yandex Wordstat and Google Trends, a significant increase in the number of requests for the word “Blockchain” occurred in 2013. The peak of popularity was recorded in December 2017. It is noteworthy that the chart of statistics of such requests is highly correlated with the chart of capitalization of the virtual currency market. The specified charts are shown in Fig. 3. All this generally demonstrates the dynamics of interest in the blockchain technology.

Such dynamics of interest can be displayed as a notional “index of interest in the blockchain technology”, which will be a visualization obtained by finding the weighted average between the charts normalized along the ordinate axis shown in Fig. 3.

⁴ Blokchejn – novye vozmozhnosti dlya proizvoditeley i potrebiteley elektroenergii? [Blockchain: are there new opportunities for power producers and consumers?]. Retrieved from https://www.pwc.ru/ru/publications/blockchain.html [in Russian]
Fig. 3. Charts Showing the Interest in the Blockchain Technology: 
a) Total Market Capitalization of the Virtual Currency Market; 
b) Statistics of the Query Results for the Word “Blockchain”

The “Index of Interest in the Blockchain Technology” chart is shown in Fig. 4.

Fig. 4. Index of Interest in the Blockchain Technology

The development of any technology and public interest in it are cyclic processes. Such a cycle was identified by Gartner, Inc.\textsuperscript{1} specialists on the basis of the conducted research, the results of which showed that each stage

\textsuperscript{1} Gartner, Inc. is an American company specializing in IT market research. Official website of Gartner, Inc.: https://www.gartner.com/.
of innovative technology development is characterized by a certain level of “information surge” around such an innovation. As a result, the company has proposed a model for forecasting and analyzing trends associated with the emergence of new technologies. The model shows how promising a particular technology is based on the degree of interest in it on the part of society and specialists. This model of technology development and implementation is called the “Technology Maturity Cycle” or Hype cycle\(^1\).

As shown in Fig. 5, the cycle can be depicted on the chart with the curve that shows each stage of technology development. The Time axis shows the time stages that the technology goes through, and the level of expectation from the technology is shown on the Expectations axis.

![Fig. 5. Graphic Representation of the Maturity of Technologies](image)

Any technology cyclically goes through the stages of its “maturity” from emergence to stable commercial implementation:

\(^1\) Gartner Hype Cycle. URL: https://www.gartner.com/en/research/methodologies/gartner-hype-cycle.
1. Innovation Trigger. Experts begin discussions, resulting in publications in the public press describing and justifying the concept of technology. This period is characterized by the beginning of promotion of an innovative idea.

2. Peak of Inflated Expectations. The technology is extremely popular and is the subject of extensive public discussion. The first companies, which emerge and try to implement the technology, usually fail, but the technology becomes popular and causes frequent and active public discussions due to its novelty.

3. Trough of Disillusionment. Due to the fact that technology has some disadvantages, it does not meet expectations of society.

4. Slope of Enlightenment. The effective search for solutions to the vulnerabilities of the technology allows eliminating its main disadvantages. The first cases of commercial deployments are emerging, and the environment of regular users is being formed. The public interest in the technology grows after successful practical use.

5. Plateau of Productivity. The technology has deservedly taken its place in the market and is accepted not as a new but as firmly established technology. Society takes this technology for granted realizing its real disadvantages and advantages.

The important point is that the technology can slow down or stop temporarily and permanently at each stage of the development.

Like any other innovation, the blockchain technology is also characterized by the above-mentioned model. The first stage of the blockchain technology maturity cycle is from 2008 to 2014:

- emergence of technology;
- launch of the first blockchain network;
- use of technology for crowdfunding and crowd-investing, the emergence of ICOs;
- first projects on blockchain;
- emergence of the cryptocurrency exchanges;
- first atomic transactions.

In such a way, the innovation trigger of the blockchain technology can be broadly characterized.
The period from 2014 to early 2018 can be considered as the peak of inflated expectations for the blockchain technology. This stage in the maturity cycle of the blockchain technology is characterized by the creation of new-generation blockchain networks and the emergence of the first blockchain platforms, as well as by attempts to integrate the technology into various fields of life and by the first legislative initiatives related to its use. It should be noted that the maximum interest in the technology was recorded in the second half of 2017 and early 2018. This period is the peak of ICOs\(^1\) and the information surge around blockchain. The popularity of the technology and the interest in it were so great that even the addition of the word “blockchain” to the names of companies led to a rise in the value of their shares. Thus, the British company On-line Plc., which invests in the development and use of Internet content, decided to make rebranding and added the word “blockchain” to its name, renaming into On-line Blockchain Plc. As a result, its shares rose by 394\(^2\)% during a day. Long Island Iced Tea Corporation, which specializes in the production and supply of bottled cold tea, added the word “blockchain” to its name, which led to an initial growth of shares due to its news by 500\(^3\)%.

A trough of disillusionment quite naturally follows the peak of inflated expectations. For the blockchain technology, this stage of the maturity cycle is characterized by the period of 2018 and early 2019. It included increased criticism of ICOs and cryptocurrencies, bubble-blowing of ICOs, collapse of the cryptocurrency market, closure of a number of cryptocurrency exchanges, stricter regulation by government agencies, and increased skepticism and cautiousness regarding the technology. The analogy with the Internet technology in the aspect of this stage in the technology maturity cycle, in particular with the “dotcom bubble”, can be a good example.

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\(^1\) ICO is initial coin (token) offering


The blockchain technology enters the slope of enlightenment stage in 2019. The technology gains popularity around the world again: the world’s leading banks, governments and global corporations consider the prospects for its use in various fields ranging from financial technology to logistics; blockchain companies offer new solutions and conduct real-world testing. Education institutions offer various specializations in the field of blockchain. According to a study by Coinbase and the research firm Qriously, 21 of the world’s 50 leading universities offer at least one course related to blockchain\(^1\).

It is noteworthy that between the curve of the technology maturity cycle and the “index of interest in the blockchain technology”, one can see a visual relation, which can be traced by comparing the curves in Fig. 6.

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\(^1\) The rise of crypto in higher education. URL: https://blog.coinbase.com/the-rise-of-crypto-in-higher-education-81b648c2466f.
1.1. Technological Aspects of Blockchain

The high degree of the curves correlation makes it possible to consider the interest in the blockchain technology as a kind of indicator. This indicator confirms the global trends in the development of the blockchain technology and indicates the beginning of the slope of enlightenment stage in the technology maturity cycle.

It is interesting to note that the difference between the first paper dedicated to future Internet technology\(^1\) and the first paper on future blockchain technology\(^2\) is exactly 30 years. Meanwhile, the Internet, from the moment it was mentioned as a future technology, reached the peak of inflated expectations in the technology maturity cycle in 39 years. The blockchain reached the same peak only in 27 years.

Fig. 7. showing comparison of the NASDAQ Composite stock index chart with the “Index of Interest in the Blockchain Technology” chart is an indicator as well. The NASDAQ Composite index is calculated based on the value of shares of high-tech companies.

\[\text{Fig. 7. Charts Showing a High Degree of Similarity in the Dynamics of Technology Development:} \]
\[\text{a) NASDAQ Composite; b) “Index of Interest in the Blockchain Technology”}\]

\(^1\) January 2, 1961 Leonard Kleinrock published his paper with a description of the packet data transfer.

\(^2\) In 1991, Stuart Haber and W. Scott Stornetta published their paper “How to Time-Stamp a Digital Document”.
As shown in Fig. 7., these charts have a high degree of correlation. Based on the above-mentioned logic, the charts can be used as indicators whose values are comparable to the maturity cycle of the respective technologies. It should be separately noted that the blockchain technology goes through the stages of the maturity cycle much faster than the Internet technology.

**Conclusion**

All this forms the basis for additional confidence in the faster integration of the technology with various fields of social life, its entry into the plateau of productivity stage and further development. According to Gartner’s Hype Cycle 2018, the blockchain technology is expected to reach the plateau of productivity within the next 5–10 years.

### 1.1.3. Classification of Blockchains

Blockchain is essentially a distributed database in which all changes are recorded in the form of a chain of blocks. However, the structure of blockchain implies different levels of access to information. This parameter is used as a criterion for the classification of blockchains, which is conditional in nature, since the blockchain technology principle is unified.

Thus, there are several versions of classification of blockchains based on this criterion: Canadian, British and Russian.

**The Canadian version** is based on the vision of Vitaliy Buterin, the creator of the Ethereum blockchain platform. He distinguishes 3 types of blockchain:

1. Public blockchain is a chain of blocks that can be “read” by anyone in the world. Anyone can also send transactions, wait for them to be

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1 Kasey Panetta. Widespread artificial intelligence, biohacking, new platforms and immersive experiences dominate this year’s Gartner Hype Cycle. URL: https://www.gartner.com/smarterwithgartner/5-trends-emerge-in-gartner-hype-cycle-for-emerging-technologies-2018/.

included if they are valid, and participate in the consensus process (a process for determining what blocks are added to the chain and what the current state of the network is). As a substitute for centralized or quasi-centralized trust, public blockchains are secured by a combination of economic incentives and cryptographic verification using such mechanisms as proof-of-work or proof-of-stake, following the principle that a degree of influence of participants in the consensus process is proportional to the quantity of economic resources they can use.

These blockchains are usually considered as fully decentralized.

2. Consortium blockchain is a blockchain where the consensus process is controlled by a pre-selected set of nodes. For example, we could imagine a consortium of 15 financial institutions, each of which operates a node, and 10 of which must sign every block in order for it to be valid. The right to read a blockchain may be publicly available or restricted to the participants. Such blockchain can be considered “partially decentralized”.

3. Fully private blockchain is a blockchain, which features a limited data access level. Confirmation of transactions in such networks, auditing, and database management are available to a clearly defined circle of people. As far as the right to read data is concerned, it can be either publicly available or fully restricted.

The British version is based on the report of Mark Walport\(^1\), the Chief Scientific Adviser of the British Government. In his report “Distributed Ledger Technology: beyond block chain” dedicated to distributed ledgers and blockchain’s potential in public administration, he divided blockchain into 3 types:

1. Unpermissioned public ledgers.
2. Permissioned public ledgers.
3. Permissioned private ledgers.

This classification is identical to that given by Vitaly Buterin, and the analogue of Public Blockchain is Unpermissioned public ledgers in the

---

British version, the analogue of Consortium Blockchain is Permissioned public ledgers, and the analogue of Fully private Blockchain is Permissioned private ledgers. Moreover, a small test “Distributed Ledger Taxonomy” was proposed in the report. This test allows determining correlation between the types of blockchain. The test is represented in Fig. 8.

![Distributed Ledger Taxonomy](image)

**Fig. 8. Distributed Ledger Taxonomy**

**The Russian version** is based on the vision of Olga Skorobogatova, Deputy Chairman of the Central Bank of the Russian Federation, who classified blockchains into 3 types: open, closed, and hybrid. Thus, giving a speech on “Innovative Technologies and Approaches to Their
1.1. Technological Aspects of Blockchain

Application” at the conference “Blockchain and Open Platforms – 2016”, Olga Skorobogatova noted: “Two types of systems are universally recognized so far. They are open and closed networks. In an open network, participants are not identified, access to the network is not restricted, the status of processors is not assigned to specific participants, and there are no visible authorities for rule management. If we are talking about a closed network, it is organized almost exactly the opposite: network participants are identified, access to the network is limited, and it has rules, the status of processors is assigned to certain counterparties and usually there is a certain body that establishes, regulates and changes these rules. These two types of networks, open and closed, were clear to us; we convinced ourselves of them and shared them with market participants. After three months of research, we realized that there is a third type of system, hybrid. A hybrid network can combine some elements from an open network and some elements from a closed network.”

Based on the foregoing, it can be argued that the vision of experts for blockchain classification is very similar across countries, and the classification is based on the degree of openness of blockchain to its participants. Thus, blockchains can be divided into two large groups — public and private. The degree of publicity (openness) of blockchain may depend on several factors. The first is the availability of the blockchain protocol source code. The source codes of public blockchains are usually open from the very beginning of their development, and their changes are made on one of the most popular Internet resources, for example, on GitHub. Blockchains and platforms for corporate use (private blockchains) can be developed based on open source code or partially/completely closed source code.

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If we look at blockchain development from a perspective of its use in public sector, it is clear that it is not widely used in real-world processes yet. At the same time, we should expect that the majority of such blockchains will also be closed (private).

The second and most important indicator is the ability of any user to freely connect to the network without any permission. This is what distinguishes a public blockchain from a private one. The vast majority of currently known blockchains are public: in order to connect to them, we just need to download the client software application compatible with the current version of the protocol and establish a connection with other peer-to-peer network nodes.

To fully participate in the work of a network, in particular, to verify and retransmit transactions of other users or to participate in the creation of blocks, it is necessary to run a client software application with the functionality of a full node. In other cases, a client application with limited capabilities is sufficient. However, in public blockchains, the level of user’s participation is always determined independently and depends only on the user’s personal (financial or hardware) resources. Furthermore, no one can disconnect a user from the distributed network, as all participants in the public blockchain are equal. In some cases, they may, for example, ignore or block a user sending incorrect transactions or attempting to transmit information that does not correspond to the protocol, but such initiatives are solely self-regulatory and are not protocol-based.

In private blockchains, dedicated trusted nodes or groups of nodes with a higher level of authority than other users can be responsible for connecting new users to the network as well as for the ability to disable them. Private blockchains are hierarchical structures consisting of two or more levels. Key pairs providing access to the system are issued and managed by special administrative nodes and can be revoked if necessary. Thus, private blockchains do not fully implement the basic principles of the technology, i.e. decentralization and equality of participants, as their presence may be conditioned by significant risks for corporate systems.

The next criterion, which creates another step in the classification of blockchains, is the level of blockchain control. Blockchains can be divided into four groups by this criterion:
1. Public decentralized blockchains.
2. Public blockchains with delegated control.
3. Private controlled blockchains.
4. State blockchains.

Most modern public blockchains have a single-level structure. All their participants are equal, and consensus is reached through indirect voting of the nodes that carry out the functions of creating a block. Public decentralized networks do not impose any restrictions on participation in control, and the capabilities of participants are determined only by the share of total resources available to them.

Over more than a decade of blockchain development, we can conclude that complete decentralization in self-regulating, or rather spontaneously regulated networks is almost impossible in practice: all public blockchains, sooner or later, face one of the forms of centralization. An attempt was made to introduce centralization elements to improve management functions and other blockchain indicators in this regard. This led to the emergence of the first public blockchains with a two-tier structure led by empowered nodes in 2015. The availability of two or more levels of control in a blockchain network, with different degrees of authority for each is the main feature for public blockchains with delegated control.

Private controlled (corporate) blockchains are technological solutions for corporate needs. In such systems, each node has a pre-assigned level of access and, unlike a public blockchain, the data are not always publicly available even for reading. These blockchains are controlled through dedicated nodes with enhanced authorities, which are responsible for the data distribution policy and user identification, as well as for certifying the entry of data into blockchains.

Distributed ledgers for government use are generally slightly different from corporate blockchains as well as they require controlled access to information. However, government agencies have specific requirements for blockchain — the maximum level of immutability of already added information and the strictest control over its addition. Meanwhile, the available information in blockchain is often public, since state bodies should
strive to increase the transparency of their work.\textsuperscript{1} Thus, we can say that state blockchains are a special case of corporate blockchains with their own specific features, but they belong to a separate group.

Thus, a blockchain classification based on the level of access to information can be represented in the form of a two-tier structure, in which the first level determines the criterion of publicity, and the second — the level of blockchain management. Graphically, this structure is shown in Fig. 9.

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{classification_of_blockchains.png}
\caption{Classification of Blockchains}
\end{figure}

Summing up the consideration of technological aspects of blockchain, we can note that blockchain should be perceived as a new technological paradigm. The technology accumulates several conceptually different ideas: distributed data storage ledgers, consensus algorithms and cryptographic data protection mechanisms. The blockchain technology is based on data storage logic that is independent of availability of a centralized server or group of servers. The technology generates and stores a list of ordered records called blocks. Each block contains a time stamp and, importantly, a unique image (hash) of the previous block, so the technology “links” data blocks, eliminating the possibility of their change in the generated blocks without changing the entire sequence of blocks.

\begin{flushright}
\textsuperscript{1} Kojfmann Ya., Tabernakulov A. \textit{Blokchejn na praktike} [Blockchain in practice]. M.: Alpina Publisher, 2019. 260 p. [in Russian]
\end{flushright}
Conclusion

Due to the combination of technological solutions, the blockchain has several distinctive features: openness, immutability of stored data, as well as the ability to publish and control executable logic (program code) in a decentralized network. All these aspects indicate that blockchain is not just an interesting and promising technology, but a truly unique technological solution that allows the idea of absolute decentralization to be practically realized.

1.2. Units of Account in Blockchain

When viewed as an accounting system, blockchain is a technology for cryptographically secure, chronologically consistent transaction recording, which should be understood as the recording of all transfers of blockchain accounting units between users of such a network. A unit of account is essentially a unit of measurement of a particular resource. In this case, the resource may be information, property, right, etc. Thus, blockchain performs the function of accounting. Such a unit of account has mandatory characteristics: standardization and immutability.

By standardization, we should understand that certain characteristics have been established for the unit of account itself:

- a physical indicator in which a certain resource must be calculated;
- the amount of the physical indicator included in the unit of account;
- the divisibility of the unit of account itself;
- any other characteristics related to the unit of account, but not to the resource itself.

An indicator of immutability means that the characteristics established for a unit of account cannot be changed after its creation. Thus, a distributed ledger may record the movement of any resource that is expressed in a unit of account, including its mandatory features¹.

¹ Varnavskiy, A. V. Token ili kriptovalyuta: tehnologicheskoe soderzhanie i ekonomicheskaya sushnost [Token or cryptocurrency: technological content and economic essence]
In addition to the above-mentioned attributes and characteristics, units of account of the blockchain network have the following properties:

- binary (digital) storage;
- distributed storage;
- storage in chronological order;
- creation using cryptographic algorithms.

Such units of account are commonly referred to as tokens or cryptocurrencies in the blockchain network.

### 1.2.1. The Term “Blockchain Token”

Blockchain networks often use such concepts as “cryptocurrency” (coin) and “token” to denote their units of account. There are no universally accepted definitions of these concepts. From the technological, economic and organizational points of view, these concepts have conditional features.

Cryptocurrency is essentially a system-wide unit of account for a particular blockchain network. As a rule, but not necessarily, the main function of cryptocurrency is to store value, i.e. it acts as a unit of value (internal currency) in a blockchain, performing the function of value. The term “cryptocurrency” was used after the publication of the article “Crypto Currency” in “Forbes” magazine\(^1\) in 2011.

The term “token” literally means a “tag”, “badge”, or “counter”. Tokens are usually, but not necessarily, operational units of account in the blockchain network; they are created on the basis of the existing blockchain and can function as a unit of value, unit of permission or access to information, grant a certain right to their owner, etc.

Due to their functional nature, a cryptocurrency and a token are the units of account in the blockchain network. The differences between these concepts are conditional as such differences are based on specific cases of implementation. For example, a unit of account in the blockchain network

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1.2. Units of Account in Blockchain

can be issued based on its own blockchain, can act as a system-wide unit of value, can grant the owner certain rights and provide access to certain information or functions. In this case, such a unit of account would have both cryptocurrency and token characteristics and would therefore have the corresponding properties. Based on the foregoing, it is advisable to use the term “blockchain token” as a generalizing concept.

Conclusion

Thus, a blockchain token should be understood as a unit of account of a distributed ledger (blockchain), which is part of the decentralized software protocol. Moreover, depending on the purpose of the issue, blockchain tokens can have absolutely different properties, characteristics and functions.

1.2.2. Nature of a Blockchain Token: Technical Aspect

Before considering the nature of a blockchain token, it should be noted that there is currently no unified, standardized and widely accepted definition of a blockchain token in the world. For example, the Great Ukrainian Law Encyclopedia defines a “blockchain token” as a unit of account circulating in the distributed ledger by means of a transaction with a unique identifier.

Meanwhile, the key elements in the definition of the term “blockchain token” are the transaction and its unique identifier. Performance of any transaction of a blockchain token is accompanied by the formation of an identifier, an ID of a transaction (output of a one-way hash function), which represents a unique set of letters and digits of a certain length that is given to the transaction of a blockchain token in its circulation environment. This identifier is generated based on the transaction data individually for each transaction and is one of a kind. At the same time, this identifier is in open access. A transaction ID is definitely connected to an unmodifiable, valid and stored in the blockchain description of this transaction that contains the date, identification of the parties and the amount of the operation, i.e.
the amount of access rights of a blockchain network user to accounting units of such a network. This is shown in Fig. 10 with the examples of such blockchain networks as Bitcoin\(^1\), Ethereum\(^2\) and Bitbon\(^3\).

Token creation stage begins once a request to perform a transfer (transaction) of a specific amount of accounting units is received by the blockchain containing the following data: accounting addresses of the parties of the transaction, volume (number of accounting units) and description of the operation (address of a smart contract, its method, parameters, conditions, etc.).

After sending the request and receiving a response from a blockchain network, a blockchain token of the future transaction is created generating a unique identifier. At this stage, the token is formed but is not confirmed by the local network node yet.

Indeed, the transaction data is an information resource because it contains information, which is structured and organized in a certain way, recorded on a physical medium (on the nodes of a blockchain network) that can be stored, transferred and used. Thus, a unique transaction identifier is a blockchain token that allows organizing the system for accounting assets in a blockchain network. The organization of a circulation environment of blockchain tokens can be realized by using software for blockchain network nodes, as well as by using a token system based on smart contracts.

For example, in the bitcoin network, which uses the model of accounting unspent transaction outputs (UTXO), the only confirming factor after receiving/spending accounting units of this blockchain network is the transaction, within which the operation was carried out, recorded in the blockchain with a unique identifier. Thus, a transaction ID with an unspent output contains information about the ownership of a user. In this case, a unique transaction identifier is a token, and its validity can easily be

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\(^1\) BTC.com: Bitcoin Block Explorer. URL: https://btc.com/1a4e6a0a57820479f94e0da6361c1b682d0b4ed1edd0dd3f1572c1d99ec5f07e.

\(^2\) Ethereum (ETH) Blockchain Explorer. URL: https://etherscan.io/tx/0x8452d4f2528750a312a37971fb4a79bbf6c6517ca2770dfec4b923b48379b0a3.

\(^3\) Bitbon Space. URL: https://www.bitbon.space/en/blockchain-statistics
checked in the blockchain by determining whether the output of the transaction\(^1\) associated with this token was spent.

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In token systems based on the ERC20 standard, just like in blockchain networks based on the UTXO accounting model, a token is represented by a unique transaction identifier definitely connected to an unmodifiable, valid and stored in the blockchain description of a transaction that contains the date, identification of the parties and the volume of the operation\(^1\).

A blockchain token has its own life cycle within a circulation environment. This cycle is shown in Fig. 11 and it consists of three stages:
1. Token creation.
2. Validation.
3. Archive storage of a token.

![Life Cycle of a Blockchain Token](image)

1. Request to a local node of a blockchain network to create a transaction.
2. Formation of the transaction identifier.
3. Validation of the transaction and an attempt to perform it on the local node of a blockchain network.
4. Distribution of the transaction to all the nodes of a blockchain network.
5. Period of waiting for the transaction to be included in a block.
6. Receiving confirmation of including the transaction in a block of the canonical chain of blockchain.

Fig. 11. Life Cycle of a Blockchain Token

The validation stage is an active stage of the token’s life cycle and begins with the process of validating the transaction and attempting to perform it locally on one network node. At this stage, the token is confirmed

\(^1\) IP 20: ERC-20 Token Standard. Fabian Vogelsteller, Vitalik Buterin, 2015-11-19
locally by the sender’s node, but the transaction is not distributed to the other nodes of the blockchain network yet.

After the local confirmation, the sender distributes the transaction to the other nodes of the blockchain network (token with a transaction description) and waits for the transaction to be included in the block.

The stage of archive storage of the token starts once the block containing the blockchain token of the transaction enters the canonical chain of blocks of the blockchain network. After that, the data cannot be altered, while the modification of balances of transaction participants’ addresses has undeniably occurred.

**Conclusion**

Thus, a blockchain token is a unique alphanumeric transaction code (identifier) that can provide access to an information resource, which contains information on such a transaction and can provide access rights to a specific set of rights (right of ownership, use and disposition) to a value, which should be viewed as property, property and non-property rights, securities, services, works, digital assets and other values. This model is shown in Fig. 12.

![Fig. 12. Entity Model of a Blockchain Token](image)

Meanwhile, the process of performing the transaction in a blockchain network is the process of creating a blockchain token with a specified amount of access rights at the accounting address of a specific user.
1.2.3. Types of Blockchain Tokens

Properties and Functions of Blockchain Tokens

As mentioned earlier, blockchain tokens can have different properties, perform different functions and provide their owners with various capabilities. For example, a blockchain token can be a virtual currency or have properties of a debt obligation, provide access to specific system functions or information, as well as provide a share in a company or business, it can essentially be an equivalent to a stock.

Thus, blockchain tokens can grant different types of rights to their holders:

- the right of access (permission) to the information resource;
- the right to purchase a particular commodity or service;
- the right to use any property or the right to the property itself.

It should be noted that this list can be significantly expanded due to the nature of the token and its functionality. In fact, virtually any relationship can be built by using a blockchain token.

Despite the identified potential of blockchain token use, they are currently used as:

- virtual currency;
- project finance tool (ICOs);
- service unit;
- unit that grants the right to a share in the profit of a project (company);
- unit that grants the right to the property (asset).

At the same time, virtual currency, service unit and project finance tool (ICOs) are the most commonly used today.

Depending on the purpose of use, a blockchain token may have specific characteristics and properties that determine its functions. These categories are the criteria in the taxonomy of a blockchain token. Several basic methods of a blockchain token classification are currently used:

- Howey test;
- Guidelines for Enquiries Regarding the Regulatory Framework for Initial Coin Offerings (ICOs);
1.2. Units of Account in Blockchain

- Guidance on Cryptoassets;
- Guidance Note to the Financial Instrument Test;
- Methodology for Determining Whether a Blockchain Token Corresponds to a Digital Asset.

**Howey Test**

The first precedent considered by the Supreme Court of the United States of America and related to the possibility of referring to an instrument as “security”, was the SECURITIES AND EXCHANGE COMMISSION v. W. J. HOWEY CO. et al.¹ in 1946. As part of this precedent, court practice tried to answer the question as to whether an investment contract is a security. The Supreme Court proposed criteria to define investment contracts falling under the term “security”. In accordance with the precedent and as provided by the SECURITIES ACT OF 1933², an investment contract should be referred to as a contract, commercial transaction or business model whereby a person invests his/her money in a common enterprise, expecting to receive income solely from the efforts of its organizers or a third party. It does not matter whether the interest in the enterprise is represented by formal certificates or nominal interests in tangible assets used in the enterprise³.

This precedent was the basis for further regulation of the securities by the United States Securities and Exchange Commission (SEC). As part of the court’s decision, the term “Howey Test” was introduced, which uses simple criteria to determine whether a transaction contains an investment agreement and, accordingly, whether such a transaction is subject to the jurisdiction of the SEC with subsequent mandatory registration.

In respect to blockchain tokens, the Howey Test was adapted by Peter Van Valkenburgh in his work “Framework for Securities Regulation of

Cryptocurrencies”¹, which analyzed the principle that allows relating blockchain tokens having certain characteristics of “uncertificated securities” to securities from the point of view of SECURITIES ACT OF 1933 and SECURITIES EXCHANGE ACT OF 1934.

Two types of blockchain tokens were identified in the paper:
1. Blockchain token that does not meet the definition of a “security” (utility token).

The term “security” is defined as “any note, stock, treasury stock, security future, security-based swap, bond, debenture, evidence of indebtedness, certificate of interest or participation in any profit-sharing agreement, investment contract, or, in general, any interest or instrument commonly known as a “security”, or any certificate of interest or participation in, temporary or interim certificate for, receipt for, guarantee of, or warrant or right to subscribe to or purchase, any of the foregoing”².

A blockchain token with one or more of the rights listed below is likely to fail to meet the definition of a “security”:
- the right to program, develop or create sets of functions for a system, or the right to intellectual analysis of objects built into the system;
- the right to connect to a system or grant a license to a system;
- the right to collect fees for the aforementioned connection or license;
- the right to contribute to the system operation;
- the right to use a system or its results;
- the right to sell products created by the system;
- the right to vote on the issues concerning upgrading or downgrading system characteristics and functionality.

A blockchain token that secures one or more of the following investment interests would likely fall in the category of a security token:
- share in a company;
- equity interest;

1.2. Units of Account in Blockchain

- participation in profits and/or losses or share in assets and/or liabilities;
- creditor or lender status;
- the right to claim the bankrupt’s assets based on the status of a participant (shareholder) in the capital or creditor;
- the status of a person in respect of whom the system or a legal entity being an issuer of a token is bound by the obligation to return the received funds;
- a property that allows an owner to convert blockchain tokens that are not securities into blockchain tokens or financial instruments related to one or more investment interests, or which provides their holder with the right to an option to acquire one or more investment interests.

Peter Van Valkenburgh’s article was the basis for the Coinbase Exchange’s work together with Coin Center, Union Square Ventures and Consensys. The result of this work was a document called “A Securities Law Framework for Blockchain Tokens”, which was published in 2016. The document contains the narrative part and the Howey Test itself. The narrative includes general provisions and analysis of securities laws in relation to blockchain tokens. The test is presented in the form of a table with three independent criteria: an investment of money (criterion 1) in a common enterprise (criterion 2) with an expectation of profits predominantly from the efforts of others (criterion 3).

Each criterion corresponds to a series of questions with explanations and examples. A positive answer to the question brings a certain number of points. A token will be considered a security only if it meets all three criteria. The higher the score for each criterion, the more likely it is that this criterion can be met.

Thus, passing this test helps to answer the question of whether a particular blockchain token belongs to a particular category: utility token.
or security token. It is worth noting that doing the Howey Test on your own can give only the probability evaluation of the correspondence of a blockchain token to either a utility token or a security token category. While only competent bodies and courts as a final authority can reliably determine such correspondence.

One of the bodies that can determine whether a blockchain token belongs to the category of securities within the legislation of the USA is the Securities and Exchange Commission (hereinafter — “SEC”), the securities market supervisory authority of the USA. For example, on October 1, 2019, in response to the application of Cipher Technologies Bitcoin Fund, based on the Howey Test and the Framework for “Investment Contract” Analysis of Digital Assets, the SEC determined that bitcoin is not a security and belongs to the category of utility tokens.

The examples where the SEC defines a blockchain token as a security token include Kin, EOS, Grams and other tokens, the ICOs of which resulted in lawsuits of the SEC against their organizers. The main complaint of the SEC was that ICO organizers were carrying out the initial offering of securities on the securities market of the USA without following the requirements of the securities legislation of the USA.

Guidelines for Enquiries Regarding the Regulatory Framework for Initial Coin Offerings (ICOs)

These guidelines (hereinafter — “ICO Guidelines”) were developed by the Swiss Financial Market Supervisory Authority (hereinafter —
1.2. Units of Account in Blockchain

“FINMA”) in order to provide market participants with information on how the regulator will approach ICO supervision and regulatory issues. These guidelines contain the information required by the FINMA to process requests from market participants, as well as the principles by which the FINMA will respond to these requests. Since there is no universally accepted classification of blockchain tokens, the Swiss regulator offers its own approach to the classification of blockchain tokens, which is based on the economic function of such tokens.

The FINMA distinguishes three categories of tokens:

**Payment tokens** are tokens that are intended to be used either now or in the future as a means of payment for goods or services, or as a means of transferring money or any value.

**Utility tokens** are tokens that are intended to provide digital access to an application or service using a blockchain-based infrastructure.

**Asset tokens** are assets such as debt securities or claims on the issuer’s shares. Asset tokens refer, for example, to a promise of a share in a company’s future earnings or future capital flows. Consequently, in terms of their economic function, these tokens are similar to equities, bonds or derivatives. Tokens that allow trading physical assets in blockchain also fall into this category. However, individual token classifications are not mutually exclusive. Asset tokens and utility tokens can also be classified as payment tokens (so-called hybrid tokens).

It should be noted that both bitcoin and ether cryptocurrencies have already been classified by the FINMA as payment tokens, according to these Guidelines.

The above-mentioned ICO Guidelines were published on February 16, 2018, following which the FINMA conducted a series of roundtable discussions in Zug, Geneva and Lugano in order to explain its evaluation of ICOs in accordance with the Guidelines, categorization of tokens and how ICOs are potentially affected by the regulation of the financial

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market\(^1\). After these discussions, on March 22, 2018, the document “FINMA Roundtable on ICOs”\(^2\) was published. This document contains a simple test that allows assigning a specific blockchain token to a specific category in accordance with the ICO Guidelines and the securities legislation. The test is shown in Fig. 13.

![Fig. 13. Determining the Category of a Blockchain Token](image)

On September 11, 2019, the FINMA published\(^3\) a supplement to the main ICO Guidelines “Supplement to the guidelines for enquiries regarding the regulatory framework for initial coin offerings (ICOs)”\(^4\) (hereinafter —

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“Stable Coin Guidelines”

From a legal point of view, most stable coins are based on contractual requirements for the issuer regarding underlying assets (the so-called buy-back requirements) or direct ownership rights.

According to the Stable Coin Guidelines, the FINMA identifies 8 categories of stable coins:

1. Stable coins linked to fiat currencies/cryptocurrencies with fixed redemption claim;
2. Stable coins linked to a basket of fiat currencies/cryptocurrencies with redemption claim dependent on price changes;
3. Stable coins linked to commodities (including bank precious metals) with contractual claim;
4. Stable coins linked to a basket of commodities (including bank precious metals) with redemption claim dependent on price development;
5. Stable coins linked to commodities (including bank precious metals) with ownership rights;
6. Stable coins linked to real estate with redemption claim dependent on price development;
7. Stable coins linked to a specific security with contractual claim;
8. Stable coins linked to a basket of securities with redemption claim dependent on price changes.

Depending on the purpose of issuing stable coins and their features, different laws of the financial market can be applied. It is worth noting that the classification provided in ICO and Stable Coin Guidelines is exclusively informative in nature and the evaluation in each specific case is done by the FINMA itself.

**Guidance on Cryptoassets**

In October 2018, the UK Cryptoassets Task Force comprising representatives from the Financial Conduct Authority (hereinafter —

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1 Stable coin is a blockchain token, the value of which is based on the underlying asset (currencies, goods, securities, etc.).
“FCA”), Bank of England, HM Treasury and private sector professionals published the “Cryptoassets Taskforce: final report”¹, which outlined the UK’s policy and approach to cryptoassets and a distributed ledger technology. It evaluated the potential advantages and disadvantages of cryptoassets, the risks associated with their use, as well as set out a plan for regulating cryptoassets in the UK, describing in detail various types of activities that should be assessed for regulation. In addition, this report defines a cryptoasset as a cryptographically secured digital representation of value or contractual rights, which use certain types of distributed ledgers and can be transferred, stored or traded electronically. The report presented the following classification of cryptoassets:

- Exchange tokens;
- Security tokens;
- Utility tokens.

In January 2019, based on the “Cryptoassets Taskforce: final report” and based on the results of the studies conducted by the FCA, the consultation document “Guidance on Cryptoassets CP19/3”² was published. The document was submitted for consideration to market participants in order to receive proposals for further development of the cryptoasset regulatory framework from representatives of the field. Based on proposals received from 92 respondents (major banks, trade associations, consulting companies, financial technology companies, cryptocurrency exchanges, etc.), the FCA presented the final version of the guidelines in the document “Guidance on Cryptoassets PS19/22³ in July 2019.

According to this document, the FCA distinguishes 4 groups of cryptoassets:

1.2. Units of Account in Blockchain

**Exchange tokens** are tokens that circulate in a distributed ledger, are not issued or maintained by a central bank or other central authority and are intended to be used as a medium of exchange. They are usually a decentralized instrument for buying or selling goods and services without traditional intermediaries. These tokens are sometimes called “cryptocurrencies”, “cryptocoins” or “payment tokens”.

**Security tokens** are tokens that grant rights and obligations similar to those of Specified Investment\(^1\) category under the Financial Services and Markets Act 2000\(^2\), except for electronic money. They may grant rights such as ownership, refund of a certain amount of money, the right to share in future profits, etc.

**E-money tokens** are tokens that meet the definition of electronic money according to “The Electronic Money Regulations” 2011\(^3\).

**Utility tokens** are tokens that can be used to access specific blockchain-based products or services.

At the same time, such cryptoasset groups as Security tokens and E-money tokens, unlike other groups, are controlled by the FCA.

What is interesting is that the bitcoin, ether and litecoin blockchain tokens have already been classified using these Guidelines. They were assigned to the Exchange Tokens category.

**Guidance Note to the Financial Instrument Test**

On July 4, 2018, the parliament of the Republic of Malta adopted the Virtual Financial Assets Act\(^4\), a law regulating virtual financial assets (hereinafter — “VFA”) and the field of initial virtual financial asset offerings. As part of this law, the concept of a DLT asset (Distributed Ledger Technology), which is essentially a blockchain token, was

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introduced. Its classification, according to which four categories are distinguished that either depend on the distributed ledger technology or use it, was introduced as well:

- **Virtual Token** means a record in a digital environment that has no value or application outside of the DLT platform on which it was issued and may only be redeemed for funds on such platform directly by the issuer of such DLT asset. This category does not include electronic money;

- **Virtual Financial Asset** means any record in a digital environment that is used as a digital medium of exchange, unit of account or measure of value and is not electronic money, financial instrument or virtual token;

- **Electronic Money** has the same meaning as described in the Appendix 3 to the Financial Institutions Act (Chapter 376 Laws of Malta)\(^1\), which repeats the definition given in the Electronic Money Directive (Directive 2009/110/EC)\(^2\), and links electronic money with the existence of monetary claim to the issuer related to the transfer of funds to it;

- **Financial instrument** has the same meaning as described in the Appendix 2 to the Investment Services Act (Chapter 370 Laws of Malta)\(^3\) regardless of the country of issuance and includes, aside from derivatives, any securities that can circulate in the capital market (shares, obligations), instruments of the currency market, participatory shares in investment funds and other financial products;

Thus, Article 47 of this law envisions that an authorized body, which implies the Malta Financial Services Authority (hereinafter — “MFSA”)
1.2. Units of Account in Blockchain

will provide the issuers, VFA agents and license holders with a test to
determine if the DLT asset is electronic money, financial instrument or
virtual token.

On July 24, 2018, the MFSA published the Guidance Note to the
Financial Instrument Test\(^1\) (version 1.00), which in the end was updated
to the version 1.02 dated April 5, 2019. The term DLT asset and its
categories in this Guidance Note have the same meaning as in the Virtual

The Guidance Note is a complete and detailed instruction for conducting
the Financial Asset Test\(^2\). Meanwhile, the Test itself represents a fill-in
form and consists of several questionnaires:

- “Virtual Token”;
- “Financial Instrument”;
- “Circulating Securities or Monetary Market Instruments”;
- “Electronic Money”;
- “Collective Investment Schemes”;
- “Permission for Issue”.

Classification of a DLT asset as electronic money, financial instrument,
virtual financial asset or virtual token is a result of the Test completing.

After completing the Financial Asset Test, it is signed by an authorized
body (VFA agent, legal advisor) and is sent to the MFSA.

Methodology for Determining Whether a Blockchain Token
Corresponds to a Digital Asset

This methodology\(^3\) was developed by Ukrainian scientist Aleksandr
Kud. In order to confirm the correspondence of a blockchain token to a


digital asset to use it in the existing international legal framework, a special diagnostic methodology has been created, which allows recording a digital asset in accounting documentation as an intangible asset in accordance with the International Financial Reporting Standards.

The use of this technology allows analyzing the properties and characteristics of blockchain tokens and determining their correspondence to the properties and characteristics of a digital asset. The term “digital asset” in the context of this Methodology is based on the definition given in the research paper “Substantiation of the Term “Digital Asset”: Economic and Legal Aspects”\(^1\). This opinion was formed on the basis of the opinions obtained as a result of the etymological analysis of the term “digital asset”; which includes four approaches: economic, legal, information and value.

Thus, the definition of a digital asset is represented as follows: a digital asset is an information resource derivative of the right to a value and circulating in the distributed ledger in the form of a unique identifier.

The Methodology for Determining Whether a Blockchain Token Corresponds to a Digital Asset\(^2\) is based on the principle of equivalence of categories. Determining the correspondence of a blockchain token to a digital asset arises from the need to meet the requirement for mandatory correspondence of its characteristics to fundamental and comprehensive categories for this digital asset in economic and legal aspects. It should be noted that according to the principle of equivalence of categories, they are all equal in significance for determining the level of correspondence of a blockchain token to a digital asset. This means that if a blockchain token does not correspond to at least one category, this blockchain token cannot be considered as a digital asset.

The level of correspondence of a blockchain token’s features to each category is a mandatory condition for determining the level of correspondence of the tested blockchain token to a digital asset.

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The methodological manual “Methodology for Determining Whether a Blockchain Token Corresponds to a Digital Asset” consists of a descriptive part, the “digital asset test” itself and its mathematical formalization. The descriptive part contains the theoretical basis for a blockchain token as a digital asset. It also describes 9 criteria that a digital asset should match as well as their indicators. These criteria are divided into 4 categories shown in Table 1:

### Table 1

**Criteria of a Digital Asset**

<table>
<thead>
<tr>
<th>Category</th>
<th>No. 1</th>
<th>No. 2</th>
<th>No. 3</th>
<th>No. 4</th>
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<th>No. 7</th>
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<th>No. 9</th>
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<tbody>
<tr>
<td>1  Determining a digital asset as an information resource</td>
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<td>2  Determining the nature of a digital asset as a derivative of the right to a value</td>
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<tr>
<td>3  Circulation of a digital asset in the distributed ledger</td>
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<tr>
<td>4  Circulation of a digital asset in the form of a unique identifier</td>
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</table>

**Criterion No. 1. Uniqueness.**

This criterion indicates the uniqueness of a blockchain token and is characterized by the following indicator: the existence of a document that records the issue date of a blockchain token.

**Criterion No. 2. Identifiability.**

This criterion points out the creator of the document and is characterized by the following indicator: the existence of an indication of a blockchain token’s creator in the document.
**Criterion No. 3. Regulability.**

This criterion indicates that the process for implementing legal claim with respect to a blockchain token is regulated and is characterized by the following indicator: the existence of a document that establishes the rules and conditions for using a blockchain token.

**Criterion No. 4. Sessionality.**

This criterion is determined by the period during which a blockchain token exists and is characterized by the following indicator: the existence of a document that sets the circulation period of a blockchain token.

**Criterion No. 5. Derivativeness.**

This criterion indicates the nature of a blockchain token derivative of the right to a value and is revealed through the following indicator: whether a blockchain token provides its holder with access to the complex of rights and obligations of the owner of value.

**Criterion No. 6. Verifiability.**

This criterion indicates the existence of reliable evidence of the owner’s property rights to the value and is characterized by the following indicator: the existence of a document that contains information that reliably indicates the owner’s property right to the value, from which the blockchain token derives.

**Criterion No. 7. Transparency.**

This criterion indicates the possibility of analyzing the history of transactions with a blockchain token based on existing accounting methods and is characterized by the following indicator: whether information on the parties to the transaction is displayed in the history of transactions with a blockchain token.

**Criterion No. 8. Decentralization.**

This criterion indicates the independence of the environment, in which the blockchain token circulates, from centralized decision-making and is characterized by the following indicator: the existence of documented mechanisms for management and development of the blockchain token circulation environment by the community.

**Criterion No. 9. Accountability.**

This criterion indicates the recording of the transfer of a certain number of blockchain tokens from one identified party to another and is charac-
1.2. Units of Account in Blockchain

terized by the following indicator: the ability to account the transfer of the number of blockchain tokens between identified parties in a transaction.

The test itself is essentially a research study and consists of a group of questions characterizing a blockchain token and disclosing the indicators of the digital asset criteria. To obtain the results of the research, additive numerical representations of the answers applied to the test questions are used. The obtained results are subject to triple classification with further interpretation. The result of the study is to determine the level of the blockchain token’s correspondence to a digital asset based on a normal distribution of indicators shown in Table 2.

### Table 2

<table>
<thead>
<tr>
<th>Range, points</th>
<th>Result</th>
</tr>
</thead>
</table>
| 1–8           | **BT does not correspond to a digital asset, i.e. it is not a digital asset.**  
The obtained result reliably confirms the absence of the required level of correspondence of a blockchain token to a digital asset |
| 9–12          | **BT can theoretically be a digital asset, but in reality, it is not one.**  
This conditionally negative result is based on the fact that the characteristics of a blockchain token can correspond to all four categories of a digital asset, but the obtained number of points is not sufficient to get reliable indicators in order to determine a BT as a digital asset |
| 13–16         | **BT corresponds to a digital asset, i.e. it is a digital asset.**  
This result indicates the required level of correspondence of a blockchain token to a digital asset, which means it is a digital asset |

To improve the ergonomics and effectiveness of determining whether a blockchain token corresponds to a digital asset, an informational service on digital assets was developed available at digitalassettest.org. As part of
this service, there is an opportunity to apply for the research of a blockchain token in accordance with the methodology.

**Conclusion**

Thus, it becomes obvious that the existing approaches to classification of blockchain tokens are mainly based on their economic function, which may lead to the need to regulate the circulation of such tokens. In particular, the classification according to the Howey Test and the methodologies proposed by the FINMA, FCA and MFSA are remotely similar. For example, the “utility token” category is used in the Howey Test, as well as in the FINMA and FCA guidelines, and is outside the regulation scope. According to the American classification, this category, in essence, is comparable to Swiss categories of utility tokens and payment tokens, English utility tokens and exchange tokens, as well as Maltese virtual tokens and virtual financial assets. The “security token” category in the Howey Test and Crypto Asset Guidelines is comparable to “asset tokens” in the FINMA Methodological Guidelines, as well as to “financial instruments” in the Guidance Note to the Financial Instrument Test and is under regulation of the relevant authorities. The “e-money tokens” category (FCA Guidelines) and “electronic money” (MFSA Guidelines) are also comparable to each other and correspond to the notion of electronic money.

The Ukrainian approach is unique due to the classification used in it, as the “Methodology for Determining Whether a Blockchain Token Corresponds to a Digital Asset” not only allows classifying blockchain tokens on the basis of their economic function but also provides a qualitatively new approach to defining a blockchain token as a digital asset, which is an information resource derivative of the right to a value. Thus, this method allows determining the possibility of using a blockchain token as a digital asset by individuals and economic entities within an existing legal framework.

This methodology makes a digital asset understandable for the norms of the current legislation in each specific jurisdiction and allows determining the possibility of using a blockchain token as a digital asset by natural persons and business entities within the existing legal framework. Thus,
the expert determination of a blockchain token as a digital asset is the
foundation for the legally protected implementation of the owner’s property
right to a digital asset in accordance with all accepted international
standards.

1.2.4. Economic and Legal Nature
of a Blockchain Token

Analysis of a blockchain token in the aspect of its technical nature,
considered in subsection 1.2.2 of this monograph, allows concluding that
a blockchain token is, essentially, a unique transaction identifier that can
perform the function of giving access to an information resource. Such an
information resource in turn contains information about this transaction
and can possess an important property, i.e. provide access to a certain set
of rights (rights of ownership, use and disposal) to a value, which implies
property, property and non-property rights, securities, services, works,
digital assets and other values.

This property of a blockchain token is key in the aspect of its economic
and legal nature and classification based on it. Thus, the pricing of a
blockchain token that does not have this property is based only on demand,
which is formed on the factors of relevance, faith and emotions caused by
various news, which is not always true and thus, can have different impact
on psychological and emotional perception of the received information.
These factors contribute to both quick speculative growth and quick
devaluation of the analyzed tokens. Such blockchain tokens can be
classified as speculative assets.

In August 2018, Yukun Liu and Aleh Tsyvinski, the specialists from
the National Bureau of Economic Research (hereinafter — “NBER”),
published the results of the research the “Risks and Returns of Crypto-
currency”¹, in the context of which, in particular, the issue of correlation

¹ RISKS AND RETURNS OF CRYPTOCURRENCY. Yukun Liu, Aleh Tsyvinski.
Working Paper 24877. NATIONAL BUREAU OF ECONOMIC RESEARCH. August
2018. URL: https://www.nber.org/papers/w24877.pdf
of cryptocurrencies with various classes of assets (shares, currencies, precious metals, etc.) was examined, as well as the impact of social networks, search services and mass media on the pricing of cryptocurrencies. They established that cryptocurrencies are almost not influenced by currencies, goods, stock market or macroeconomic statistics, but are very sensitive to the information influence, in particular, from Google search queries and Twitter posts; they also stated the high level of volatility of cryptocurrencies, which is not characteristic of traditional assets. Thus, we can conclude that cryptocurrencies as a category, based on their features and properties, are comparable to the category of speculative assets.

It is worth noting that calculating economic models based on speculative assets with real predictions of their development and implementation in the legal field is impossible. This brings doubt as to the prospects of global implementation and development of this category.

Blockchain tokens that have the above-mentioned property provide the right to access a certain set of rights to a value, can be compared to such a category as a digital asset, an information resource derivative of the right to a value and circulating in the distributed ledger in the form of a unique identifier¹.

Thus, a digital asset, by means of an identifier, provides its owner with the right of access to the information resource that contains a set of rights (ownership, use and disposal) to a value (property, property and non-property rights, securities, services, works, digital assets and other values). Meanwhile, unlike a speculative asset, the foundation for the pricing of a digital asset is not the factor of demand or panic, but a specific value. Further use and integration of digital assets into the global economy must lead to the formation of a global market of information resources, products and services based on the distributed ledger technology (blockchain).

Thus, blockchain tokens in the aspect of their economic and legal nature can be classified as a speculative asset or a digital asset. This classification is shown in Fig. 14.

Another important aspect of using a digital asset is its accounting. Digital assets are essentially a compound combination of technological, economic and legal solutions, therefore, when speaking about accounting of circulation of digital assets, it should be based on their nature: technical, economic and legal.

The volume “Financial Law” in the Great Ukrainian Legal Encyclopedia has the definition of balance accounting of digital assets as a method for determining the difference between income and expenditure of digital
assets at a certain point in time at the address of their accounting, which is based on the registration and accounting of transactions of a blockchain token and is implemented by the software of the blockchain network node. Thus, the use of digital assets allows accounting a set of rights to a value (asset) through software solutions based on the use of the distributed ledger technology. The representation of the balance accounting of a digital asset is shown in Fig. 15.
When looking at the economic and technological components of the balance accounting of digital assets as blockchain tokens, we should consider the fact that a digital asset circulates in the blockchain network through a blockchain token transaction identifier, which is one of the key components when carrying out the accounting of blockchain tokens as accounting units of such a network. Therefore, firstly, the issue related to the balance accounting of blockchain tokens should be considered. In the methodological manual “Methodology for Determining Whether a Blockchain Token Corresponds to a Digital Asset”¹, balance accounting of blockchain tokens is defined as a method for registering and accounting transactions implemented by the software of the blockchain network node, which allows determining the difference between income and expenditure of units of account at a certain point in time at the address of their accounting. It is worth noting that distributed ledger networks currently use one of two models of balance accounting of blockchain tokens: UTXO or Account Based Model.

The UTXO (Unspent Transaction Output) model is based on accounting unspent transaction outputs. In blockchain networks that use this model (Bitcoin, Litecoin, Cardano, etc.), each transaction spends output data of previous transactions and generates new output data, which can be spent by future transactions. Each transaction is assigned a unique identifier that contains information about it recorded in the blockchain. All unspent transactions are stored in each completely synchronized node, which is why this model is called UTXO. The user’s accounting address tracks the list of unspent transactions related to all addresses that belong to the user, while the balance is calculated as a sum of such unspent transactions².

The Account Based Model is based on the balance accounting of addresses of the blockchain network’s users. This model, used in the Ethereum blockchain, envisions that the state of the blockchain is stored locally on network nodes and not transferred with blocks. Network nodes

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² en.bitcoin.it, Protocol documentation. URL: https://en.bitcoin.it/wiki/Protocol_documentation
reach an agreement on the state of the blockchain by comparing the StateRoot (Merkle tree root of the global state)\(^1\).

Transactions are interpreted as events for the blockchain finite state machine, and the Ethereum virtual machine calculates the result of state transition of these events based on the previous state of the blockchain. In this model, input data (transactions), which influence the state of the blockchain, are separate from the transaction results (output data).

The state management system of the Ethereum blockchain allows determining the amount of the ownership share of a user in this system of tokens at any point in time. The basis for state transition at the accounting addresses of the completed transaction is its validity and correspondence to the rules of circulation (specified in the smart contract)\(^2\).

When talking about the legal component of balance accounting of digital assets, it is important to understand that, when creating a digital asset, various models of splitting access rights can be used. Thus, the owner of a value can create a digital asset that will be presented in the form of one access token holding 100% of the amount of rights of access to the information resource containing a set of rights to this value. Another option would be to create a digital asset, which will be issued in the form of a set number of access token units without the ability of further splitting that will provide the amount of access rights divisible by the number of such units, and their total amount will be 100% of the amount of rights. One more option for creating a digital asset can be, essentially, similar to the previous one, but with the possibility of free splitting of access token units of a set depth.

**Conclusion**

Thus, the use of digital assets allows subjects of legal relations to conduct accounting of any values using the blockchain technology, as well as calculate the main economic activity indicators, in particular: production volume, cost of production, profit and cost-effectiveness of production.

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\(^1\) GitHub. A Next-Generation Smart Contract and Decentralized Application Platform. // URL: https://github.com/ethereum/wiki/wiki/White-Paper

Section 2  

PRACTICAL ASPECTS OF USING THE BLOCKCHAIN TECHNOLOGY

2.1. Blockchain as a New Way of Regulating Relations

It is known that the ways of regulating relations change due to the socioeconomic development of society and the emergence of fundamentally new phenomena that require conscious understanding and systematic research.

For example, some of the most important technological breakthroughs took place mainly during the Renaissance in the 14th century and the Enlightenment in the period between the 17th and 18th centuries. Each epoch gave tools with the help of which radical transformations were carried out. For example, printing houses were originally invented for the purpose of mass dissemination of Christian teaching in the Middle Ages, but, ultimately, they became particularly useful during the Renaissance allowing the widespread dissemination of humanist theses.

This shows that a technology in any field (industrial, commercial, financial, informational and others) is designed to contribute to the qualitative transformation of society, including the modification and regulation of relations.

At present, the amount of information has not only increased several times, but the method of recording and transmitting information is becoming multivariate, is being transformed and, as a result, is acquiring the most appropriate form for society depending on the presentation format of data and its purpose. At the same time, great attention is paid to the verification of the reliability of data and the security of its transmission at all stages of using information.

Thus, with the emergence and introduction of the Internet as an integral phenomenon to modern reality, the dissemination and exchange of information have become its primary functions.
The next significant step was the use of a distributed ledger and blockchain, the main purpose of which is to record, store and transfer values.

The smart contract algorithm used in these blockchain processes is designed to automate instant execution, which allows subjects to interact directly and not to resort to the services of intermediaries. Thus, the impact of smart contracts on the transformation processes in society can be considered from two points of view — the absence of intermediaries and automation of execution.

The absence of intermediaries and the automation of execution are interlinked and complementary factors. Blockchain operates on the basis of smart contracts, the terms of which are automatically executed upon the occurrence of predetermined circumstances. Taking into account that a smart contract works only in blockchain, there is no need to engage intermediaries. Correspondingly, smart contracts are executed automatically, and all records are registered in the system.

The introduction of these mechanisms to various segments of the economy and activities of society contributes to the establishment of qualitatively new relations, the essential components of which are trust and transparency. Thus, executed transactions will not be suspicious in terms of their legality, and the absence of intermediaries will not only help to reduce financial and time costs, but also to create a high level of responsibility of participants in transactions.

Taking into account that the main purpose of blockchain is to record, store and transfer values, it is obvious that value in this context is one of the categories of the blockchain technology based on which new relations emerge and develop. And it is precisely the high level of reliability and trust that forms a solid foundation for making these relations trustworthy.

### 2.1.1. Building Trust-Based Relations Using the Blockchain Technology

If we exclude moral, philosophical and sociocultural connotations when considering the concept of “trust”, then, in the context of the
2.1. Blockchain as a New Way of Regulating Relations

formation of a qualitatively new type of relations and blockchain as a new way of regulating them, this concept must be understood as reliability, predictability, confidence and accuracy.

**Transformation of the Trust-Based Relations**

By conducting a particular activity or acting in their own interest, citizens or business entities choose institutions with which they daily interact based on their trust: banks, governments, credit card companies, utilities and other organizations of any type. In business, companies rely heavily on honesty, transparency and responsibility of the counterparty. Such trust often requires additional verification of the counterparty, for example, for outstanding debts.

Integrity in fulfilling obligations (timeliness, accuracy, quality, etc.) can also be a factor in building trust in public relations. It is known that some counterparties, ignoring the integrity in fulfilling their obligations, undermine trust in general, which encourages the development of mechanisms aimed at preventing the failure to fulfill obligations or monitoring the quality of their fulfillment.

**Transparency and Factuality as an Aspect of Building Trust-Based Relations**

Transparency and factuality are additional characteristics of trust. Transparency implies the ability to see and verify a phenomenon. Factuality clarifies the extent to which this meets the requirements for documentary accuracy. In this aspect, the blockchain technology brings qualitatively new components to the concept of trust, and one of the basic ones is the absence of intermediaries in any transactions or development of any relations, which allows both parties to interact directly.

By providing more transparency about levels of trust, blockchain becomes part of the early warning system, resulting in a reduction of overall risks.

Blockchain provides maximum transparency as well as access to facts. Thus, blockchain has a trust assurance function that is typical of intermediaries, which allows achieving a similar result with additional
benefits. For example, the use of blockchain provides transparency as a basic level of assurance.

**Conclusion**

Thus, the process of transforming relations in society becomes natural: their formation and development based on the blockchain technology make them transparent and trustworthy. Prior to the emergence and active use of this technology, a generally accepted paradigm was being implemented, which determined the exclusive rights of the relevant authorities and businesses to process transactions and any data, as well as to confirm the legal status of subjects by controlling all transactions with any values.

In the new paradigm, some processes of centralized trust (trust through a third party) will be delegated to the blockchain technology (one of the characteristics of which is the principle of decentralization) that will provide the foundation for building trust-based relations in society.

### 2.1.2. The Principle of Equality in Public Relations Based on the Blockchain Technology

The issue of equality has always been a topical one for discussion in the community of sociologists and legal scholars, as it is interlinked with such categories as freedom and law. Social equality, equality in society, and equality of rights are evaluative concepts with the relative ambiguity of the form of their presentation that are determined by notional indicators.

In ancient times, equality existed within individual estates, but it did not exist between the estates themselves. In the Middle Ages, equality was reflected in religious dogmas, but later the idea acquired a more secular nature, and a person’s social status was determined according to bloodline and, with time, personal achievements. As can be seen, the understanding of equality is shaped through the prism of certain historical and sociocultural aspects. In different epochs, the concept of “equality”
was filled with a certain content, which was promoted mainly by political tendencies and the value criterion of equalization; in particular, equality was understood as:

- the same attitude to the means of production;
- the same rights and obligations for all members of society;
- equality of opportunity;
- equality before the law;
- equality in consumption, etc.

Thus, social relations, which are characterized by social equality, are called communitarian relations. This model of relations is used consciously by subjects, and they are equal in everything. Equality in communitarian relations is achieved by the same position of people and the lack of division into “high” or “low” statuses. However, members of the community agree to such a position and form equality independently in such relations. In the case of blockchain-based relations, users are initially equal because of the nature of the technology.

**Factors of Equality Formation**

Special attention regarding the issue of equality is paid to the factors of its formation. As noted earlier, it does not arise by itself, but is created under certain conditions. The laws of nature and society imply diversity, absence of similarities, which leads to gender inequality, racial differences, differences in status, etc. There are also factors that artificially create inequality through popularization or state regulation and rulemaking. If in the first case the differences are explained by natural factors or sociological laws, then, in the case of artificial division, the differentiation occurs deliberately due to the interest of individual subjects.

The practical capabilities of the blockchain technology can protect users from such a division. Due to the nature of the blockchain technology, all its users are equal in their gender, religion, race or any other characteristics, just as they are equal in their ability to conduct their activities with the help of blockchain tools. The blockchain technology helps to create a digital environment of trust that exists without intermediaries, and a distributed ledger environment creates equal conditions for all users:
• the ability to choose an activity;
• the ability to build and develop relations with the blockchain network participants;
• the ability to use other functionality of the technology.

Conclusion

By analyzing the above-mentioned, it can be stated that the emergence and successful implementation of the blockchain technology has become a new step in ensuring equality in public relations. Due to the technical nature and properties of blockchain, users of the technology are deprived of the possibility of violating the rights of other users, interfering with their activities or forcibly changing their status. Thus, the blockchain technology has neither external nor internal artificially created factors influencing the formation of equality.

2.1.3. Comparison of the Terms “Anonymity” “Identification” and “Verification” Based on the Dialectical Approach

In the life of the modern society, especially in the time of development of information technologies, the transition to the digital economy and emergence of the market of products and services based on the blockchain technology, as well as the use of mobile devices, became natural and commonplace. The availability of such devices, along with the simplicity and convenience of use, allow subjects to interact with a high speed of transferring information (for example, connecting to a user and sending/receiving messages happen within a few seconds). It should be noted that the products related to the use of the newest technologies provide their users with the ability not only to communicate, but also to remain anonymous: phone number can be hidden, a screen name can be used for social networks, etc.

The implementation of the distributed ledger technology (blockchain) provides the society with new opportunities, mostly satisfying its socioeconomic needs. Aside from the advantages of this technology such
2.1. Blockchain as a New Way of Regulating Relations

As security, reliability, and transparency, blockchain allows conducting operations keeping transaction participants anonymous.

According to the norms of civil law, exercising certain rights without disclosing names is allowed. However, most forms of deals require specifying the parties for further identification of participants in legal relations.

Therefore, from a marketing point of view, anonymous transactions based on the blockchain technology actively increase the interest of consumers towards this technology.

At present, jurisdictional boundaries have become conditional as a result not so much of the high dynamics of Internet communications, but of the characteristic and integral component of modern everyday realities. Thus, without using your real name you can in seconds contact a user anywhere in the world, including via video connection. Such preferences are usually explained as “precautionary measures” and “ways of ensuring security” of actions conducted online. However, if we talk about the relations formed on the Internet, anonymity stops being a “precaution” for the party whose interests are being violated.

Anonymity was the discussed advantage of blockchain for a long time, up until a point of the first controversial situations, which caused an ambiguous reaction in society. Then the users of platforms and holders of blockchain tokens faced the inability to identify the counterparty of the deal on the conducted transaction. If even one incorrect character is indicated in the address of the token recipient, the sender’s crypto wallet will automatically send all the amount specified in the transaction. Thus, it will be impossible to return the tokens sent to the wrong address. Due to the absence of user identification on many platforms, it is virtually impossible to find and interact with the counterparty. It is worth noting that the platforms, on which transactions are performed, usually remove themselves from any liability and do not participate in resolving the situation in case of disputes.

Anonymity immediately becomes a problem and no longer seems attractive to users in general. Essentially, such events can be compared to the “Maturity Cycle of the Blockchain Technology” (Blockchain hype cycle).
“Maturity Cycle of the Blockchain Technology” is described in subsection 1.1.2. “Evolution of the Blockchain Technology”. And if anonymity was initially perceived as an advantage of blockchain, the emergence of the first controversial and conflict situations, inability to identify the parties to the relations arising from the use of blockchain tools significantly lowered the level of trust in the technology, which can be classified as the “Trough of Disillusionment” in the “Maturity Cycle of the Blockchain Technology”.

**Distinction Between the Terms**

**“Anonymity” and “Identifiability”**

It should be noted that most people using blockchain tools view anonymity of relations based on this technology as a negative feature without understanding the essence of the term “anonymity”. The S.I. Ozhegov’s Explanatory Russian Dictionary gives the following definition: “anonym is an author who concealed his name”, whereas “anonymous is the one reporting something without specifying a name or a signature”.

It is reasonable to consider the term “identifiability” along with the term “anonymity”. A. Kuznetsov’s Great Explanatory Dictionary of Russian Language gives the following definitions” “identify is to establish the match of someone, something, similarity with something alike”; “identify oneself is to match, turn out to be identical”.

In the Regulation (EU) No 910/2014 of the European Parliament and of the Council, there is a definition of “electronic identification”, which states that it is a process of using identification data of a person in the electronic form that clearly represent either a natural person or a legal entity.

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2.1. Blockchain as a New Way of Regulating Relations

In the Law of Ukraine “On Preventing and Countering Legalization (Laundering) of Proceeds of Crime, Financing of Terrorism, and Financing of Proliferation of Weapons of Mass Destruction”, there is a definition: “identification is measures taken by the subject of the primary financial monitoring to identify the person by obtaining his/her identification data”\(^1\).

Thus, when subjects hide (anonymize) their data (particularly the name), it poses no threat to performing the identification. This way, there is a need for an identifier, a sign that is meant for identification. A screen name used online, hash or any other alphanumeric code can serve as such an identifier. Verification can be considered to be a similar procedure. In the context of relations between providers (suppliers, service providers) and their customers, verification means a process of confirming the identity of a customer.

The Law of Ukraine “On Preventing and Countering Legalization (Laundering) of Proceeds of Crime, Financing of Terrorism, and Financing of Proliferation of Weapons of Mass Destruction” contains a definition of “customer verification”, which means “establishing (confirming) the correspondence of the identity of a customer (customer’s representative) to the obtained identification data in his/her presence by the subject of the primary financial monitoring”\(^2\).

Therefore, the essence of the verification process lies in establishing the correspondence of the identity of one party (customer, user) to the obtained identification data by another party (exchange, platform). It is

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worth noting that for most platforms, it is enough to obtain the photocopies or scanned copies of identification data and conduct the identity verification based on the previously provided data.

**Dialectic Triad of Identifiability of Subjects of Relations: Anonymity, Identification, Verification**

Thus, the definitions analyzed above can be viewed as follows: anonymity means hiding the data (name) of the subject; identification means establishing the data of the subject; verification means establishing the correspondence of the provided data to the identification data.

In order to comprehensively review the issue of identifiability of subjects of relations based on the blockchain technology, the three above-mentioned terms must be considered as a unit taking as a basis the dialectical approach, which lies in comparing the thesis and antithesis, as a result of which the synthesis occurs, i.e. consensus. The main thesis of this issue is anonymity (anonymization) of the parties, i.e. the participants in relations based on the blockchain technology. The antithesis, which essentially is the counterpoint to anonymity, is the ability to identify parties. Thus, if the parties of relations that emerged based on the blockchain technology are anonymized, but there is a way to identify and establish the identity of participants in such relations, a synthesis occurs — verification. This procedure gives the ability to identify the participants in relations by checking the obtained data’s correspondence to the identification data.

Thus, users of platforms based on the blockchain technology (or blockchain platforms), which envision the verification procedure, can remain anonymous, but, if necessary, they will be able to identify the counterparty of the transaction by turning to an operator, administrator or to another authorized subject of the platform.

**Approaches to Regulating the Relations**

Over the long period of the distributed ledger technology’s (blockchain) existence, various approaches to regulating relations, which emerge based on this technology and instruments derivative of it, blockchain tokens, were developed.
However, most legislators encountered difficulties in resolving the legal regime of such relations due to their anonymous nature.

A clear solution for this issue will be changing the approach to regulation: if the legislator made attempts to eradicate the anonymous nature of relations based on blockchain by directing the effect of the norms onto the parties to such relations, then, in this case, they should be redirected onto the platforms where the operation and maintenance of such relations is possible.

Implementing the norms that would force various platforms and services based on the blockchain technology to conduct the verification of its users and customers by collecting personal data is effective. Thus, if necessary, authorized bodies can identify the person performing certain operations on such platforms. Meanwhile, the platform users can use a screen name themselves and stay anonymous for other users.

**General Data Protection Regulation Requirements and the Blockchain Technology**

It is important to understand that processes such as identification and verification are directly related to the processing of personal data. Starting from May 25, 2018, all European Union member countries have applied the Regulation (EU) 2016/679 (General Data Protection Regulation, hereinafter — “GDPR”) in order to agree on all confidentiality laws. It should be noted that in April 2016, when this document was being developed, the world did not see the trend of globalization of data processing, so it makes sense that using decentralized data processing systems, certain conflicts took place with the GDPR provisions and operation principles of the blockchain technology. Undoubtedly, these provisions cover the platforms that collect personal data, i.e. they conduct the user verification procedure.

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When processing users’ data, many blockchain-based platforms faced the difficulty or inability to meet the GDPR requirements. Such platforms include the ones that not only operate on blockchain, but also use this technology for processing personal data. It should be noted that processing means collection, storage, transfer and other actions. The GDPR pays special attention to the subjects of personal data, i.e. persons whose personal data is being processed. In this case, an important aspect is to ensure the ability of the subjects of personal data to exercise their right to the technical extent that the functional features of the blockchain platform allow.

In the context of the GDPR, various rights of personal data subjects are distinguished. After analyzing the text of the GDPR and comparing it with the functionality of blockchain, we can state that the implementation of the majority of rights corresponds to the technical capabilities of this technology. However, the GDPR text has a certain category of rights of personal data subjects, the implementation of which is complicated or seems impossible due to the nature of blockchain. Thus, for example, we can talk about the right to be forgotten, in accordance with which personal data subjects can turn to the platform operator with a request for complete deletion of any information on them or their actions known to the operators of this platform. Due to the decentralized nature of blockchain and such properties as transparency and free access, the complete realization of the right to be forgotten is impossible.

One can come across a number of conflicts that may arise when applying the GDPR provisions to blockchain platforms. Along with them, there are also recommendations of experts in the field of jurisprudence on applying these provisions, among which the most common one is revising the GDPR provisions taking into account the implementation of the distributed ledger technology into the field of personal data processing.

**Conclusion**

Blockchain-based relations are usually anonymous. It should be noted that along with such a factor as anonymity, one should consider the processes of identification and verification. The confidentiality of parties
to blockchain-based relations has no risks and threats to the parties themselves only with the synthesis of these three elements (anonymity, identification and verification).

Thus, the minimization of risks related to the property of blockchain-based relations such as anonymity occurs through the processes of identification and verification: identification data allows identifying a certain subject among others, while verification data allows establishing the correspondence of the identification data to the personal data of a specific user.

Such procedures must be conducted through the mechanism of blockchain platforms, on which the relations are based. Regulatory intervention in such processes, i.e. the creation of norms that would force such platforms to verify their users, will ensure the formation of relations falling into the field of legal regulation. The corresponding norms regulating personal data processing must be adapted to the methods of decentralized processing, in particular, to the distributed ledger technology, as well as be synchronized with the technical capabilities of blockchain, since this technology is actively being applied by modern resources to implement their functionality in accordance with legislative norms. Such synchronization will allow avoiding conflicts and gaps in law related to personal data processing through the distributed ledger technology.

2.2. Public Administration Sector

The public administration sector is a complex multi-level centralized system. The structural stability of this system and the ability to adapt to changing realities determine the effectiveness of public administration, as well as the equal satisfaction of the needs of the population and entrepreneurs with public services. Complex, bureaucratic and non-transparent interactions between persons and the state apparatus often create whole industries of intermediaries. At the same time, the increase in the number of intermediaries naturally leads to an increase in the cost of services and complicates the procedure for their provision. The
organizational structures of the public administration are often fragmented and almost always isolated making the exchange of information between departments and agencies more complicated. As a rule, intermediaries in the chain of public services remain invisible to the recipient (agencies interact with each other in a back-end mode).

Many countries are aware of the needs of a new generation of people who are accustomed to using modern and convenient products; they conduct research and solve the above-mentioned problems by actively reforming the public service system. Some of them combine separate IT departments into unified systems, the so-called agencies; others begin to use alternative methods of data processing and research, as well as introduce dark analytics for rapid analysis of correspondence and requests from the public; still others develop new architectures of interaction between state institutions, but the most effective solution is the use of the distributed ledger technology (blockchain)\(^1\).

The speed at which various government departments around the world become involved in using blockchain technologies is disproportionate to the actual development and level of practical implementation of this technology. The public administration system is extremely static and “sedentary”, but it must be sustainable and stable, so any implementation must prove its effectiveness.

At present, governments of many countries around the world are paying special attention to the priority of implementing distributed ledger or the blockchain technology in the existing systems of information exchange, integration of taxation, payment systems, voting and registration of citizens. This is also confirmed by the results of the analysis carried out by Deloitte based on studies conducted by Wirtschafts Universität Wien Global Tax Policy Center and presented in the publication “Blockchain in Public Sector — Transforming Government Services through Exponential Technologies”\(^2\).

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Thus, the number and geography of experiments involving the blockchain technology in the public sector is growing worldwide. Agencies in more than 20 countries, including Canada, the United Kingdom, Brazil, China and India, began to launch pilot projects, carry out experiments and tests, exploring the ample opportunities and usefulness of the distributed ledger architecture as a basis for public service delivery and procurement a few years ago. The geography and scale of such activity are shown in Fig. 16.

The concept of “digital government” is a modern paradigm in the science of public administration as well. The former, much narrower concept of e-government recognized the role of digitalization as a contribution or factor in modernizing public administration. The concept of digital government is aimed at providing user-friendly, flexible and innovative public services. These services and service delivery models must use digital technology, as well as government and civil information resources. Blockchain is definitely one of the most innovative digital
Section 2. Practical Aspects of Using the Blockchain Technology

technologies that should be considered as part of the new paradigm of public policy development and service delivery.

The main benefits of integrating the blockchain technology into the public administration sector may include:

- Reducing economic costs, time and complexity in the intergovernmental and public-private exchange of information, which increases performance level for the administrative function of governments;
- Reducing bureaucracy, discretionary power and corruption through the use of distributed ledgers and programmable smart contracts;
- Increasing the level of automation, transparency, auditability and accountability of information in public registries in the interests of citizens;
- Increasing confidence of citizens and companies in government processes and records management through the use of algorithms that are no longer under the unified control of the government.

In the context of digital government, the blockchain technology can facilitate direct interaction between government agencies, citizens and economic agents. At the most basic level, this means improving public services for registration and information exchange. The blockchain technology is a combination of several separate technical solutions that form a new decentralized information infrastructure. Decentralization of the blockchain technology is a key function that can change the way states and citizens interact.¹

Blockchain-based solutions could take on most of the administrative tasks that governments now perform for society. Governments will not have to provide processes for storing and exchanging information to facilitate economic activity in society, as this can be achieved through a blockchain protocol. Instead, they should perform regulatory and supervisory functions regarding transactions occurring within this infrastructure. The blockchain technology can potentially be used as an information infrastructure for information exchange between public administrations. For example, blockchain can facilitate the timely and

¹ Blockchain technology and decentralized governance: Is the state still necessary? Journal of Governance and Regulation. № 6(1). p. 45–62. URL: http://doi.org/10.22495/jgr_v6_i1_p5.
reliable exchange of information on crime and the distribution of grants, as well as the exchange of information related to academic degrees or taxes\(^1\). Distributed registration of documents and assets has significant technical and economic advantages over centralized registration.

Blockchain architecture can reduce operational risk and transaction costs, improve compliance with regulatory requirements and, as a result, trust in government institutions. Taking into account all these advantages and peculiarities, the blockchain technology can significantly increase the efficiency of functioning and interaction of public administration institutions\(^2\).

### 2.2.1. Blockchain as an Innovative Technology for Transparent Voting

Elections are the central institution of democracy because the power of government is based solely on the consent of the governed. The main mechanism that turns this consent into the government’s authority is free, equal and secret elections. It is no coincidence that electoral systems and processes are one of the main characteristics of democracy. According to Tatu Vanhanen, a state can be democratic, “in which ideologically and socially different groups are given a legal opportunity to compete for control over power, and where agents controlling the institutions of power are elected and held accountable to the people”\(^3\).

Technological progress has completely transformed the life of society, and the implementation of many processes has moved into the digital space. At the same time, the organizational and technological aspects of


such an important element ensuring the democratic functioning of society as elections have remained practically unchanged for a long time.

Voting is currently an expensive and inconvenient process that involves significant time and resources for both organizers and voters. And this applies not only to large-scale national elections, as even small voting in student councils or dacha partnerships is often associated with tedious organization and paperwork.

Another problem with elections is the lack of trust. According to statistics, even in developed countries, the percentage of public trust in the government is quite low, for example, in the UK this figure is about 16%\(^1\). So far, corruption has been a major problem in most countries\(^2\), and the processes, which the voting system in such countries is based on, remain closed and non-transparent.

Citizens come to polling stations, make voting marks and put ballots in boxes, and votes are counted by independent officials or representatives of the election commission. This approach is based on trust, but it is obvious that no one can guarantee 100% fairness and impartiality.

At the end of the XX century, due to the emergence of various new technologies, the idea of creating and implementing an electronic voting system in the electoral process was born. As N. Kersting notes: “Interactive elections were supposed to make the electoral process simpler and cheaper, and the vote count faster and more reliable. Reduced costs, as expected, could also give new impetus to the development of direct democracy instruments”\(^3\).

Electronic voting refers to the method of voting in which citizens use electronic means or means of electronic communication to transmit their votes. According to the Council of Europe Recommendations, it includes electronic voting machines at polling stations, the use of optical scanners

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\(^1\) Politicians are still trusted less than estate agents, journalists and bankers. URL: https://www.ipsos.com/ipsos-mori/en-uk/politicians-are-still-trusted-less-estate-agents-journalists-and-bankers.


for recording and/or counting ballots and remote electronic voting. Electronic voting must respect the generally recognized principles of suffrage and must therefore be subject to a number of requirements: be accessible to every voter, ensure the protection of personal data and observance of the principle of a secret ballot, as well as be a reliable and secure means of transmitting votes\(^1\).

However, experience with electronic voting in different countries has shown that it does not meet the developed standard. The systems used are insecure: in France, in 2017, it was decided not to use electronic voting in parliamentary elections due to the threat of hacker attacks\(^2\). Also, electronic voting systems have certain technical flaws and are not transparent to voters and external observers. In addition, there is a possibility of loss of votes due to improper operation of electronic voting devices.

Thus, in order to make impossible the use of ballot rigging technologies, it is necessary to use a set of organizational and technical solutions at all stages of elections:

- voter identification;
- process of voting and confirmation of the election choice;
- identification of the results and their separation from the voters’ identities;
- storage of the results without the possibility of making changes to the results;
- output and interpretation of the final results.

In this regard, four main tasks can be identified that need to be accomplished to ensure transparent and credible elections:

1. Ensuring accurate and mutually unambiguous identification of a voter and the results of his/her vote in the system.
2. Ensuring the authenticity of the voting process itself.
3. Ensuring fault tolerance and reliability of the system operation.

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\(^1\) Recommendation CM/Rec (2017)5 of the Committee of Ministers to member States on standards for e-voting. URL: https://search.coe.int/cm/Pages/result_details.aspx?ObjectId=0900001680726f6f.

\(^2\) Trunina A. Franciya otkazhetsya ot elektronnogo golosovaniya iz-za hakerov [France will refuse electronic voting due to hackers.]. Retrieved from: https://www.rbc.ru/politics/06/03/2017/58bda9e09a79473b95e3ce6 [in Russian]
4. Ensuring the accuracy of the vote count and declaration of the poll. A set of organizational and technical measures to ensure transparency, authenticity, reliability and trustworthiness of the entire election process may be an alternate solution. Such a set should involve:

- creation of the state registry of voters, developed on the basis of the blockchain technology with the possibility of public audit;
- creation of a single digital voter profile in such a registry, including his/her biometric data;
- maintaining a registration procedure on an election day that will include voter authentication using the voter’s biometric data and his/her identity document (e.g. passport or ID card) and/or digital signature;
- creation of territorially and procedurally distributed electoral information systems based on the blockchain technology with the possibility of public audit;
- ensuring integrated interaction and synchronization of all systems.

On the election day, after authentication and registration, one blockchain token, which will serve as the voter’s voice, can be credited to a voter. The voter can use this token only once.

In general, such an approach to using the blockchain technology could guarantee minimization of financial costs of elections and reduction of the staff of election commissions, ensure the maximum accuracy of voter turnout information and almost instant online counting of votes with reliable results, allow avoiding the use of the votes of persons, who did not participate in voting or did not have the right to vote, as well as could guarantee voters full confidentiality.

Today, there are a number of examples, which show the successful use of the blockchain technology while holding elections at different levels. Sierra Leone, for example, was the first country in the world to hold a presidential election using the blockchain technology as an additional factor in ensuring integrity in the vote count. The Swiss startup Agora

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2 Michael del Castillo. Sierra Leone Secretly Holds First Blockchain-Audited Presidential Vote. URL: https://www.coindesk.com/sierra-leone-secretly-holds-first-blockchain-
provided technical support and implementation of the initiative. The node
operators were the Red Cross, the École polytechnique fédérale de Lausanne
and the University of Freiburg, and everybody could watch the process
through additional nodes that worked in read-only mode\(^1\).

On July 2, 2018, the Swiss city of Zug announced the successful
completion of the test voting with the use of the blockchain technology.
Out of 240 who had access to registering with the online voting system,
72\(^2\) took part.

During the U.S. Congress elections held on November 6, 2018, about
140 Americans used a blockchain voting platform. The first state that decided
to experiment was West Virginia. Voting was conducted in the Voatz
application created by an American development team. Every citizen was
identified to participate in the elections. The system compared the data and
correlated it with the voter database. After that, it was possible to elect a
candidate and leave a vote, which was automatically entered, in the digital
registry. To confirm the vote, it was required to put a finger on the fingerprint
sensor on the smartphone or enable the face recognition function. American
citizens from 29 countries joined the experiment\(^3\).

**Conclusion**

The given examples of the blockchain technology application in
different types of voting are among the most indicative, but not the only
ones.

Cheaper, more accessible, more transparent, more reliable, faster and
safer voting based on blockchain can be the impetus that will transform

\(^1\) *V Serra-Leone proshli pervye v mire prezidentskie vybory s ispolzovaniem tehnolo-
gii blokchejn* [Sierra Leone hosted the world’s first presidential election using blockchain


Section 2. Practical Aspects of Using the Blockchain Technology

the electoral system, expand suffrage and allow citizens to make decisions, including remotely, in real time, paving the way for the transition from representative to direct democracy.

2.2.2. Use of Blockchain in the Public Sector: Registries, Notariat

It is obvious that the blockchain technology is rapidly developing and optimizing various processes in many areas of society: legal, social, economic, political, etc.

Interest in the Blockchain Technology from Public Authorities

As the blockchain technology is being implemented, there is increased interest in it on the part of both public and private entities. One of the indicators of such an interest in the technology is the report “Distributed Ledger Technology: beyond block chain”¹ published by the UK Government Chief Scientific Adviser in early 2016. This report states that one of the main tasks of a government is to understand how distributed ledger technology can affect business processes in public management and how this technology can be used to provide services to citizens. The document emphasizes that a state should act as an initiator and customer when implementing distributed ledger technology; it should influence the development of economic activity in this field, as well as contribute to creation of the future with a faster, more personal and effective provision of public services due to the implemented technologies and the possibility of receiving feedback from citizens, who are participants in the processes implemented through smart contracts. The implementation of smart contracts based on distributed ledgers should lead to significant improvements in compliance, accountability and cost-effectiveness².

2.2. Public Administration Sector

In February 2019, the Public Chamber of the Russian Federation hosted the conference “New Technologies and Law Enforcement”. The focus of the conference was on the prospects of using modern information technologies in the legal field. Representatives of legislative, executive and judicial authorities, notariat, lawyers, research centers, banks, foundations and public organizations shared their vision of various aspects of such topics as blockchain, artificial intelligence, smart contracts, cybersecurity, cryptocurrency, etc. As part of the conference, speakers suggested that blockchain could simplify and speed up a number of trade relations, registration and administration procedures, but its statutory regulation and human supervision remained a necessary factor to consider.

Implementation of Blockchain in Public Registers and Databases

Governments of some countries gradually implement blockchain in the public sector and activity of individual institutions: they use the technology in document management, land administration and other areas of public services.

For example, the Estonian government actively supports the blockchain technology. Thus, Estonian company Guardtime, one of the world’s largest blockchain companies, has developed the Keyless Signature Infrastructure technology, which is used for independent verification of all government processes. For instance, it is used in the healthcare sector to protect medical records and clinical charts. Patients view their data and can see their viewing history, thus preventing unauthorized access to their data. Blockchain technologies are also used in the banking sector, stock trading industry and notary sector.

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In **Sweden**, in early 2016, the National Land Service (Lantmäteriet) announced its successful work with the blockchain project ChromaWay, consulting firm Kairos Future and telephone service provider Telia. The aim of their collaboration was to digitize the records of real estate ownership. According to Mats Snell, Director of Digital Technology in Lantmäteriet, “digital documentation of the transfer of immovable property in combination with new technology will ensure the highest level of transaction security”\(^1\). A prototype solution was developed to reduce the risk of errors in the case of manual data entry and provide more reliable conditions for the transfer of documentation. A distributed ledger-based system, or blockchain, provides access to information only for a limited number of people. As soon as a seller and a buyer make a deal, other parties will be able to join in: banks, government agencies, brokers, other buyers and sellers. All of them will be able to track the process of making a deal\(^2\).

In this context, the government of **Honduras** should be mentioned, which, in collaboration with Factom company, decided to use the distributed ledger to register land rights to combat fraud\(^3\) in 2016.

In **Ghana**, in early 2016, the Bitland project based on the Graphene platform was officially approved by the government in order to develop a land registry based on the Bitshares blockchain and issued the basic tokens called CADASTALLAL. They can be used to register land rights, resolve contentious land tenure issues, sell and buy land. This was a pilot project, but Bitland plans to use it in other African countries\(^4\).

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In April 2016, a multi-profile blockchain company Bitfury and the National Agency of Public Registry of Georgia launched a project to transfer the domestic real estate register to blockchain. The aim of the project was to eradicate corruption, strengthen the rights of owners and the trust of citizens\(^1\). After the implementation of the project, the time of real estate registration was reduced from a few days to several minutes, operating costs for some services were reduced by 90%, and users were able to transfer property rights in real time. Due to the developments of Bitfury, which ensured transparency and security, the first auction of state property on blockchain was held in \textbf{Ukraine} in September 2017\(^2\).

In the \textbf{United States}, in May 2016, Jack Markell, the Governor of Delaware, presented an initiative to automate the legal and operational activities of companies operating in this jurisdiction. The initiative is implemented in partnership with the Symbiont startup and the Pillsbury Winthrop Shaw Pittman LLP technology company. The system being created digitalizes the process of registration of companies, tracking the movement of shares, and managing the communication between shareholders\(^3\). In June 2017, the newly elected Governor of the state, John Charles Carney Jr., signed a bill authorizing organizations to use distributed ledger technology for securities transactions, which was part of an initiative proposed by his predecessor\(^4\).

\(^1\) \textit{Mezdunarodnaya tehnologicheskaya kompaniya vedushij provajder v ekosisteme blokchejna} [An international technology company is a leading provider in the blockchain ecosystem]. p.17. Retrieved from: https://bitfury.com/content/downloads/bitfury_brochure_a5_2018_10_001_web_pages_1.pdf [in Russian]

\(^2\) \textit{Mezdunarodnaya tehnologicheskaya kompaniya vedushij provajder v ekosisteme blokchejna} [An international technology company is a leading provider in the blockchain ecosystem]. p. 18. Retrieved from: https://bitfury.com/content/downloads/bitfury_brochure_a5_2018_10_001_web_pages_1.pdf [in Russian]


In October 2016, Crown Prince of Dubai, Hamdan Bin Mohammed Bin Rashid Al Maktoum, published a strategy aimed at achieving a high level of efficiency in government agencies using the blockchain technology. The strategy developed in collaboration with the Dubai Future Foundation and Dubai Smart City Office involves the complete transfer of the state document flow to blockchain by 2021\(^1\).

**Use of the Blockchain Technology in Notariat**

The use of blockchain in notariat is due to the fact that this technology and such a public or state institution have common objectives — to ensure trust and transparency when concluding transactions.

Notaries act as neutral and independent parties to transactions, thus creating an atmosphere of trust. At the same time, trust between the parties to the relations, which are based on blockchain, is ensured by the nature of the technology itself. Blockchain can significantly increase the efficiency of a notary’s daily work by reducing the amount of archiving work and at the same time increasing the level of digitization. This maximizes security and minimizes the time spent on paperwork.

For example, V. A. Vaipan proposes the introduction of so-called “electronic notaries” (trusted third party, distributed ledgers, etc.), which requires the determination of their legal status, as well as the functions of independent recording and verification of facts. Therefore, V. A. Vaipan considers that it is necessary to make changes to the legislation in terms of providing the possibility of notarial actions by making a notarial document in electronic form, signing the document in the presence of a notary with an enhanced qualified digital signature, and in the future, perhaps, a simple digital signature. It will also require the introduction of a mechanism for remote fulfillment of individual notarial acts such as:

- certification of transactions;
- certification of true copies of electronic document and extracts from them;

2.2. Public Administration Sector

- certification of correctness for translation of documents from one language to another;
- certification of the time when electronic documents have been submitted;
- executive inscriptions in electronic form on electronic documents or other actions.

In the digital economy, notarial activities will involve the creation of an electronic bank of title establishing and certification documents. However, the proposed innovation can be improved by using blockchain. For example, digital signatures can be replaced by the acceptance of a document within a distributed ledger by a user who has been previously identified.

**Blockchain and Document Verification**

Notaries conclude and certify various business transactions every day, verify the authenticity of documents and business partners in case a simple contract is not enough. In the future, such a procedure may take place even faster in a blockchain-based system: once a document has been signed, it may be submitted electronically and stored in blockchain unchanged, and appendices may be digitally attached.

The trustee, who initially places the document in such an environment, should be a notary, and other procedural steps, such as authentication, archiving and others, can be greatly simplified, as well as the efficiency of the processes can be improved.

**Digital Document Storage**

If we consider the use of documents in notarial archives, it should be noted that storage and verification of authenticity of confidential documents should be absolutely safe.

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1 Pravovoe regulirovanie ekonomicheskikh otnoshenij v sovremennyh usloviyah razvitiya cifrovoj ekonomiki [Legal regulation of economic relations in modern conditions of development of the digital economy]: monograph / exec. editor V. A. Vaipan, M. A. Egorova; Moscow branch of the Association of Russian Lawyers; Moscow State University named after M. V. Lomonosov; Association of Russian Diplomats. M.: Yustitsinform, 2019. p. 30. [in Russian]
By using an application on a smartphone or a program on a computer, it is possible to ensure uninterrupted access to information or data. A user interface can be designed in such a way that it takes only a few minutes to access the desired document. Biometric control (fingerprint, retinal or facial scan, etc.) or a password will be used to ensure accessibility. For example, a customer can give friends and family access to individual documents or provide doctors and hospitals with access to a universal medical record, regardless of the country in which they are located; all this is possible due to the use of the blockchain technology. All documents can be stored securely and intact. Notaries digitize documents and “place” them in blockchain, thus ensuring trust in data integrity.

**Conclusion**

The state document flow, voting, registration of rights and civil status acts are closely related to the exchange of information between state agencies. Blockchain projects implemented around the world are aimed at reducing the costs associated with the exchange of information and combining data into a single system for storing and recording information and rights.

For example, the use of the blockchain technology in the public sector, particularly in the notariat and in public registers, will increase the efficiency of notaries, civil servants and government employees, and will contribute to more convenient storage of data and documents, as well as ensure uninterrupted access to such information to authorized persons.

### 2.2.3. Digital Currencies of Central Banks

The history of such a category as money is directly related to the emergence and development of trade relations. Initially, such relations were of a natural kind and occurred without the use of money in the form of exchange of goods for goods, which can be represented with the formula “Commodity – Commodity”. This formula characterizes the original form of settlements. Then it was transformed into “Commodity – Intermediate Commodity – Commodity”, where the intermediate commodities were
general equivalents, or the most liquid goods such as grain, fur, metals, etc. Precious and semi-precious metals, in particular gold, silver, copper, bronze, and coins of a certain weight manufactured from them, played the role of a general equivalent as a result of further development of commodity production and expansion of commodity exchange relations. This led to the unification of the general equivalent. Payments were made by weighing the metal: the unit of value was determined using the unit of weight of the metal. As a result, the exchange formula acquired a modern commodity-money form: “Commodity – Money – Commodity”.

Trading activities were accompanied by the movement of metal money from the place of storage to the place of trade, and vice versa, but due to its natural properties, heavy weight and volume, such movements involved certain difficulties and risks. In fact, this led to the emergence of the first forms of non-cash money presented in the form of promissory notes, bills of exchange, checks, bank accounts, etc., which became the prototype of modern electronic money.

Currently, fiat money is used, i.e. its value is backed by government debt obligations. Only central banks have the right to issue cash money. The share of cash money in circulation, although significant, is currently showing a clear downward trend. At the same time, the number of non-cash transactions is growing, which gradually makes non-cash or electronic money the main part of the money supply. Thus, according to forecasts presented in the materials of “Cash Use Across Countries and the Demand for Central Bank Digital Currency”¹ published by the International Monetary Fund in March 2019, the average reduction in the use of cash money will slow down to 1.4% per year by 2026. And, according to the World Payments Report 2018² prepared by the specialists of the consulting company Capgemini and the financial conglomerate BNP Paribas, the number of non-cash transactions in the world increased by 9.8% in the

period from 2012 to 2016. In particular, in developing countries in Asia, the figure was 31.1\%, while in North America it was 6.0\%. These data are shown in Fig. 17.

![Fig. 17. Number of Worldwide Non-Cash Transactions (Billions) by Regions, 2012-2016](image)

Under the generally accepted two-tier financial system, the central bank provides e-money only to commercial banks in the form of correspondent accounts and deposits at the central bank. Payments between financial institutions are made through correspondent accounts. This ensures the unity of the value of money and the ability for the central bank to manage the monetary system and, as a result, price and financial stability. Economic agents use non-cash money in circulation, which is a liability of commercial banks, i.e. settlement (current) and deposit accounts. Thus, it can be stated that modern money is a debt in nature: deposits and settlement accounts of companies and natural persons are backed by assets of the banking system, and correspondent accounts and deposits of banks at the central bank are backed by its assets\(^1\).

The emergence of the blockchain technology and its integration into the financial sector, the use of blockchain tokens that can perform some of the functions of money, the decrease in the share of cash money in circulation in a number of countries and the increase in the number of non-cash money transactions in the world have led to the need to transform the modern monetary system.

Over the past years, central banks in many countries have been carefully studying issues related to the distributed ledger technology (blockchain), its use, digital money and, in particular, the possibility of creating their own digital currencies — the Central Bank Digital Currency (CBDC), i.e. the liabilities of a central bank, which are denominated in national currency, have a digital representation and can be a medium of payment, measure and preservation of value. Thus, according to the report “Proceeding with caution — a survey on central bank digital currency”\(^1\) published by the Bank for International Settlements, 70% of central banks conduct research on the issue of central bank digital currency (CBDC).

**Bank of England** was the first central bank to conduct and publish research related to the use of distributed ledger technology. The results of this research have been reflected in the reports “Innovations in payment technologies and the emergence of digital currencies”\(^2\) and “The economics of digital currencies”\(^3\). The **Bank of Canada** and **Monetary Authority of Singapore** launched pilot projects, Jasper and Ubin, to study the use of CBDC in order to improve efficiency, productivity, resilience and risk reduction in cross-border payments\(^4\). In November 2018, the three central banks presented one of the first multilateral research works on the use of

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4. Central Banks of Canada and Singapore conduct successful experiment for cross-border payments using Distributed Ledger Technology. URL: https://www.mas.gov.sg/
distributed ledger technology called “Cross-border interbank payments and settlements”\textsuperscript{1}. This work provides an initial basis for a deeper assessment of cross-border payments and settlements for the global financial community. The report discusses three cross-border payment models: the first two are based on existing interbank payment systems using traditional technologies; the third model focuses on the use of CBDC and its various applications using distributed ledger technology.

In December 2016, the \textbf{Bank of Japan} and the \textbf{European Central Bank} launched a joint research project called Stella, which examined the potential use of distributed ledger technology for financial market infrastructure. The results of the research were published in the report “Payment Systems: liquidity saving mechanisms in a distributed ledger environment”\textsuperscript{2}. This joint work of the two central banks led to a number of results that provide grounds for optimistic forecasts regarding the use of distributed ledger technology in payment systems.

Blockchain-related research is also being carried out in many other central banks of the world, for example:

- \textbf{Bank of Lithuania} plans to issue Digital Collector Coin to test blockchain on a small scale in a real environment. To this end, an open tender was announced for the development, deployment and maintenance of the platform for selling and exchanging digital collector coins\textsuperscript{3};

- \textbf{Bank of Thailand} has initiated the Inthanon project for performing internal transfers of funds within the country’s interbank system with the issuance of CBDC\textsuperscript{4} tokens;

- \textbf{Eastern Caribbean Central Bank} and Bitt Inc company have signed a contract to conduct a blockchain-issued Central Bank Digital

\textsuperscript{1} Cross-border interbank payments and settlements. URL: https://www.mas.gov.sg/-/media/MAS/ProjectUbin/Cross-Border-Interbank-Payments-and-Settlements.pdf.


\textsuperscript{4} Bank of Thailand. URL: https://www.bot.or.th/English/FinancialMarkets/Pages/default.aspx.
Currency (CBDC) pilot within the Eastern Caribbean Currency Union. The project involves the issue of a digital version of the Eastern Caribbean dollar (DXCD) for financial transactions in a peer-to-peer network using smart devices¹.

- **Deutsche Bundesbank** and **Deutsche Börse** have carried out a joint research project BLOCKBASTER, during which blockchain platforms Digital Asset Platform and Hyperledger Fabric were developed. These prototypes support settlements of securities transactions, payments, interest payments and repayments at the maturity of a bond²;

- **Saudi Arabian Monetary Authority** jointly with the **United Arab Emirates Central Bank** launched the Aber project to create a single digital currency for financial settlements between the Kingdom of Saudi Arabia and the United Arab Emirates³;

- **South African Reserve Bank** has launched the Khokha project to assess the performance, scalability, privacy and resilience of the payment system based on the distributed ledger technology in the most realistic conditions for the banking sector⁴;

- **Sveriges Riksbank** is studying the need to issue the Swedish krona in electronic form. In spring 2017, the bank launched a project to study the bank’s ability to issue CBDC, the so-called e-krona⁵.

Thus, CBDC is a new form of money issued by a central bank in digital form and intended for use as legal tender. In the report “Central Banks and Distributed Ledger Technology: How are Central Banks Exploring

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⁵ E-krona. URL: https://www.riksbank.se/en-gb/payments--cash/e-krona/.
Blockchain Today?"¹ published by the World Economic Forum, 2 main options for CBDC implementation are identified:

- Retail CBDC is a digital currency that is used to make peer-to-peer payments and is available to a wide range of consumers;
- Wholesale CBDC is a digital currency used to make more efficient interbank payments without the intermediation of correspondent banks and other payment systems, and is available to a limited number of consumers, in particular commercial banks, clearing houses and other professional participants in the financial and money markets.

Fig. 18. shows the classification of money using the Venn diagram in the form of a so-called “money flower”.

Fig. 18. The Money Flower: a Taxonomy of Money

“Money flower” allows defining four key properties of money:

- issuer;
- form;
- degree of accessibility;
- payment transfer mechanism.

For example, the issuer may be a central bank or a commercial bank. The form can be physical, such as a metal coin or paper note, or digital. Money may be widely accessible as commercial bank deposits or have limited access as central bank reserves. The latter property concerns the transfer mechanism, which can be decentralized (peer-to-peer) and centralized (through an intermediary)\(^1\). This typology shows how two types of CBDC (shaded areas) fit into the overall currency environment.

**Conclusion**

Obviously, CBDC can replace cash in the future and become “digital cash”, which, despite the absence of physical form, may be publicly available to residents of a particular state, as well as to individuals and organizations around the world. CBDC can be used to make transactions of any amount in the B2B (Business-to-Business), P2P (Person-to-Person) and P2B (Person-to-Business) models. CBDC can reduce costs associated with the issue, storage and use of funds. In addition, the CBDC can significantly improve financial inclusion. The use of CBDC can also help central banks to improve the security of the payment system and its credibility in general\(^2\).

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2.3. Financial Sector

The financial sector of the economy is characterized by a high rate of adaptation to innovative technologies. Thus, the use of innovative and advanced products and services helps to strengthen competitive advantages


in the market by optimizing costs. Financial sector experts were among the first to focus on the blockchain technology as simplifying and speeding up transactions, as well as reducing transaction costs, are very important for market participants. The use of the blockchain technology is relevant, demanded and promising in many areas of the financial sector: banking products and services, microcredit, project financing, insurance, stock exchange transactions, etc.

The execution of transactions based on the blockchain technology eliminates the “human factor” problem, excludes intermediaries and increases the level of security of such transactions. That is why the research of the blockchain technology use in the financial sector is an extremely relevant issue.

Thus, according to the report of International Data Corporation, European companies spent about $400 million on blockchain solutions, and almost half of the investment accounted for the financial sector\(^1\) in 2018. These data are presented in the form of a diagram in Fig. 19. European banks, insurance, leasing and investment companies spent more than $172 million on the development and implementation of blockchain products, which corresponds to 43\% of the total market volume.

\[\text{Fig. 19. Diagram of Investments in Blockchain Solutions by Sectors}\]

\(^1\) European Blockchain Spending to Grow to $3.5 Billion by 2022, According to New IDC Spending Guide. URL: https://www.idc.com/getdoc.jsp?containerId=prEMEA44163218.
2.3. Financial Sector

Such an interest in the sectors where the blockchain technology is used is quite natural, since the implementation of blockchain in the traditional banking system can fundamentally change it by making it more efficient and accessible, and lead to significant savings by the banks themselves. Thus, according to a study published by the consulting company Accenture¹, the implementation of the blockchain technology will save banks up to 38% of annual costs.

2.3.1. Use of Blockchain in the Banking Sector

The banking sector is one of the most important elements of the financial system, the role of which in the economy cannot be overestimated. By accumulating temporarily free monetary resources and placing them subsequently in active operations, banks act as a “circulatory system” of various areas of economic activity, being a system-forming element of any type of economy. Successful operation of the banking system largely determines the economic growth in any country and the efficiency of the economy as a whole, thus the banking sector should adapt to the emergence of new technologies as quickly and effectively as possible, as well as seek ways of implementing them to meet the needs of modern society.

Nevertheless, despite the centuries-old history of banks and the banking sector as a whole, the current level of informatization and the degree of automation of many processes, there are a number of topical issues, some of which are related to the human factor and the presence of a number of intermediary links in the provided services and performed operations. In particular, they include high commission costs and time spent on money transfers and transactions, the presence of internal and external fraud, staff errors, leak of customers’ personal data, and much more.

Therefore, the increased interest of the banking sector in the blockchain technology is obvious and reasonable. For example, blockchain is a new

type of database management system that allows a wide group of participants to receive almost simultaneous joint access to shared data with an unprecedented level of confidentiality.

There are several main areas of the blockchain technology use in the banking sector:

- Know Your Customer (hereinafter — “KYC”) / Anti Money Laundering (hereinafter — “AML”) procedure;
- international payments, settlements of foreign trade operations and domestic payments;
- banking security;
- lending;
- securities transactions;
- internal and external reporting.

One of the most effective processes of personal data protection and identification is the KYC procedure. It is based on the time-proved principle “know your customer”, which is used in centralized financial institutions to prevent the financing of terrorist organizations, laundering of illegally obtained money, as well as the execution of transactions that may be fraudulent. However, the existing model for implementing this procedure is not effective enough, and the cost of its implementation is constantly growing.

Thus, in September 2018, the lawyers of Denmark’s largest bank “Danske Bank” reported that 200 billion euros were laundered\(^1\) through the Estonian branch in the period from 2007 to 2015. This situation seriously undermines confidence in KYC and AML procedures. Moreover, it was suggested that several bank employees conspired to commit the offence. This case is rather an exception, but many of the world’s leading banks have been fined for money laundering over the past decade. According to experts, the number of fines for this period reached 26 billion U.S. dollars. Ubiquitous initiatives of banks to develop crime detection and prevention measures had mixed results. Decisions on customer verification by banks were usually a

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response to large fines or regulatory intervention. All this is usually imposed on outdated business models and systems in an effort of rapid implementation and does not actually bring the expected results, but significantly increases the costs\(^1\). According to the Thomson Reuters Survey, financial institutions spend an average of more than $60 million annually on customer identification and verification\(^2\).

A potential solution to this situation is to improve the used models by integrating the blockchain technology. The blockchain architecture allows collecting information from different service providers into a single cryptographically secure and consistent database that does not require a third party to authenticate the information. Thus, it is possible to create a system where a user only has to go through the KYC procedure once, and then use this platform to confirm his/her identity. At the same time, the use of smart contracts could automate many processes.

According to Deloitte’s report “Blockchain applications in banking”\(^3\), the use of distributed ledgers such as blockchain can automate some processes and reduce the number of errors while meeting regulatory requirements. Blockchain-based ledgers can not only eliminate duplication of activities while meeting the “Know Your Customer” requirements, but also perform encrypted updates of customer data, which will be distributed among all banks in real time. Moreover, ledgers can provide a history of records of all documents and the compliance of the activities with the requirements of the regulator for each individual customer. These records can be used to provide evidence that the bank acted in accordance with the applicable law.

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\(^1\) How can the blockchain solve banks’ problems with KYC and AML (customer verification and money laundering)? Retrieved from: https://golos.io/blockchain/@blockchained/ru-kak-blokcheijn-mozhet-reshitx-problemy-bankov-s-kyc-i-aml-verifikaczieij-klientov-i-otmyvaniem-deneg [in Russian]


The use of the blockchain technology in the KYC procedure is not just a theory, it has already acquired a practical character. Thus, three Asian banks and the Monetary Authority of Singapore jointly conducted a study to confirm the possibility of using the blockchain technology in order to optimize the collection of customer data (as part of the KYC procedure). The customer identification system was implemented by OCBC Bank, HSBC Singapore and Mitsubishi UFJ Financial Group involving Info-communications Media Development Authority. According to the participants, the proof of concept phase occurred within 4 months. The aim was to move towards fully digitized identification methods abandoning cumbersome approaches that often use paper and can last several days or longer. Using a common distributed ledger in their work, banks will now be able to verify the customer by referring to the information, which is stored in the ledger and updated automatically¹.

Abu Dhabi Global Market, which is the International Financial Centre of the United Arab Emirates, successfully completed testing a blockchain application for the KYC procedure. The first stage of the project was implemented jointly with the Financial Services Regulatory Authority and a consultant from KPMG. The application provides financial institutions with a single platform where a customer can carry out identification only once, without the need to repeat the procedure in other institutions².

It is worth noting that the architecture of modern global payment systems is imperfect. Cross-border transactions involve the participation of one or more correspondent banks, and it can take up to several days to make transfers. McKinsey & Company’s analysis shows that the total revenue of the global payment market in 2017 was estimated at more than $1.9 trillion, which is the best figure for the survey period. Such dynamics is reflected in Fig. 20.

The international payment market can be divided into B2B (Business-to-Business) and C2C (Consumer-to-consumer) transfers. The private transfer segment accounts for 0.4% of the market or $0.4 trillion of payments in 2017, with revenues of $26 billion and operating margins of about 6%. In contrast to the private transfer market, the corporate segment is truly huge, with $124 trillion in annual payments. In 2017, revenue from the corporate segment amounted to approximately $127 billion and operating margin was about 0.1%. Transaction fees in the B2B segment vary from bank to bank, and the global average was $45\(^1\).

It is obvious that the level of transaction fees in the international segment is higher than for domestic payments. This is due to the fact that

the international segment is less prone to competition and much slower to transformation. The structure of interaction between correspondent banks is still complex, and it is also necessary to comply with various regulatory rules, which results in duplication of functions. Bank charges for payments can be significant. Each step of verification adds a small fee to the total cost and takes time: from a few hours to several days. In addition, banks and other financial institutions involved in international money transfers operate centrally, which makes them vulnerable to hacker attacks.

Thus, we can identify three significant drawbacks of centralized bank transfers:

• high commission costs;
• unreasonable time costs;
• vulnerability to hacker attacks and fraud.

The nature of the blockchain technology, which was originally developed as a peer-to-peer electronic network designed for direct online payments from one side to the other without going through financial institutions allows upgrading modern payment systems. The main benefits of using the blockchain technology to make money transfers and payments include the following:

• **Low transaction fees.** The use of the blockchain technology will allow confirming and executing transactions, including international transactions, between individuals without the involvement of a centralized intermediary. This will minimize the cost of such transactions by reducing commission fees.

• **High transaction speed.** The nature of the blockchain technology, as well as the exclusion of intermediaries from the transfer process, will allow transfers to be made in real time.

• **Financial inclusion.** According to Findex data presented in the report of “The World Bank”¹, one third of the world’s adults, about 1.7 billion people, have limited or no access to financial services. Many people

in Asia, Africa and South America do not have access to banks and traditional financial services but have smartphones. Creating and providing access to such a blockchain-based transfer system will help to globalize financial inclusion.

- **Increased security.** Blockchain is decentralized, and therefore it is almost impossible to crack it or rewrite transactions in the system.
- **Automation of processes.** The use of smart contracts will help to fully automate payments.

A good example of such a concept would be the launch of the Blockchain World Wire (hereinafter — “BWW”) by IBM. BWW is a unified blockchain platform for cross-border money transfers. Its creators promise to carry out transactions around the world instantly, reliably and at a much lower cost. Today, 44 banks represented in 72 countries of the world are already connected to the system. BWW can “send” analogues of world currencies in the form of blockchain tokens pegged to the exchange rates. According to its principle of operation, the system is identical to JPMorgan’s solution: at the request of one of the parties, BWW generates a portion of tokens for a certain amount of money, transfers them, buys and credits fiat money to the account of the other party, and then “destroys” the used tokens.

Today, the banking sector spends billions of US dollars on protection against hackers and traditional steps to prevent hacker attacks by investing in hardware and software upgrades do not give the desired effect. Obviously, the financial sector needs a more reliable tool that will not only work to prevent attacks but will also reduce the theft of any information to zero; which is why more and more banks are investing in blockchain-related developments. This is substantiated by the fact that the technology has already proved its effectiveness in the field of data management and integrity through the use of cryptographic methods of protection and distributed storage of information.

Thus, the use of the blockchain technology in the banking sector is becoming a natural phenomenon not only in the field of transfers,
Section 2. Practical Aspects of Using the Blockchain Technology

authentication systems and banking security, but also in the field of securities transactions, lending, issuing bank guarantees and automation of settlements.

Probably the most famous example of the blockchain technology and securities issue in the world is the 73 million US dollars issue of The World Bank bonds by the largest Australian financial conglomerate Commonwealth Bank of Australia. The securities were issued on August 28, 2018, and yield of Bond-i (two-year bonds) of the World Bank is 2.251%. These securities are traded in test mode on a specially developed blockchain platform. The blockchain technology provides confidence in the issuer of securities, which cannot change the terms and conditions of the bond issue and is also a tool for ensuring the safe circulation of e-format bonds in the secondary market¹.

Raiffeisen Group banks, together with PJSC Gazprom Neft and other large companies, issued the first international bank guarantee based on the blockchain technology. Blockchain enabled the use of a fully integrated model, which resulted in the highest level of transparency².

**Conclusion**

Thus, banks have a new prospect of transferring the main operating and financial systems, as well as risk assessment systems, to a new platform of collective work with blockchain-based data. This will allow them to significantly simplify many processes by eliminating a large number of existing information infrastructure mechanisms and elements. However, even though achieving such results will take time and require careful consideration, the prospects of significant cost savings and increased efficiency will continue to increase interest in the technology and its financing.

2.3. Financial Sector

2.3.2. Use of a Digital Asset in the Context of Cross-Border Capital Flows

In order to understand the possibilities of using a digital asset in the context of cross-border capital flows, it is necessary to refer to the definition of this term and its essence. Digital asset is an information resource derivative of the right to value and circulating in the distributed ledger in the form of a unique identifier.

Based on this definition, it can be stated that the place of registration and circulation of a digital asset by means of a unique identifier is the distributed ledger (blockchain). The distributed ledger network technically consists of computers connected to such a network, or nodes, the geography of which is not limited to a particular state. Since the nodes of the distributed ledger network are continuously updated and are up-to-date full copies of the ledger, the records of the registration and circulation of a particular digital asset are simultaneously located in all nodes of the network. Thus, it is possible to state the cross-border property of a digital asset.

Availability of a digital asset gives a subject the right to access the information resource, which contains information on a complex of rights to a value and information on the obligations of the owner of the value, the fulfillment of which he/she is entitled to demand. In this case, the object of the relations while transferring a digital asset is the information about the value expressed in the information resource, and the transfer itself is carried out through the assignment of the right of access to such an information resource. For example, money can also serve as a value.

Thus, based on the cross-border property of a digital asset, we can conclude that there is no cross-border movement of the digital asset itself when it is transferred between subjects located in different countries, since the digital asset is already “simultaneously” located in all nodes of the distributed ledger network. In this case, only a specific subject can have

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the right to access an information resource. When a digital asset is transferred by such a subject to another subject, for example, in another country, and the digital asset further circulates, there is no cross-border movement of capital, since the money (value) from which the digital asset derives does not move in this case and remains in the possession of its owner.

If necessary, the owner of a digital asset may require the owner of the value (money) to fulfill his/her obligations, for example, by actually transferring the specified amount of money to the owner of the digital asset. In this case, such transfer will be carried out through banking services and within the framework of the current legislation in accordance with the principle of personal law.

**Conclusion**

Thus, a digital asset itself becomes a value and can be used in exchange, settlement and other operations, including international ones, which is not identical to the process of moving money in its physical manifestation since different objects are involved: in the first case this is a digital asset and money in the second.

### 2.3.3. Evolution of Crowdfunding

Crowdfunding is the collaboration of people who voluntarily pool their financial or other resources to support people or organizations. Fundraising in the form of crowdfunding can serve a variety of purposes:

- financing startups and small businesses;
- creation of free software;
- return on joint ventures;
- support of political campaigns;
- providing support to victims of natural disasters etc.

Jeff Howe, an English journalist, was the first to use this term in 2006 in his article “The Rise of Crowdsourcing” published in Wired\(^1\) magazine.

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\(^1\) The Rise of Crowdsourcing. Jeff Howe. 06.01.06. URL: https://www.wired.com/2006/06/crowds/.
Crowdfunding as a business model was practiced in ancient times. Even then, the public raised money, for example, for the construction of temples. It is believed that one of the first to use this funding model was Marillion, a British rock band. In 1997, after the release of their last album, the band could not afford a tour of the United States of America. However, thanks to the help of the group’s fans, they managed to raise 60 thousand dollars during the crowdfunding internet campaign for the organization of the tour¹.

Crowdinvesting is one of the forms of crowdfunding. At the same time, there is the same connection between crowdfunding and crowdinvesting processes as between the conventional financing and investment processes; they are related in whole and in part.

Unlike crowdfunding, crowdinvesting involves investing funds raised in the form of collective sourcing in a project, but always with the expectation that an investor will receive a financial benefit. In other words, a distinctive feature of crowdinvesting is investments that are attracted by small amounts of money through a simplified procedure and with the expectation of financial benefit.

There are three models of crowdinvesting. Depending on the expected financial benefit by the investor, crowdinvesting is designed to receive remuneration in the form of:

- royalties (investors receive remuneration as part of the income or profit from the financed project);
- fixed interest rate and repayment of the debt amount (investors (creditors) receive a fixed interest rate and return of the invested amount over a specific period in accordance with the established conditions);
- participation in the share capital (it is envisaged that investors will receive remuneration in the form of a share of ownership in the company, shares, dividends or voting rights at general meetings of shareholders).

The latter model became possible after signing of the law called “Jumpstart Our Business Startups Act (JOBS Act)²” by Barack Obama,

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U.S. President, in April 2012. The law allows start-up companies to accept investments from ordinary citizens for a total amount of up to 1 million U.S. dollars per year without filing papers and registering for the sale of shares. On October 30, 2015, the Securities and Exchange Commission adopted the final rules allowing companies to offer and sell securities through crowdfunding\(^1\), which came into force on January 29, 2016.

The emergence of the blockchain technology was an important milestone in the field of crowdfunding. The growing popularity of this technology and the beginning of its integration led to the appearance of the first blockchain projects and the further evolution of crowdfunding forms, which resulted in the term “ICO” (Initial coin (token) offering). A distinctive feature of this type of crowdfunding was such means of financing as cryptocurrency, in particular Bitcoin. The first project that proposed and used this model of crowdfunding was Mastercoin, which was based on J. R. Willett’s idea to make new protocol layers on top of the existing Bitcoin protocol. Officially, Mastercoin was launched on July 31, 2013 with a monthly promotion during which everyone could buy Mastercoins. The idea was that during the development of the platform, tokens could become more valuable and investors could sell their coins for profit. As a result, the project attracted 5,000 bitcoins, which was equivalent to 500,000 USD at an average exchange rate of 100 USD per 1 bitcoin at the end of ICO\(^2\).

The creator of the Ethereum platform, Vitaliy Buterin, gave an impetus to ICO development. He did not want to use venture capital investments to develop his project but he needed a lot of money to continue working on the platform. Since Mastercoin had already successfully completed the ICO, Vitaliy Buterin realized that it was possible to implement the plan and presented a long-term plan (White Paper) for the development of Ethereum. As a result of the 42-day ICO (from July 23, 2014 to September 1, 2014), Ethereum raised approximately 18 million USD.

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2.3. Financial Sector

9, 2014), 31,529 Bitcoins were collected that amounted to almost $18.5 million\(^1\) at an average rate of $585 per 1 Bitcoin for the ICO period.

It should be noted that on June 26, 2019, according to the Binance Exchange, the maximum rate value was 13,970 U.S. dollars per 1 Bitcoin\(^2\).

As a result of the first ICOs, a model consisting of the following stages was developed:

1. Forming an idea.
2. Forming a project team.
3. Company registration.
4. Writing a project white paper.
5. Marketing program.
6. ICO process.
7. Listing on a cryptocurrency exchange.

The simplicity of such a model, examples of success, the popularity of cryptocurrencies and the information surge around the blockchain technology have opened up great opportunities for scammers: from phishing and defacing to the implementation of projects based on the Ponzi pyramid. Thus, according to the research conducted by New York consulting company Satis Group LLC dated July 11, 2018, 78\% of the projects were identified scams, ~4\% failed, ~3\% of ICOs had gone dead, and only ~15\% went on to trade on an exchange. However, of those 15\%, only about 7\% of all ICOs were successful\(^3\). These research statistics are shown as a chart in Fig. 21.

The next step in the evolution of crowdfunding was the emergence of such a category as Initial Exchange Offering (IEO).

Unlike ICOs, the distinctive feature of IEO is that tokens are sold to investors with strict pegging to a specific cryptoexchange, which studies the project before listing, determines its reliability and prospects, and only after that allows investors to purchase tokens of such a project for internal


\(^2\) Chart BTC/USDT. URL: https://www.binance.com/ru/trade/BTC_USDT.

\(^3\) CRYPTOASSET MARKET COVERAGE INITIATION:NETWORK CREATION. JULY 11, 2018. URL: https://research.bloomberg.com/pub/res/d28giW28tf6G7T_Wr77aU0gDgFQ.
tokens of the cryptoexchange. Such a transformation of the model turned out to be a pragmatic solution, unlike ICOs, as it was able to add to the existing model an additional factor of calmness for potential investors in the form of verification and evaluation of the project by specialists of the cryptoexchange. However, the quality of such verification and evaluation is supported only by the authority of the exchange. It is also worth noting that the purchased tokens are stored on the investor’s account on the issuing stock exchange. Cryptoexchanges are centralized structures, which increases the risk of losing tokens in the event of hacker attacks or any other fraudulent activities.

The first cryptoexchange to launch its IEO platform was Binance with the IEO Binance Launchpad\(^1\) platform. In January 2019, the first official IEO occurred on the platform where the BitTorrent project raised about $7 million in BNB tokens\(^2\).

The next stage of evolution was such a category as Initial Business Offering (IBO). IBO is a part of a separate process called contributing within the framework of the Bitbon System\(^3\) blockchain platform. It has

\[\text{Prior to Trading} \quad \begin{array}{cccc}
\text{Scams: 78\%} \\
\text{Failed: 4\%} \\
\text{Gone Dead: 3\%} \\
\text{Continued to get listed/traded: 18\%}
\end{array}
\]

\[\text{Currently Trading} \quad \begin{array}{ccc}
\text{Successful: 7\%} \\
\text{Promising: 3\%} \\
\text{Dwindling: 4\%}
\end{array}
\]

\begin{center}
\text{Fig. 21. ICO Success Statistics Chart}
\end{center}

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\(^1\) Binance Launchpad. URL: https://launchpad.binance.com/


\(^3\) Bitbon Space. URL: https://www.bitbon.space/.

126
specific subjects: a contractat is the project initiator; contributors are buyers of tokens (digital assets) of the project; Bitup-agency prepares the contractat’s project for IBO, conducts IBO, controls the fulfillment by the contractat of all obligations under the project and represents the interests of the contributors to the project. Another important difference between this model and its predecessors is absence of focus on blockchain projects. Any project with any field of implementation can conduct IBO. A key feature of this model is the use of digital assets as units of access to information about a set of rights to a value. However, the circulation of digital assets constitutes assignment of the right to access such information. This broadens any possible transactions with fiat money and other values beyond the platform (system) and allows this crowdfunding model to exist within the framework of existing legislation.

The IBO model can be represented as follows:

1. Forming an idea.
2. Forming a project team.
3. Company registration.
4. Contacting a Bitup-agency.
5. Conducting preliminary assessment of the economic efficiency and validity of the project’s business idea by the Bitup-agency’s specialists.
6. Concluding an agreement with the Bitup-agency for the project preparation for IBO.
7. Writing a business plan and white paper by the Bitup-agency’s specialists as well as creating one pager and project abstract.
8. Creating and issuing a projectbon by the Bitup-agency’s specialists, which is a digital asset of the project.
9. Creating and issuing a project card, the IBO certificate, and registering it in a special register of the blockchain platform.
10. Conducting IBO.
11. Automatic listing on a decentralized component of the blockchain platform exchange (decentralized exchange).
12. Controlling by the Bitup-agency of the fulfillment of all obligations undertaken by the project team for implementation of the project.
Thus, this crowdfunding model minimizes the likelihood of fraudulent projects due to the preliminary assessment of a project by the Bitup-agency’s specialists, availability of contractual obligations of the project team, as well as the control of the fulfillment of these obligations by the Bitup-agency during the project implementation. An important element of the model is also the storage of the project’s digital assets in a decentralized environment rather than on a centralized exchange.

Today, IBO is the most optimal, progressive and safe implementation of the crowdfunding model in the legal field using the blockchain technology.

Conclusion

The emergence of the blockchain technology and its application in the field of crowdfunding have significantly accelerated the development process in this area. Only over the past six years, several new forms of blockchain-based crowdfunding have emerged raising more than $32 billion for the creation and development of many promising projects\(^1\). These forms gradually take their place along with traditional venture capital investment and crowdfunding. The use of the blockchain technology in this field can make venture capital markets more accessible and transparent for new projects and investors, thus creating the necessary conditions for the development of innovations.

——— 2.3.4. Prospects of Using a Blockchain Token as a Potential Financial Law Object

According to the theory of law, values (tangible and intangible), which are directly influenced by subject rights and duties of parties to legal relations are the object of legal relations\(^2\).


According to doctrinal provisions, public relations in the field of financial activity are the object of financial law, i.e. relations on systematic creation, distribution and use of centralized and decentralized funds by the government and local self-governing authorities to implement their tasks and functions. Thus, state financial legal relations based on the term “finances” are the object of financial law.

Scientific literature takes several different approaches to defining finances. L.K. Voronova states that finances are a system of economic relations connected to systematic creation and distribution of public centralized and decentralized funds needed for the operation of a government or local self-governing authorities and other structures recognized by the state as necessary. In turn, E.P. Orliuk states that finances are money relations that arise in the process of distributing and redistributing the value of the gross social product and part of national wealth due to the formation of money income and savings by business entities and the state and using them for extended reproduction, material incentives for employees, satisfaction of social and other needs of society.

Explanatory dictionaries also contain various meanings of the word “finances”, such as: “economic category”, “aggregate monetary resources”, “practice of handling money”, etc. Meanwhile, the majority of specialists determine finances as monetary or economic relations, or a system of relations.

In turn, tangible and intangible values are the objects of financial legal relations. A lot of objects can belong only to property financial legal relations and only in the form of money. Such objects are directly secured by the legislator and relations directed at them are also regulated.

It should be noted that, at one point, the evolution of financial and legal relations led to the emergence of electronic and digital money. With the

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development of technologies, it became possible to make electronic payments. This led to the need to divide all payment instruments that perform the function of transferring funds into cash (bills, coins) and non-cash instruments.

**Categories of Payment Instruments**

According to the report “Payment Aspects of Financial Inclusion” made by the Committee on Payments and Market Infrastructures and World Bank Group, electronic payment instruments can be divided into three categories:

1) instruments based on the electronic funds transfer. They include direct credit (from one account to another) and direct debit transfers. Direct credit transfers can be made completely electronically (end-to-end transfers);

2) instruments based on plastic payment cards that include payments using credit, payment or debit cards. Outside a few exceptions, such payments are initiated, authorized, checked and performed completely electronically;

3) instruments based on electronic money (E-Money), which mean the existence of an account for operations with the funds that were deposited beforehand on the side of the service provider, often a non-bank organization. Such specific products will include online money if the payment instructions are received via the Internet, and mobile money when the instructions are transferred using a mobile device (smartphone) or by purchasing pre-paid cards¹.

Many states have transformed their legislation to implement the norms regulating operations related to electronic money or created new legislative norms, which confirms the significance of electronic money in the global economy. The European Union made the first step towards regulating electronic money by adopting the Electronic Money Directive² 2000/46/EC in 2000, which was aimed at strengthening the competition and

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innovations in types of retail payments without jeopardizing their security. This Directive authorized activities of the organization regarding the issue of electronic money — Electronic Money Institution. In 2007, the Payment Service Directive\textsuperscript{1} 2007/64/EC secured the status of payment institutions at the state level as payment service providers. In 2009, the Directive 2009/110/EC on electronic money\textsuperscript{2} was adopted, which reviewed the requirements for electronic money, and which repealed the Directive 2000/46/EC of the same name.

As we can see, the approaches to determining and regulating electronic money as a non-cash electronic means of payment constantly change and adapt to the emergence and development of technologies, as well as to socioeconomic needs of society. In turn, the practice of implementing innovative technologies allows showing the world a truly unique instrument. This instrument can be a medium of exchange and perform the functions of value (cost) transfer — a blockchain token.

**The Ability to Use a Blockchain Token in the Financial Field**

If we look at a blockchain token in the aspect of its application in the financial field, we have to understand its essence shown in the definition accepted in the Great Ukrainian Legal Encyclopedia: **blockchain token** is an accounting unit circulating in the distributed ledger by means of a transaction with a unique identifier.

The emergence of the distributed ledger technology (blockchain) and its integration into various areas of human activity, as well as the use of


instruments derivative of it, such as blockchain tokens, have significantly affected financial and legal relations and already act as an object of such relations, despite the absence of comprehensive regulation of this phenomenon.

In essence, a blockchain token is a unique alphanumeric code and, like electronic money, does not have a physical form. In the case of this instrument, we can state that the formation of relations based on the blockchain technology using blockchain tokens is significantly ahead of legislative initiatives and regulation as a whole. Many examples from numerous countries confirm this fact. Lawmaking in this field is more of a consequence, rather than a cause for the emergence of such financial and legal relations. In this context, it is more about this specific type of legal relations, since a blockchain token can be a medium of exchange, as well as perform the function of recording the transition of the right to a value (cost). It should be noted that when forming the transaction, the token itself does not move in the system. Instead, a unique identifier is generated, which is connected to the information on the transferred amount of rights within the formed transaction. This, essentially, gives the ability to conduct the balance accounting of blockchain tokens. This property differentiates this instrument from the ones known to financial legislation.

**Blockchain Token as an Example of Private Money**

Private money, i.e. money not issued by the subject of a public authority, has historically been quite popular. The monopoly of states on the issue of money was established only in the 19th century. According to Friedrich August von Hayek, the Austrian economist and philosopher, winner of the Sveriges Riksbanks pris i ekonomisk vetenskap till Alfred Nobels minne (award established by the Bank of Sweden in honor of Alfred Nobel), state monopoly on the issue of money has a negative effect on society. Believing that money has to be decentralized, the economist

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proposed a system based on competition of parallel private currencies. The interest towards the proposed theory reignited with the emergence of cryptocurrencies, which in reality are an alternative type of private money\(^1\). Meanwhile, one of the functions of cryptocurrencies as an alternative to private money can lie in securing the value.

Therefore, we can state that, nowadays, the phenomenon of private money exists as well, but it is represented by other instruments — blockchain tokens.

It is worth noting that the subject of public authority is not needed to issue a blockchain token, moreover, some states come to realization of the need to issue tokens at the national level (digital dollar, digital ruble, digital yuan, etc.) with the development of the blockchain technology.

Private money, especially in non-cash form, has always been the center of attention of law enforcement and fiscal agencies for a number of reasons:

- uncertainty of the legal status of the platforms that perform non-cash exchange of such money and, therefore, inability to apply exchange control to them;
- absence of identification of users on such platforms, which makes it impossible to use the Know Your Customer (hereinafter — “KYC”) and Anti-Money Laundering (hereinafter — “AML”) provisions;
- inability to track the full number of issued units and, therefore, absence of control over the issuing process from regulatory bodies and users;
- vulnerability to technical failures and risks due to the absence of reliable system hardware and software, which could be checked and guaranteed.

Unlike private payment instruments, blockchain tokens are not “private” in nature. The initiator of their creation does not have to be a subject of public authority, any person can become the issuer, but as soon as a blockchain token goes into circulation, it stops being private due to its circulation environment — a distributed ledger. The distributed ledger

technology operates extraterritorially and is not limited to just one server supporting its functioning because this technology is based on the principle of decentralization. Platforms that function based on the distributed ledger technology (blockchain) are more secure, reliable and transparent in their functionality. Their open ledger of transaction data can contain all information about the number of tokens circulating on this platform and about subjects that carry out transactions. This solves the issue of audit from authorized bodies and the issue of identification and compliance with KYC and AML. The distributed ledger technology and its instruments (blockchain tokens) are not subject to the same number of risks as private money platforms due to the distributed decentralized system.

**Taxation of Blockchain Tokens**

Another reason for positioning blockchain tokens as an object of financial law is the issue of taxation of this instrument. The legislator, based on the object that was given a definition at the regulatory level (be it cryptocurrency, virtual currency, digital asset or token in general), aims to define the approach to the taxation of a blockchain token. For example, the Skatteverket v. David Hedqvist case was precedent-setting, over the course of which the European Court of Justice stated that the operations on exchanging the “bitcoin virtual currency” for traditional currencies do not fall into the field of application of the value added tax (VAT)

The tax legislation of the United States of America, in turn, considers cryptocurrencies as a property asset in the context of the object of taxation.

Due to the fact that some legislators try to find the approaches to taxing cryptocurrencies and similar tokens, and other — to taxing digital assets, we can state that there is no unified classification of blockchain tokens in the legal field. The development of a blockchain token definition within each specific jurisdiction or a widely accepted definition for all jurisdictions can solve this situation, along with defining a blockchain token as money,

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currency value, payment instrument, information, other property or an entirely new category of objects.

**Conclusion**

Thus, the development of the new technology has transferred various types of legal relations, including financial ones, into the digital field, which also brought the need to secure new subjects of relations at the doctrinal and, therefore, regulatory levels. With the development of technologies, and in particular, with the emergence of the distributed ledger technology (blockchain), the legislator faces the issue of the prospects of using blockchain tokens as a potential object of financial law.

### 2.4. Promising Fields of Application of the Blockchain Technology

It is important to note that the practical application of blockchain is not limited only to the public administration and financial sectors. The use of the blockchain technology is most effective in all fields where the authenticity and immutability of already recorded information is one of the key components, for example: medicine, education, real estate, legal system, property rights management, data management, trade, logistics, agricultural sector and much more.

**Property rights management and real estate.** The blockchain technology ensures that blockchain data on property rights cannot be challenged or lost. The information recorded in the chain will now be sufficient to ensure that in the event of a conflict of interest the position of the property owner is the only correct one. In addition, it will save time and money, avoiding all the bureaucratic formalities. Sellers will be able to securely transfer property rights and documentation, and buyers will be able to send money expressed in blockchain tokens. In addition, blockchain will be able to provide a reliable way of sending property rights records to the relevant government agencies.

**Copyright.** Through blockchain platforms, artists, musicians, inventors, producers and other representatives of the arts and sciences will be able to
store copyrights and works themselves through encrypted identifiers, as well as sell their own works. This possibility will increase the monetization of their activities, as well as solve the problem of piracy.

**Personal identification.** The use of blockchain-based services in the field of personal identification and confirmation of access rights can guarantee the reliability of digital data storage, its relevance and protection against duplication.

**Agrarian sector.** As is known, the development of the global food market is determined by two groups of factors:

- population growth, especially in low-income countries, and, consequently, increased food demand;
- increased demand for quality organic products.

Providing food to a growing population requires solving problems such as organizing efficient logistics, financing procurement, as well as controlling food quality and preventing food fraud.

The blockchain technology can solve these problems. A unified data exchange space for everyone will allow effectively organizing the supply chain: establishing contacts between suppliers, carriers, buyers and warehouse operators. This is especially true for food products with short shelf life. The introduction of blockchain in the agro-industrial sector will solve an important problem of the agricultural industry: it will simplify the sale of products and exclude intermediaries from the chain. Consumers will receive a fully transparent supply chain and detailed information about the origin of products, as well as fair and lower prices.

**Education.** As the demand for distance learning increases, the world needs a better system for verifying the learning outcomes of graduates. Introducing blockchain in this area could lead to the creation of a kind of virtual notary that would exclude the possibility of forging any documents regarding the applicant’s educational qualifications.

**Healthcare.** The use of this technology will allow keeping records of patient’s health data, ensuring a high level of safety of any information: certificates, extracts, appointments, examination results, insurance data, etc. This approach solves a fairly common problem of the loss of medical records with important information or lack of access to them if necessary.
If all these data are entered in blockchain, they will never disappear and can be accessed by authorized subjects located in any country. This can lead to the creation of a huge network of secure records that guarantee the safety of all personal information from the moment of birth and throughout the life of any person.

**Charity.** The creation of blockchain-based platforms with open information about donations to foundations and their expenses will increase trust in such foundations, will make their activities transparent and lead to an increase in funds raised to help those in need.

**Conclusion**

Thus, the implementation of blockchain, as well as the platforms created using this technology can significantly transform everyday reality by providing mechanisms that will not only simplify and automate many processes in various fields, but also improve the life quality of society as a whole.
Section 3

FINANCIAL AND LEGAL REGULATION OF VIRTUAL CURRENCIES IN THE ASPECT OF THE BLOCKCHAIN TECHNOLOGY DEVELOPMENT

3.1. Theoretical Aspects of the Definition of Virtual Currency and Its Place in the System of Financial Instruments

The Concept of Money and Its Classification

Money is a set of assets in the economy that consumers, businesses and governments regularly use to buy goods and services. Money performs three functions in the economy:

1) medium of exchange (an item that buyers give to sellers when they want to buy goods and services);

2) unit of account (a criterion that people use to publish prices and to account debts);

3) store of value (an item that people can use to transfer purchasing power from the present to the future).

According to the report “International Approaches to Digital Currencies”\(^1\) published by Congressional Research Service in December 2018, money takes two main forms: physical currency and digital currency. This classification is shown in Fig. 22.

\(^1\) International Approaches to Digital Currencies. URL: https://crsreports.congress.gov/product/pdf/R/R45440.
3.1. Theoretical Aspects of the Definition of Virtual Currency and Its Place in the System...

### Types of Money

**Commodity Money**
- Made of materials that have intrinsic value, like gold or silver coins.

**Fiat Money**
- No intrinsic value.
- Serves as money by government decree.

**Digital Flat Currency**
- Digital representations of fiat currencies that can be digitally traded.
- Serves as money by government decree.

**Virtual Currency**
- Digital representations of value that can be digitally traded.
- No status as legal tender.

![Classification of Money](image)

**Fig. 22. Classification of Money**

Commodity money is made of materials that have intrinsic value, like gold and silver coins. Fiat money has no intrinsic value but serves as money by government decree. Before World War I, most countries adhered to the gold standard, using gold coins or fiat money convertible to gold on demand. Today, most countries, including the United States of America and other large countries, use fiat money as national currencies.

### The Concept of Virtual Currency

Due to rapid technological progress and the creation of distributed ledger technology, such a category as virtual currency has emerged. Virtual currency is a digital representation of value that can be used in digital form (without any physical banknotes or coins) and that functions as a medium of exchange, unit of account, and store of value. However, unlike fiat currency, virtual currencies, as a rule, do not have legal tender status in any jurisdiction. They are endowed with value only by agreement in a community of virtual currency users.

In 2014, the European Banking Authority defined virtual currency in its report “EBA Opinion on ‘virtual currencies’”¹ as a digital representation

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of value that is neither issued by a central bank or a public authority, nor necessarily attached to fiat money, but is accepted by natural or legal persons as a means of payment and can be transferred, stored or traded electronically.

The report “Virtual currency schemes — a further analysis”\(^1\) published by the European Central Bank in February 2015 defines virtual currency as a digital representation of value not issued by a central bank, credit institution or financial institution authorized to issue electronic money. Virtual currency can be used as an alternative to money in certain circumstances.

The “Internal Revenue Service”, in its guidance on the tax treatment of virtual currency transactions, defined virtual currency as a digital representation of value that functions as a medium of exchange, a unit of account and/or a store of value\(^2\).

In November 2017, amendments to the “Money Laundering and Terrorist Financing Prevention Act”\(^3\) were adopted in Estonia, according to which cryptocurrencies (virtual currencies) are defined as a digital representation of value that can be transferred, stored or traded digitally, is not legal tender of any country or funds (banknotes, coins or e-money) and is accepted as a payment instrument by natural and legal persons.

According to the report “Virtual Currencies Key Definitions and Potential AML/CFT Risks”\(^4\) released by the Financial Action Task Force, virtual currencies are divided into two types: convertible and non-convertible. Convertible virtual currencies can be exchanged back-and-forth for specified (real) currencies, while non-convertible virtual currencies are used in limited network domains (e.g., online multiplayer games) and are not converted into fiat currencies.


Moreover, some virtual currencies are managed by a centralized administrator that issues the currency and maintains a central payment register. Other virtual currencies are decentralized, and their transactions are recorded in a distributed ledger network that is supported by many independent peer-to-peer computers. They use encryption methods to control the creation of money units and verify the transfer of funds. Users are given a certain level of anonymity. Such a system does not rely on government agencies (central banks) or financial institutions, which are usually involved in the creation and transfer of fiat money. Convertible decentralized virtual currencies are often referred to as cryptocurrencies. This taxonomy of virtual currencies is shown in Fig. 23\(^1\).

<table>
<thead>
<tr>
<th></th>
<th>Centralized</th>
<th>Decentralized</th>
</tr>
</thead>
<tbody>
<tr>
<td>Convertible</td>
<td>• Administrator, exchangers, users.</td>
<td>• Exchangers, users.</td>
</tr>
<tr>
<td></td>
<td>• Third-party ledger.</td>
<td>• No administrator.</td>
</tr>
<tr>
<td></td>
<td>• Can be exchanged for fiat currency.</td>
<td>• No Trusted Third-Party ledger.</td>
</tr>
<tr>
<td></td>
<td><strong>Example:</strong> <em>WebMoney</em></td>
<td>• Can be exchanged for fiat currency.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Example:</strong> <em>Bitcoin</em></td>
</tr>
<tr>
<td>Non-convertible</td>
<td>• Administrator, exchangers, users.</td>
<td>Does not exist</td>
</tr>
<tr>
<td></td>
<td>• Third-party ledger.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Cannot be exchanged for fiat currency.</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Example:</strong> <em>World of Warcraft Gold</em></td>
<td></td>
</tr>
</tbody>
</table>

Fig. 23. Taxonomy of Virtual Currencies

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Comparison of the Terms: “Virtual Currency” and “Cryptocurrency”

The analysis of the above-mentioned reports, the positions of the Federal Financial Supervisory Authority\(^1\) and the Uniform Law Commission\(^2\), as well as the report “Regulation of Cryptocurrency Around the World”\(^3\) published by the Law Library of Congress in June 2018 allows us to state that the concept of virtual currency is associated or identified with the concept of cryptocurrency or that they are related as a whole and a part. It is important to note that virtual currencies (cryptocurrencies) perform functions in a distributed ledger environment and can be used as money, i.e. as a unit of account, a medium of exchange and store of value. All this allows them to be the subject of broad discussions at completely different levels as an instrument or a conceptually new solution, which can replace traditional money.

There is no uniform legal regime for cryptocurrencies (virtual currencies) around the world, as some countries have absolute or indirect restrictions on virtual currencies, some have introduced changes to their tax and/or anti-money-laundering and anti-terrorism financing laws, and some even have issued national or regional cryptocurrencies. This information is shown in more detail in Fig. 24, 25 and 26\(^4\).

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2 UNIFORM REGULATION OF VIRTUAL-CURRENCY BUSINESSES ACT. URL: https://www.uniformlaws.org/HigherLogic/System/DownloadDocumentFile.ashx?DocumentFileKey=f0dc5f7a-c80f-209c-973d-a9d0e158daa0&forceDialog=0.
Fig. 24. Legal Status of Cryptocurrencies (Virtual Currencies)
Regulatory Framework for Cryptocurrencies: Application of Tax Laws, Anti-Money Laundering/Anti-Terrorism Financing Laws, or Both

Fig. 25. Regulatory Framework for Cryptocurrencies (Virtual Currencies): Application of Tax Laws, Anti-Money Laundering/Anti-Terrorism Financing Laws, or Both
3.1. Theoretical Aspects of the Definition of Virtual Currency and Its Place in the System...

Countries that Have or Are Issuing National or Regional Cryptocurrencies

<table>
<thead>
<tr>
<th>ISO Code</th>
<th>Country Name</th>
<th>ISO Code</th>
<th>Country Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>AI</td>
<td>Anguilla (ECCB)</td>
<td>MS</td>
<td>Marshall Islands</td>
</tr>
<tr>
<td>AG</td>
<td>Antigua and Barbuda (ECCB)</td>
<td>MS</td>
<td>Montserrat (ECCB)</td>
</tr>
<tr>
<td>CN</td>
<td>China</td>
<td>MK</td>
<td>Saint Kitts and Nevis (ECCB)</td>
</tr>
<tr>
<td>DM</td>
<td>Dominica (ECCB)</td>
<td>LC</td>
<td>Saint Lucia (ECCB)</td>
</tr>
<tr>
<td>GD</td>
<td>Grenada (ECCB)</td>
<td>VC</td>
<td>Saint Vincent and the Grenadines (ECCB)</td>
</tr>
<tr>
<td>IF</td>
<td>Ireland</td>
<td>VE</td>
<td>Venezuela</td>
</tr>
<tr>
<td>LT</td>
<td>Lithuania</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*ECCB is the Eastern Caribbean Central Bank, which is the monetary authority for eight island economies in the Eastern Caribbean Currency Union, has entered into an agreement for the development of a digital currency for member states.

Fig. 26. Countries that Have or Are Issuing National or Regional Cryptocurrencies (Virtual Currencies)
Conclusion

Thus, the relations concerning the legal regulation of virtual currencies as a digital representation of value that can perform the functions of money are primarily associated with the transformation of money circulation relations and relations of currency regulation. It is no coincidence that the first public blockchain network, Bitcoin, was developed as a peer-to-peer electronic network for direct online payments from one side to the other, without going through financial institutions, and the units of account in the distributed ledger networks were called “cryptocurrencies”, “virtual currencies”, etc., i.e. the “currency” nature of such units was strongly emphasized. That is why it seems necessary to pay some attention to the characterization of relations associated with currency regulation.

3.2. Currency Values in the Context of Ukrainian Legislation

In the context of comparing the blockchain technology, in particular, virtual currencies to currency regulation, it is necessary to analyze currency values through the prism of Ukrainian legislation.

The Concept of Currency Values

The basis of regulation is the establishment of the concept of currency and currency values. The regulatory definition of “currency” and “currency values” is particularly important when organizing the system of currency regulation and currency control in a state, because due to the legitimization of these concepts, the legislator determines the list of currency transactions, the procedure for which is regulated by regulatory legal acts of the currency legislation. In accordance with Article 1 of the Law of Ukraine “On Currency and Currency Transactions” dated June 21, 2018, the term “currency values” includes:

1) national currency (hryvnia):
   (a) monetary units of Ukraine, hryvnia, in the form of banknotes, coins (including negotiable, commemorative and jubilee coins, etc.);
b) funds deposited into bank accounts and accounts of other financial institutions expressed in hryvnia;

c) electronic money expressed in hryvnia;

2) foreign currency:
   a) monetary units of foreign states in the form of banknotes, treasury tickets, coins;
   b) funds deposited into bank accounts and accounts of other financial institutions expressed in currency units of foreign states and international settlement (clearing) units payable in foreign currency;
   c) electronic money expressed in currency units of foreign countries and/or bank metals;

3) bank metals: gold, silver, platinum, and metals of platinum group brought (refined) to the highest standards in accordance with international standards, in ingots and powders that have a quality certificate, as well as coins made of precious metals

Legal Regime of Currency and Currency Values Circulation

Regarding national and foreign currencies, the legislator distinguishes two regimes of their circulation and application. Firstly, it concerns the regime of circulation of national and foreign currencies, which circulate and are legal tender in Ukraine and respective foreign states. Secondly, the system of currency values also includes national and foreign currencies withdrawn or being withdrawn from circulation, but are subject to exchange for currency units in circulation. In this case, we are talking about the parallel circulation of several currencies within the state, which occurs during the transition stages of monetary reforms.

The currency of Ukraine has a special regime in the system of currency values. The Law of Ukraine “On Payment Systems and Transfer of Funds in Ukraine” stipulates that the hryvnia as the monetary unit of Ukraine is

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the only legal tender in Ukraine, accepted by all individuals and legal entities without any restrictions throughout Ukraine for making transfers and settlements. This regulation is based on the provisions of Article 99 of the Constitution of Ukraine: “The currency unit of Ukraine is hryvnia. Ensuring stability of the currency unit is the main function of the central bank of the state, which is the National Bank of Ukraine.”

Conclusion

Thus, it is possible to state that the legal regime of currency and currency values is reflected in detail by the legislator of Ukraine and is comprehensively regulated. Comparing “virtual currencies” and “currency values” proposed by the legislation of Ukraine, we can conclude that virtual currencies are not included in the system of currency values of Ukraine and their legal regime has not been established.

3.3. Currency Convertibility in the Context of Ukrainian Legislation

Currency Convertibility Framework

An important characteristic of currencies is the concept of convertibility. In general, the convertibility of currency is determined by regulated domestic legislation and international legal acts, as well as by the procedure for exchanging national currency for foreign currency. At the same time, in a broad sense, the construction of convertibility includes a number of conditions, which, if enshrined in legislation, may lead to the conclusion

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that there is a freely convertible currency. The terms of a freely convertible currency include:

- balanced backing of the money supply of the national currency in circulation by the commodity supply, which guarantees the circulation of the national currency;
- free crossing of the customs border of Ukraine by the national currency of Ukraine;
- free crossing of the customs border of Ukraine by foreign currency;
- free exchange of national currency for foreign currency.

Currency that meets the requirements of internal and external convertibility is fully convertible. Internal convertibility means that every citizen of the country, who has the means of payment in the national currency, has the right to transfer them abroad without restrictions and obstacles, or freely exchange them for foreign means of payment at an established exchange rate. External convertibility stipulates the right of a foreign entity to dispose of national means of payment without restrictions and, above all, exchange them for foreign means of payment at an established exchange rate.

The basis of convertibility is the constant relation between the country’s monetary circulation and the monetary circulation of other countries through the mechanism of the foreign exchange market and exchange rate.

**Currency Classification According to the Degree of Convertibility**

Depending on the scope of currency exchange restrictions, there are three types of convertibility:

a) Current account convertibility, which is characterized by the absence of currency restrictions on current operations;

b) Capital account convertibility, which means the absence of restrictions on the implementation of the respective group of currency operations, defined by the national currency legislation;

c) Full currency convertibility, which implies no restrictions on currency operations by both residents and non-residents of a particular state.
This classification is based on the existence or absence of currency restrictions, which determines the respective area of application of a particular currency.

According to the degree of convertibility, currencies are divided into:

1) Non-convertible currencies — currencies that are used within one state, and the circulation of which is characterized by fundamental prohibitions on export, use and exchange for foreign currencies. Non-convertible currencies are the currencies of countries where foreign exchange restrictions exist for all types of currency transactions. Such currencies are traded in only one country. Non-convertible currencies are the currencies of countries that have not ratified Articles of Agreement of the International Monetary Fund, which stipulates non-application of restrictions on payments and transfers under current international agreements, as well as the rejection of any discriminatory measures or practices of multiple exchange rates;

2) Partially convertible currencies — currencies in relation to which there are some restrictions on export, use and exchange for foreign currencies;

3) Freely convertible currencies — currencies that are not subject to restrictions on their export, use and exchange for foreign currencies.

Freely convertible currencies include two groups of currencies:

a) Convertible currencies, which are widely used to make payments on international transactions (currencies of European Union member countries and bank metals);

b) Currencies, which are not widely used to make payments on international transactions.

Reserve currencies occupy a special place in the classification of currencies. Convertible currencies of countries where central banks of other countries and international financial institutions form their own foreign exchange reserves are reserve currencies. These currencies are the currencies of the most economically developed countries: the U.S. dollar, the British pound sterling, the Swiss franc, and the euro, which is the collective currency of the eurozone countries.
Reserve currencies form the basis of Ukraine’s foreign exchange reserves\(^1\).

### Conclusion

Thus, the convertibility of currency organically connects the domestic market with the global market and allows quickly responding to changes in the international economic environment, which has a positive impact on the economic development of a country. In the economy of the country, which is under the influence of the global market, we can observe the processes of adaptation and alignment of national production conditions with the world ones in all respects: costs, prices, quality, technical level of production, etc. Only such a regime can ensure the full implementation of the well-known market principle “sell on the most expensive markets and buy on the cheapest” and will allow rationally using funds for global investment, as well as benefitting from the international division of labor\(^2\).

### 3.4. Currency Transactions and Their Regulation

#### Concept and Types of Currency Transactions

The diversity of currencies, both domestic and international, creates the need for transactions involving such currencies. Currency transactions detail the regime of movement and circulation of currency values. Thus, currency transactions may include:

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Transactions involving the transfer of ownership of currency values;
Transactions involving trading currency values;
Transactions involving the cross-border transfer of currency values and the cross-border movement of currency values.

It is advisable to consider the types of currency transactions. For example, according to Part 2, Article 9 of the Law of Ukraine “On Currency and Currency Transactions”, non-banking financial institutions conduct following currency transactions:

- trading currency values in cash;
- transfer of funds;
- settlements in foreign currency in Ukraine under life insurance contracts;
- factoring (with regard to settlements in Ukraine in foreign currency between factors and clients in international factoring transactions on assignment of the right of claim to a non-resident debtor); and
- other currency transactions determined by the National Bank of Ukraine.

The basis for conducting currency transactions is the license. In Ukraine, licenses for currency transactions are issued by the National Bank of Ukraine. Banks provide banking and other financial services (if they are currency transactions) solely on the basis of a banking license.

Postal operators provide financial services for transferring funds (if they are currency transactions) and/or financial services for trading currency values in cash on the basis of the license of the National Bank of Ukraine for conducting currency transactions.

**Currency Regulation: Content and Types**

The form of implementation of the monetary policy of the state is currency regulation. Currency regulation should be understood as a special...
3.4. Currency Transactions and Their Regulation

legal regime for the implementation of currency relations, providing a set of measures aimed at organizing the functioning of the domestic currency market in a country and determining the procedure for conducting currency transactions; the above-mentioned set of measures is carried out by authorized state bodies.

Foreign exchange control is carried out in order to ensure compliance of subjects of currency transactions and authorized institutions with currency legislation. Foreign exchange control is performed by foreign exchange control authorities and foreign exchange control agents in order to establish compliance of the executed currency transactions with currency legislation, taking into account a risk-based approach. It is carried out by foreign exchange control authorities and foreign exchange control agents without interfering in the respective currency transactions and the activities of the subjects of such transactions, except for cases when foreign exchange control agents prevent currency transactions that do not meet the requirements of the currency legislation.

Foreign exchange regulation is carried out by establishing special regimes of currency value circulation, restrictions on rights and assignment of obligations to subjects of currency relations. All this is due to the establishment and implementation of a certain procedure for conducting operations with currency values in the domestic foreign exchange market; the procedure for moving currency values abroad or to its territory from abroad and the regime for making foreign investments; backing and protecting ownership of currency values; regulating international payments; maintaining a stable exchange rate of the national currency and the national balance of payments; providing the necessary (integration or isolation) regime for the country’s interaction with the global foreign exchange market.

Depending on the area of implementation of the levels of currency regulation, we can distinguish:

• External (international) currency regulation, which is carried out by international financial and credit organizations (mainly by the International Monetary Fund) in order to create a common currency space that ensures the free exchange of goods and services within the global economic space. Article 1 of the Agreement of the International Monetary Fund\(^1\) sets out the objectives of such regulation, among which are: promoting currency stability, providing a mechanism for currency regulation in relations between states, preventing competitive devaluation of currencies, as well as establishing a system of multilateral payments on current transactions between states and the removal of currency restrictions that impede the growth of world trade.

• Domestic (national) currency regulation. The main element of the national system of currency regulation is currency restrictions. Currency restrictions should be considered as a system of state measures aimed at establishing the procedure for conducting currency transactions\(^2\).

Currency regulation includes a system of currency restrictions. This system of restrictions stipulates:

**Restrictions with regard to an object.** Such restrictions are implemented by establishing an exhaustive list of objects, i.e. currency values.

**Restrictions with regard to a subject:**

• Restrictions with regard to persons vested with authority to organize and supervise currency relations. According to Article 116 of the Constitution of Ukraine\(^3\), the authorized body in the field of currency regulation is the

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Cabinet of Ministers of Ukraine and in accordance with Article 44 of the Law of Ukraine “On the National Bank of Ukraine”\(^1\) it is the National Bank of Ukraine.

- Restrictions with regard to the liable persons whose rights and obligations are detailed in accordance with a certain type of currency transactions and types of currency values. Residents and non-residents have the right to be owners of currency values located in Ukraine. Residents also have the right to be owners of currency values located outside of Ukraine, except for cases stipulated by the legislative acts of Ukraine.

**Restrictions with regard to the composition of currency transactions.** The list of currency transactions is determined by Article 9 of the Law of Ukraine “On Currency and Currency Transactions”\(^2\).

The National Bank of Ukraine and the central executive authority, which implements the state tax and customs policy as the foreign exchange control authority, monitor within their competence the compliance of residents and non-residents with the currency legislation.

Direct measures related to the implementation of foreign exchange control are carried out by foreign exchange control agents, which are authorized institutions accountable to the National Bank of Ukraine.

**Conclusion**

Thus, foreign exchange transactions detailing the regime of movement and circulation of currency values have a number of peculiarities of their implementation. Foreign exchange regulation imposes restrictions on conducting currency transactions, which allows creating a transparent system of the foreign exchange control.

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3.5. Financial and Legal Regulation of Virtual Currency Circulation

Virtual currencies as an object of legal relations require financial and legal regulation. It is necessary to consider the legal nature of the object to analyze this issue.

3.5.1. Legal Nature of Virtual Currencies

The first decade of the XXI century was marked by the emergence of a new phenomenon on the verge of economic and legal relations based on the distributed ledger technology, i.e. virtual currency (cryptocurrency). The first cryptocurrency is considered to be Bitcoin. The main purpose of introducing virtual currency was to withdraw third parties (the state, banking institutions, and other intermediaries) from the scope of transactions that were conducted between their direct participants. Historically, the emergence of relevant phenomena has caused difficulties in developing appropriate legal regulation. In other words, a phenomenon appears reflecting the current stage of public relations development, which subsequently requires adequate legal reflection. Rule-making actors face a number of problems, especially if such a phenomenon affects the area of financial legal relations.

Virtual currencies are associated with an entire set of terms, which reflect the level of development of public relations in this field over the past decade: cryptocurrencies, digital currencies, virtual assets, etc. The first document with the description of the protocol and operation principles of the Bitcoin payment system was published in 2008. The developer or the group of developers acted under the name Satoshi Nakamoto. On January 3, 2009, the first 50 Bitcoins (hereinafter — “BTC”) were generated. In October of the same year, the first exchange rate of BTC against the U.S. dollar was published: $1 = 1,309.03 BTC. On February 6, 2010, the first official exchange Bitcoin Market was opened. In the same year, the first purchase for BTC took place: a pizza was sold for 10,000 BTC. On December 6, 2012, the first BTC exchange received the banking
license in Europe. The capitalization of BTC as of March 28, 2013 exceeded $1 billion. The change in the exchange rate reflected both the lack of trust and the excitement regarding the new instrument. The maximum exchange rate of BTC against the U.S. dollar was registered on December 17, 2017 and constituted, for example, on the Bitfinex exchange, 19,891 U.S. dollars for 1 BTC.

If we analyze the regulatory acts and publications since 2013, we can see at least 5 different terms to define “cryptocurrency”: tokens, coins, virtual currencies, crypto-assets, digital currency. The first attempt to regulate cryptocurrency was the research of the European Central Bank (hereinafter — “ECB”) in 2012. It reviewed virtual currencies used in games, and the ECB classified cryptocurrency as a type of a virtual currency. The first official statements were focused mainly on the historically first cryptocurrency, Bitcoin. As a result, Bitcoin was frequently used as a collective term to define all cryptocurrencies until 2014.

In 2014, the terms “cryptocurrency” and “digital currency” became more popular, but the most used term to define cryptocurrencies was “virtual currency”. It is worth noting that the terms “cryptocurrency”, “virtual currency”, and “digital currency” are often used interchangeably, while some official documents contain all three. The trend towards using the term “virtual currency” emerged in 2014 after the Financial Action Task Force (FATF) published its first report on virtual currencies and AML/CFT risks. After the FATF report, a lot of regulators used the terminology and definition presented by this intergovernmental authority. The report gave the following definition: decentralized virtual currencies (for example, cryptocurrencies) are distributed virtual currencies with an open source code based on mathematical calculations, which have no centralized monitoring or supervision (Bitcoin, Litecoin and Ripple).

Under various circumstances, virtual currencies are defined as money, electronic money, currency, financial instrument, means of payment, means of exchange, type of digital money, digital representation of value, type of a value, intangible asset, etc. The lack of clarity in the definition of virtual currency is supplemented by the multitude of equal terms, such as “cryptocurrency”, “crypto-asset”, “digital financial asset” and others.
3.5.1.1. Advantages and Disadvantages of Virtual Currencies

Public relations in the field of circulation of virtual currencies formed both a group of supporters and a group of opponents, which is reflected not only in the positions of researchers, but in the corresponding state policy. This phenomenon is characterized by certain advantages and disadvantages. The advantages of virtual currencies may include:

- anonymity of the parties;
- absence of intermediaries;
- lowering of time consumption and commissions.

At the same time, certain difficulties are associated with a number of negative aspects of the use of virtual currencies:

- high price volatility;
- absence of guarantees for return of real funds invested into a cryptocurrency;
- incomplete or false information.

These circumstances are the foundation of the state evaluation of this phenomenon. For example, in Canada, one can receive salary in BTC, and the profit received from mining is subject to the income tax. In order to legalize the process of taxation, BTC is recognized as an official payment system in Spain.

Some countries impose restrictions on virtual currencies (Indonesia, China, Columbia, Bahrain and others) or have direct prohibitions (Bolivia, Egypt, Vietnam, Ecuador and others). Not so long ago, the main mufti of Egypt, sheikh Shawky Allam emphasized that trading in Bitcoin is forbidden and the existence of cryptocurrencies goes against Islam.

At the same time, a number of countries, whose policy was characterized by strict and definite prohibitions with regard to virtual currencies, revised their position and began to develop the legislation for their regulation (Malaysia, Nigeria and Thailand). Regulation of circulation of virtual currencies in the legal framework is a complicated process and requires a complex approach, which is why it does not exclude the unification of two positions within one state regarding the need for legal regulation of relations connected to the circulation of virtual currencies.
3.5. Financial and Legal Regulation of Virtual Currency Circulation

3.5.1.2. Peculiarities of Legal Regulation of Relations Connected to the Circulation of Virtual Currencies

The distinctive feature of the legal regulation of these relations is associated with the coordination of regulation of virtual currency circulation at the national and international levels. In these conditions, regulation of the virtual currency circulation is associated with a certain duality of coordination. Firstly, we are talking about combining the regulation of these relations both within the framework of national legislation and at the international level. Secondly, social relations that have to do with the circulation of virtual currencies are complex in nature, providing both their regulation by means of private and public law, and the allocation of certain aspects of these relations as the subject of civil, economic and financial law.

The multi-level correlation of regulatory requirements within one country also adds some complexity. In 2017, the Uniform Law Commission (ULC) developed the Uniform Regulation of Virtual-Currency Business Act\(^1\), a unified act on the regulation of activities related to virtual currencies. In many states, business activity related to virtual currencies is connected to “money transfers” and is performed by “money providers”, as well as is identical to the services that are already a subject of licensing and prudential regulation. In 2018, this act was supplemented by the Uniform Supplemental Commercial Law for the Uniform Regulation of Virtual-Currency Businesses Act\(^2\), a unified act on commercial law for the uniform regulation of virtual currencies.

The peculiarity of such uniform acts is that they are not automatically included either in the US federal law or in the legislation of the federal subjects. These acts are guidelines for policy makers in the process of legislation development in the relevant field.

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1 UNIFORM REGULATION OF VIRTUAL-CURRENCY BUSINESSES ACT. URL: https://www.uniformlaws.org/HigherLogic/System/DownloadDocumentFile.ashx?DocumentFileKey=f0dc5f7a-c80f-209c-973d-a9d0e158daa0&forceDialog=0.

A significant number of negative aspects of the use of virtual currencies are associated with the lack of a legal assessment of this phenomenon and the uncertainty of their legal nature, which greatly complicates the development of an appropriate regulatory framework.

The Financial Action Task Force on Money Laundering (hereinafter — “FATF”), whose recommendations are widely considered to be international standards for combating money laundering and the financing of terrorism, in turn, makes attempts to focus the attention of the representatives of the financial field on a uniform approach to defining virtual currencies. The FATF is an independent intergovernmental organization that develops and popularizes the principles of protecting the global financial system from threats of money laundering, financing of terrorism and financing of the proliferation of weapons of mass destruction.

In June, 2014, the FATF published a report “Virtual Currencies — Key Definitions and Potential AML/CFT Risks”\(^1\), which is based on the “Guidance for a Risk-Based Approach to Prepaid Cards, Mobile Payments and Internet Based Payment Services”\(^2\) issued in 2013 and proposes a definition of the “virtual currency” along with the classification of its various types. According to this report, virtual currency is a digital representation of value that can be digitally traded and functions as a medium of exchange; and/or a unit of account; and/or a store of value but does not have legal tender status in any jurisdiction. It is not issued nor guaranteed by any jurisdiction and fulfils the above functions only by agreement within the community of users of the virtual currency\(^3\). Virtual currency is distinguished from fiat currency (paper or bills), which is a

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means of exchange in a country that designates it as its legal tender. The report also mentions the term “digital currency”, which is a digital representation of either virtual currency (non-fiat) or e-money and thus is often used interchangeably with the term “virtual currency”.

This paper proposes dividing virtual currency into two basic types: convertible and non-convertible virtual currency. Although the paper uses “non-convertible” and “closed”, and “convertible” and “open” as synonyms, it should be emphasized that the notion of “convertible currency” does not in any way imply an ex officio convertibility (e.g. in the case of gold standard), but rather de facto convertibility (e.g. because a market exists). Thus, a virtual currency is “convertible” only as long as some private participants make offers and others accept them, since the “convertibility” is not guaranteed at all by law.

**Convertible (or open) virtual currency** has an equivalent value in real currency and can be exchanged back-and-forth for real currency.

**Non-convertible (or closed) virtual currency** is intended to be specific to particular virtual domains, such as a Massively Multiplayer Online Role-Playing Games (MMORPGs) or stores, and under the rules governing its use, cannot be exchanged for fiat currency.

All non-convertible virtual currencies are centralized: by definition, they are issued by a central authority that establishes rules making them non-convertible. In contrast, convertible virtual currencies may be either of two sub-types: centralized or decentralized. Centralized virtual currencies have a single administering authority (administrator) — i.e., a third party that controls the system. An administrator issues the currency; establishes the rules for its use; maintains a central payment ledger; and has authority to redeem the currency (withdraw it from circulation). Decentralized virtual currencies (a.k.a. crypto-currencies) are distributed, open-source, math-based peer-to-peer virtual currencies that have no central administering authority, and no central monitoring or oversight.

Meanwhile, it should be noted that cryptocurrency is defined as a math-based, decentralized convertible virtual currency that is protected
Section 3. Financial and Legal Regulation of Virtual Currencies in the Aspect...

by cryptography — i.e., it incorporates principles of cryptography to implement a distributed, decentralized, secure information economy¹.

This report also defines the participants of the virtual currency system: exchanger (also sometimes called a virtual currency exchange); administrator; user; miner; wallet provider; administration service providers (a.k.a. web administrators); third party payment senders; software developers; application providers.

Thus, an exchanger is a person or entity engaged as a business in the exchange of virtual currency for real currency, funds, or other forms of virtual currency and also precious metals, and vice versa, for a fee (commission). Exchangers can act as a bourse or as an exchange desk. An administrator is a person or entity engaged as a business in issuing (putting into circulation) a centralized virtual currency, establishing the rules for its use; maintaining a central payment ledger; and who has the authority to redeem (withdraw from circulation) the virtual currency. A user, according to this report, is a person/entity who obtains virtual currency and uses it to purchase real or virtual goods or services or send transfers in a personal capacity to another person (for personal use), or who holds the virtual currency as a (personal) investment. A miner is an individual or entity that participates in a decentralized virtual currency network by running special software to solve complex algorithms in a distributed proof-of-work or other distributed proof system used to validate transactions in the virtual currency system. Miners may also be users or participate in a virtual currency system as exchangers. A wallet provider is an entity that provides a virtual currency wallet (i.e., a means (software application or other mechanism/medium) for holding, storing and transferring virtual currencies)².

By issuing the report “Virtual Currencies — Key Definitions and Potential AML/CFT Risks”, the FATF acknowledged the introduction of

virtual currencies into the financial field. At the same time, payment products and services based on virtual currencies pose risks of money laundering and financing of terrorism, as well as of other crimes that need to be identified and minimized. Therefore, in June 2015, the FATF issued the “Guidance for a Risk-Based Approach to Virtual Currencies”\(^1\). This Guidance is dedicated to applying a risk-based approach to payment products and services based on virtual currencies and not to other financial products based on virtual currencies, such as securities or futures in virtual currency. The purpose of this Guidance is to clarify the application of a risk-based approach to measures of combating money laundering and financing of terrorism implemented in regards to virtual currencies, as well as to assist in identifying subjects that provide or use payment products and services based on virtual currencies, as well as in clarifying the issues related to applying the FATF Recommendations in relation to convertible virtual currency exchangers. This Guidance pays most of its attention to payment products and services based on both centralized and decentralized virtual currencies as well as to the issues and measures related to them in the field of combating money laundering and financing of terrorism.

Thus, the 2014 report provided the definition of virtual currencies and a general classification, and this Guidance of 2015 focuses on specific recommendations and their application in relation to such a participant in the virtual currency system as exchangers of virtual currencies in the context of payment products and services based on virtual currency. This document reviews mainly convertible virtual currencies because they pose the highest risks.

In October 2018, the FATF introduced changes to the Recommendations, 2012\(^2\) and supplemented them with such definitions as “virtual asset” and “virtual asset service provider”. The updated document uses the term “virtual asset” as a digital representation of value that can be traded in

\(^1\) GUIDANCE FOR A RISK-BASED APPROACH TO VIRTUAL CURRENCIES. https://www.fatf-gafi.org/media/fatf/documents/reports/Guidance-RBA-Virtual-Currencies.pdf

digital form or transferred, and can be used for payment or investment purposes. It should be noted that virtual assets do not include digital representation of fiat currencies, securities or other financial acts that are already included in other FATF Recommendations\(^1\). These innovations emphasize that the FATF Recommendations are also applicable to the financial activity related to the use of virtual assets.

In June 2019, an Interpretive Note to Recommendation 15 on New Technologies (INR. 15) was adopted and published, which further clarifies the FATF’s previous amendments to the international standards relating to virtual assets and describes how countries and obliged entities must comply with the relevant FATF Recommendations to prevent the misuse of virtual assets for money laundering and terrorist financing\(^2\).

The Guidance for a Risk-Based Approach to Virtual Assets and Virtual Asset Service Providers\(^3\) was also adopted in June 2019. The Guidance examines how virtual asset activities and virtual asset service providers fall within the scope of the FATF Recommendations. It discusses the five types of activities covered by the definition of the “virtual asset service provider” and provides examples of virtual asset-related activities that would fall within the definition of the “virtual asset service provider” and that would be excluded from the FATF scope. This Guidance updates the Guidance for a Risk-Based Approach to Virtual Currencies issued in 2015.

**Conclusion**

Despite the fact that various documentary substantiations of the essence and functions of virtual currencies are being developed and proposed for implementation, today, there is no single well-established approach to the content of the term “virtual currency” at either international or national levels. Under various circumstances, it is defined as money, electronic


\(^3\) GUIDANCE FOR A RISK-BASED APPROACH TO VIRTUAL ASSETS AND VIRTUAL ASSET SERVICE PROVIDERS. https://www.fatf-gafi.org/media/fatf/documents/recommendations/RBA-VA-VASPs.pdf
money, currency, financial instrument, means of payment, medium of exchange, type of digital money, digital representation of value, type of asset, intangible asset, etc. The lack of clarity in the definition of virtual currency is also supplemented by the multitude of equal terms such as “cryptocurrency”, “cryptoasset”, and “digital financial asset”.

### 3.5.2. Approaches to Defining Virtual Currencies

The complexity and diversity of relations associated with the circulation of virtual currencies objectively determine the various approaches to their definition.

#### 3.5.2.1. Virtual Currency as a Kind of Money

In most cases, when assessing the nature of virtual currency, it is considered as a type of money at the national and international levels. Ukrainian legislation does not enshrine the definition of money, but contains several basic principles embedded in the legal framework for the circulation of national and foreign currency, which are considered as appropriate monetary instruments. In accordance with Article 99 of the Constitution of Ukraine, the monetary unit of Ukraine is hryvnia\(^1\). Ensuring stability of the monetary unit is the main function of the National Bank of Ukraine. A more detailed interpretation of the category of money is associated with the definition of national and foreign currency. Thus, the national currency (hryvnia) is understood as:

- monetary units of Ukraine, i.e. hryvnia, in the form of banknotes, coins, including negotiable, commemorative and jubilee coins, and in other forms, which are in circulation and are legal tender in Ukraine, as well as withdrawn or being withdrawn from circulation, but are subject to exchange for currency units in circulation;

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b) funds deposited into bank accounts and accounts of other financial institutions expressed in hryvnia;

c) electronic money expressed in hryvnia.

Foreign currency is understood as:

a) denominations of currency units of foreign states in the form of banknotes, treasury tickets, coins in circulation that are legal tender on the territory of the corresponding foreign state or group of foreign states, as well as withdrawn or being withdrawn from circulation, but are subject to exchange for currency units in circulation;

b) funds deposited into bank accounts and accounts of other financial institutions, expressed in currency units of foreign states and international (clearing) units of account (in particular, special drawing rights) due to payment in foreign currency;

c) electronic money expressed in currency units of foreign countries and/or bank metals\(^1\).

The legal definition of money, which is used for interstate relations, was developed by ULC. For example, the Uniform Money Services Act describes money as a medium of exchange authorized or adopted by a domestic or foreign government as a part of its currency and that is customarily used and accepted as a medium of exchange in the country of issuance\(^2\). Such a definition is directly enshrined in the annexes to this act and is proposed to be adopted by all constituent entities of the federation.

After starting its work on legislation in the field of financial and legal regulation of virtual currency circulation, the European Central Bank (hereinafter — “ECB”) considered virtual currency as a type of unregulated, digital money, which is issued and usually controlled by its developers, and used and accepted among the members of a specific virtual community in the report “Virtual currency schemes”\(^3\) in 2012.

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\(^2\) UNIFORM MONEY SERVICES ACT, §533. C.102. URL: https://www.legis.iowa.gov/docs/ico/chapter/533C.pdf.

However, in 2015, after analyzing the legal nature of money and currencies, the ECB justified the impossibility of classifying virtual currencies into these categories, on the basis of which it excluded some of their characteristics from the definition since 2012\(^1\). The ECB report emphasized that such a definition should not contain the word “money”, as it became clear that today virtual currencies do not have the nature of highly liquid assets and have not reached the level of perception usually associated with money.

The beginning of circulation of virtual currencies is mostly due to the private initiative. It can be explained, first of all, by the fact that the issuers of virtual currencies are persons of private law. If the circulation of real money was previously connected to certain state guarantees, the modern condition of payment systems is based on the refusal to establish any real backing of national currency. The banknotes issued by central banks are their unconditional obligations.

The issue of virtual currencies is a process of recording information on transactions. Similar procedures occur in alternative systems. The foundation for this is the use of the blockchain technology, a special software that implies the use of a decentralized database, which functions according to a protocol (a set of established rules).

The unique features of virtual currencies are characterized by the following aspects:

- Decentralized. Because they do not have a single centralized server for issuing new units, processing transactions or storage.
- No intermediaries. In these conditions, the right holder is not connected to actions of any subjects (except providers that give access to the Internet). In some cases, the proposition is initiated to define the legal status of validators at the legislative level, which are persons that legally confirm the validity of digital records in the ledger of digital transactions. However, we have to agree that this approach is more applicable to the deals with financial assets on the stock market, where a similar function is inherent in natural persons and legal entities as participants in the ledger.

\(^1\) Virtual currency schemes – a further analysis. URL: https://www.ecb.europa.eu/pub/pdf/other/virtualcurrencyschemesen.pdf.
of digital transactions\textsuperscript{1}. This aspect also concerns the issue of trust between participants in the market and users of this instrument; it is based primarily on technical and not legal protection on the basis of modern encryption methods.

- Confidentiality of operations. Information on a transaction is reflected in the chain of sequential blocks, which are stored in the blockchain network nodes. This ensures access to information related to previous and the last transactions without the ability to receive information on the person who carried out the transaction.

- Anonymity. A transaction is visible only to participants in the corresponding blockchain network, meanwhile the subject that made a deal remains anonymous. Therefore, it is more logical in this case to state the transparency or ability to identify the object of a deal, but not the owner. An additional guarantee of anonymity is the creation of a special individual account (wallet). Anonymity also has certain unfavorable consequences, because if the digital access keys to the wallet are lost, virtual currencies become inaccessible.

- Trust. Modern fiduciary instruments, national currencies have only symbolic backing based on trust towards the state, which is represented by a central bank. Trust in this case is transformed into another, higher level. If under the conditions of circulation of fiat currencies, trust was associated with the state as a subject of issue and initiator, then in the circulation of virtual currencies, trust must characterize the relations of users to the system as a whole.

**3.5.2.2. Virtual Currency as a Medium of Circulation and a Unit of Value**

Due to the classical nature of money, virtual currencies do not fully include a combination of all the functions of money. Virtual currencies are

able to provide a limited function of a medium of exchange, as they have a very low level of acceptability among users. Moreover, they are highly volatile (as a form of statistical financial control), and their exchange rate to currencies makes virtual currencies unsuitable as a store of value. Their low level of acceptability, high volatility of their exchange rates and purchasing power make them unsuitable as a unit of account.

In the report “Virtual currency schemes — a further analysis” in 2015, the ECB emphasized that currency is used for “minted” forms of money, nowadays usually taking the form of coins and banknotes. Given that virtual currencies are not widely used as a medium of exchange, they are not legal money, and – in the absence of minted versions – they are not currency either, and no virtual currency is currency. Based on these arguments, the ECB defined virtual currency as a digital representation of value, not issued by a central bank, credit institution or e-money institution, which, in some circumstances, can be used as an alternative to money. Virtual currency is not issued by central banks of states. The process of issuing cryptocurrency is decentralized and is carried out mainly (but not exclusively) through mining.

Thus, virtual currency may be used as a medium of circulation in certain transactions (which is one of the functions of money), but it cannot be considered as money. The categorization of virtual currency as money contradicts the purpose of its creation. Money is backed by the state. It is the state represented by its authorized body that issues money and determines the legal regime for its circulation. Virtual currency is created by high-performance computerized technologies, and its universal and secure circulation is provided by a decentralized system in the form of a ledger.

In some cases, virtual currencies are identified with electronic money. But virtual money is neither a kind nor a type of electronic money because it is of a completely different legal nature. Part 1, Article 15 of the Law of Ukraine “On Payment Systems and the Transfer of Funds in Ukraine” sets forth the features of electronic money:

- A unit of value;
- Stored on an electronic device (automatic teller machine, payment terminal, self-service software and hardware complex, etc.);
• Accepted as a means of payment by others;
• A monetary obligation of a person, which is performed in cash or non-cash form;
• Issued exclusively by a bank\(^1\).

Virtual currencies, in turn, can be a unit of value, but are stored in a virtual wallet of a virtual currency holder, which is accessed with a holder’s private code. This private code is a password prototype that allows access to the virtual wallet. The loss of the private code causes the loss of access to the virtual wallet by the wallet holder or any trusted person and the loss of any further virtual currency transactions stored on it.

### 3.5.2.3. Virtual Currencies as a Kind of Currency Values

An attempt to define virtual currencies as a kind of currency values, an instrument associated with the criteria of a foreign currency, is based on the demand for the principle of exterritoriality. Foreign currency, going beyond its state, turns into a certain common denominator associated with a value, high liquidity and quick turnover. This gives certain stability in circulation of convertible reserve currencies.

Virtual currencies also have a supranational nature and are not bound by any state borders. They have a criterion of value of alternative payment instruments, which is represented in the specific value parameters of certain types of virtual currencies. The functioning of such instruments based on reversion is also not an issue because a certain type of virtual currency can be transferred into another type or fiat money. The use of virtual currencies also corresponds to the required conditions for using them as a means of payment.

### 3.5.2.4. Virtual Currencies as Securities

The classification of virtual currencies as a kind of securities is first and foremost determined by the focus on defining them as a kind of

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external securities. In this case, the circulation regime is relatively narrowed because they are not legal tender, even though they can be used in payments. Another factor that unites the essence of virtual currencies and securities is the fact that private entities can act as issuers in both cases. The derivativeness of the issue of virtual currencies by private entities compares them to the uncertificated external securities. In some cases, there is a need for legal specification of the duty of the issuer of a virtual currency to publish an investment memorandum before starting the issue process. This memorandum must contain the same reasoning as the issue of external securities (justification of economic feasibility, volume, terms, etc.)

3.5.2.5. Virtual Currencies as Property, Items

When analyzing the legal nature of virtual currencies as an object of private legal regulation, we have to base it on the concept of an object of legal relations. In this case, this concept can be connected to the reason why the participants in legal relations form various types of interaction. Such actions achieve their objective only in the case of a clear direction at a certain object to adjust its legal regime.

The difficulty of unconditional classification of virtual currencies as money or currency values is the reason why they are the object of civil rights. A big number of researches define them as other property. According to a number of authors, it is reasonable to classify virtual currencies as other property because they have a value and can be included in civil circulation. Obviously, there is no unambiguity in classifying virtual currencies as property. Analyzing this issue, I.I. Kucherov proposes to


consider virtual currencies as documented information including electronic documents, information transferred using electronic means of payment\(^1\). That is why there are certain reasons regarding the objects or private legal regulation to classify “other property, as well as property rights (including non-cash money, uncertificated securities, digital rights)”\(^2\).

This approach also forms a corresponding judicial practice in the countries that allow using virtual currencies. For example, the Suwon court (South Korea) recognized the confiscation of BTC to be illegal. It covers the situation when law enforcement authorities confiscated BTC from a person, who used them to ensure the operation of an illegal website (meanwhile, there was an unanswered question as to whether he was receiving payments in BTC or converted funds into the cryptocurrency later). The court based its decision on the fact that confiscation can cover property and items. Virtual currencies are not subject to confiscation because they do not have standard objective value, physical medium and, therefore, confiscation is impossible.

A crucial thing in this case is to distinguish between property rights and items. It is important to keep in mind that under the conditions of digitalization, objects of private legal regulation are objects\(^3\) that cannot individually possess certain characteristics. The legislator faces a task to regulate the regime of an object such as a digital code, which characterizes the actions of any participant that operates on the blockchain platform. In reality, any item can be represented as a digital code in these conditions.


At the same time, this digital code of an item will not be able to transfer its individual features, unique characteristics, which will determine its value that is the basis for the value evaluation. This is the reason why an attempt to form a special civil legal regime, which will not be the same as the proprietary can be promising. “This means that digitalization cannot extend to proprietary rights because they, just like any other property rights, cannot be an object of proprietary right, aside from individually defined items and items determined by generic indicators after their individualization”.

At the same time, it is important to take into account that the transfer of properties of an item is mediated by two conditions:

- such properties must be transferred by means of a digital designation;
- such information circulates among participants who do not contact directly.

Therefore, for the purpose of digitalization, it is preferable to focus on the rights, the digital code of which gives a clear understanding of what these rights are.

We have to agree that “… each subjective civil right is represented by a certain set of generic and type indicators, which are shown in a combination of rights, the specification of which happens regardless of the characteristics of the items”. Therefore, the objects of digitalization are first and foremost bound to assets and liabilities of participants, uncertificated shares, etc. In this case, the quantitative characteristics of the object are the object of interest because they represent the indicators of the real financial condition of the subject, a special way of recording rights connected to monetary obligations. “Digitalization of these objects


Section 3. Financial and Legal Regulation of Virtual Currencies in the Aspect...

in case of their alienation means recording of their price as a quantitative indicator (measure) of the amount of money paid by a participant in the information system in the form of a performed action, transaction on the transfer of cryptocurrency to the initial right holder of the corresponding object of acquisition”¹.

The use of flexible digital instruments (tokens) on the blockchain platform gives the subjects of these relations the ability to be the participants in digital deals related to the acquisition/realization of the corresponding instruments performed on the basis of transactions in information systems. The buy-and-sell object in this case is any property right (including proprietary). If the blockchain system confirms the “quasideal act” and classifies it as a legal fact, we can draw a conclusion on the formation of a controversial but real construction of “right to the right”².

The specificity of virtual currencies makes it difficult to characterize them based on the criteria that are applied to property. The database of digital transactions is stored, created and updated simultaneously on all media of all ledger participants³. This is based on the algorithms that ensure the equivalence of information for all participants in relations, users of the ledger. Thus, it is impossible to determine the ability of objects of proprietary rights to circulate and the essence of such rights. Another issue is to determine the location of this property (virtual currency), which creates difficulties related to determining the legislation of which country must protect the interests of a certain subject.

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Characterizing virtual currencies through the concept of a product also does not reflect the nature of this phenomenon. In some cases, foreign currency and other elements of currency values are viewed as a product. However, the latter are characterized by a certain national payment authority in the countries that issued and guarantee them.

### 3.5.2.6. Virtual Currency as a Deal

When looking at transactions with virtual currencies, we can connect the essence of this process with certain deals or transfer of information performed according to the rules of deals. In this case, we can draw parallels with cross-border buy-and-sell operations. The participants in such an exchange act as sellers of an object regardless of whether one type of a virtual currency is being exchanged for another, or virtual currency is being exchanged for national currency. The cross-border exchange relations, depending on the circumstances, can have the following connecting factor: the right of location of either party involved in the exchange. In this case, it can refer both to the person that initiated the exchange and the person that accepted the exchange and therefore it is important to take into account the right of which participant in the exchange it may concern.

### 3.5.3. Types of Virtual Currencies

The report “Virtual Currencies — Key Definitions and Potential AML/CFT Risks” proposes to divide virtual currencies into two main types:

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convertible and non-convertible virtual currency. Convertible virtual currency has an equivalent value in real currency and can be exchanged for real currency and vice versa. Non-convertible virtual currency is intended for use in specific virtual fields or worlds and cannot be exchanged for fiat currency. All non-convertible virtual currencies are centralized: by definition, they are issued by a central administrator that establishes the rules, which limit their convertibility. Decentralized virtual currencies, also known as cryptocurrencies, are distributed, mathematical-based, open-source peer-to-peer virtual currencies, which do not have a central administrator and have no centralized control or supervision.

The classification of virtual currencies can be done based on the specification of the legislation of countries that form the state policy regarding this phenomenon. In this case, there are the following types:

- virtual currencies that perform the function of a means of payment and are an element of the regulated market of this state. Such a position is reflected in the state policy of the countries that view the digital asset market as an objective component of the economy as a whole;
- virtual currencies that perform the functions of a financial instrument (uncertificated securities, shares, bonds), which exist in the conditions of state restriction of virtual currency markets by means of a strong prohibition;
- virtual currencies that are characterized as a product (asset, property, etc.), the state policy regarding them is ambiguous in the countries, where such a phenomenon still has no place in the country’s economy.

### 3.5.4. Virtual Currency as an Object of Relations

Taking into account the dynamic nature of relations and regimes for regulating the circulation of virtual currencies, as well as the dynamic nature of behavior of participants in relations, it is important to identify the object of regulation as an objective goal, which corrects the behavior of subjects in legal relations. The definition of the object of regulation is related both to the identification of a combination of items, with regard to
which the behavior of participants is formed, and the actual behavior. For example, the Maltese Virtual Financial Assets Act classifies the object of relations regulating the circulation of virtual currencies as a combination of two approaches.

The first approach classifies the object as an indication of various items, in relation to which the regulated relations are being formed. In this case, the object of regulation includes phenomena, because of which subjects enter into the relations with each other. According to this approach, the regulation objects are:

- virtual tokens or utility tokens, which are assets of the distributed ledger technology and have no value or usefulness outside the platform, in which they were issued. They can be bought out only by the issuer of this token on that same platform;
- virtual financial assets represent any form of record on a digital medium, which is used as a digital exchange medium, unit of account or store of value, which is not electronic money, financial instrument or virtual token;
- electronic money and financial instruments.

The second approach implies the indication of the regulation object as the behavior of participants in relations, which are presented in relations of the issue, circulation and monitoring of movement of virtual currencies. According to this approach, the regulation objects are:

1) receipt and transfer of orders (receipt of an order to buy, sell or prepay for a virtual financial asset from a person; transfer of such an order to a third party for execution);
2) execution of orders on behalf of third parties (execution of actions on behalf of third parties aimed at concluding buy-and-sell agreements or prepaying for one or several virtual financial assets);
3) execution of account transactions (trading using own capital, which results in concluding agreements on one or several virtual financial assets);
4) portfolio management;

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5) provision of services of a nominee shareholder (acting as a depository or nominee holder of virtual financial assets, private cryptographic keys, etc.);
6) listing of virtual financial assets (marketing of issued virtual financial assets);
7) recommendations on investing funds;
8) activity of the exchange of virtual financial assets.

3.5.4.1. Unique Features of an Object in the Conditions of Private Legal Regulation

The private legal regime that organizes the behavior of subjects of relations is also similar to this type of public relations. The object of this private legal regime is the relations that regulate the exercising of the legal capacity or participants in these relations. Distinguishing between the item and object of this legal regime allows specifying the tangible object as an item, over which the relations occur, and the object as the behavior of participants in relations over the item.

The private legal approach to evaluating the object of regulation of the circulation of virtual currencies is often connected to the construction of “deal” and “obligation”. The analysis of the essence of blockchain as a combination of deals that occur in order and are bound together is characterized by a number of unique features:1

- minimum time required to conduct deals;
- anonymity when performing operations;
- exclusion of excessive supervision from state authorities;
- exclusion of intermediaries from deals that participate in fulfilling the obligations.

In the context of the private legal regulation, the relations that imply the use of the blockchain technology must primarily be regulated by the norms of the law of obligation.

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3.5.4.2. Unique Features of an Object in the Conditions of Public Legal Regulation

As mentioned above, the legal regulation of the circulation of virtual currencies is a field of the comprehensive impact of public and private law. When analyzing the nature of public regulation of such relations, a crucial feature has to be taken into account. The relations regarding the circulation of virtual currencies are exterritorial. In these conditions, it is difficult to determine the location of activity of a participant in the relations and his/her overall location. This is why the criterion of territoriality in the conditions of public legal regulation of such relations becomes quite conditional. Sure, we can talk about various kinds of licensing, which will be determined by the location and the role of the state in evaluation and initiation (obstruction) of these relations and about the formation of the corresponding state policy based on it.

Drawing certain parallels with monetary instruments, virtual currencies attract interest in the regime of public legal regulation, which causes attempts to use the same constructions towards them, that became commonplace when regulating the circulation of monetary instruments. The latter (typically non-cash, electronic) have always been the center of attention of law enforcement and fiscal authorities. That is why the main areas of public legal regulation of these relations can be reduced to the areas of management, accounting and taxation of the results of the activity related to the circulation of virtual currencies.

Control of Relations Connected to the Circulation of Virtual Currencies

The control of such relations is determined by the unique features of the blockchain technology. The program is designed in such a way that with the ability for all participants to access it, none of them knows anything about the other participants. The program based on anonymity eliminates the ability to determine the jurisdiction of participants and their locations. Transaction control is also complex and problematic. Moreover, the functions of control in this case are already performed by the system.
itself. In conditions when the transaction represents access to the database accumulated in the corresponding information resource, the system itself controls the sequence and logic of actions.

**Accounting of Virtual Currencies**

The issue of accounting of virtual currencies is directly reflected in the nature of specific IFRS standards for evaluating such instruments. For example, Canadian experts consider the following ways of accounting of cryptocurrencies (virtual currencies) as\(^1\):

- cash;
- non-monetary financial assets;
- investment property;
- intangible assets;
- reserves.

Canadian experts also came to the conclusion on the inability to use cryptocurrencies (virtual currencies) as a money equivalent in most countries, which is why there are no prospects of applying the standard for accounting the movement of virtual currencies in IAS 2 (Reports on the Movement of Monetary Funds).

Because, in the future, virtual currencies can be considered as buy-and-sell agreements, they, as a kind of a derivative, can be accounted using the reasoning of financial instruments in accordance with IFRS 9 (Financial Instruments). According to Canadian experts, cryptocurrencies can be viewed as intangible assets according to IAS 38 (Intangible Assets), despite the issue of reevaluating the value of cryptocurrency in conditions of the actively changing market. In this case, the devaluation of a currency will be reflected in the reports on the profit of losses (effect of reduction), whereas the report on other combined product will contain the pure increase effect. There are also arguments regarding the classification of virtual currencies as intangible assets of initial expenses similar to extractive industries. A significant obstacle in this case occurs

\(^1\) Pozharickaya, I. M. *Problemy identifikacii i priznaniya cifrovych finansovyh aktivov v uchete* [Problems of identification and recognition of digital financial assets in accounting]. *Accounting, analysis, and audit*. 2018 No. 6. p. 63 [in Russian]
due to inability to classify virtual currencies as exhaustible resources (oil, gas, etc.)

**Taxation of Relations on the Circulation of Virtual Currencies**

Due to the fact that many legislators are looking for approaches to taxation of virtual currencies and other blockchain tokens, while others for digital assets, we can state the absence of unification regarding the issue of taxation of blockchain tokens. The development of a definition of a blockchain token within each specific jurisdiction or a generally accepted definition for all jurisdictions, as well as qualification of currency values, payment instruments, information, other property as money or as an absolutely new category of objects, can serve as a solution to this situation.

When analyzing the relations on taxation of operations on circulation of virtual currencies, we have to keep in mind that, in order to establish the obligation to pay a particular type of tax or fee, one significant point has to be taken into account. Such a payment can have permissible nature, be connected to conducting a certain activity and provide the ability for the state to conduct such an activity or be connected to the emergence of tax liability when exchanging virtual currencies for national or foreign currency. Meanwhile, taxation must cover only money, from which the corresponding size of tax liability is calculated.

The tax services of most states insist on identifying the clients of stock exchanges, their financial activities, operations with cryptocurrencies assuming systematic violations of tax legislation. At the same time, the state regulation of activity, or more precisely of the results of activity related to the circulation of virtual currencies is totally different: from specification of certain preferences (benefits), withdrawal of an object from taxation, to establishment of a clear connection between the object and the produced tax liability.

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With regard to determining separate aspects of taxing operations with cryptocurrencies, it is worth paying attention to the Judgement of the European Court of Justice dated October 22, 2015 (case C-264/14) Skatteverket v David Hedqvist. This Judgement looked at the legal nature of cryptocurrencies, and, as a result, the European Court of Justice decided that in accordance with the Directive of the EU “On the EU’s common system of value added tax (VAT)”\(^1\), operations on exchanging cryptocurrencies for fiat currencies and vice versa are not subject to VAT. The Judgement of the European Court of Justice is mandatory for all member countries of the EU and, therefore, is the source of law all over the EU.

The tax legislation of the USA considers cryptocurrencies to be a property asset as a taxable item\(^3\). Cryptocurrency trading in the USA implies the duty of all cryptocurrency exchanges to conduct the verification of their customers. In Japan, operations with this object are equivalent to foreign exchange transactions, which creates the corresponding tax consequences.

Activities related to the use of various types of cryptocurrencies are considered in the UK as a traditional object of taxation. It creates the duty to pay corporate income tax, capital gains tax and income tax. The evaluation of prospects of using taxation constructions where natural persons are the obligors must be treated with caution. In Germany, operations with cryptocurrency are charged with the capital gains tax if the size of the operation exceeds 600 euros and the profit was received over the course of a year after receiving Bitcoin\(^4\).

\(^1\) European Court of Justice JUDGMENT OF THE COURT (Fifth Chamber) 22 October 2015 (Case C-264/14). “Skatteverket v David Hedqvist”. URL: http://curia.europa.eu/juris/document/document.jsf;jsessionid=9ea7d0f130dcd0616dcafa294f9a9e0e59a9170fed6.e34KaxiLe3eQc40LaxqMbN4Pbh0Ne0?text=&docid=170305&pageIndex=0&doclang=en&mode=lst&dir=&occ=first&part=1&cid=759800


3.5.5. Legal Regulation of Virtual Currency Circulation

The legal regulation of virtual currency circulation is a complex process that requires a comprehensive approach and, therefore, does not exclude the possibility of combining two positions within a single state regarding the need to legally regulate relations connected to the circulation of virtual currencies. For example, the National Bank of the Republic of Kazakhstan takes a conservative approach to the regulation of digital currency or cryptocurrency, trying to prohibit its exchange for national currency and all types of cryptocurrencies. At the same time, in spring 2018, the Committee of the International Financial Center “Astana” developed and published on its official website the Concept of legal regulation of the virtual currency market and private placement of securities.

There is also no uniformity in the taxation of such relations. For example, according to the Decree No. 8 of the President of the Republic of Belarus “On the Development of the Digital Economy” dated January 21, 2017, the parties to the relations connected to the use of modern technologies are granted tax benefits for a fairly long period of time. Such tax benefits are mainly applied in the form of exclusion of certain constituent objects of taxation. For example, they are recognized as objects of taxation:

a) turnover, profit (incomes) of High-Tech Park residents from mining, creation, acquisition, and alienation of tokens — by value added tax and income tax (personal income tax);

b) income of natural persons from mining, acquisition (including by donation), alienation of tokens and/or exchange for other tokens — by personal income tax;

c) turnover on alienation of tokens, including turnover on their alienation by foreign organizations that do not carry out activities through

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a permanent establishment and are not registered with the tax authorities — by value added tax;

d) revenue from the alienation of tokens through their exchange for other tokens — by tax under a simplified taxation system;

e) profit from the alienation of tokens through their exchange for other tokens — income tax\(^1\).

**Conclusion**

The analysis of the existing regulatory legal acts has shown that the legislation of the countries in the field of regulation of virtual currencies is being developed, which indicates that there is no single approach to defining the legal nature of virtual currency. Each state has its own legal point of view as to the content of the phenomenon under consideration. At the same time, today, virtual currency can be considered as a means of representation of the value that exists in digital form, is stored in a virtual wallet owned by a particular person; operates within a ledger that is open for public use; is used as a medium of exchange, a means of payment, and a store of value; transactions with which are cryptographically protected.

Thus, it is possible to say that only after each specific state clearly defines and establishes the phenomenon of virtual currency at the legislative level, the legal nature of the object and its legal regulation will be formed.

### 3.5.6. Subject Composition of Relations in the Field of Circulation of Virtual Currencies

A decentralized system is the circulation environment for virtual currencies, and by nature it implies the absence of external interference. Therefore, the list of participants must be limited to the persons that generated (created) virtual currencies and were direct subjects of deals

with virtual currencies. Due to popularization of virtual currencies, the need arose to create an order regarding their circulation, which contributed to the expansion of the list of participants in relations in this field.

A certain system in evaluating the participants in relations of the circulation of virtual currencies was established in June 2014 when the Financial Action Task Force (hereinafter — “FATF”) published the report “Virtual Currencies — Key Definitions and Potential AML/CFT Risks”\(^1\). As part of this report, the subjects of the virtual currency system were defined:

An **exchanger** is a natural person or legal entity engaged in exchanging virtual currency for fiat currency, other forms of virtual currency, as well as precious metals, receiving a commission. Exchangers generally accept a wide range of payments, including cash, wires, and other virtual currencies. Exchangers can act as a stock exchange or as an exchange desk.

An **administrator** is a natural person or legal entity engaged in issuing (putting into circulation) a centralized virtual currency, establishing the rules for its use; maintaining a central payment ledger; and who has the authority to redeem (withdraw from circulation) the virtual currency.

A **user** is a natural person or legal entity that receives virtual currency and uses it to purchase real or virtual goods, services or send transfers to another person. The user can hold the virtual currency as an investment. Users can receive virtual currency in several ways:

- purchase virtual currency, using real money (from an exchanger or, for certain centralized virtual currencies, directly from the administrator/issuer);
- participate in specific activities for remuneration in virtual currency;
- generate units of the currency by “mining” them (e.g. Bitcoin mining);
- receive virtual currency as gifts, rewards, or as part of a free initial distribution.

A **miner** is a natural person or legal entity that participates in a decentralized virtual currency network by running special software to solve complex algorithms in a distributed ledger used to validate virtual currency transactions. Miners may be users, if they self-generate a virtual currency solely for their own purposes. Miners can also act as exchangers.

A **wallet provider** is an entity that provides a virtual currency wallet\(^1\) (i.e. a software application) for holding, storing and transferring virtual currency.

Additionally, other subjects can also be the participants in the virtual currency system, for example, web administration service providers, software developers, etc.

In February 2015, the European Central Bank (hereinafter — “ECB”) published the “Virtual Currency Schemes — a Further Analysis\(^2\), as part of which the key subjects of relations when using virtual currencies were defined. With regard to virtual currencies and ways of using and purchasing them, this document uses the term VCS (virtual currency schemes). VCS is essentially the same as the virtual currency circulation environment. Thus, the subjects that make up the system of participants in legal relations in the field of circulation of virtual currencies depending on the functional area of their operation include:

**Inventors** are persons who create a virtual currency and develop the technical part of its network. They usually remain unknown, however, following the launch of the system, some remain involved in maintaining and improving its technical characteristics.

**Issuers** are entities able to generate units of the virtual currency. Depending on the design of the VCS, the total issuance volume is predetermined or depends on demand.

In the most general sense, the issuer is the person that initiates the issue of something into circulation and on his/her behalf performs and guarantees it. Essentially, it is a participant in relations who, on his/her own behalf is

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\(^1\) Virtual currency wallet is a means (software application or other mechanism/medium) for holding, storing and transferring virtual currency.

3.5. Financial and Legal Regulation of Virtual Currency Circulation

responsible for the issue of a virtual currency. The issuer is a participant that has a duty to publish the public offer before concluding the agreement. The agreement means a unilateral statement of this participant that is responsible for transfer of his/her obligations to the rights of an unlimited number of persons.

In a centralized VCS, the issuer is also the VCS administrator that establishes the rules of its use and is authorized to withdraw units of virtual currency from circulation. After the units are issued, they are usually distributed among users on both commercial and free-of-charge basis. In decentralized VCS systems, new units can be created automatically as a result of actions performed by miners that receive new units of a virtual currency as remuneration.

Some states can establish the corresponding restrictions at the state level. For example, in Malta, only a legal entity can be an issuer, which is properly authorized in accordance with the current Maltese legislation and which issues or proposes the issue of virtual financial assets both domestically and internationally¹.

Miners are persons that verify transactions and create blocks out of such transactions supplementing the payment ledger with them. As a reward, miners usually receive a certain amount in a virtual currency. Such remuneration can be received both as a result of automatic decentralized issue of new virtual currency units, as well as through a direct transfer from the issuer. Miners can also ask for payment for the transaction from those who initiate it.

The status of such entities is not always specified in legislative acts. For example, Appendix No. 1 to the Decree No. 8 of the President of the Republic of Belarus “On the Development of Digital Economy”² explains the term “mining”, however the person performing such an activity, miner, is not defined. Provision 2.2 of this Appendix gives natural persons the

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right to perform mining, which they can exercise on their own without involving third parties including the residents of the High Technologies Park and cryptoplatform operators.

**Processing service providers** make easier the transfer of virtual currency units from one user to another. In decentralized systems, miners are usually the ones performing such services.

**Users** are natural persons or legal entities that acquire a virtual currency and use it to purchase real or virtual products or services, or send transfers in a personal capacity to another person (for personal use), or use a virtual currency for investment purposes including speculation. There are five ways of receiving virtual currency units:

1) purchase;
2) participation in events that are rewarded with virtual currency units (for example, filling in the survey, participating in advertising);
3) participation in mining;
4) receipt as payment;
5) receipt as a donation or a gift.

**Wallet providers** provide users with a digital wallet to store cryptographic keys and transaction authentication codes to initiate transactions and provide access to their transaction history. There are two main types of wallets: online wallets (hot storage) and offline wallets (cold storage).

**Exchanges** offer trading services to users specifying the prices at which the purchase/sale of a virtual currency will take place in relation to the main currencies (U.S. dollar, yuan, euro, etc.) or to other virtual currencies.

**Trading platforms** are platforms that bring buyers and sellers of virtual currencies together in one place offering them the space for such purposes.

Subjects that make up the system of participants in legal relations in the field of circulation of virtual currencies can also include other participants that are not characteristic of the VCS environment, for example, sellers, payment intermediaries (allowing sellers, mainly in the field of electronic trading, to accept virtual currencies as payment), software
developers (development of user interfaces for trading and storing virtual assets), producers of computer equipment (creation of special equipment for mining), ATM manufacturers, etc.

Thus, it is worth noting that the approaches to defining the subject composition of relations with virtual currencies of FATF and ECB is similar. Moreover, another group of subjects related to the use of virtual currencies has to be pointed out — the subjects that perform the supervision in the field of circulation of virtual currencies. State bodies that are authorized to perform the supervision in the field of circulation of cryptocurrencies include:

a) bodies that perform supervision in the field of taxation. The authority of supervisory bodies of this type must be focused on analyzing the compliance with the legislation in conditions when the circulation of virtual currencies leads to the emergence of tax liability (the taxable item emerges, increases or decreases, etc.). This way, the authority of the Federal Ministry of Finance of Germany has to do with supervising the operations on exchanging traditional currencies for cryptocurrency and vice versa because this type of operations is subject to taxation, but when the value added tax is charged, it is not a taxable item;

b) licensing bodies focus the fulfillment of their authority on providing the permission to conduct the corresponding activity and supervising the compliance with all the requirements of this activity. For example, the Malta Financial Service Authority is a competent body that takes part in giving licenses on the provision of services with virtual financial assets, as well as supervises the compliance of the subjects with the field-specific legislation and correspondence of their activity with the licensing conditions established by special acts, Virtual Financial Assets Act, and resolutions of the supervising body. According to the Uniform Regulation of Virtual

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1 Eckpunkte für die regulatorische Behandlung von elektronischen Wertpapieren und Krypto-Token. URL: https://www.bundesfinanzministerium.de/Content/DE/Standardartikel/Themen/Internationales_Finanzzmarkt/2019-03-08-eckpunkte-elektronische-wertpapiere.html

Section 3. Financial and Legal Regulation of Virtual Currencies in the Aspect...

Currency Business Act\(^1\), a person is not allowed to conduct business activity in virtual currencies if such a person does not have a license;

c) bodies that supervise the circulation of securities. The authority of this type of bodies has a certain derivative nature. Therefore, in order to perform the corresponding type of supervisory activity, a phenomenon such as virtual currencies has to be defined as securities.

**Conclusion**

Thus, the relations in the field of use and circulation of virtual currencies are characterized by a certain subject composition that was specified as part of the FATF and ECB reports. At the same time, the approaches of these organizations to defining the subject composition of relations with virtual currencies are similar. The subject composition also includes a group of participants that perform supervision in the field of use and circulation of virtual currencies.

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3.5.7. **Comparison of Domestic and International Regulation of Circulation of Virtual Currencies**

The supranational nature of relations of circulation of virtual currencies implies not only specification of national legislative norms, but also implementation of international norms into national legislation. At the level of interaction of domestic and international regulation, both prerequisites and tasks of special performance regulation are formed. In this case, national legislation takes into account modern trends in development of economic relations and, by correspondingly adjusting their mandatory orders, must at the same time ensure the fulfillment of obligations undertaken by the state.

When adjusting the current legislation to the content of international treaties, it has to be taken into account that in this case, the specification

\(^1\) UNIFORM REGULATION OF VIRTUAL-CURRENCY BUSINESSES ACT. URL: https://www.uniformlaws.org/HigherLogic/System/DownloadDocumentFile.ashx?DocumentFileKey=f0dc5f7a-c80f-209c-973d-a9d0e158daa0&forceDialog=0
of the application field for the norms of international treaties can take place, detailing the behavior of participants in such relations. Meanwhile, one should not ignore the court practices of both domestic and international judicial institutions, for example, the European Court of Human Rights. In the search for optimal reasons to adjust the behavior rules at the national and international levels, in many cases, the court practice guarantees stability in regulating certain relations.

Conclusion

Thus, the formation of regimes that take into account the content of the norms of international treaties must also reflect the regime representing the state of national legislation.

3.6. Analysis of Examples of Legislative Regulation of Cryptocurrencies and Digital Assets in Separate Jurisdictions

Such terms as “cryptocurrency”, “virtual currency” and “digital asset” are often mentioned in regulatory acts. Separate jurisdictions already have the practice of defining and regulating the above-mentioned objects. At the same time, the legal regulation of cryptocurrencies, virtual currencies and digital assets is reflected in the European Union law, as well as in the practice of the European Court of Human Rights and European Court of Justice.

3.6.1. European Union Law

The legal regulation of cryptocurrency relations in the EU is in its beginning stages. Since 2012, the main institutions of the EU have started issuing their reports, recommendations and public statements regarding the circulation of cryptocurrencies. Thus, in October 2012, the European Central Bank published the Report “Virtual Currency Schemes”. This
Report states that the legal regulation of financial services market cannot be applied to relations connected with the circulation of Bitcoin. Bitcoin itself was defined as a convertible decentralized virtual currency\(^1\).

In February 2015, the European Central Bank published the Report “Virtual Currency Schemes — a Further Analysis”, which stated that the operation model of virtual currencies can replace the field of payment for services in the future\(^2\).

In March 2018, the European Commission approved the FinTech Action Plan on the prospects of using the opportunities of the blockchain technology, artificial intelligence and clouds in the field of financial services\(^3\). Along with that, it should be noted that in December 2016, the European Central Bank and Bank of Japan introduced a mutual research project “Stella”, the purpose of which is to use the blockchain technology to modernize the existing tools of financial markets\(^4\).

When it comes to determining separate aspects of taxation using cryptocurrencies, it is worth looking at the Judgement of the European Court of Justice dated October 22, 2015 (case C-264/14) Skatteverket v David Hedqvist\(^5\). As part of this Judgement, the legal nature of cryptocurrencies was examined, and, as a result, the European Court of Justice stated that, in accordance with the Directive of the EU “The EU’s Common


\(^5\) European Court of Justice JUDGMENT OF THE COURT (Fifth Chamber) 22 October 2015 (Case C-264/14) “Skatteverket v David Hedqvist”. URL: http://curia.europa.eu/juris/document/document.jsf;jsessionid=9ea7d0f130ced0616dcafa294f6a9e0e59a9170fed6.e34KaxiLc3eQc40LaxqMbN4Pbh0Ne0?text=&docid=170305&pageIndex=0&doctype=xml&dir=&occ=first&part=1&cid=759800
3.6. Analysis of Examples of Legislative Regulation of Cryptocurrencies and Digital Assets...

System of Value Added Tax (VAT)\textsuperscript{1}, operations on exchanging cryptocurrencies for fiat currencies and vice versa are not subject to VAT. The Judgement of the European Court of Justice is mandatory for all member countries of the relevant international organization, and therefore, is the source of law on the territory of the entire EU.

Amendments to the Directive (EU) 2015/849 “On the Prevention of the Use of the Financial System for the Purposes of Money Laundering or Terrorist Financing” were an important step towards normative regulation of cryptocurrency relations\textsuperscript{2}. Thus, on May 30, 2018, the joint Directive (EU) 2018/843 of the European Parliament and the Council of the European Union\textsuperscript{3} was adopted (hereinafter — “Directive”).

This Directive gives definitions to the terms such as “virtual currency” and “custodian wallet provider”. Virtual currencies are viewed as a digital representation of value that is not issued or guaranteed by a central bank or a public authority, is not necessarily attached to a legally established currency and does not possess a legal status of currency or money, but is accepted by natural or legal persons as a means of exchange that can be transferred, stored and traded electronically.

As for the “custodian wallet provider”, it should be viewed as an entity that provides services to safeguard private cryptographic keys on behalf of its customers, to hold, store and transfer virtual currencies. At the same time, there is a clear division between the terms “virtual currencies” and “electronic money”.

\textsuperscript{1} Directive 2006/112/EC — the EU’s common system of value added tax (VAT). URL: https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=celex%3A32006L0112


The provisions of the Directive specify that subjects conducting activity on exchanging virtual currencies for fiat funds and vice versa, as well as custodian wallet providers, must inform the authorized public authorities about suspicious operations. They state the need to develop national legal mechanisms and create systems of special bodies, which will be authorized to monitor the circulation of cryptocurrencies.

The monitoring of cryptocurrency operations should ensure the transparency of such operations since the nature of their increased anonymity can serve as the basis for their application in various illegal operations. Virtual currencies are defined as alternative finances. Such alternative finances have increased autonomy of operation (transactions can be performed without intermediaries — special exchange organizations or wallet providers). Taking the above-mentioned into account, the Directive specifies the need to develop the mechanisms for identifying the owners of “electronic wallets” of virtual currencies by national Financial Intelligence Units. It also noted the need to develop legal mechanisms for voluntary independent declaration of the corresponding units by the owners of cryptocurrencies. In turn, cryptocurrencies within this Directive should not be confused with the term “complementary currencies”.

The primary task of this Directive is to introduce the mechanisms for monitoring the operations with cryptocurrencies to achieve the goals of combatting money laundering and financing of terrorism, but not to form the foundation for comprehensive regulation of the cryptocurrency market.

It should be noted that the term “digital asset” in the EU legislation is not directly defined. This type of asset is indirectly mentioned in subparagraph 3, article 4 of the Directive when defining the term “property”, which contains assets of any type: material or non-material, movable or immovable property, tangible or intangible, as well as legal documents or instruments in any form, including in electronic or digital format, confirming the property right to such assets or right to their share.

The European Securities and Markets Authority (hereinafter — “ESMA”) focused its attention on the problematic aspects of regulating the field of circulation of crypto-assets by developing the Advice on Initial
3.6. Analysis of Examples of Legislative Regulation of Cryptocurrencies and Digital Assets... 

Coin Offerings and Crypto-Assets\(^1\) published on January 9, 2019. The Advice is a systemic professional document formed on the basis of researching the legal nature of crypto-assets and their types. The applied significance of the Advice lies in the fact that it proposes specific ways of solving issues (risks and threats for potential investors, numerous gaps in legal regulation, etc.) of the examined field.

The glossary provided in Appendix No.1 to the Advice defines “crypto-asset” as a type of private asset that depends primarily on cryptography and Distributed Ledger Technology (DLT) or similar technology as part of their perceived or inherent value. Unless otherwise stated, the ESMA uses the term “crypto-asset” to refer to both “virtual currencies” and “digital tokens”. Crypto-asset additionally means an asset that is not issued by a central bank. Crypto-assets can be means of payment and/or exchange for fiat currencies or other crypto-assets.

The ESMA distinguishes the following types of crypto-assets:

- **investment-type crypto-asset** resembles a financial instrument;
- **payment-type crypto-asset** is meant to be used as a means of payment or exchange for goods or services that are external to the DLT system on which they are built;
- **utility-type crypto-asset** provides some “utility” function other than as a means of payment or exchange for external goods or services (for example, the ability to use them to access or acquire some services or products within the corresponding system).

The ESMA believes that when regulating relations on the circulation of crypto-assets, the primary objective is to have legal classification of various crypto-assets based on their correspondence to a certain type in order to apply the proper regulatory framework, which is different for each type of crypto-assets.

In summer 2018, the ESMA conducted a survey of national competent authorities of the EU member states in order to identify the ability to classify specific crypto-assets as financial instruments in the EU (paragraphs

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According to paragraph 15 of article 4 of the Directive of the European Parliament and of the Council 2014/65/EC dated May 15, 2014 on markets in financial instruments¹ (hereinafter — “MiFID II”), financial instruments are the instruments specified in Section “C” of Annex No. 1 to the MiFID II. These include “transferable securities”, “money-market instruments”, “units in collective investment undertakings”, etc. If a crypto-asset belongs to the investment type, the provisions of the MiFID II will be applied to it. Moreover, the ESMA provided a number of regulatory acts of the EU, the corresponding provisions of which can potentially be applied to regulate the relations if a crypto-asset is a financial instrument. These acts include: Directive 2003/71/EC dated November 4, 2003 on the prospectus²; Directive 2013/50/EU dated October 22, 2013 on amending the Directive 2004/109/EC on the harmonization of transparency requirements in relation to information about issuers whose securities are admitted to trading on a regulated market³; Regulation (EU) No. 596/2014 of the European Parliament and of the Council dated April 16, 2014 on market abuse regulation⁴; Regulation (EU) No. 236/2012 of the European Parliament and of the Council dated March 14, 2012 on short selling and certain aspects of credit default swaps⁵, etc.

The ESMA divided the problematic aspects and ways of resolving them into two parts based on the type of crypto-assets:

- investment-type crypto-assets;
- other types of crypto-assets.

Investment-type crypto-assets. As mentioned above, if a crypto-asset is considered a financial instrument, the regulatory framework developed by the EU institutions regarding financial instruments can be applied to it. However, the ESMA notes that the existing regulatory framework was developed without taking into account the peculiarities of crypto assets, which leads to issues in interpreting the existing requirements. Therefore, there is a risk of inconsistent application in all EU member states, which can lead to the creation of regulatory arbitrage (paragraph 171 of the Advice). In this regard, the ESMA proposes to review and supplement the existing acts for their adaptation to the regulation of investment-type crypto-assets, in particular:

a) to clarify the types of services/activities that may qualify as custody/safekeeping services/activities under EU financial services rules in a DLT framework (paragraph 172 of the Advice);

b) to provide greater certainty around the concepts of settlement and settlement finality applied to crypto-assets (paragraph 173 of the Advice);

c) to introduce a means to ensure that the protocol and smart contracts underpinning crypto-assets and crypto-asset activities meet minimum reliability and safety requirements (paragraph 174 of the Advice), etc.

As for other types of crypto-assets, the ESMA identifies the most significant risks of using payment-type and utility-type crypto-assets as potentially stemming from fraud, cyber-attacks, and money laundering and market manipulation. At the same time, the ESMA notes that there is no special regulatory framework in this field. To solve this issue, the ESMA proposes the following two options:

a) to implement a bespoke regime for specific types of crypto-assets, which would allow tailoring the rules to the specific risks and issues posed by those crypto-assets that do not qualify as financial instruments or electronic money (paragraphs 182–187 of the Advice);

b) to do nothing (paragraphs 188–189 of the Advice).
The analysis of the regulatory framework indicates that the institutions of the EU do not use the term “digital asset”. The ESMA, however, uses a more general term “crypto-asset”, which can mean both virtual currency and a digital token. A digital token, in turn, is any digital representation of interest that can have value, right to receive benefit or performance of certain functions, or can have no specific purpose or use.

Conclusion

Based on everything mentioned above, it is evident that there is currently no specialized normative regulation of the cryptocurrency market in the EU. At the same time, we can see prospects for future development of the legislation that will be more comprehensive in regulating relations of circulation of crypto-assets not only in public legal field, but also in the private one.

3.6.2. Practice of the European Court of Human Rights and European Court of Justice

The Judgement of the European Court of Justice (hereinafter — “Court of Justice”) dated October 22, 2015 on the case С-264/14 Skatteverket v David Hedqvist¹ was the defining factor in regulating cryptocurrencies, virtual currencies and digital assets. In this case, the Supreme Administrative Court of Sweden, in accordance with Article 267 of the Treaty on the Functioning of the European Union², turned to the Court of Justice regarding the explanation on defining the object being taxed with the value added tax for the operations on exchanging cryptocurrencies. The key points that were recorded in this Judgement are:

a) Bitcoin addresses are equivalent to bank accounts;

¹ European Court of Justice JUDGMENT OF THE COURT (Fifth Chamber) 22 October 2015 (Case C-264/14) “Skatteverket v David Hedqvist”. URL: http://curia.europa.eu/juris/document/document.jsf?jsessionid=9ea7d0f130dcd0616d6ca294fed40e59a9170fed6.e34LkciLc3eQc40LaxqMbN4Pbh0N0e0?text=&docid=170305&pageIndex=0&doclang=en&mode=lst&dir=&occ=first&part=1&cid=759800
b) Cryptocurrencies are means of payment;

c) Cryptocurrencies are not tangible property according to Article 14 of the Directive of the EU “On EU’s Common System of Value Added Tax (VAT)”¹;

d) operations on selling and purchasing Bitcoins are not subject to VAT.

Based on the above-mentioned Judgement of the Court of Justice, we see that virtual currency is a contractual payment instrument, is not tangible property, cannot be considered as a current or deposit account, payment or transfer. At the same time, the Bitcoin virtual currency is neither a security that confirms the property right, nor any similar security, has no other purpose than being a payment instrument, it is accepted by certain operators for that purpose.

The term “digital asset” is not used in this Judgement of the Court of Justice. It is only mentioned in paragraph 12, where the Supreme Administrative Court of Sweden, when citing the report of the European Central Bank on virtual currencies from 2012, states that virtual currencies can be defined as a type of unregulated digital money issued and controlled by its developers and accepted by the members of a specific virtual community. However, the term “digital money” is not the same as “digital asset” because the latter is a general category, which can simultaneously include digital money.

Taking the above-mentioned into account, according to the Court of Justice, digital money as an element of a digital asset is a general term that contains virtual currency. Bitcoin is one of the types of virtual currency, a payment-type cryptocurrency.

Based on the fact that the practice of the Court of Justice is mandatory for national courts of the EU member states, the clarity was provided to the field of tax enforcement. Thus, operations on exchanging cryptocurrencies will not be viewed as the ones that cause the emergence of an object of taxation subject to the value added tax.

It is worth noting that prior to the mentioned court Judgement, the prevailing position was the doctrinal one, according to which cryptocurrency

was viewed as property. Thus, in the practice of the Court of Justice, in particular, in the Judgement dated January 22, 2013 on the case C-283/11 Sky Österreich GmbH v Österreichischer Rundfunk\(^1\) (the corresponding Judgement is not directly connected to the relations on the circulation of cryptocurrencies), it was noted that property should be understood as “all rights that have a value characteristic of assets and therefore create the legal foundation for executing the relevant rights by the subject they belong to autonomously and in his/her interests (essentially, executing such property rights in one’s favor)”.

In this case, it has to be stated that any cryptocurrency has a specific value characteristic, which is determined by its market value. However, defining cryptocurrencies using categories such as “property” or “product” is unlikely to be progressive. As of today, the conclusions drawn by the Court of Justice on the case Skatteverket v David Hedqvist correspond to the substantive characteristics of most cryptocurrencies.

Today, there are no solutions that would contain any legal positions regarding the legal nature of cryptocurrencies in the practice of the European Court of Human Rights (hereinafter — “ECHR”).

It should be noted that a number of legal positions of the ECHR (legal positions regarding the definition of property) can guarantee protection of rights and interests of persons that a certain type of cryptocurrency belongs to. Thus, according to the practice of the ECHR, property is anything that has economic value (value representation) for participants in civil circulation and can be transferred from one person to another. The ECHR considers economic value as one of the main criteria when solving the issue of existence of the actual property right object. As an example of this point, we can take the judgment on the case Bramelid and Anne Marie Malmström v. Sweden\(^2\). In this case, we should note that cryptocurrency

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\(^2\) European Commission of Human Rights “Bramelid and Anne Marie Malmström v. Sweden” 1983. URL: [https://www.google.ru/url?q=t&rct=j&q=&esrc=s&source=web&cd=1&ved=2ahUKEwj1uZO85tjdAhXJo4sKHFfR1DDwQFjAAegQICCRAC&url=https%20011983-10-12-32194320-448](https://www.google.ru/url?q=t&rct=j&q=&esrc=s&source=web&cd=1&ved=2ahUKEwj1uZO85tjdAhXJo4sKHFfR1DDwQFjAAegQICCRAC&url=https%20011983-10-12-32194320-448)
has economic value designated in its market price, therefore, it is an object of civil rights with all corresponding characteristics. The right to the corresponding object of civil rights can also be protected if the subject of such right appeals to the court.

The Judgement of the ECHR dated June 13, 1979 in Marckx v. Belgium\(^1\) can serve as the substantiation of existence of legal basis of cryptocurrency transactions. This decision of the ECHR states that the right to dispose of one’s property is the traditional and main aspect of the property right. This means that without the ability to dispose of the property that belongs to a person, such property right will be “incomplete”. If the person has a property right to the units of cryptocurrency that he/she owns, such a person has the right to freely dispose of such property.

**Conclusion**

Therefore, operations on exchanging cryptocurrencies, which take place in civil (business) circulation if there is no direct prohibition of such operations within national legislation, must be viewed as legal, ones that create the corresponding legal consequences for the parties to such transactions and are aimed at complete and consistent execution of a set of rights that belong to the owners of such cryptocurrencies.

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**3.6.3. Republic of Cyprus**

Today, the Republic of Cyprus (hereinafter — “Cyprus”) does not have specialized national legal norms determining the legal basis of the cryptocurrency market’s functioning. The Central Bank of Cyprus takes a position that cryptocurrencies cannot be viewed as a payment instrument envisioned by the national legislation, which is why there are no...
mechanisms that would determine the way of compensating losses from operations of cryptocurrencies, while their price is volatile\(^1\).

On March 18, 2014, the website of the Central Bank of Cyprus published a joint Announcement by the Ministry of Finance, the Ministry of Energy, Commerce, Industry and Tourism and the Central Bank of Cyprus in relation to virtual currencies\(^2\). The purpose of this Announcement was to draw the attention of the public to the risks associated with the purchase, holding or trading of virtual currencies (such as bitcoin), which are not legal tender nor financial instruments.

This Announcement gives a definition of virtual currencies, which are “non-regulated digital products, which are not issued by a central bank. They can only be used as a medium of exchange for products in a limited trading network”.

It should be mentioned that the operations with cryptocurrencies (purchase, exchange, etc.) in Cyprus are not forbidden. However, operations with cryptocurrencies performed by both natural persons and legal entities are subject to taxation. Participants in business relations are extensively using cryptocurrencies in various sectors of the economy. In October 2017, the Cyprus Securities and Exchange Commission (hereinafter — “CySEC”) clarified the requirements for investment companies acting in the country and providing services related to virtual currencies and derivatives, where they act as an underlying asset, in particular, in contracts for differences (hereinafter — “CFD”).

The CySEC has basically performed the localization of providing investment services related to virtual currencies specifying the need to conduct legal examinations for compliance of such investment products with the established requirements of each jurisdiction.

In its Announcement of February 14, 2018, the CySEC again addressed the definition of virtual currencies, cryptocurrencies in particular, stating


that they are a digital representation of value that is neither issued nor
guaranteed by a central bank or public authority and does not have the
legal status of currency or money. They are highly risky, generally not
backed by any tangible assets and unregulated under EU law, and do not,
therefore, offer any legal protection to consumers.

On May 15, 2018, the CySEC issued a Circular (C268), which states
that based on the decision of the European Securities and Markets Authority
dated March 27, 2018 on including CFDs on virtual currencies into the
scope of product intervention measures, CFDs on virtual currencies are
considered as financial instruments in accordance with the Directive of the
15.05.2014 on markets in financial instruments. The provisions of the
Circular state that virtual currencies may constitute an underlying variable
in other derivative contracts including CFDs, options and futures, which
are generalized as the “Derivative on Virtual Currencies”. Therefore, the
CySEC noted that any activity related to virtual currencies is not currently
regulated by CySEC, unless a virtual currency meets the criteria and falls
under the existing regulatory framework as per CySEC’s Announcement
dated November 15, 2017. However, Derivatives on Virtual Currencies
can be classified as financial instruments under the Directive 2014/65/EU.
Therefore, depending on their specific characteristics and use, providing
investment services in relation to derivatives on virtual currencies will
require specific authorisation by CySEC.

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1 Announcement ESMA, EBA and EIOPA warn consumers on the risks of
Virtual Currencies. 14 February 2018. URL: https://www.cysec.gov.cy/CMSPages/GetFile.aspx?guid=b286d3e9-88cd-45bb-8cd3-8d75e06e3e0d
2 Circular NO.: C268 - Introduction of new rules governing derivatives on virtual
2014 on markets in financial instruments and amending Directive 2002/92/EC and
4 CySEC Announcement ESMA highlights ICO risks for investors and firms.
15 November 2017. URL: https://www.cysec.gov.cy/CMSPages/GetFile.aspx?guid=d8d643e1-74f9-4723-98b6-e5e8c79be7fa
Conclusion

The above-mentioned analysis indicates that Cyprus does not have a specific regulation of the field of circulation of cryptocurrencies. However, Cyprus, as a member of the EU, must apply binding acts issued by the EU institutions, including the ones related to virtual currencies. Therefore, the authorized subjects, particularly CySEC, refer to the Directives of the EU in their acts that must be used in the process of regulating the corresponding relations in Cyprus.

As for digital assets, this term is not defined in the current legislation of Cyprus and is not used by authorized subjects in the process of developing the regulatory framework.

3.6.4. Republic of Malta

Malta is one of the first EU member states to develop a comprehensive legislation on the regulation of cryptocurrency legal relations. At the end of 2018, three regulatory acts came into force:

- Innovative Technology Arrangements and Services Act\(^1\) defines the registration procedure for blockchain platforms and related contracts, establishes the foundation for certification procedures conducted by the Malta Digital Innovation Authority regarding blockchain platforms;
- Malta Digital Innovation Authority Act\(^2\) envisions the creation of the Malta Digital Innovation Authority to develop the shared vision, skills and other qualities regarding technological innovations, including distributed or decentralized technology, performing regulatory functions related to innovative technologies, mechanisms and services connected to them, as well as solving other issues;
- Virtual Financial Assets Act\(^3\) — the preliminary statement of the Act states that it is aimed at regulating virtual financial assets (hereinafter —


“VFA”) and the field of initial VFA offerings, as well as that the Act makes provisions for issues ancillary or incidental in this field.

When giving the definition to the term “distributed ledger technology” (hereinafter — “DLT”), the Virtual Financial Assets Act includes the following as a DLT asset: virtual token, VFA, electronic money, financial instruments. In turn, VFA means any form of digital medium recordation that is used as a digital medium of exchange, unit of account, or store of value and that is not electronic money, financial instrument or virtual token. Virtual token means a form of digital medium recordation that has no utility, value or application outside of the DLT platform on which it was issued and may only be redeemed for funds on such platform directly by the issuer of such DLT asset. Comparison of the terms “virtual token” and VFA according to the legislation of Malta allows only identifying the similarities and distinctions between them. The similarities include:

a) they are types of DLT assets;

b) they are records in the digital space.

Distinctions include the fact that a virtual token is not a means of representing a value, it is used exclusively within the corresponding platform, is subject to exchange for money by the issuer of the asset only within this platform, whereas a VFA is used as a digital medium of exchange, accounting unit or a measure of value.

Conclusion

The analysis of the legally accepted definition of a VFA indicates that this term implies cryptocurrency and not a digital asset per se. Therefore, even though Maltese legislation does not directly define the term “cryptocurrency”, it does so indirectly through the VFA category.

3.6.5. Federal Republic of Germany

Regulating the market of cryptocurrencies, virtual currencies and digital assets is also relevant for the Federal Republic of Germany (hereinafter — “Germany”). The Federal Financial Supervisory Authority (hereinafter — “BaFin”) views virtual currencies as innovative means of
payment that have various names at national and international levels. They are called virtual, digital, alternative currencies or cryptocurrencies, money or coins, etc.\(^1\).

The issue of determining the legal nature of virtual currencies is still open for BaFin. According to this institution, Bitcoin is a specific accounting unit that can be defined as a financial instrument in accordance with the Federal Law “On the Credit System”\(^2\). At the same time, virtual currencies are not legal tender, currencies, foreign currencies or coins. They are also not electronic funds according to the Federal Law “On the Supervision of Payment Services” (Gesetz über die Beaufsichtigung von Zahlungsdiensten)\(^3\).

According to the general rule, natural persons and legal entities that conduct business activity on cryptocurrency markets (buy and sell tokens on a commercial basis, broker services on cryptocurrency trading online platforms) must first go through the authorization by BaFin\(^4\).

In February 2018, BaFin published the information on regulatory evaluation of ICOs, tokens and cryptocurrency\(^5\). In particular, it mentioned that the companies that participate in ICOs in every specific case must

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\(^1\) Banking Act, § 32; Virtual Currency (VC), supra note 216
\(^2\) Gesetz über das Kreditwesen [KWG] [Banking Act], Sept. 9, 1998, BUNDES-SETZBLATT [BGBL.] [FEDERAL LAW GAZETTE] I at 2776, § 1, para. 11, sentence 1, no. 7, http://www.gesetze-im-internet.de/kredwg/KWG.pdf
\(^3\) Gesetz über die Beaufsichtigung von Zahlungsdiensten (Zahlungsdiensteaufsichtsgesetz - ZAG). URL: https://www.gesetze-im-internet.de/zag_2018/ZAG.pdf
conduct the evaluation as to whether the participation in the ICO can be classified as a financial instrument (e.g. an investment) or as relations connected to the circulation of securities and, therefore, draw a conclusion on applying the required legislation.

In February 2018, the Federal Ministry of Finance of Germany (Bundesministerium der Finanzen) published an information letter on taxation of operations with cryptocurrencies with the value added tax (VAT). The Ministry noted that the operations on exchanging traditional currencies for cryptocurrencies and vice versa in general sense are taxable operations (operations on the provision of services), however, they are not subject to value added tax (VAT).

The above-mentioned authority noted that for the purpose of taxation, cryptocurrencies must be considered as a simple payment instrument (same as with traditional money). That is why the use of cryptocurrencies simply as a means of payment is not subject to taxation. This legal position of the Ministry agrees with the practice of the Court of Justice on the corresponding issue (European Court of Justice (ECJ) Judgement Skatteverket v David Hedqvist from October 22, 2015). The Ministry also gave an evaluation to taxation of mining activity, electronic wallets and trading platforms that operate online.

The Deutsche Bundesbank noted that cryptocurrencies cannot be classified as virtual currencies. According to experts of the Deutsche Bundesbank, cryptocurrencies cannot be viewed as virtual currencies or digital money because they do not perform the standard functions of currency and are not part of the national monetary system. The Deutsche Bundesbank recommends using the term “cryptotoken” to define cryptocurrencies.

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Conclusion

The above-mentioned indicates that the Federal Republic of Germany does not have a special normative regulation of cryptocurrency relations. As for digital assets, the authorized institutions do not use this term. BaFin equates the terms “virtual currencies”, “digital currencies” and “cryptocurrencies” noting that states use different generic terms to represent one phenomenon.

3.6.6. Kingdom of Sweden

Sweden has no special laws that would regulate the cryptocurrency market. However, it should be noted that a number of public authorities in Sweden issued provisions, reports and preliminary evaluations regarding their vision of essence of a term such as “cryptocurrency” and how the corresponding category relates to the provisions of the current legislation of Sweden in the regulatory aspect.

In particular, the Swedish Financial Supervisory Authority (hereinafter — “SFSA”) defined cryptocurrencies as a category that is within its competence. Such an approach is due to the fact that trading cryptocurrencies (placing a cryptocurrency exchange offer is equivalent to exchange activity in the aspect of traditional currencies) is a financial service, therefore it falls under the requirements for mandatory reporting\(^1\).

In 2017, the SFSA published the Report on the FI’s Role Regarding Innovation\(^2\), which described the role of the corresponding institution in the field of regulating cryptocurrencies. In this Report, ICOs are viewed as an investment project and a way of ensuring capital. At the same time, the SFSA mentioned that their competence does not include supervision


over ICOs. The corresponding national supervisory authority noted that supervision over ICOs must be conducted by the European Supervisory Authority in accordance with the following regulatory acts of the EU:

a) Prospectus Directive;

b) The Markets in Financial Instruments Directive (MiFID);

c) The Alternative Investment Fund Managers Directive (AIFMD);

d) mining will be considered for the purposes of taxation. If all special conditions are fulfilled, the profit from mining cryptocurrencies will be defined as income received from hobbies, therefore, will not be subject to taxation. However, the Swedish Supervisory Authority did not provide any

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In 2017, the SFSA stated in its Report that it is not aware of cases of companies in Sweden that would attract investments through ICOs.

In 2013, the Swedish Tax Board published a preliminary statement on taxing operations with cryptocurrencies with the VAT. This statement mentioned that trading cryptocurrencies is not subject to VAT. However, it noted that the corresponding operations fall under the regulative acts of the Swedish Financial Supervisory Authority because such operations are classified as currency relations. The corresponding statement was appealed in the court of the Swedish Tax Authority. It is worth noting that the Supreme Administrative Court of Sweden made a decision that operations with cryptocurrencies are not subject to VAT (the corresponding decision was made based on the legal position specified in the Judgement of the Court of Justice).

In 2015, the Swedish Tax Authority published its position on how cryptocurrencies received as a result of ed with Initial Coin Offerings] (Nov. 7, 2017), http://www.fi.se/sv/publicerat/nyheter/2017/varning-for-risker-med-initial-coin-offerings/

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explanations on the ability to apply the provisions of the Income Tax Act to the profits received from operations with cryptocurrencies.

The position of the Sveriges Riksbank comes down to the idea that cryptocurrencies are not money in its traditional understanding. Sveriges Riksbank views digital currencies as an electronic currency (E-krona), i.e. electronic money, the issuer of which is a state authority i.e. the central bank. In turn, the term “crypto-asset” is being equated to “cryptocurrency”. Whereas cryptocurrency cannot be defined as money, because such an asset does not have an official issuer and cannot act as an affective payment instrument these days.

**Conclusion**

The above-mentioned means that the authorized subjects use the terms “crypto-asset”, “cryptocurrency”, “digital currency” when solving issues in the reviewed field, without using the term “digital asset” in this context.

3.6.7. Swiss Confederation

In the Swiss Confederation, we can observe the growth of processes related to the implementation of cryptocurrencies into various fields of public interaction. In particular, on November 2, 2017, the Commercial Registry Office in the canton of Zug started accepting separate cryptocurrencies (Bitcoin and Ether) as payment of administrative fees, as well as viewing cryptocurrencies as an investment into the formation of a

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2 When a central bank digital currency meets private money: effects of an e-krona on banks. Reimo Juks. URL: https://www.riksbank.se/globalassets/media/rapporter/pov/artiklar/engelska/2018/181105/20183-when-a-central-bank-digital-currency-meets-private-money---effects-of-an-e-krona-on-banks.pdf?_=1B2M2Y8AsTpgAmY7PhCgf%3d%3d&--t_q=language%3aen%2csiteid%3af3366ed3-598f-4166-aa5a-45d5751e940b&--t_ip=77.120.177.166&--t_hit.id=Riksbanken_Core_Models_Media_DocumentFile/_dddb2b9b3-05d2-4b8e-9546-835b0b3fe44&--t_hit.pos=1

3 Are Bitcoin and other crypto-assets money? Gabriel Söderberg, 14 March 2018. URL:
statutory capital of companies. In the city of Zug, separate municipal services can be paid for with cryptocurrencies, for example, the service of resident registration. Starting from January 1, 2018, the municipality of Chiasso located in the Swiss canton of Ticino has started accepting tax payments in cryptocurrencies.

On February 16, 2018, the Swiss Financial Market Supervisory Authority (hereinafter — “FINMA”) published the Guidelines for Enquiries Regarding the Regulatory Framework for Initial Coin Offerings (ICOs). These Guidelines gave classifications to tokens:

a) payment tokens;

b) utility tokens;

c) asset tokens;

d) hybrid tokens.

Cryptocurrencies were classified as payment tokens. The Guidelines also define a set of indicators, to which tokens must correspond to be considered securities. These Guidelines examined the issue related to the application of the current legislation in executing public relations in the field of circulation of the corresponding tokens.

For the purposes of taxation, cryptocurrencies in Switzerland are viewed as foreign currencies and, therefore, as a taxable item.

On January 21, 2019, the annual Geneva Blockchain Congress took place, the results of which are in the Overview “Digital Assets — Swiss Regulatory Aspects”. This document defines digital assets as digital representations registered in a database as accounting units based on the distributed ledger technology (DLT), blockchain in particular, and can

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“represent” virtually anything. The Overview presents the position of the FINMA regarding the classification of digital assets (tokens) based on the functional criterion. Thus, they are divided into:

1) payment tokens, which do not raise claims against the issuer and are intended for use either now or in the future as a payment instrument to acquire products or services, or as a means of transferring money or value (for example, cryptocurrency, in particular, Bitcoin, Ether);

2) utility tokens, which provide digital access to a program or service using the infrastructure based on the distributed ledger technology (DLT) at the moment of issue (vouchers, mainly hybrid tokens);

3) investment or asset tokens, which comprise assets, such as promissory notes, shares or any other claims against the issuer or a third party (shares, options, bonds, etc.);

4) hybrid tokens, which combine separate characteristics of digital assets (tokens) of other classifications.

**Conclusion**

The above-mentioned confirms that cryptocurrencies are defined as a payment instrument and are a type of digital assets in accordance with the FINMA. That means that “digital asset” is a general term and aside from a payment instrument (cryptocurrency) can be considered in other meanings. However, there is currently no defined regulatory position in the Swiss Confederation.

### 3.6.8. Ukraine

The Ukrainian legislation currently does not have a single provision aimed at regulating relations that arise from circulation of digital assets and cryptocurrencies.

The first step towards legal regulation of the mentioned field was made on September 14, 2018, when, at the initiative of twenty-three people’s deputies of Ukraine, the Draft Law “On Amendments to the Tax Code of Ukraine Regarding the Taxation of Transactions with Virtual...
Assets” No. 9083¹ was entered into the Apparatus of the Verkhovna Rada of Ukraine (hereinafter — “VRU”).

This Draft Law provides for amendments to the Tax Code of Ukraine (hereinafter — “TC of Ukraine”). Therefore, based on paragraph 5.1 article 5 of the TC of Ukraine, the terms, which the TC of Ukraine will be supplemented with should this law be adopted, will be used exclusively to regulate relations that arise in the field of charging taxes and fees.

The Draft Law No. 9083 does not specify the term “digital asset” separately, using the category “virtual asset” in its place, which is any form of record within the distributed ledger of records in digital form and can be used as a medium of exchange, accounting unit or means of storing value.

The proposed meanings of the term “virtual asset” are cryptocurrencies and asset tokens. This means that the initiators of the Draft Law No. 9083 view “virtual asset” as a general term, which includes cryptocurrencies and asset tokens.

Cryptocurrency is defined as a virtual asset in the form of a token that functions as a medium of exchange or storing value. Whereas an asset token is a virtual asset in the form of a token that confirms property and/or non-property rights of the token owner corresponding to the obligations of the token issuer. The crucial component of the reviewed terms is “token”, which the Draft Law No. 9083 describes as a digital unit of account within the distributed ledger of records in digital form, which has cryptographic protection.

The Opinion of the Leading Scientific and Expert Department of the Verkhovna Rada Secretariat states that the terminological apparatus of the Draft Law No. 9083 is classified as one that needs improving. In particular, it notes that the proposed definitions of “virtual assets”, “cryptocurrency” and “asset tokens” are too broad and do not allow for a clear definition of

an object of taxation by distinguishing it from other objects of civil rights, first and foremost, from the ones similar in essence i.e. electronic money or securities.

In September 2018, the Draft Law “On Amendments to the Tax Code of Ukraine Regarding the Taxation of Transactions with Virtual Assets” No. 9083-1 was introduced as an alternative to the Draft Law No. 9083.

Even though the alternative Draft Law uses the term “digital asset”, it does not provide its official definition and, unlike Draft Law No. 9083, does not define virtual assets, only mentioning that they include tokens and cryptocurrencies. The Draft Law No. 9083-1 defines “cryptocurrency” as an intangible digital asset that determines units of value, the direct property right to which is recorded in accordance with the records in the distributed ledger of transactions (blockchain). In turn, “token” is defined as a record in the distributed ledger of transactions (blockchain), which confirms the existence of the claim right or property right of the owner to the objects of civil right.

Draft Laws No. 9083 and No. 9083-1 give different meanings to the similar reviewed terms, which is why it is important to note the differences between them. Firstly, in accordance with the Draft Law No. 9083 the types of virtual assets are cryptocurrencies and asset tokens, whereas in accordance with the Draft Law No. 9083-1 they are tokens and cryptocurrencies. Secondly, the main Draft Law does not classify a token as a type of virtual assets, but defines it as a digital unit of account within the distributed ledger of records, while the alternative classifies it as virtual assets and defines it as a record in the distributed ledger of transactions (blockchain). Thirdly, the Draft Law No. 9083 specifies the term “cryptocurrency” regardless of the essential characteristics and its form, whereas the Draft Law No. 9083-1 focuses more on the essence noting that cryptocurrency is an intangible digital asset, which determines units

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of value. Fourthly, the definition of cryptocurrency in the main Draft Law indicates its functional purpose as a means of exchanging or storing value, while the alternative Draft Law has no connection to the functions.

At the beginning of February 2019, both Draft Laws were entered into the agenda of the session of the VRU, which is confirmed by the Decision of the VRU “On the Agenda of the Tenth Session of the Verkhovna Rada of Ukraine of the Eighth Convocation”

On November 15, 2019, the VRU registered the Draft Law “On Amendments to the Tax Code of Ukraine and Other Laws of Ukraine Regarding the Taxation of Operations with Crypto-Assets”. The Draft Law contains the following definitions:

- **token** is an electronic unit of account in the form of a record in the distributed ledger;
- **virtual asset** is a special type of property that is a value in digital form, which is created, accounted and alienated electronically. Virtual assets include crypto-assets, token-assets and other virtual assets;
- **crypto-asset** is a type of a virtual asset in the form of a token, which is created, accounted and alienated in the distributed ledger and does not confirm property and/or non-property rights of the owner of a crypto-asset;
- **token-asset** is a type of a virtual asset in the form of a token, which is created, accounted and issued in the distributed ledger that confirms property and/or non-property rights of the owner of a token-asset. Operations with a token-asset are taxed according to the rules applied to property and/or non-property rights, which a token-asset confirms.

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Taking into account the above-mentioned terms, “virtual asset” is the widest term that covers all other objects related to this Draft Law.

**Conclusion**

The legal fate of the given Draft Laws has not been decided yet, and it is hard to predict how the implementation of such changes into tax legislation will develop in the future. However, we have to focus on the fact that Ukraine has no special legislation regarding digital assets and cryptocurrencies defining their legal nature regardless of tax legislation.

### 3.6.9. Republic of Belarus

The Republic of Belarus (hereinafter — “Belarus”) is one of the leaders in the field of providing normative regulation of public relations that arise in the cryptocurrency market. The Decree No. 8 of the President of the Republic of Belarus “On the Development of the Digital Economy” dated December 21, 2017¹ (hereinafter — “Decree”) is the specialized legal act that specifies the legal basis of activities on circulation of cryptocurrencies, mining and blockchain technology.

The Decree was issued in order to ensure systematic development of the High Technologies Park, field of innovations and creation of the modern digital economy in Belarus. The Appendix No. 1 to the Decree specifies a number of used terms and their definitions², which include: “cryptoplatform operator”, “virtual wallet”, “owner of a digital unit (token)”, “cryptocurrency”, “mining”, “cryptocurrency exchange operator”, “listing of digital units (tokens)”, “ledger of transaction blocks (blockchain)”, “smart contract”, “technological mode”, “digital unit (token)”.


According to paragraph 4 of Appendix No. 1 to the Decree, cryptocurrency is defined as Bitcoin, any other digital unit (token), which is used in international circulation as a universal means of exchange. Provision 12 of this Appendix characterizes a digital unit (token) as a record in the ledger of transaction blocks (blockchain), any other distributed information system, which confirms the existence of rights of the owner of a digital unit (token) to the objects of civil rights and/or is a cryptocurrency. In turn, the ledger of transaction blocks (blockchain) is a sequence of blocks with information on operations that occurred in the distributed decentralized information system that uses cryptographic ways of protecting information, which is built based on the specified algorithms in such a system.

The Decree specifies the rights and duties of both natural persons and legal entities in the field of circulation of cryptocurrencies. Thus, legal entities are given the right to own tokens and perform various operations, which include:

- creation and listing of own tokens in Belarus and abroad through the resident of the High Technologies Park that performs this type of activity;
- storage of tokens in virtual wallets;
- acquisition, alienation of tokens and other deals (operations), etc. through cryptoplatform operators, cryptocurrency exchange operators, other residents of the High Technologies Park that perform this type of activity.

It is worth noting that the corresponding list of operations is not exhaustive, which influences the “adaptation” of the normative regulation to the relations, which constantly develop and change in the specified field.

As for natural persons, they have the right to own tokens and perform the following operations:

- mining;
- storage of tokens in virtual wallets;
- exchange tokens for other tokens, alienation for Belarusian rubles, foreign currency, electronic money, as well as gifting or testament of tokens.
At the same time, mining activity that is performed by natural persons without involving other natural persons (based on employment or commercial contracts), cannot be defined as a business activity, while the tokens themselves are not subject to declaration. The Decree also defines the rights in the field of cryptocurrency market for subjects such as individual entrepreneurs, residents of the High Technologies Park, which are given the rights equal to the rights of legal entities in the corresponding field.

The Decree introduces a number of tax benefits (temporary tax benefits, until January 1, 2023) for the income tax, personal income tax, value added tax, tax under the simplified taxation system regarding the income received from business activity on circulation of cryptocurrencies.

According to the provisions of the Decree, cryptoplatform operators have the right to adopt local regulatory acts aimed at regulating their activity, which, specifically, include: rules regulating the trading of tokens; admission of participants to and exclusion of certain participants from trading; rules of admission of tokens to trading.

**Conclusion**

Thus, the legislation of Belarus is aimed at regulating the activities regarding circulation of cryptocurrencies, mining, as well as relations that arise when using the blockchain technology. It should be noted that the term “digital asset” is not used in the regulatory acts of this state.

**3.6.10. Russian Federation**

Today, the Russian Federation (hereinafter — “Russia”) is one of the states that try to define the basis for normative regulation of the market of digital assets and cryptocurrencies at the legislative level. On May 20, 2018, the State Duma of Russia adopted the Decision “On Federal Draft Law No. 419059-7 ‘On Digital Financial Assets’”1, according to which

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1 Pro proekt federalnoho zakonu № 419059-7 «Pro tsyfrovi finansovi aktyvy»: Post-anova Derzhavnoi Dumy Rosiiskoi Federatsii № 4030-7 HD vid 20.05.2018 r. [On the draft federal law No. 419059-7 “On Digital Financial Assets”: Resolution of the State Duma
the Draft Law No. 419059-7\(^1\) was approved during the first reading and sent to the authorized subjects for amendments.

This draft law proposes definitions of a number of terms including “digital financial asset”, “distributed ledger of digital transactions”, “mining”, “cryptocurrency”, “token”, “smart contract”, etc.

Thus, a digital financial asset (hereinafter — “DFA”) is property in electronic form created using encryption (cryptography). Property right to this property is confirmed by entering digital records into the ledger of digital transactions. Digital financial assets include cryptocurrencies and tokens. Such assets are not legal tender in Russia.

Taking into account the given definition, we can identify the following features of a DFA:

- it is property in electronic form, i.e. it is in circulation exclusively in electronic space, meanwhile access to it is provided through special computer systems;
- it was created using encryption (cryptography). According to the decision of the Russian government dated April 16, 2012 No. 313\(^2\), encryption tools are software-, hardware- and software-hardware-based

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\(^1\) Proekt Federalnogo Zakona Rossiskoi Federatsii «Pro tsyfrovi finansovi aktyvy» vid 30.01.2018 r. № 419059-7 [On the draft federal law No. 419059-7 “On Digital Financial Assets” dated 30/01/2018. No. 419059-7]. Retrieved from: http://pravo.gov.ru/proxy/ips/?searchres=&bpas=cd00000&a3=&a3type=1&a3value=&a6=&a6type=1&a6value=&a15=&a15type=1&a15value=&a7type=1&a7from=&a7to=&a7date=&a8=&a8type=1&a1=%%6E%8F4%F0%EE%E2%FB%F5+%F4%E8%ED%0%ED%F1%EE%E2%FB%F5+%E0%EA%F2%E8%E2%FB%F5+%a0=&a16=&a16type=1&a16value=&a17=&a17type=1&a17value=&a4=&a4type=1&a4value=&a23=&a23type=1&a23value=&textpres=&sort=7&x=72&y=9 [in Russian]

\(^2\) Postanovu Uriadu Rossiskoi Federatsii vid 16.04.2012 r. № 313 [Resolution of the State Duma of the Russian Federation No 313, 16.04.2012].:http://pravo.gov.ru/proxy/ips/?searchres=&x=53&y=3&bpas=cd00000&a3=&a3type=1&a3value=&a6=&a6type=1&a6value=&a15=&a15type=1&a15value=&a7type=1&a7from=&a7to=&a7date=16.04.2012&a8=313&a8type=1&a1=&a0=&a16=&a16type=1&a16value=&a17=&a17type=1&a17value=&a4=&a4type=1&a4value=&a23=&a23type=1&a23value=&textpres=&sort=7 [in Russian]
encryption (cryptographic) tools that implement algorithms of cryptographic transformation of information to restrict access to it when storing, processing and transferring such information. This proves that restricting access to such property when storing, processing and transferring is a mandatory condition for the operation of the DFA;

- it belongs to a person exclusively by the property right;
- property right to such property is confirmed by entering digital records (information on DFA) into the ledger of digital transactions, i.e. into the systematized database, which is created for the corresponding period of time;
- it is not recognized as legal tender in Russia;
- DFA owners have the right to conclude agreements on exchanging one type of a DFA for another type of a DFA and/or exchanging DFA for rubles, foreign currency and/or other property only through the DFA exchange operator.

The definition of a DFA clearly shows that this asset is compared to cryptocurrencies and tokens as a whole and a part, since the latter is considered as types of DFAs according to the initiators of the Draft Law.

Cryptocurrency is characterized as a type of a DFA, which is created and recorded in the distributed ledger of digital transactions by participants in this ledger in accordance with the rules of keeping this ledger. At the same time, token is a type of a DFA, which is issued by a legal entity or an individual entrepreneur (issuer) in order to attract financing and is recorded in the ledger of digital records.

The Draft Law also determines the process of issuing tokens and unique features of circulation of a DFA. Meanwhile, it should be noted that if the Draft Law is adopted, participating in ICO will be limited to only qualified investors, except for the cases specified by the Central Bank of Russia. Therefore, tokens and cryptocurrencies are defined as property, the exchange of which is proposed to be permitted only through authorized operators.

In the aspect of regulating the relations in this field, another important law is the Federal Law of Russia “On Amendments to Parts One, Two and Article 1124 of Part Three of the Civil Code of the Russian Federation
No. 34-ФЗ”, adopted on March 12, 2019\(^1\), which came into force in October 2019. According to Provision 3 of this law, chapter 6 of the Civil Code of Russia is supplemented by article 1411, which states that digital rights are binding rights and other rights specified in the law, the essence and conditions for exercising which are determined in accordance with the rules of the information system and correspond to the indicators established by law. Meanwhile, digital rights were recognized as objects of civil rights, a type of property rights. The law states that digital rights can be alienated without the agreement of the issuer, pawned, bequeathed and revert their collection.

**Conclusion**

Regulatory acts and Draft Laws of the Russian Federation establish the regulatory framework based on the principle of technological neutrality, which allows creating the fundamental conditions for introducing acts into the legislation that would regulate the issue and circulation of digital rights, as well simplifies the process of making deals in electronic form.

### 3.6.11. Republic of Moldova

Moldova is one of the countries that has no legal regulation of digital assets and cryptocurrencies. Moreover, the term “digital asset” is absent in conversations, while the term “virtual assets” is used instead in professional circles.

The National Bank of Moldova (hereinafter — “NBM”) has repeatedly published messages on its official website warning about the risks arising from the use of virtual assets, cryptocurrencies in particular.

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Thus, on July 10, 2017, the NBM’s website first published the message “Virtual Currency and Its Associated Risks”\(^1\). The NBM noted that Moldova does not have legal regulation of “virtual currencies”, they are not a form of electronic money within the context of the Law on Payment Services and Electronic Money No. 114 dated May 18, 2012\(^2\), and the activity on issuing and concluding agreements using them is not supervised by authorized state bodies.

The message generalizes the features inherent in virtual currencies, which, in particular: represent a digital value; are not issued; are not backed by a central bank or government; do not depend on national currencies; are used by natural persons and legal entities as an alternative to money; can be transferred, stored or alienated electronically.

The NBM identified two blocks of risks related to virtual currencies. Those are risks of general (threat to the integrity of the financial system) and individual (threat to the interests of a user) nature. Risks of general nature are risks related to: money laundering and financing of terrorism; financial crimes; the use of virtual money to sell prohibited products, etc. Risks of individual nature include: fraud when executing conversion operations; high commissions and unprofitable exchange rate during conversion; fraud with electronic wallets; loss of personal data; “freezing” of the sum by the exchange platform when converting virtual currencies into standard currencies; loss of sums in case of bankruptcy of the exchange platform; high level of volatility of the exchange rate, at which virtual money can be exchanged; absence of guarantees that virtual currencies will be accepted by sellers, etc.

Thus, the NBM equates the terms “cryptocurrency”, “virtual currency”, “virtual asset”.

\(^1\) Virtualnaya valyuta i svyazannye s nej riski [Virtual currency and associated risks]. Retrieved from: https://www.bnm.md/ru/content/virtualnaya-valyuta-i-svyazannye-s-ney-riski [in Russian]

In the interview with Sergiu Cioclea, the Governor of the NBM, it was noted that “virtual money” or “cryptomoney” are synonyms of “cryptocurrencies”. However, according to the Governor of the NBM, cryptocurrency is not money, it is a virtual or electronic asset.

In September 2018, the NBM distributed a message called “Clarification of the regulatory and authorization position of the virtual currency”. In this message, the NBM confirmed its position that virtual currencies are not currencies in the general sense of the term, but instead are virtual assets without real coverage and backing, which does not allow accepting it as means of payment and means of reimbursement by the monetary authorities.

**Conclusion**

Thus, according to the official explanations of the NBM, cryptocurrencies and virtual currencies are used as instruments for investing. The management of the NBM also notes that using cryptocurrencies and virtual currencies brings risks due to the absence of backing of such phenomena.

### 3.6.12. United States of America

Since the 80s of the 20th century, the USA has started regulatory enforcement of the status of digital assets, which, in particular, is due to the adoption of the *Stored Communications Act*[^3] and *Computer Fraud and..."
Abuse Act\(^1\). The USA is the country where the active work on introducing the legal regulation of digital assets started.

There is a special form of codes in the USA, which means creating unified acts in order to ensure the integrity of normative regulation of the corresponding field of common law at the state level. The development of such acts is done by the National Conference of Commissioners on Uniform State Laws known as the Uniform Law Commission (hereinafter — “ULC”).

In 2014, the ULC developed the Uniform Fiduciary Access to Digital Assets Act, which was revised in 2015\(^2\). The corresponding Law was adopted by 42 states (in 2016 — Wyoming\(^3\), Maryland, South Carolina, Colorado, North Carolina, Washington, Florida, Tennessee, Indiana, Hawaii, Oregon, Arizona, Idaho, Nebraska, Minnesota, Connecticut, Michigan, Illinois, New York\(^4\), Wisconsin; in 2017 — Iowa, Kansas, New Mexico, Texas, Montana, Mississippi, Ohio, Arkansas, Virginia, Vermont, Alabama, Utah, South Dakota, North Dakota, Alaska, New Jersey, Nevada; in 2018 — Georgia, West Virginia, Maine, Missouri, U.S. Virgin Islands). Since 2019, this Act has been reviewed in the legislative authorities of Massachusetts and New Hampshire.

In accordance with paragraph 10 section 2 of the Act, “digital asset” means an electronic record in which an individual has a right or interest. The term does not include an underlying asset or liability unless the asset or liability is itself an electronic record.

According to paragraph 11 section 2 of the Act, the term “electronic” means relating to technology having electronic, digital, magnetic, wireless,
optical, electromagnetic, or similar capabilities (hereinafter — “electronic capabilities”). According to paragraph 22 section 2 of that same Act, “record” means information that is inscribed on a tangible medium or that is stored in an electronic or other medium and is retrievable in perceivable form.

Cambridge dictionary defines “underlying asset” as the assets on which another investment product is based, for example, the shares on a stock market in which an investment fund has put money: demand for most investment trusts is low, as the price has fallen below the value of the underlying assets\(^1\). As mentioned in the comments on the Act, underlying asset means funds held in an online bank account.

Taking the above-mentioned into account, we can specify the following features of a digital asset:

- it is an electronic record, i.e. information that has electronic capabilities;
- it confirms the right or interest of a person in the electronic record;
- it does not have an underlying asset, i.e. funds that are stored in an online bank account or obligations unless the asset or liability is itself an electronic record;
- it is information recorded on a tangible medium or stored on an electronic or other medium;
- such information is retrievable in perceivable form.

On the official ULC website, the description to the above-mentioned document\(^2\) states that the Act allows a trusted person to dispose of digital property, e.g. computer files, web domains and virtual currency. Taking that into account, we can make a conclusion that the ULC assigns virtual currencies to the category of digital property.

\(^1\) Cambridge dictionary; https://dictionary.cambridge.org/ru/%D1%81%D0%BB%D0%BE%D0%B2%D0%B0%D1%80%D1%8C%D0%B0%D0%BD%D0%B3%D0%BB%D0%B8%D0%B9%D1%81%D0%BA%D0%B8%D0%B9/underlying-assets

\(^2\) Fiduciary Access to Digital Assets Act, Revised; https://www.uniformlaws.org/committees/community-home?communitykey=f7237fc4-74c2-4728-81c6-b39a91ecdf22&tab=groupdetails
In 2017, the ULC developed the Uniform Regulation of Virtual-Currency Businesses Act\(^1\) (hereinafter — “URVCBA”), which was supplemented by the Uniform Supplemental Commercial Law for the Uniform Regulation of Virtual-Currency Businesses Act\(^2\) in 2018. Since 2019, the URVCBA has been under review in the parliaments of Hawaii, Nevada and Oklahoma.

According to paragraph 23 section 102 of the URVCBA, “virtual currency” means a digital representation of value that is used as a medium of exchange, unit of account, or store of value; and is not legal tender, whether or not denominated in legal tender; and does not include: a transaction in which a merchant grants, as part of an affinity or rewards program, value that cannot be taken from or exchanged with the merchant for legal tender, bank credit, or virtual currency; or a digital representation of value issued by or on behalf of a publisher and used solely within an online game, game platform, or family of games sold by the same publisher or offered on the same game platform.

According to paragraph 8 section 102, “legal tender” means a medium of exchange or unit of value, including the coin or paper money of the United States, issued by the United States or by another government.

The comments to the URVCBA note that virtual currencies are a subset of cryptocurrencies. Thus, cryptocurrency is a virtual currency, according to the URVCBA. Virtual currency, in turn, is digital property, according to the Revised Uniform Fiduciary Access to Digital Assets Act. Thus, cryptocurrency is digital property.

The point of the Revised Uniform Fiduciary Access to Digital Assets Act lies in the fact that a trusted person can dispose of a digital asset of a grantor if the latter transferred that right voluntarily. Digital asset comprises digital property, which includes virtual currencies, in particular,

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cryptocurrencies. This means that the terms “digital asset” and “cryptocurrency” are compared as a whole and a part according to the acts reviewed above.

**Securities Legislation**

The United States of America has an extensive legislative base for regulating the securities market. Normative acts aimed at regulating legal relations in this field include: Securities Act of 1933; Securities Exchange Act of 1934; Investment Company Act of 1940; Investment Advisers Act of 1940; Securities Investor Protection Act of 1970; Depository Institutions Act of 1982; Insider Trading and Securities Fraud Enforcement Act of 1988 and others.

The USA has a stable legal practice, developed, in particular, by the judicial branch, which is related to separate aspects of token circulation. A lot of attention is paid to the issue of distinguishing the terms such as utility token and security token. In reality, this problem lies in distinguishing specific tokens from securities.

Thus, in the Securities Act of 1933, “security” means “any note, stock, treasury stock, security future, security-based swap, bond, debenture, evidence of indebtedness, certificate of interest or participation in any profit-sharing agreement, any interest or instrument commonly known as

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6 Depository Institutions Act of 1982/USA/ [Digital source]. URL: https://www.congress.gov/bill/97th-congress/house-bill/6267?q=%7B%22search%22%3A%5B%22Depository+Institutions+Act+of%22%5D%7D&r=2&s=2
7 Insider Trading and Securities Fraud Enforcement Act of 1988/USA/ [Digital source]. URL: https://www.congress.gov/bill/100th-congress/house-bill/5133?q=%7B%22search%22%3A%5B%22Insider+Trading+Act+of%22%5D%7D&r=1&s=7
a “security”, or any certificate of interest or participation in, temporary or interim certificate for, receipt for, guarantee of or warrant or right to subscribe to or purchase, any of the foregoing”.

As for digital assets and the ability to assign them to the category of securities, it should be noted that, in accordance with the Revised Uniform Fiduciary Access to Digital Assets Act¹, “digital asset” is defined as an electronic record that a person has right or interest in. This term does not include an underlying asset or liability unless this asset or liability is itself an electronic record.

The above-mentioned indicates that securities and digital assets have different legal nature, so it is impossible to classify the latter as securities, as well as to apply the same normative regulation to the specified categories for a number of reasons.

Firstly, a mandatory feature of securities is their legislative definition and unification of types of constructions. The definition of securities itself contains a list of their types (note, stock, treasury stock, security future, security-based swap, bond, etc.), every one of which has independent meaning and circulation regime envisioned by the legislation. Meanwhile, a digital asset, from the standpoint of legal regulation, is a general term without any links to specific types. Thus, the approach of the legislator to defining securities is based on the type characteristics, whereas the approach of the ULC regarding digital assets — on general features, correspondence to which allows classifying a certain object as a digital asset.

Secondly, by the nature of their existence, securities can be certificated and non-certificated. A distinctive feature of a digital asset is its existence in electronic form. The so-called “digitization” of an asset transfers it into the electronic space, due to which access to the asset is provided using computer systems or corresponding devices.

Thirdly, securities are a document that confirms the property right of their holder. Whereas a digital asset is, essentially, an electronic record,

i.e. information stored on electronic media. And this is the information that a person has right or interest in. Based on the above-mentioned, the analyzed categories, securities and digital assets, are separate categories. Therefore, the securities legislation of the USA cannot be applied to digital assets, which, due to their uniqueness, require a proper legislative framework, the active implementation of which began in 2014 at the state level after developing the Uniform Fiduciary Access to Digital Assets Act.

**Money Services Legislation**

When reviewing the issues related to comparing the terms “digital assets” and “cryptocurrencies” in the USA, it is reasonable to review special legal acts that regulate money services.

During the annual conference of the ULC (July 28 to August 4, 2000), the Uniform Money Services Act\(^1\) was adopted (hereinafter — “UMSA”), which received the following amendments after the annual conference of the ULC (July 30 to August 6, 2004).

Vermont became the first state to adopt the UMSA in 2001. In 2003, Iowa and Washington did the same. Currently, the USMA is a part of legislation in another seven states (Texas (2005), Hawaii (2006), Alaska (2007), Arkansas (2007), South Carolina (2016), North Carolina (2016), New Mexico (2016), the U.S. Virgin Islands (2005) and Puerto Rico (2011)).

The fact that certain states did not adopt any laws based on the UMSA does not mean that they do not have normative provisions regulating the corresponding field of public relations. Such states have their own legislation, which is not based on the UMSA. For example, Alabama has a Money Transmission Act, Louisiana — Sale of Checks and Money Transmission Act, etc. It is worth noting that in the majority of states, which did not adopt their own acts, the legislation on money transmission is based on the UMSA.

\(^1\) Uniform Money Services Act (Last Revised or Amended in 2004)/ [Digital source]. URL: https://www.uniformlaws.org/committees/community-home?communitykey=cf8b649a-114e-4be9-8937-c4ee17148a1b&tab=groupdetails
The UMSA is an act of security and reliability, which confirms the conditions for licensing various types of institutions that provide monetary services. Such institutions are also called non-banking financial institutions or non-depository providers of financial services, the activity of which is aimed at providing alternative mechanisms for persons that carry out payments or receive currency or cash in exchange for payment instruments.

The need to adopt the acts in the reviewed field by the states was due to the fact that non-bank entities providing financial services did not fall under the special regulation of the corresponding federal or state legislation. Taking that into account, the objective of adopting the UMSA is ensuring the implementation of protection, which is realized by combatting the laundering (legalization) of illegally received funds, as well as the implementation of guarantees, which means ensuring the exercising of rights and interests of consumers of the corresponding financial services.

The UMSA provides the states with a unique opportunity to adopt a stage-by-stage approach to licensing and regulating stored value and other forms of new mechanisms of online and electronic payments.

This Act expands the traditional concept of money. With the emergence of the Internet and new technology of microchips, value that is not money in traditional sense can be exchanged. Thus, the UMSA provides a new definition of monetary value. Like money, monetary value can be transferred. In a similar fashion, the issuers do not have to sell the physical tangible payment instrument in order to give it to customers. The customers can acquire the repurchase value, which can exist only in computerized form. Therefore, the UMSA contains the definition of stored value, which is different from traditional payment instruments.

According to the comments on the UMSA\(^1\), the new types of payment mechanisms that potentially fall under the framework of the Act include: stored value; E-money and Internet payment mechanisms; Internet scrip;

\(^1\) Uniform Money Services Act (Last Revised or Amended in 2004) with prefatory note and comments (pages 8-13)/ [Digital source]. URL: https://www.uniformlaws.org/HigherLogic/System/DownloadDocumentFile.ashx?DocumentFileKey=4ddb7fd0-891f-7140-4ee4-680c84bde71d&forceDialog=0
Internet funds transfer; Gold/precious metals transfer and payment; Internet bill payment services.

According to the provisions of the UMSA, a stored value is monetary value that is evidenced by an electronic record, whereas monetary value is a medium of exchange, whether or not redeemable in money. Meanwhile, “record” means information that is inscribed on a tangible medium or that is stored in an electronic or other medium and is retrievable in perceivable form.

According to the Federal Reserve, stored-value products share three attributes:

- a card or other device electronically stores or provides access to a specified amount of funds selected by the holder of the device and available for making payments to others;
- the device is the only means of routine access to the funds;
- the issuer does not record the funds associated with the device as an account in the name of (or credited to) the holder\(^1\).

Cards with stored value record the balance on the computer chip, which is deducted at the terminal of a marketplace when a buyer or a natural person makes a purchase. Typically, the customer pays money to the bank or another provider in exchange for a card with a value. The customer uses the card instead of paper currency to purchase goods and services.

New types of cyberpayments or Internet payment mechanisms have been referred to by regulators and commentators by a host of different names including electronic cash, digital cash, electronic currency, and Internet or on-line scrip (E-money)\(^2\). E-money refers to money or a money substitute that is transformed into information stored on a computer chip or a personal computer (hereinafter — “PC”) so that it can be transferred through information systems such as the Internet. Technology permits the transmission of electronic value through networks that link PCs and the storage of electronic cash on the hard drives of PCs.

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2. Uniform Money Services Act (Last Revised or Amended in 2004)) with prefatory note and comments (page 10)/ [Digital source]. URL: https://www.uniformlaws.org/HigherLogic/System/DownloadDocumentFile.ashx?DocumentFileKey=4ddb7fd0-891f-7140-4ce4-680c84bde71d&forceDialog=0
The first type is through use of a traditional payment mechanism (Authorized Clearing House) or a credit card.

The second type of Internet payment mechanisms involves E-money. One type of Internet-based E-money system has been described as a token or notational system. These computer-based systems involve a customer purchasing electronic tokens, which serve as cash substitutes for transactions through the Internet. With this type of system, “money” or “value” is purchased from an issuer (who may be a bank or a nonbank). The value is then stored in a digital form on a consumer’s PC and the notational value is transferred via the Internet.

As for Internet scrips, the term “scrip” has been used to refer to a value that may be exchanged through the Internet but which may not be redeemable for money. Scrip is more analogous to coupons or bonus points that can be exchanged by a consumer for goods or services but have no cash redemption value.

In the context of cryptocurrency relations, it is reasonable to note that in a number of states, operations on exchanging cryptocurrencies fall under the regulation of the existing special legislation on money services. Legal regulation of cryptocurrency relations (in the aspect of operations on exchanging cryptocurrencies) is not unified in the USA. First and foremost, it is due to the two-level legislation system (two levels of legislation: federal and state).

Today, a number of states are quite progressive in regulating relations connected to the circulation of virtual currencies (also covers the term “cryptocurrency”). Various states, which directly or indirectly determine the regulation of cryptobusiness, companies that lead activity on exchanging cryptocurrencies are called money transmitters or money services businesses. The definitions of the following categories also include Western Union, PayPal and money transmission brokers. The main duties of these subjects lie in conducting procedure to identify their customers and in storing information on the performed transactions.

The approaches formed in different states can be divided as follows:

- approach of “cryptopioneers” (positive attitude towards cryptocurrency operations);
• approach of “customer protectors” (mostly negative or at least cautious attitude towards cryptocurrency operations);
• approach of the “golden middle” (states do not define the legal status of such operations but do not prohibit them).

Thus, the states that are considered cryptopioneers attempt to make the regulation of cryptocurrency operations as simple as possible. The main objective of this approach is to ensure economic growth and to create new jobs (generally — socially-oriented objectives).

The state of Texas determined how companies conducting business activity on exchanging cryptocurrencies could be compared to the subjects of money transfers. Puerto Rico also has a more flexible (favorable) approach to regulating cryptocurrencies. Completely opposite positions regarding cryptocurrencies are occupied by the states that adhere to the approach of “customer protectors”. The corresponding states are more concerned with the issue of potential risks that cryptocurrencies bring, rather than the positive aspects that the development of cryptocurrency relations could create. Such states prioritize interests of customers and investors before the interests of cryptocurrency companies. Cryptocurrency companies in such states are subject to increased requirements, which is evident from their obligation to provide more detailed information on cryptocurrency operations; from conducting regular supervision; from increased level of attention towards risk assessment of cryptocurrency investments.

The legislation of the state of New York is a bright example of a more strict regulation of activity of cryptocurrency companies. In this state, the regulation of cryptocurrency relations is not included into the legislation on money services. In New York, there is a specialized strict legislation that regulates the activity of cryptocurrency companies (BitLicense). The District of Columbia also took the position of strict regulation of cryptocurrency relations.

As for the states that took the position of the “golden middle”, they do not implement special regulation of cryptocurrency relations (in the positive sense of this idea), nor do they attempt to limit such an activity. This category includes the majority of states in the USA.
In the majority of states, operations with cryptocurrencies are equated to money transfer operations for the purpose of normative regulation. The states that have selected the approach of “the golden middle” can be divided as follows:

a) **first group** — states that included a category such as cryptocurrencies in their own legislation on money transfer, while the regulators of such states adopt official guidelines (special acts) regarding separate aspects of applying the state legislation in the context of cryptocurrency relations (North Carolina, Washington);

b) **second group** — these states do not legitimize the term “cryptocurrency” as a category of the legislation on money transfer, however, their regulatory bodies publish official guidelines aimed at determining the foundations for applying the current legislation in the context of cryptocurrency relations, or, on the contrary, legitimize it but do not have official guidelines (Alabama, Connecticut, Georgia, Idaho, Illinois, Kansas, Louisiana and others);

c) **third group** — states that have neither normative inclusion of the term “cryptocurrency” into the current legislation nor any official guidelines regarding the legal aspects of regulating such concept (Florida, Indiana, Iowa, Montana, Nebraska and others).

However, the approach, according to which the term “cryptocurrency” is included into the current legislation on monetary services, and the foundation for legal application in the aspect of cryptocurrency relations is being formed based on that same legislation, can soon drastically change. In this case, we need to pay attention to the act developed by the ULC — Uniform Regulation of Virtual-Currency Businesses Act¹.

The above-mentioned analysis of the UMSA text indicates that this Act does not contain any definitions of “digital asset” and “cryptocurrency”. However, in the comments on this Act, the ULC operates terms such as “token”, “electronic currency”, “e-money”, “digital money”, “Internet or online scrips” without giving them a detailed description.

3.6. Analysis of Examples of Legislative Regulation of Cryptocurrencies and Digital Assets...

Conclusion

The United States of America shows a positive attitude towards innovative instruments and the blockchain technology as a whole, which is evident from a number of regulatory acts adopted since 2014.

3.6.13. Islands of Bermuda

An interesting approach to defining digital assets was taken by Bermuda. In 2018, Bermuda adopted the Digital Asset Business Act\(^1\), which determines new legal basis for the circulation of digital assets.

In accordance with the provisions of the Digital Asset Business Act, digital asset means anything that exists in binary format and comes with the right to use it and includes a digital representation of value that:

- is used as a medium of exchange, unit of account, or store of value and is not legal tender, whether or not denominated in legal tender;
- is intended to represent assets such as debt or equity in the promoter;
- is otherwise intended to represent any assets or rights associated with such assets;
- is intended to provide access to an application or service or product by means of distributed ledger technology.

This Act also determines the types of digital asset businesses, which include the issue and sale of virtual coins, tokens and other forms of digital assets; activity related to electronic exchange of digital assets; provision of services of electronic wallets for digital assets. The provisions of this Act indicate that the term “digital asset” also includes virtual currencies. Meanwhile, the list of forms of digital assets itself remains open, which allows stating the possibility of including other digital assets there.

Conclusion

The legislation of Bermuda has formed a new approach to defining digital assets since 2018, which can be characterized as a narrow approach

to defining a term such as “digital asset”. At the same time, the terms “cryptocurrency” and “virtual currency” are not used in legal acts.

3.6.14. People’s Republic of China

The People’s Republic of China started researching the cryptocurrency market at the state level a long time ago. The People’s Bank of China created the Electronic Money Institution for such purposes. Overall, it should be noted that today, the People’s Bank of China takes a position that cryptocurrency cannot be considered as a normatively determined payment instrument.

The main provisions for regulating the circulation of cryptocurrencies were specified in the General Principles of Civil Law. At the same time, such regulatory framework of cryptocurrency circulation indicates the acceptance of cryptocurrencies by the government as an object of property right. Cryptocurrencies themselves are viewed as a product in China.

In China, it is mandatory to register cryptocurrency exchanges by the Telecommunication Bureau of the People’s Republic of China. As for taxation, cryptocurrency operations are subject to taxation on general terms, in particular, by taxes such as profit tax, income tax and capital gain tax. The sale of cryptocurrencies itself can be subject to value added tax.

It should also be noted that China prohibits ICOs. On September 4, 2017, seven central state regulatory bodies (People’s Bank of China, Cyberspace Administration of China (hereinafter — “CAC”), Ministry of

Industry and Information Technologies, State Administration for Industry and Commerce, China Banking Regulatory Commission, China Securities Regulatory Commission and China Insurance Regulatory Commission) jointly published the Announcement on Preventing Financial Risks from Initial Coin Offerings, which prohibits the implementation of ICOs in China1.

On February 15, 2019, the “Rules Against Anonymity” approved by the CAC came into force, which cover all the companies related to blockchain, in particular, websites and mobile apps that provide information on technical support to the public using the blockchain technology. After the Rules came into force, the specified companies had to register their names, domains and server addresses with the CAC. Moreover, in case the authorized state body turns to the corresponding company regarding the provision of access to the stored data on users or the company itself, such a company must provide access and the requested information.

**Conclusion**

The legal nature of cryptocurrencies is still not completely determined at the state level. Along with the term “cryptocurrency”, state authorities use the term “digital asset” without distinguishing between them. Taking into account that cryptocurrencies are viewed as a product, digital assets are also a product in the understanding of the authorized bodies.

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**3.6.15. Kingdom of Thailand**

The legislator of the Kingdom of Thailand approached the issue through specialized (narrow) definition of digital assets. In 2018, the Kingdom of Thailand adopted the Emergency Decree on Digital Asset Businesses2. This document was adopted to ensure the effectiveness of

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supervision and monitoring of activity of businesses related to digital assets, as well as to ensure transparency of such activity in order to maintain the stability of economy and protection of investors. This document determines the foundation for normative regulation of digital asset.

This Decree formalizes a short and specific definition of digital assets: digital asset means cryptocurrency and digital tokens. According to the Decree, cryptocurrency means an electronic data unit created on an electronic system or network for the purpose of being used as a medium of exchange for the acquisition of goods, services or any other rights, or the exchange between digital assets, and shall include any other electronic data units. In turn, the term “digital tokens” is used as an electronic data unit created on an electronic system or network for the purpose of: specifying the right of a person to participate in an investment in any project or business; specifying the right of a person to acquire specific goods, specific service, or any specific other right under an agreement between the issuer and the holder, and shall include any other electronic data units of right.

Conclusion

The legislation of the Kingdom of Thailand contains the terms “digital asset”, “cryptocurrency” and “digital token” without using the term “virtual currency”. Meanwhile, a digital asset is the most extensive term.

3.6.16. Republic of Singapore

The Republic of Singapore does not have any specialized legislative acts that determine the term “cryptocurrencies” and establish the foundation for their legal regulation. However, Singapore has a number of documents issued by the authorized public authorities, which contain the explanations regarding separate aspects of applying the current legislation to the relations connected with the circulation of cryptocurrencies.

Back in 2014, the Inland Revenue Authority of Singapore determined cryptocurrencies as products or services for the purposes of taxation.
According to the criterion of the economic and legal characteristics, electronic tokens are viewed as:

a) product (in case of utility tokens);

b) securities (in case of security tokens).

The activity on offering and issuing tokens is within the competence of the Monetary Authority of Singapore (hereinafter — “MAS”). If tokens fall under the definition of “securities”, in accordance with the provisions of the Singaporean Securities and Futures Act, the corresponding business entity must issue a prospectus of such tokens and register them with the MAS before issuing.

In this case, the corresponding tokens will be equated to securities and fall under the corresponding normative regulation. At the same time, the MAS notes that it does not have the goal to ensure the regulation of cryptocurrencies. This organization views electronic tokens as a category that “evolved” long ago and stopped being covered by the term “virtual currency”. This approach indicates that the MAS distinguishes the terms such as “electronic money” and “virtual currencies”.

In November 2017, the MAS issued “A Guide to Digital Token Offerings”\(^1\). This document was the one that distinguished between the tokens that fall under the regulation of the legislation on securities and the tokens that are not subject to such regulation because by their nature they fall under the definition of a product. Thus, in particular, the token platforms for mutual use of computing powers do not fall under the regulation from the MAS, therefore, the national legislation on securities does not affect them.

On January 14, 2019, the Payment Services Act\(^2\) was adopted at the second reading by the parliament of Singapore and approved by the


239
president on February 11, 2019. This law includes services on digital payment tokens into the number of regulated payment services, the implementation of which requires a license.

The corresponding provision of the Act defined “digital payment token” as any digital representation of value (other than an excluded digital representation of value) that:

- is expressed as a unit;
- is not denominated in any currency, and is not pegged by its issuer to any currency;
- is, or is intended to be, a medium of exchange accepted by the public, or a section of the public, as payment for goods or services or for the discharge of a debt;
- can be transferred, stored or traded electronically;
- satisfies such other characteristics as the authority may prescribe.

This shows that digital payment token is not a digital asset in its theoretic sense, but a cryptocurrency.

**Conclusion**

The legislation of Singapore contains the terms such as “cryptocurrency” and “digital payment token”, but there are no definitions of the terms “digital asset” and “virtual currency”. With regard to public relations that arise during the circulation of such objects, Singapore applies the legislation on combatting money laundering and financing of terrorism.

**3.6.17. Japan**

In Japan, operations on exchanging cryptocurrencies are regulated by the provisions of the national legislation. In order to ensure the regulation of relations on exchanging cryptocurrencies, the Payment Services Act of Japan\(^1\) was amended in June 2016. The amendments came into force on April 1, 2017. The corresponding legal act specified the definitions of the term “virtual currency”, which means:

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\(^1\) Payment Services Act of Japan. URL: http://www.japaneselawtranslation.go.jp/law/detail/?id=3078&vm=02&re=02
• a property value, which can be used for the purpose of paying
consideration for the purchase or leasing of goods or the receipt of provision
of services and can also be purchased and sold by means of an electronic
data processing system;
• a property value, which can be mutually exchanged with what is
set forth in the preceding item.

The provisions of the Japanese legislation state that the main and
integral part of virtual currencies is their electronic nature of existence.

In accordance with the provisions of the Payment Services Act of
Japan, only operators registered with the local bureau of finances have
the right to perform operations on exchanging cryptocurrencies. The
corresponding operator must have an organizational and legal form of a
joint-stock company or be a “foreign business entity that performs activity
on exchanging cryptocurrencies”, which is a company that is represented
in Japan. Such a representative office is a resident of Japan and its office,
respectively, is located, in Japan. The “foreign business entity that
performs activity on exchanging cryptocurrencies” should be understood
as a provider of services on exchanging cryptocurrencies registered by
the authorized foreign bodies in accordance with the provisions of a
foreign legislation that envision special procedures for registering such
business.

The law obliges the companies that exchange cryptocurrencies to
separately manage the funds or cryptocurrency of their clients (separate
their own cryptocurrency from the cryptocurrency provided to them by
clients for performing the corresponding operations). Proper implementa-
tion of this management must be supervised by certified public audit companies.
Business entities that conduct activity on exchanging cryptocurrencies
must have a contract with the dispute resolution center that has experience
in this field. Companies that conduct activity on exchanging cryptocurrencies
must keep the accounting of their cryptocurrency operations and annually
submit the corresponding reports on the results of their activity to the
Financial Services Agency.

In terms of taxation, it should be noted that the National Tax Agency
published the legal positions in December 2017 that contain the explanations
on the issue of taxation of the operations on exchanging cryptocurrencies. Thus, the regulatory authority of Japan noted that the profit received from cryptocurrency operations is a different kind of income than the one subject to taxation with the capital gain tax. The term “cryptocurrency” itself is not defined by the legislation of Japan.

**Conclusion**

The terms “digital asset” and “cryptocurrency” are not specified in the legislation of Japan, even though the latter can be found in separate legal acts. Meanwhile, the term “virtual currency” is directly specified in the corresponding act of 2016.

### 3.6.18. Commonwealth of Australia

The public authorities of the Commonwealth of Australia have issued a number of documents regarding the applied aspects of using the current Australian legislation for the relations connected to the circulation of cryptocurrencies. In August 2015, the Senate Economic References Committee (hereinafter — “Committee”) published the Report “Digital Currency — Game Changer or Bit Player”¹. This Report aims to determine the approaches to ensuring the efficient normative regulation of the system of digital currencies, the potential ability to implement the corresponding technologies into Australian economy and the advantages of using such currencies.

The mentioned act focuses its attention on the issues related to the application of the legislation on combatting money laundering and financing of terrorism in the aspect of electronic currencies. The Report proposes to consider digital currencies, which also include cryptocurrencies, as money for the purposes of taxation with the goods and services tax. Taking that into account, the Committee proposed that the government

should advise the corresponding local authorities on introducing changes into the current tax legislation of Australia.

In Australia, special attention is paid to the issue of overcoming a negative phenomenon such as “double taxation of operations with cryptocurrencies”. In the corresponding field (tax legal field and the functioning of cryptocurrencies within its limits), the government of Australia is closely cooperating with the FinTech Advisory Group. The introduction of the proper systematic tax regime for electronic currencies is one of the priority areas for the government in the FinTech field.

Back in December 2014, the Australian Taxation Office adopted a number of solutions on taxation with the profit tax, capital gain tax and using tax benefits in operations with cryptocurrencies. The corresponding solutions brought clarity to the practice of taxation regarding operations with cryptocurrencies.

In particular, we can mention the published Guidelines “Tax Treatment of Cryptocurrencies”\(^1\). This document gave a definition of the term “cryptocurrency”. It means a digital asset in which encryption techniques are used to regulate the generation of additional units and verify transactions on a blockchain. Overall, the Australian Taxation Office takes a position, where operations with cryptocurrencies must be considered as barter operations for the purposes of taxation because cryptocurrencies are neither national nor foreign currencies.

The Australian Taxation Office also issued the Guidelines “GST and Digital Currency”, which specify the foundation for applying the current tax legislation on the goods and services tax to cryptocurrency operations\(^2\).

In August 2017, the government proposed the draft law to the parliament on spreading the legal regime that is established by the legislation on combatting money laundering and financing of terrorism to the relations connected with exchange of cryptocurrencies. This law was adopted in December 2017 and came into force on April 3, 2018.


On October 10, 2018, the Australian Securities and Investments Commission (hereinafter — "ASIC") published the Information Sheet 225 Initial Coin Offerings and Crypto-Currency¹, as amended, which describes the ability to use the Corporations Act² if a crypto-asset is classified as a financial instrument. If, after the subsequent examination by the ASIC, it is established that a specific crypto-asset, for example, Bitcoin, is not a financial instrument, then the Consumer Protection Legislation must be used when regulating the issues related to its circulation.

In September 2018, the ASIC approved the Corporate Plan for 2018–2022³ on developing the financial sector. Both in the above-mentioned Information Sheet and in the ASIC’s Corporate Plan, the terms “digital currencies” and “crypto-assets” are used along with the term “crypto-currency”.

Conclusion

The terms “digital asset” and “virtual currency” are not specified in the legal base of Australia. However, the legislator of this country has defined the terms “crypto-assets” and “digital currencies”.

¹ Information Sheet 225 Initial coin offerings and crypto-currency. URL: https://asic.gov.au/regulatory-resources/digital-transformation/initial-coin-offerings-and-crypto-currency/#when
4.1. Legislative Initiatives to Regulate the Blockchain Technology: Global Experience

The evolution of digital technologies, globalization and the modification of relations between society and an individual encourage us to reconsider the development and vector of the countries’ policies, which leads to a radical rethinking of the missions, functions, legitimacy, space and tools of activity not only of separate state institutions, but of the state as an institution as a whole.

Many countries have already understood that such phenomena as distributed ledgers and digital assets, the relations arising from their use, as well as the market that is based on these phenomena, require legislative regulation. Many states build their own policy on the blockchain technology by putting forward legislative initiatives, while others have already determined their position regarding this “revolutionary” technology by enshrining it in the existing legislation.

4.1.1. Ukraine

Today, the status of digital assets and the blockchain technology in Ukraine remains unregulated. At the same time, such topics are quite often raised at Ukrainian forums and conferences, as well as are a relevant subject of legislative drafting.
Concept of State Policy in the Field of Virtual Assets

In 2017, Ukraine was among the top 10 countries in the world in the number of users of virtual currencies. Thus, it is obvious that in October 2018, the Concept of State Policy in the Field of Virtual Assets was published, aimed at ensuring clear lawful conditions for its legal development. According to this Concept, the main way to solve problems is to eliminate legal uncertainty regarding activities in the field of virtual assets. It can be achieved by defining the terms “virtual currency”, “virtual assets”, “mining”, “ICO/ITO”, “smart contract”, and “token”, as well as by recognizing virtual currencies as intangible assets, by defining crypto exchanges as primary financial monitoring entities, as well as by implementing Directive 2018/843/EU of the European Parliament and of the European Council dated May 30, 2018 on amending Directive 2015/849/EU on preventing the use of financial systems for the purpose of money-laundering and terrorist financing, and amending Directives 2009/138/EC and 2013/36/EU.

At the same time, the Concept distinguishes “virtual currency” from “virtual assets”, defining virtual currency as a digital representation of value that does not have a currency or money regime, and virtual assets as “any records in a distributed ledger in the form of data that are expected to generate economic benefits in the future.” It is assumed that the above-mentioned distributed ledger with records in the form of data will be built on the basis of blockchain.

The definition of a “digital asset” is not given in the Concept, and “token” is understood as “a digital unit of accounting within a distributed


4.1. Legislative Initiatives to Regulate the Blockchain Technology: Global Experience

ledger of records in the form of data that has cryptographic protection”. At present, the Concept is still awaiting approval.

**Concept of Development of the Digital Economy and Society of Ukraine for 2018-2020**

Another concept was proposed and approved in January 2018, the Concept of Development of the Digital Economy and Society of Ukraine for 2018-2020. In accordance with this document, blockchain is a concept that will help transform public administration in areas such as property rights registration, justice, and identity verification. The blockchain technology in this Concept is presented through the prism of trust technology with the possibility of application in the public sector for electronic referenda, petitions, voting and other e-government services. Blockchain can provide highly effective mechanisms for protecting the integrity and accessibility of information and allows creating fully decentralized systems. As defined in the Concept, “blockchain is a software and computer-based algorithm for a decentralized public or private ledger or database that operates through peer-to-peer interaction over the Internet or in any other way that guarantees proper cryptographic protection for all records and transactions conducted by using an appropriate technology”.

**Doctrine of Balanced Development “Ukraine 2030”**

The Doctrine of Balanced Development “Ukraine 2030” presents the existing and prospective clusters of the national economy, which also

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include information and communication technologies, in particular cloud technologies, robotics, artificial intelligence technologies and data exchange security systems, the capabilities of which can be expanded by the blockchain technology.

**Economic Strategy “Ukraine 2030E — a Country with a Developed Digital Economy”**

The section of the Economic Strategy “Ukraine 2030E — a Country with a Developed Digital Economy” presents the so-called “soft” infrastructure, which is supported by blockchain infrastructure. According to the Economic Strategy, blockchain will allow conducting electronic referenda, e-petitions, e-voting. It will provide an unprecedentedly high level of information security, which will contribute to the creation of a decentralized system, while its high resistance to attacks will enable it to be used in areas such as e-finance, public procurement and electronic budgeting.

**Draft Law “On the Circulation of Cryptocurrency in Ukraine”**

The first substantive legislative initiatives have been submitted to the Ukrainian parliament since 2017. In autumn 2017, the Draft Law of Ukraine “On the Circulation of Cryptocurrency in Ukraine” was submitted. The basis of the Draft Law’s terminology was made up of cryptocurrencies and cryptocurrency transactions. Although the term “blockchain system” was defined, the definitions of token, blockchain and digital assets were not given in the document. The Draft Law was not adopted. It was sent for revision.

**Draft Law “On Stimulating the Market of Cryptocurrencies and Their Derivatives in Ukraine”**

Further, the Draft Law of Ukraine “On Stimulating the Market of Cryptocurrencies and Their Derivatives in Ukraine” regulating the general

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principles of functioning and legal regulation of the market of cryptocurrencies and their derivatives was submitted for consideration. The Draft Law was not adopted and was sent for revision.

**Draft Law “On Amendments to the Tax Code of Ukraine Regarding the Taxation of Transactions with Virtual Assets in Ukraine”**

Another legislative initiative was submitted to the Verkhovna Rada in September 2018 — the Draft Law of Ukraine “On Amendments to the Tax Code of Ukraine Regarding the Taxation of Transactions with Virtual Assets in Ukraine”¹. The Draft Law also introduced the term “virtual assets”, which by its definition is quite close to the identical term presented in the Concept of State Policy in the Field of Virtual Assets. However, in this Draft Law, the term “virtual asset” is proposed to be understood as cryptocurrencies and asset tokens, arguing that both cryptocurrencies and asset tokens are virtual assets in the form of tokens.

There is a terminological inconsistency in the definition of an asset token. It follows from the definition of “token” that it is a digital accounting unit within a distributed ledger (in fact, a conventional digital unit). When it comes to an “asset token”, the word “token issuer” gets its formalization in its definition. The issuer should be understood as a person, who issues a certain value (in the material sense of this concept) and has specific obligations arising from such issue. It follows from the logic of the authors of the Draft Law that a token itself is a technical category, which serves as an external form of existence (objectification) of cryptocurrencies and asset tokens. Accordingly, an issue cannot concern tokens, it will rather be characteristic of asset tokens. Therefore, the phrase “… an issuer of an asset token” would be correct rather than “… an issuer of a token”.

The Draft Law also proposes a definition of the term “mining” but does not specify the purpose of such activities. The presented definition of a

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distributed ledger is not sufficiently specific and unambiguous, which in turn may lead to an erroneous comparison with this concept of a significant number of objects that do not correspond to the term “distributed ledger”. The proposed definition of a token is identical to that provided in the Concept of State Policy in the Field of Virtual Assets. The project is still under review.

**Regulation on the Ministry of Digital Transformation**

On September 18, 2019, the Cabinet of Ministers of Ukraine adopted the Resolution on approval of the Regulation on the Ministry of Digital Transformation. According to the adopted Resolution, this Ministry is responsible for forming and realizing the state policy in the field of digitalization, open data, national electronic information resources and interoperability, implementation of electronic and public services, electronic trust services, etc. The authority of the Ministry also includes the development of telecommunication networks and IT industry.

The III Kharkiv International Legal Forum took place in September 2019. One of the key events of the forum was the panel discussion “Future of Digital Assets: Financial and Legal Aspects”. As part of this forum, the representatives of more than twenty countries discussed the financial and legal aspects of the operation of the blockchain technology and digital assets, including the tendencies of using them not only in the activity of exchanges, but also at the state level. The forum participants aim to initiate the creation of regulations and to amend existing legislation, which would

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contribute to the structuring and development of this area. The forum resulted in the signing of the Protocol (final protocol of the panel discussion “Future of Digital Assets: Financial and Legal Aspects” of the III Kharkiv International Legal Forum¹). It recorded the decision of the participants to initiate the creation of the Center for Development of Legal Solutions in the Areas of Application of Blockchain Technologies that will be the foundation for the creation of a working group for the development and systematization of the terminology and categorical apparatus of legal acts regulating the use of the blockchain technology. This initiative has been sent for review and further promotion to the Ministry of Digital Transformation of Ukraine. The Center was named the “Research Center of Legal Solutions in the Area of Application of Distributed Ledger Technologies”.

**Conclusion**

Having analyzed the above-mentioned concepts and legislations, we can conclude that the state regulation of Ukraine, under the conditions of its modification and increase in the number of initiatives, projects and tasks, should be based on technological and digital forms of ensuring its uninterrupted and complete operation. The speed at which the blockchain technology will take place of such a form of ensuring depends on a number of factors, for example, on the level of involvement of the relevant state institutions, in particular, the Ministry of Digital Transformation of Ukraine in these transformations.

The creation of the Center for Development of Legal Solutions in the Areas of Application of Blockchain Technologies, the objective of which is to develop and systematize the terminology and categorical apparatus of legal acts regulating the blockchain technology, also significantly contributes to the development of relations arising due to the blockchain-based interaction and integration of the technology in many areas of state regulation.

4.1.2. European Union

On March 8, 2018, the European Commission approved the **FinTech Action Plan**\(^1\) on the prospects of using the blockchain technology, artificial intelligence and cloud services in the field of financial services. Moreover, it should be noted that in December 2016, the European Central Bank and the Bank of Japan launched a joint research project, Stella. The aim of the project is to use the blockchain technology to modernize existing financial market instruments.

Thus, the attention of EU regulators is focused on issues related to crypto-assets, virtual currency and blockchain. It is worth noting that the term “digital asset” is not directly enshrined in EU legislation. Indirectly, this type of asset is mentioned in the definition of the term “property”, which includes assets of any type: tangible or intangible, movable or immovable property, as well as legal documents or instruments in any form, including in electronic or digital format, confirming the ownership right or interest in such assets.

The glossary provided in Appendix 1 to the Recommendatory Report by the European Bank for Reconstruction and Development for the European Commission defines a crypto-asset\(^2\) as a type of private asset that depends primarily on cryptography and Distributed Ledger Technology (DLT) or similar technology as part of their intended or inherent value. Unless otherwise specified, the European Securities and Markets Authority uses the term “crypto-asset” to refer to both “virtual currencies” and “digital tokens”.

In February 2018, the European Commission launched the EU Blockchain Forum aimed at supporting European cross-border interaction with technology and its multiple stakeholders, as well as at uniting the economy around blockchain.

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Since its official launch, the newly created organization has produced three thematic reports: Blockchain innovation in Europe\(^1\), Blockchain and GDPR\(^2\), and Blockchain for government and public services\(^3\) with the support of the European Parliament.

A second important step was taken in April 2018, when 22 countries (21 EU member states and Norway) signed the Declaration of creating the European Blockchain Partnership\(^4\) (hereinafter — “EBP”). During 2018, five more European countries joined the EBP: Greece, Romania, Denmark, Cyprus and Italy. The EBP focuses on cyber security, privacy, energy efficiency and interoperability — all in full compliance with EU legislation.

There are trends towards settlement and the implementation of blockchain in the legal field at the level of national legislation in EU member states. France has positioned itself at the forefront of blockchain innovation, regulating the use of blockchain for the exchange of securities using mini bonds since 2017. The country is also one of the first in Europe to propose a legal framework for tokens in the bill “Action Plan for Business Growth and Transformation” (Plan d’Action pour la Croissance et la Transformation des Entreprises)\(^5\).

The current coalition agreement outlined the position of the German government on developing a comprehensive blockchain strategy and supporting an appropriate legal framework for crypto-asset and token trade in Europe and worldwide.

Austria supports research projects on blockchain with an annual allocation of 8 million euros to the research fund.

In the process of creating a “sandbox” for blockchain companies, the Central Bank of Lithuania announced its intention to issue a digital

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\(^1\) Blockchain innovation in Europe. URL: https://www.eublockchainforum.eu/reports.
\(^2\) Blockchain and GDPR. URL: https://www.eublockchainforum.eu/reports.
\(^3\) Blockchain for government and public services. URL: https://www.eublockchainforum.eu/reports.
Section 4. Legal Aspects of the Blockchain Technology

collector coin (DCC), as well as formed ICO guidelines in cooperation with the Lithuanian Ministry of Finance and tax authorities.

**Estonia** has made itself known through its e-Estonia program, innovative research to support its citizens, inter alia, in the field of digital identification and medical records.

In **Spain**, the Alastria project is supported as a model for building national and pan-European blockchain platforms.

In the **Netherlands**, the government works with the private sector to promote blockchain innovations through the Dutch Blockchain Coalition, which has already developed more than 40 evidence-based blockchain concepts.

The **Benelux countries** have signed a memorandum of mutual assistance and cooperation in the development of blockchain. Infrachain is a project supported by the government of Luxembourg, which “aims to implement management mechanisms that would facilitate the development, deployment and adoption of blockchain applications for various sectors, including banking, FinTech and financial services in the current regulatory environment”.

**Switzerland**, which is not a member of the EU, has gained a global reputation as one of the most dynamic and important blockchain ecosystems in the world.

**Conclusion**

Europe is becoming quite active in research and development based on the blockchain technology. Today, the European Commission has provided about 80 million euros to blockchain-related EU projects in many fields and has announced plans to increase funding to 300 million euros.

4.1.3. **Great Britain**

In 2016, the UK government tested the use of the blockchain-based system to distribute social benefits through the Department for Work & Pensions, which allowed examining the use of blockchain as a service for each government department conducting activities as of August 2016.
4.1. Legislative Initiatives to Regulate the Blockchain Technology: Global Experience

An important step in the development of the digital economy was publication of the “Digital Strategy” by the UK Government\(^1\), which set out the UK Government’s commitments to making Great Britain a leader in the development of digital business, including by testing new technologies such as Distributed Ledger Technology (DLT).

As the cryptoasset market is growing rapidly, causing both positive and negative aspects, Her Majesty’s Treasury Chancellor established a Cryptoasset Task Force in March 2018, which includes Her Majesty’s Treasury, the Financial Conduct Authority (FCA), and the Governor and Company of the Bank of England.

Based on the results of these studies, the Cryptoasset Taskforce report\(^2\) was published in October 2018, outlining the UK policy and regulatory approach to cryptoassets and DLT. This report allowed assessing the risks and potential benefits of cryptoassets, potential losses, determining a plan for regulating cryptoassets in the UK, and detailing various types of activity.

According to paragraph 2.9 of this report, a cryptoasset is one of applications of DLT\(^3\). While all cryptoassets use a particular type of DLT, not all applications of DLT involve cryptoassets. Noting that there is no unified definition of “cryptoasset”, in paragraph 2.10 of the Report, the Task Force defined this concept as “a cryptographically secured digital representation of value or contractual rights that uses some type of DLT and can be transferred, stored or traded electronically”.

In January 2019, the Guidance on Cryptoassets\(^4\) was published on the FCA official website, and in July the final version of the document — Guidance on Cryptoassets: Feedback and Final Guidance to CP 19/3\(^5\).

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Conclusion

We can state that Great Britain is developing in the field of the blockchain technology integration.

4.1.4. Commonwealth of The Bahamas

Since 2018, The Bahamas have been determined to integrate crypto assets into the financial field. In June 2018, Deputy Prime Minister of The Bahamas and Kevin Peter Turnquest, Minister of Finance, announced the goal to create a national digital currency. According to the Minister of Finance, this kind of an innovation will contribute to the creation of a secure system for providing financial services and will allow all islands of the Commonwealth to have full access to bank services. The launch of the digital currency is supervised by the Central Bank of The Bahamas (hereinafter — “CBOB”)\(^1\). The state also intends to apply the blockchain technology in the fields of licensing, insurance and issue of passports\(^2\).

In November 2018, the CBOB published a Discussion Paper on regulating crypto assets “Discussion Paper: Proposed Approaches to Regulation of Crypto Assets in The Bahamas”\(^3\), which amended the Payment Instruments (Oversight) Regulations\(^4\) regulating payment systems. This document proposes the following classification of tokens:

- **payment tokens** can contain value or be a unit of measure;

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• **asset-backed or security tokens** are a digital representation of a physical asset or income flow. They can also include rights to exchange tokens for physical assets, shares or stake in organizations;

• **utility tokens** represent the right to goods or services, similar to gift cards.

The document also addresses the issues of tax evasion, volatility of markets, fraudulent ICOs and policies regarding the fight against money laundering and the difficulties that such standard-setting bodies as the International Monetary Fund face.

In May 2019, the Securities Commission of The Bahamas published a project Digital Assets and Registered Exchanges (Dare) Bill, which envisions the regulation of issue and sale of digital tokens, as well as of the activity of persons that issue digital tokens and provide intermediary services related to the issue of digital tokens. The project provides the definition of a digital asset, which is a digital representation of value distributed via a platform based on the distributed ledger technology, which contains this value or the right to use this value. Meanwhile, an asset token is defined as a digital asset that represents a claim against the issuer, it is intended to represent the asset and is embedded with underlying assets; derives its value by reference to an underlying asset, or is secured by an underlying asset; is backed by assets held as collateral for the primary purpose of encouraging price stability.

This document is applicable to any person, who as an organizer, issuer, founder, sponsor, wallet provider, exchange, buyer or investor participates in forming, promoting, maintaining, organizing, selling or redeeming the initial token offering.

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Conclusion

Having analyzed the documents, the purpose of which is to regulate the application of the blockchain technology in various fields, payment systems, as well as the issue and sale of digital tokens, we can state that the Commonwealth of The Bahamas is one of the states, which is positive towards the integration of instruments of the distributed ledger into the financial sector. The CBOB considers the integration of such an instrument to be a step towards further modernization of the financial services sector. Moreover, taking into account the unique territorial features of this country, particularly the existence of a number of islands, the integration of digital assets or issue of national currencies based on them can positively impact the economic conditions of the population of The Bahamas.

The issued documents and public statements of state representatives also indicate active integration of the blockchain technology into the operation of state institutions.

4.1.5. Eastern Europe

The countries of Eastern Europe have thoroughly approached the issue of the development and implementation of new technologies in order to develop the innovation industry. It is advisable to consider some of the countries in this region that are most actively involved in the regulation of cryptocurrencies and the introduction of the blockchain technology.

Belarus

In Belarus, a specialized normative legal act is in force regulating the legal framework for activities on the cryptocurrency circulation, mining and the blockchain technology. This act is the Decree No. 8 of the President of the Republic of Belarus “On the Development of the Digital Economy” dated December 21, 2017 (hereinafter — “Decree”){1}. This

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258
Decree is aimed at establishing normative regulation of cryptocurrencies, as they are considered as objects of the digital economy, and it is designed to ensure the progressive development of the High-Tech Park\(^1\), the innovation sector and the construction of a modern digital economy in Belarus. However, neither the Decree itself nor its four Appendices use the term “digital asset”.

Appendix No. 1 to the Decree contains a list of used terms and their meanings, including the following: “cryptoplatform operator”, “virtual wallet”, “owner of a digital unit (token)”, “cryptocurrency”, “mining”, “cryptocurrency exchange operator”, “listing of digital units (tokens), “ledger of transaction blocks (blockchain)”, “smart contract”, “technological mode”, digital unit (token)\(^2\).

**Poland**

In 2015, the Polish Ministry of Finance announced a possible start of regulation of cryptocurrencies in the country\(^3\). It should be noted that this statement was made with the proviso that any regulatory acts should be adopted either as a result of their initiation at the EU level, taking into account the cross-border nature of business, or in the event of a security threat due to the circulation of cryptocurrencies in the domestic market.

In 2016, the Central Statistical Office of Poland announced that trade and mining of cryptocurrencies had already become an “economic reality”, and companies engaged in these activities will soon be able to obtain official registration\(^4\).

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1 High-Tech Park is a special economic zone with a special tax and legal regime in Belarus for the development of IT business. It is not a free (special) economic zone, but it represents a jurisdiction that operates on the basis of extraterritoriality.


In January 2018, Polish Blockchain Technology Accelerator announced that the development of the national cryptocurrency on blockchain, that is a “digital zloty” (dPLN), had begun.

PKO Bank Polski announced that it has entered into a partnership with Blockchain Coinfirm to create a system for storing and verifying bank documents based on blockchain using the Trudatum instrument.

Poland has significant intellectual and entrepreneurial potential in the digital industry. Despite the fact that the country is not currently a leader in innovative technologies, Poland is open to innovation, which contributes to the regulation of cryptocurrency, mining, and blockchain.

**Russian Federation**

The Russian Federation (hereinafter— “RF”) is currently one of the countries trying to determine the legal framework for the market of digital assets and cryptocurrencies. On May 20, 2018, the State Duma of the RF adopted the Decree “On the Draft Federal Law No. 419059-7 “On Digital Financial Assets” according to which the Draft Law No. 419059-72 (hereinafter — “Draft Law”) was approved in the first reading, and its text was sent to the authorized entities for amendments.

Within the framework of the Draft Law, a number of definitions were proposed, including: “digital financial asset”, “distributed ledger of digital transactions”, “mining”, “cryptocurrency”, “token”, “smart contract”, etc.

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3 O proekte federalnogo zakona № 419059-7 «O cifrovyh finansovyh aktivah»: Postanovlenie. [On the draft Federal law No. 419059-7 “On Digital Financial Assets”: Resolution]. Retrieved from: http://www.pravo.gov.ru/proxy/ips/?doc_itself=&nd=102470251&page=1&rdk=0&intelsearch=%E3%F0%E0%E6%E4%E0%ED%F1%EA%E8%E9+%E A%E4%E5%EA%F1+%F0%EE%F1%F1%E8%E9%F1%EA%EE%E9+%F4%E5 %E4%E5%F0%E0%F6%E8%E8++&link_id=19#0 [in Russian]


260
Thus, the “digital financial asset” (hereinafter — “DFA”) is defined as property in electronic form created using encryption (cryptographic) means. The ownership of this property is confirmed by making digital entries in the ledger of digital transactions. Digital financial assets include cryptocurrency and token. Such assets are not legal tender in the Russian Federation.

Based on the definition above, as well as a comprehensive analysis of other provisions of the above-mentioned Draft Law and the relevant industry-specific legislation of the Russian Federation, the following features of the DFA can be distinguished:

1. The DFA is an asset in electronic form, i.e. it is in circulation exclusively in the electronic field, and access to it is provided through the use of special computerized systems.

2. The DFA is created using encryption (cryptographic) tools. According to the Decree of the Government of the RF dated April 16, 2012 No. 313¹, encryption tools are hardware, software and hardware-based encryption (cryptographic) tools that implement algorithms of cryptographic information conversion to restrict access to this information, including when it is stored, processed, and transmitted. This indicates that a prerequisite for the functioning of the DFA is the restriction of access to such property, including during its storage, processing, and transfer.

3. DFAs belong to a person solely on the basis of ownership.

¹ On approval of the provision on licensing the development, production, distribution of encryption (cryptographic) means, information systems and telecommunication systems protected using encryption (cryptographic) means, performance of work and provision of services in the field of information encryption, maintenance of encryption (cryptographic) means, information systems and telecommunication systems protected using encryption (cryptographic) means (except for the cases, if the maintenance of encryption (cryptographic) means, information systems and telecommunications systems protected with encryption (cryptographic) means, is carried out to ensure the needs of a legal entity or individual entrepreneur): Resolution No. 313 dated April 16, 2012. Retrieved from: http://pravo.gov.ru.proxy.ips/?searchres=&x=53&y=3&bpas=cd00000&a3=&a3type=1&a3value=&a6=&a6type=1&a6value=&a15=&a15type=1&a15value=&a7type=1&a7from=&a7to=&a7date=16.04.2012&a8=313&a8type=1&a1=&a0=&a16=&a16type=1&a16value=&a17=&a17type=1&a17value=&a4=&a4type=1&a4value=&a23=&a23type=1&a23value=.&textpres=&sort=7.
4. The ownership of this property is confirmed by the entry of digital records (information about the DFA) in the ledger of digital transactions, i.e. in a systematic database.

5. DFAs are not recognized as legal tender in the RF.

6. Holders of DFAs have the right to conclude agreements on the exchange of DFAs of one type for DFAs of another type and/or the exchange of DFAs for rubles, foreign currency, and/or other property only through a DFA exchange operator.

On October 1, 2019, the Law of the RF “On Amendments to Parts One, Two and Article 1124 of Part Three of the Civil Code of the Russian Federation”, the so-called Digital Rights Law, entered into force. The Russian legislator establishes the term “digital right”, using it as an analogue of the term “token”. The law reflects that digital rights are part of the civil rights system and are defined in the framework of the existing classification as property rights. In this case, “the owner of a digital right is a person who, in accordance with the rules of the information system, has the ability to dispose of this right”¹.

Conclusion

At present, Eastern European countries evolve towards the normative consolidation of the terms “digital asset” and “digital rights” and develop plans to introduce the latest technologies, such as blockchain, into various segments of the economy.

4.1.6. United States of America

It is known that the specifics of the U.S. legal system are conditioned by the administrative-territorial structure of this state. The United States of America is a federation with a two-tier legislative system: federal legislation and legislation of the constituent entities of the Federation.

At the federal level, there is currently no normative framework for the definition or regulation of digital assets. The establishment of the legal nature and formalization of the status of digital assets is left to the discretion of the states.

The United States of America is one of the most progressive states in the field of legislative initiatives and recommendations for regulating the blockchain and token area. It should be noted that draft regulatory documents of a recommendatory nature trace the evolution of the development of the blockchain technology and crypto instrument derivatives.

In 2014, the Uniform Law Commission (ULC) developed the **Revised Uniform Fiduciary Access to Digital Assets Act**, which was revised in 2015 and adopted by 42 states. In accordance with paragraph 10 section 2 of this document, the “digital asset” is defined as an electronic record of the right or interest of a person. The term does not include an underlying asset or liability unless the asset or liability is itself an electronic record[^1].

On April 16, 2016, the New York State Senate presented and adopted an **Act to Amend the Estates, Powers and Trusts Law, in Relation to the Administration of Digital Assets**. This act adds a new article 13-A to the Law of the State New York, under the name of The Estates, Powers and Trusts Law, called Administration of Digital Assets. This document contains recommendations on the powers of a fiduciary, such as a performer or a depository, to enable access to digital assets. This bill was also adopted in 19 other states. It provides administration of digital assets, defines a number of terms, and regulates the relations between a user (owner of digital asset), a custodian, and a fiduciary. The law applies to digital assets used for personal benefit and does not apply to digital assets of the employer used by the employee in the ordinary course of the employer’s business. In this document, the term “digital asset” is used precisely as a digital or electronic record of the right or interest of a person. The term does not

include the definition of an underlying asset or liability unless the asset or liability (debt) is itself an electronic record.

In January 2018, Tom Emmer, a Congressman from the District of Columbia, publicly announced his intention to prepare a legal framework for blockchain regulation, stating that this technology will change the way business is conducted in almost all areas, and that the blockchain processes related to the interaction of politicians and economists will significantly expand the economic potential of the United States. The Congressman announced his intention to prepare 3 documents:

- **Blockchain Regulatory Certainty Act** — Act on the need for legal regulation of blockchain.
- **Resolution Supporting Digital Currencies and Blockchain Technology** is a resolution to support digital money and the blockchain technology.
- **Safe Harbor for Taxpayers with Forked Assets Act** — Act on a tax-privileged zone for taxpayers with forked digital assets.

In September 2018, the **Resolution Supporting Digital Currencies and Blockchain Technology** was presented to the U.S. Congress. The Act states that “The United States recognizes the potential benefits and broad use of digital currencies and the blockchain technology to enhance public services, and enable more business growth, capital formation, and capital investment”.

Almost simultaneously, the **Safe Harbor for Taxpayers with Forked Assets Act** was submitted to the U.S. Congress. This document establishes a safe harbor period that prohibits certain fines and additional taxes to a taxpayer, who receives forked convertible virtual currency, until the Internal Revenue Service issues regulations or guidance, or legislation that

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In January 2019, the **Blockchain Regulatory Certainty Act** was presented to the U.S. Congress. This Act provides a safe harbor for developers and providers of blockchain services that do not control consumers’ funds. In particular, the Act defines blockchain service as “any information, transaction, or computing service or system that provides or enables access to a blockchain network by multiple users, including specifically a service or system that enables users to send, receive, exchange, or store digital currencies described by blockchain networks”.

The U.S. legislator proposed another definition of a digital asset under the bill with the same name, **Digital Assets-Existing Law** in early 2019. The Wyoming State Senate Act not only defines a digital asset, which means “a representation of economic, proprietary or access rights that are stored in a computer readable format and include digital consumer assets, digital securities and virtual currency”, but also proposes the term “digital consumer asset”. This term “means digital asset that is used or bought primarily for consumptive, personal or household purposes”. In general, the document is aimed at defining the term “digital asset” and its classification, enshrining its legal nature, establishing the legal status (rights and obligations) of the owner of a digital asset, introducing standards and procedures for custodial services, as well as the mechanism for providing custodial services by banks. The Act entered into force on July 1, 2019.

In the spring of 2019, The United States Securities and Exchange Commission issued a **Framework for “Investment Contract” Analysis of Digital Assets**, a guidance document containing fundamental principles for determining whether ICOs are actually investment contracts. The term

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“digital asset” is often used in this document within the meaning of an asset issued using Distributed Ledger Technology (DLT) or blockchain. For the purposes of this document, the term “digital asset” includes, but is not limited to, “virtual currencies”, “coins” and “tokens” or other assets issued and transferred on a DLT or blockchain basis.

On September 30, 2019, French Hill and Bill Foster, the congressmen, wrote a letter to Jerome Powell, the Chair of the Federal Reserve, proposing to review the possibility of creating a U.S. dollar digital currency\(^1\).

**Conclusion**

To summarize, we can say that the United States of America has revised the approach to determining the nature of blockchain tokens over the past five years, digital assets in particular. It gradually came to the need to consolidate relations arising in connection with the use of the blockchain technology at the state level.

It can also be stated that US lawmakers aim to introduce their own national digital currency, the U. S. dollar digital currency.

### 4.1.7. The Asia-Pacific Region

The Asia-Pacific region remains one of the most controversial in the area of regulation of the “revolutionary” phenomenon, i.e. the blockchain technology. However, according to an audit of International Data Corporation, a market research firm, dated April 23, 2019, blockchain solutions in the Asia-Pacific region, excluding Japan, are projected to reach $2.4 billion by 2022\(^2\). This indicator shows that countries in the

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\(^2\) Lyapota V. *Rashody na resheniya Blockchain v Aziatsko-Tihookeanskom regione, krome Yaponii, sostavyat $2,4 mlrd k 2022 godu* [The costs of Blockchain solutions in the Asia-Pacific region, except for Japan, will amount to $2.4 billion by 2022]. Retrieved from: https://cryptohamster.org/%D1%80%D0%B0%D1%81%D1%85%D0%BE%D0%B4%D1%8B-%D0%BD%D0%B0-%D1%80%D0%B5%D1%88%D0%B5%D0%BD%D0%B8%D1%8F-blockchain-%D0%B2-%D0%B0%D0%B7%D0%B8%D0%B0%D1%8
Asia-Pacific region are gradually preparing for the implementation of the technology in their infrastructure and economy.

**People’s Republic of China**

An audit conducted by Deloitte in the summer of 2019 showed that the vast majority of CEOs (73%) in China are convinced that blockchain is not just a tool that can improve the efficiency of operational processes and solve short-term problems, but a technology that should be viewed as a “long-term tool”¹. Despite this indicator, the communist state is characterized by the control over innovations that can have a global impact on the development of the economy, and until 2019, China carefully limited attempts to introduce the blockchain technology and its crypto derivatives. For example, ICOs were banned at the national level, but The Cyberspace Administration of China issued the Administrative Provisions on Blockchain Information Services in February 2019, which came into force on February 15, 2019. This document outlines the final draft of legal regulations related to cryptocurrencies and companies that use blockchain². According to a report by the China Banking Regulatory Commission published on June 1, 2019, the Chinese securities market needs new rules focused on the blockchain technology regulation to prevent potential risks. The report says: “The innovative application of the blockchain technology in the securities market must still be consistent with the theory and empirical principle of the financial sector”. “Irregularity of P2P financing which took place before blockchain introduction in China has shown how fast-growing technology can outpace financial regulation and pose a


serious threat to the system”. In this regard, the People’s Bank of China intends to issue rules for cryptocurrency exchanges.

It should be noted that the term “cryptocurrency” is actively used in the regulatory documents, although its legal nature is not clearly stated in the legislative acts. In addition to the concept of “cryptocurrency”, the Chinese government uses the term “digital assets” without distinguishing between them, which is only a matter of time as is shown by the tendency of enshrining blockchain in legislation.

**Republic of Kazakhstan**

As to the issue of institutionalization and regulation of the use of the blockchain technology, the Republic of Kazakhstan is currently at the stage of consolidating the areas of use of this innovative technology. The Government of the Republic of Kazakhstan actively cooperates with the Kazakhstan Association of Blockchain and Crypto-currency, which aims to accelerate the development of the blockchain market and the integration of Kazakhstan into the global blockchain ecosystem.

The National Bank of Kazakhstan has a conservative approach to regulating digital currency or cryptocurrency. At the same time, in spring 2018, the International Financial Center “Astana” (hereinafter — “IFCA”) began to actively develop legislation on the exchange of cryptocurrency or digital currency for the national currency of Kazakhstan and other types of cryptocurrencies. On May 25, 2018, the IFCA Committee on Regulation of Financial Services developed the Concept of legal regulation of the virtual currency market and private placement of securities.

The above-mentioned Concept uses the term “digital assets” and specifies that they may function as virtual currency or may grant rights to tangible assets such as real estate or precious metals.

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4.1. Legislative Initiatives to Regulate the Blockchain Technology: Global Experience

Singapore

Singapore’s financial regulators are slightly ahead of the financial regulators of other countries in terms of the prospects of the blockchain technology and its implementation in the national economy. From the very beginning of the trend towards the use of this technology, Singapore has openly supported various blockchain projects and technology as a whole. The leading organization in this direction is the Monetary Authority of Singapore (hereinafter — “MAS”). At the moment, the MAS is developing a concept for the application of the blockchain technology in the organization of payments in the banking system. In the process of testing, banks in Singapore, together with banks in Canada, used blockchain for cross-border payments. In 2014, the Inland Revenue Authority of Singapore defined cryptocurrency as a product or service, and for a long time it was the only official definition.

In November 2017, the MAS issued “A Guide to Digital Token Offerings”. In this document, the tokens that fall under the regulation of securities legislation were distinguished from the tokens that are not subject to such regulation, since by their content they fall under the definition of “product”.

Republic of the Philippines

In the Republic of the Philippines, the term “virtual currency” is used at the regulatory level. In 2017, Bangko Sentral ng Pilipinas issued the “Guidelines for Virtual Currency (VC) Exchanges”, which is a regulatory act for virtual currency circulation; it is considered part of the law and is mandatory for fulfillment.

There is no explicit consolidation of the definition of “digital asset” in the legislation.

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1 Jon Southurst. Singapore Government: This is How We Intend to Tax Bitcoin. URL: https://www.coindesk.com/singapore-government-how-we-intend-tax-bitcoin.
With regard to the blockchain technology, the government actively promotes the development of this technology in the country. In June 2019, the Philippine Government’s technical department signed a Memorandum of Agreement with Monsoon Blockchain, an American blockchain firm. According to this document, the firm is authorized to act as a blockchain consultant and advisor and to provide socioeconomic monitoring of blockchain solutions in the Philippines. In early 2019, the state-owned Cagayan Economic Zone Authority Corporation announced a new set of rules for Digital Asset Token Offering, which is designed to regulate the relations arising in respect of blockchain tokens (token shares, instrumental tokens, etc.), to strengthen investor protection and fraud prevention. Compliance with the new rules is monitored by the Asia Blockchain and Crypto Association, which is a self-regulatory organization.

**Commonwealth of Australia**

The Commonwealth of Australia has demonstrated strong support for the blockchain technology. In spring 2019, the government announced the development of a national blockchain strategy aiming to introduce innovative technologies and establish Australia as a global leader in the blockchain industry. It is worth noting that cryptocurrency was recognized as a legal alternative means of payment in Australia in 2013. However, even today, the government is struggling with double taxation of transactions related to cryptocurrencies. Australia also has the Australian Digital Currency Industry Code of Conduct developed by the Australian Digital Commerce Association, which sets standards for the activities related to cryptocurrencies. It should be noted that despite the active support of the blockchain technology, the term “digital asset” is not yet enshrined within Australia’s legal framework.

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4.2. Legal Relations Arising from the Use of the Blockchain Technology

Japan

In Japan, relations connected to the exchange of virtual currencies are regulated by the national Payment Services Act\(^1\). The term “digital asset” is not enshrined in the regulatory documents, but in practice, it is used by representatives of state authorities in the meaning of “virtual currency”. In summer 2019, the House of Representatives of Japan approved a Draft Law submitted by the Financial Services Agency, which provides for changes in the national legislation in the field of regulation of cryptocurrencies. In particular, it is planned to introduce changes in the Financial Instruments and Exchange Law and the Fund Settlement Act, which are aimed at protecting consumers and improving regulatory certainty, including stricter control over derivative products, as well as preventing the risk of stock exchange hacking\(^2\).

Conclusion

Thus, we can say that some countries in the Asia-Pacific region do not distinguish the terms “digital asset”, “cryptocurrency”, “cryptoasset”, “virtual currency”, and in most cases define them as a product. At the same time, the governments of these countries are quite progressive in their approach to the innovative blockchain technology and intend to integrate it into state institutions.

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1 Payment Services Act of Japan. URL: http://www.japaneselawtranslation.go.jp/law/detail/?id=3078&vm=02&re=02.
has already passed the stage of legal consolidation, we can state that the 
use of blockchain is related not only to formation of social relations, but 
also legal relations. Blockchain is a technology that is not only used in 
the cryptocurrency industry, but also goes far beyond it. This statement is 
based on one of the components of the nature of the blockchain technology, 
i.e. its multifunctionality, which allows it to be a qualitatively new base 
for the formation and development of progressive social relations.

Legal relations are divided into groups in accordance with various 
criteria. For example, they can be divided into constitutional, financial and 
legal, administrative and legal, civil and legal, etc. in accordance with their 
industry-specific features. Considering the active integration of the 
blockchain technology into various government institutions, there is a 
reason to believe that blockchain can serve as a medium for the 
implementation of any of the above-mentioned legal relations. In many 
countries, such as Sweden\(^1\), blockchain is actively used by the government, 
and many government registers have been transferred to blockchain. Thus, 
the use of blockchain-based government resources has resulted in the 
formation of new relations between citizens and public administration, 
which are of cross-sectoral importance.

Taking legal relations as a specific form of exercising rights, we can 
say that the blockchain technology has also become a medium for exercising 
social and economic rights.

The beginning of the active use of the revolutionary blockchain 
technology in the economic space became the basis for establishing 
qualitatively new social and economic relations; an operating system was 
introduced into the existing information market, based on which the 
information market was transformed into the blockchain-based market of 
information resources and services.

We can state that blockchain is already a factor in building new social 
relations, and from the moment of legal consolidation of the term 
“blockchain”, such relations have taken the form of legal relations by

becoming the object of state regulation. We should also note that the basis for building this type of relations was not a legislative initiative, but the global integration of the blockchain technology into all areas of society, which, as a result, led to the need for legislative consolidation and regulation.

However, in the structure of legal relations, blockchain can play a role not only as a medium of implementation, but also be an object of legal relations if the subject of the relations is derivative of blockchain. In particular, this refers to the relations, the subject of which is crypto-instruments derivative of the blockchain technology, information resources or registers operating on the basis of blockchain. Thus, in legal relations, which arise and develop as a result of using the blockchain technology, the technology itself can perform functions related to the formation of the environment for the implementation of relations or the definition of the object of relations.

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### 4.2.1. Ensuring Legal Relations

The generally recognized factors ensuring legal relations include social, economic, environmental, historical, etc. The factors that affect the implementation of legal relations connected to the use of blockchain include economic, social, political and legal.

**Economic Factor**

The economic factor brought the blockchain technology to the global consumer services market and made it one of the most popular technologies of our time. Today, many corporations are interested in implementing distributed ledger technology in their business processes, as they are able to replace a significant number of inefficient components and rationally use available resources.

**Social Factor**

The social factor of ensuring such legal relations is based on the needs of society to introduce the technology with an optimal level of reliability
and transparency into its daily activities. Among the main properties of blockchain, we could distinguish decentralization and publicity, which allow bringing social relations to a new level with a higher degree of trust, reliability, openness, security and without intermediaries. Thus, the demand for the blockchain technology, its compliance with the current requirements of society form a socioeconomic factor in ensuring the relations that are built as a result of the use of distributed ledger technology.

**Political Factor**

The political factor in ensuring relations connected to the use of the blockchain technology directly depends on the concept of development of the state or individual authorities. Many countries, such as Sweden, Switzerland and Luxembourg, have already formed their own development concepts for the coming years, which include a plan to integrate the blockchain technology into the state apparatus and various state institutions.

**Legal Factor**

The legal factor in ensuring legal relations connected to the use of blockchain is fully reflected in international or state regulatory legal acts governing the scope of application of the blockchain technology. It should be noted that the legal relations arising from the use of this technology do not require additional external security, as they are secured due to the nature of the execution environment, i.e. the distributed ledger. Such relations cannot be partially or inappropriately implemented. They are either fully realized or not formed at all. The nature of blockchain guarantees the fulfillment of the relations established within the framework of the distributed ledger. Legal ensuring is necessary only in the field of resolving relations that may arise as a result of attempts to violate the integrity of the distributed ledger or its smooth operation. Such ensuring should be regulatory and expressed through special measures provided for

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unauthorized interference in the work of the distributed ledger as an environment for the execution of legal relations.

Conclusion

Having analyzed the above-mentioned information, we can state that the legal relations connected to the use of distributed ledger technology or blockchain are implemented without intermediaries and are secured by a number of reasonable factors, the identification of which is due to the laws of the formation of legal relations connected to the use of blockchain.

The economic factor is determined by the demand for multifunctional and reliable technology, the use of which will allow modernizing any production and economic processes as well as using resources rationally.

The social factor of ensuring reflects the need for open and transparent relations in society that can be built, regulated and further developed on the basis of the blockchain technology.

The political and legal factors depend on the political and legal structure and policies of a particular jurisdiction. It is worth noting that such factors are of a separate nature and are formed over a long period of development, taking into account the peculiarities of legislative processes. However, we can state that the legal relations arising from the use of the blockchain technology are secured by a sufficient number of external factors, which are implemented in everyday life.

4.2.2. Applied Nature of Ensuring Relations

The applied nature of ensuring is an integral part of the implementation of the following factors for ensuring legal relations arising from the use of the blockchain technology: socioeconomic, political and legal.

Practical Implementation of the Socioeconomic Factor

Since the socioeconomic factor of ensuring is related to the increased demand for blockchain, the applied nature of ensuring legal relations by this factor directly depends on the needs of society in the blockchain technology: as long as society needs such a phenomenon, social and economic ensuring of legal relations will be implemented.
Blockchain has become popular due to its nature and its “revolutionary” technical properties. In this context, the applied nature of ensuring, in particular the implementation of the socioeconomic factor, indicates stable demand from society. One of the blockchain’s advantages is the absence of human factor in such basic processes as the formation of a database, accounting, storage and transfer of information resources, transactions, etc. At the same time, it was the human factor that allowed forming a broad public position and vision of the prospects for the blockchain technology, as well as the need for its integration into various fields, which can serve as a means of ensuring relations connected to its use.

The blockchain technology has basic functions that can rather develop than change. However, the global promotion of this technology, various marketing methods, and effective advertising campaigns have led to a high level of public awareness concerning the diversity of ways in which this technology can be used. This, in turn, allowed forming an idea about the universality of blockchain. Many companies, e.g. BHP Billiton\(^1\), which is one of the world’s largest mining firms, being global leaders in their industry and at the same time not directly related to innovative technologies, apply blockchain technology in their activities, thereby confirming the practicality, feasibility and efficiency of using this phenomenon not only in all areas of the economy, but also in many areas of activity and economic systems.

Analyzing the trend of demand, it is worth noting that blockchain is a universal technology available for everyday use and designed to solve many issues related to bureaucratic manifestations. World-famous organizations use blockchain to fundamentally change existing business models and systems in order to increase efficiency and confidence in their activities. For example, in June 2019, Kodak, a manufacturer of photo materials, equipment, consumables and offset, digital and functional printing software, presented a document management system developed on the blockchain that simplifies the processing of sensitive

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4.2. Legal Relations Arising from the Use of the Blockchain Technology

data\(^1\). Government organizations use the technology to stimulate innovation and infrastructure development. Medical institutions record research results and transfer the database of medical records to an improved and modern format, a distributed ledger, and a similar system has already been implemented in Estonia\(^2\). Logistics managers manage transactions in supply chains spanning thousands of kilometers, reducing costs and time expenditures, and improving process efficiency. For example, in August 2017, a number of major food manufacturers such as Unilever, Nestlé, Tyson Foods joined the IBM’s blockchain technology project to track the food supply chain and obtain information on the origin and quality of products\(^3\). Such banks as Landesbank Baden-Wuerttemberg and Commerzbank\(^4\) use blockchain to increase trust and support transparency, eliminate fraud and adapt to market needs\(^5\).

Thus, the practical use of blockchain in various fields of society is an applied way to implement the socioeconomic factor in ensuring legal relations arising from the use of the blockchain technology.

**Practical Implementation of the Political and Legal Factor**

The political and legal factor of ensuring is reflected in the statements of national leaders and various government organizations\(^6\) and through the

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\(^4\) Blokhejn v bankovskoj sfere i drugie vazhnye iniciativy po vnedreniyu tehnologii [Blockchain in the banking sector and other important initiatives for the introduction of this technology]. Retrieved from: https://forklog.com/blokhejn-v-bankovskoj-sfere-i-drugie-vazhnye-initiativy-po-vnedreniyu-tehnologii/ [in Russian]


legislative activity of the subjects of legislative initiative. Various concepts of the development of states in the direction of integrating the blockchain technology into the state apparatus are a direct implementation of the applied ensuring of relations arising from the use of the blockchain technology. The practical implementation of the political and legal factor for ensuring legal relations arising from the use of blockchain includes:

- Formation of the conceptual and terminological apparatus for this field and its securing at the regulatory level;
- A clear definition of the regime of the technology itself and the subjects of such legal relations;
- Comprehensive legislative regulation of such relations;
- Systematization of national and international legislation;
- Implementation of the relevant international law rules;
- Application of legal means of influence aimed at eliminating offenses in this field.

**Conclusion**

Thus, the applied nature of ensuring legal relations lies in the practical implementation of socioeconomic, political and legal factors. In turn, the **socioeconomic factor** is based on the need of society to use reliable and safe technology, which will create an environment for transparent and open relations.

The implementation of the **political and legal factors** is disclosed in public statements of the leaders of countries and international organizations, as well as in the direct legal and regulatory framework and regulation of relations arising from the use of the blockchain technology. It is worth noting that the practical ensuring of such relations is achieved through the integrated implementation of the above-mentioned factors: the socioeconomic factor contributes to the popularization of blockchain, and the political and legal ones contribute to the regulatory framework for the use of technology and regulation of relations arising from its application.

4.2.3. **New Technology for Accounting and Circulation of Rights**

The organizational and technical essence of blockchain can be explained by the fact that this technology is a way of recording information in which falsification or destruction of records is impossible. These capabilities and properties allow blockchain to be characterized as an optimal technology for the infrastructures that underlie such fields as science, law, finance, medicine, and many others.

**Advantages of Blockchain over Other Information Systems**

Taking into account the main advantageous properties of blockchain, such as security, openness and reliability, we can talk about the effectiveness of its application in various databases and accounting systems, but it is necessary to understand that the potential of this technology is much wider than its current functional capabilities. Enterprises can use blockchain to account for goods and supplies, as well as for book-keeping purposes. Logistics companies with branches around the world can use blockchain to quickly update and share information because this technology not only allows keeping records, but also, when accessed, tracking any changes from anywhere in the world in real time.

Now blockchain is becoming more and more popular in the field of information and various data accounting, its technical properties allow maintaining accounts for even such an intangible object as right, and therefore blockchain acts as a medium for exercising rights. Today, blockchain is used to build various types of relations and legal relations as well as to implement many social and economic rights. The innovative technology allows maintaining not only information in general, but also rights as units of accounting, presented in the form of an information resource. The blockchain’s functionality allows such an abstract category as right to find its material representation in the form of an information resource, which, in turn, is a distinctive feature of digital assets. Normative legal acts often use the term “digital asset” precisely as a digital or electronic record of the right or interest of a person. Thus, we can say that
digital assets are a way of recording and using information about the right that has arisen in relation to the needs of modern society and the capabilities of blockchain.

**Examples of Accounting Rights Based on the Blockchain Technology**

It is worth noting that such a method allows not only storing but also transferring information embedded in a digital asset, which makes the right an object of relations in the exchange of information resources.

The use of blockchain can be particularly effective in the field of intellectual property rights. Registration of intellectual property objects in the form of information resources in blockchain enables copyright holders to avoid plagiarism, “pirated” distribution and other violations of intellectual property rights. Such a way of using information as a digital asset allows displaying information about exclusive rights to specific objects of creativity and results of scientific activity, as well as recording information about rights in a distributed ledger in the form of a unique copy.

The functional properties of the blockchain technology solve the issues of organized and legal distribution of the results obtained due to creative and scientific activities (music, articles, research, etc.) through the circulation of digital assets, in which these objects of intellectual property rights are embedded. Such distribution is controlled, since all activities are recorded in blockchain, which also excludes the possibility of creating and further transmitting the so-called “pirated” copies.

The blockchain technology can also be used in voting procedures. The concept of collective decision-making is widely spread in various fields of public administration, finance, business and other fields. It is worth noting that the concept of voting remains unchanged when using blockchain. However, the use of the distributed ledger technology eliminates such a problem as falsification of votes and allows fully ensuring the legal, technical and mandatory components of any vote.

The *legal component* is realized by exercising the right to vote through blockchain: instead of filling out paper ballots, the electorate records its votes in real time electronically.
The *technical component* is implemented by recording votes in a database. The votes cannot be modified or deleted. In such a case, the vote counting does not take long, and the results are available immediately.

The *guarantee component* consists in personalized access to the distributed ledger. Such access may be provided with a personal login and password secured by electronic keys or biometric data, which, in turn, allows avoiding the use of the votes of subjects that do not participate in the vote. It is also important that this method eliminates the presence of intermediaries that may affect the voting results.

Maintaining various state registers based on the blockchain technology allows tracking property rights to assets, keeping records of social, pension and other payments, recording tax distribution, conducting electronic voting (recording the right to vote in blockchain), displaying medical records and all types of insurance policies (recording the exercise of the right to health protection), as well as recording other rights. Thus, blockchain is a technology that allows modifying databases, public registers and other accounting systems, as well as solving the problem of their interoperability and data consolidation.

**Blockchain as a Circulation Environment of Rights**

Blockchain can also be an environment for the circulation of rights. Traditional doctrinal approaches to defining objects of circulation no longer correspond to modern ideas about them; in particular, the dogmas of Roman law regarding things as objects of the material world are outdated. In an era of advanced technology, even such an abstract category as right can be an object of the material world and a subject of circulation. Many normative legal acts classify a digital asset as a product, i.e. it acts as a subject of product exchange, or as the category of intangible assets as a subject of civil circulation. Since a digital asset is a way of using information, including information on a set of rights, it can be said that information about the right is in circulation through blockchain. In such a case, the civil circulation of rights takes place in a cyber-physical space and has no geographical and jurisdictional boundaries. This raises the question about the protectability of such objects of circulation and the legal
regulation of relations connected to the circulation of digital assets. The protectability of digital assets as objects of circulation is guaranteed by the blockchain technology itself, since such objects are represented as an information resource with a unique identifier that cannot be changed, copied or deleted.

The blockchain technology also allows anonymizing the owners of digital assets, but not depersonalizing them. Thus, the legal regulation of relations arising in connection with the circulation of digital assets may be connected to the residence jurisdiction of the parties to the transactions, who are owners of digital assets. In general, the relations between owners of digital assets, in particular, during the transfer and exchange, are based on technological protection (security), since the digital assets themselves are in a distributed ledger, where the use of an open standards system ensures the unification of the collection, consolidation and storage of all data. In order to build relations between owners of digital assets, technical support (distributed ledger) is first and foremost required; in this case the need for legal regulation is derivative.

**Conclusion**

Analyzing the aspects of practical application of the blockchain technology, we can conclude that this technology is the most effective and practical solution in the field of information accounting. Along with the transformation of the usual mechanisms of interaction, blockchain provides new opportunities, in particular, the possibility of accounting and circulation of rights through their recording in a distributed ledger. In this context, blockchain acts as an interoperable technology for accounting, storage and circulation of rights.
Section 5  
FUNDAMENTAL PRINCIPLES OF A DIGITAL ASSET’S FUNCTIONING

5.1. Conceptual Purpose of a Digital Asset

Blockchain is one of the key technologies and is the global technology of the XXI century, which should contribute to solving the issues of reliability and transparency of public relations, forming a qualitatively new confidence level of relations and modifying all kinds of accounting systems, storing and transmitting information due to new needs and economic resources of society.

The properties of the technology allow implementing the above-mentioned tasks through the functioning of such tools as blockchain tokens. A qualitatively new type of blockchain token is a digital asset, which is endowed with unique properties and attributes, and has a number of objectives. At the same time, the properties of a digital asset are much wider than the properties of other tokens (blockchain tokens), which contributes to more efficient implementation of the technology itself.

On the basis of the essential features established in the research paper “Substantiation of the Term “Digital Asset”: Economic and Legal Aspects”, we can state that “digital asset is an information resource derivative of the right to a value and circulating in the distributed ledger in the form of a unique identifier”¹. The proposed term “digital asset” is represented by its

components (economic, legal, information, value), which are interrelated and interdependent.

**Conclusion**

Having analyzed the functional nature of blockchain and digital assets, we can conclude that their properties and functions are organically related. For example, the information accounting function available in blockchain is not possible without the existence of a unit of account, which can be a digital asset. At the same time, such a property of a digital asset as information management is not feasible without the appropriate space, i.e. a distributed ledger or blockchain.

Thus, a digital asset is a new approach to the concept of a distributed ledger token or blockchain. Digital asset in a certain sense can be attributed to a blockchain instrument, its conceptual purpose is to completely realize the properties of this technology.

### 5.2. The Term “Digital Asset” in Economic and Legal Aspects

Before we begin to consider the term “digital asset” as an information resource, it should be noted that the first decade of the XXI century was marked by a transition to a new technological era, in which socioeconomic globalization and new phenomena, in fact, erase the boundaries between physical and digital technologies. In these fundamentally new realities, digital technologies are becoming the core of the post-industrial innovation economy and the processes of digital transformation, which under the current conditions of the modern world are becoming natural and popular for society. The development of new technologies, especially digital ones, is accompanied by systemic changes in all fields of society, business and politics, as well as by the emergence of the improved forms of organization of the public and private sectors of the economy guaranteeing transparency of the public environment, as well as transparency of the ways of using information as one of the tools for interaction between its participants.
The next generation of the economy, which is called the “digital economy”, is being formed; it is mainly based on the introduction and use of digital technologies in all types of economic activities, which, in turn, contributes to the emergence of a new form of assets i.e. digital assets. The creation of new and the development of existing digital infrastructure facilities should depend on the tasks of ensuring digital transformation or the functioning of the market of information resources and services.

Today, the term “digital asset” does not have a single comprehensive definition that would fully reveal the essence and content of the term. This fact greatly complicates the understanding of many processes related to the use of digital assets and quite often affects the distortion and misinterpretation of information laid down in the basis of existence of digital assets. Such terminological confusion creates stable conditions for further establishment of the inconsistency and ambiguity not only of the term “digital asset” itself, but also of the prospects for its use.

The analysis of modern scientific publications and research works on digital assets shows that today there is no clear definition and understanding of this term. The “digital asset” concept is often used in a broad sense, is inaccurate and ambiguous, and is identified with a cryptocurrency. Thus, V. A. Laptev insists on a broad interpretation of a digital asset and states that they include any assets of economic value\(^1\). The Wyoming State SF0125 bill dated July1, 2019 gives the following definition: “Digital asset means a representation of economic, proprietary or access rights that are stored in a computer readable format, and include digital consumer assets, digital securities and virtual currency”\(^2\).

In this context, it is necessary to understand that a digital asset, by its very nature, provides information about value and is an information resource that can be used. And the significance of a digital asset lies in its

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2 SF0125 - Digital assets-existing law. URL: https://www.wyoleg.gov/Legislation/2019/SF0125.
reliability and uniqueness, which are ensured as a result of the circulation of a digital asset in the distributed ledger. Based on these characteristics, we can state the high practical significance of a digital asset in economic and legal aspects.

**Conclusion**

Based on the established essential and semantic features of the term “digital asset” in the research paper “Substantiation of the Term “Digital Asset”: Economic and Legal Aspects”\(^1\), the following definition was formulated: “**Digital asset** is an information resource derivative of the right to a value and circulating in the distributed ledger in the form of a unique identifier”.

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5.3. Economic Aspect

An integral component of the definition of a digital asset is its economic aspect expressed in an information resource, which has the properties of practical utility, as well as the possibility of multiple use. In the digital environment, this information resource is presented in the form of a unique identifier for the purpose of its circulation. Thus, considering the economic aspect of the definition of a digital asset, it is necessary to speak about the common nature and functional identity of a digital asset as an information resource and a unique identifier.

The widespread use of the term “unique identifier” is due to the development of information technology on a global scale, as its use is directly associated with this area. The use of this term in various fields and areas of the economy is increasing, which can be explained by the desire of both public and private entities to improve the security level for data use in terms of their storage and transmission. The ability to identify the

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recognized object due to its unique feature expressed in the identifier contributes to the practical realization of the goal set above.

In the context of the economic aspect of a digital asset, a unique identifier is not only important, but also has a substantive significance.

**The Term “Unique Identifier”**

Considering the term “unique identifier”, it should be noted that this term is often used in public relations.

Thus, when submitting documents to the state register, a unique identifier represents a logical sequence of characters. Using the characters, an applicant transmits, on the official website of the special authorized body on state registration, information on the status of electronic documents submitted by him/her in order to register a legal entity or a natural person (entrepreneur), as well as receives electronic documents sent to him/her by the state registrar\(^1\).

Within the context of holding electronic auctions, a unique identifier is presented in the form of a set of numbers and letters, which the auction platform automatically assigns to any distributed bandwidth that was distributed between users according to the results of the electronic auction\(^2\).

In information systems, a unique identifier is intended to identify a specific object in the network, as well as allows excluding any probability of duplication of this object and confirms its authenticity.


It should be noted separately that the unique identifier indicates the form of representation of a digital asset and the existence of a unique name. The environment, in which the digital asset is created and circulates, assigns an alphanumeric code that allows distinguishing a specific digital asset in the distributed ledger or blockchain as well as obtaining the necessary information about it.

**Existence of a Unique Identifier**

The main purpose of a unique identifier as a generally accepted identification criterion is the ability to allow an authorized subject to identify information for its uniqueness without a coordination center. Thus, the existence of a unique identifier allows using it to identify an object or subject with a reasonable degree of certainty that the identifier will never be deliberately used for purposes that are not inherent in it, which is very important in the field of economic and legal relations. Thus, information with a unique identifier can be placed in a common database without the need to resolve a name conflict.

It should be noted that the identification of the subject or object is not a new process, since it has been used for a long time, for example:

- In railway tickets as a unique order identifier;
- An individual factory-made serial number of the card is used in the public transport payment system;
- Payment documents of state institutions use a unique identifier of accrual, etc.

In the electronic space, the unique identifier displays:

- E-mail;
- Phone number;
- Hash.

Thus, identification of subjects and objects has been widely used for a long time, but recently there has been a pronounced tendency to use a unique identifier in the execution environment based on the blockchain technology. Due to its nature, blockchain guarantees the absence of counterfeiting and copying, which creates a new level of reliability and trust. The value of a unique identifier lies in the fact that a digital asset is
assigned to information on a value using it. Therefore, assigning a digital asset to the information on a value by means of a unique identifier allows safely operating this information. Thus, a unique identifier, by protecting and making information invulnerable, forms the economic aspect of a digital asset.

**Conclusion**

The uniqueness of a digital asset is ensured by the blockchain technology due the blockchain structure, which is precisely the guarantor of that the information would be preserved, and the verification of the authenticity of data embedded in the digital asset would be possible. The blockchain provides conditions for identifying a digital asset by giving it a unique hash code, which allows assigning such an asset to a specific subject.

The nature of a distributed ledger allows avoiding duplication and/or illegal use of a digital asset. Thus, even one change in such a ledger will result in the creation of a new unique identifier, which guarantees the protection of users from counterfeiting and unauthorized copying.

Thus, the economic aspect of a digital asset is revealed through a unique identifier and an information resource related to it.

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**5.4. Legal Aspect**

If we consider the legal aspect of the term “digital asset” as an information resource, it is necessary to speak about the formation of its legal component, such as “derivative of the right”.

Digital asset is essentially a way of using information about value, which is presented as an information resource in an information system based on the blockchain technology.

**Derivative of the Right**

First of all, it should be noted that the normative definition of the term “derivative of the right” has not been established in the legal field.
Derivative of the right as a legal phenomenon is used to one degree or another in all branches of law, i.e. it has cross-sectoral nature. In the general theory of law, as well as in separate branches of law, the authors use the term “derivative rights”, however, the question of legislative and doctrinal understanding of derivative of rights remains open.

If we look at the explanatory dictionary by S. I. Ozhegov, it gives us the following interpretation of the word “derivative”: “Formed from another object, from something else.”\(^1\) A similar definition is given in the explanatory dictionary by T. F. Efremova\(^2\) and in the explanatory dictionary by S. A. Kuznetsov\(^3\). D. N. Ushakov’s explanatory dictionary slightly expands the lexical meaning of the given word: “Produced, formed from another, simplest or basic value, form, or category.”\(^4\)

The polyparadigmatic approach to the understanding of right is caused by the origins of this phenomenon, centuries-old philosophical polemics around it and, as a result, the ambiguity of its interpretation. The term “right” can be seen as:

a) formalized set of rules of behaviour;

b) science, which studies the corresponding formalized rules of behaviour;

c) measure of possible behaviour, freedom of action provided by the state\(^5\).


5.4. Legal Aspect

The last definition of right as a measure of possible behavior, or freedom of action provided by the state, is the closest to the true understanding of the definition in the context of the term “digital asset”, presented in the research paper “Substantiation of the Term “Digital Asset”: Economic and Legal Aspect”\(^1\).

**Properties of Derivative of the Right to a Value**

Derivative of the right emerges as a result of the transformation of the basic phenomenon of right with the preservation of basic properties. The following properties of derivative of the right to a value can be distinguished:

- secondariness in relation to primary (fundamental) right;
- direct relation between derivative and such a right;
- preserving the basic properties of primary fundamental rights.

Thus, a digital asset is not a right to a value, but it has properties of derivative of the right to value. This means that an owner of a digital asset has the right of access to an information resource that contains information about a set of rights to a value and obligations of the owner of the value, the fulfillment of which he/she is entitled to demand.

**Conclusion**

Thus, considering the legal aspect, we can state that, with the transfer of a digital asset to a new owner, all the rights of the previous owner are also transferred.

In other words, a digital asset is a digital representation of a value, i.e. a digital asset, in essence, is not a right to a value, but it has the properties of derivative of the right to a value.

In fact, the principle inherent in a digital asset allows operating the right to an information resource derivative of the right to a value, while the value itself remains in possession of its owner.

5.5. Information Aspect

The essence of a digital asset, which consists in identifying it with an information resource, forms an information component in the context of the definition of the term “digital asset”.

Despite the fact that modern science uses a large number of terms related to the issues of informatization of society, only a few of them are of a scientific and applied nature.

It seems obvious to consider the term “information resource” based on an analysis of its legal nature and involving the construction of a conceptual list, the basic category of which is the concept “information”.

“Information Resource” Component

The term “information resource” does not have a single generally accepted comprehensive definition, which is explained by the use of this term in various fields, while approaches to the understanding of an information resource also vary.

The term “information resource” is used not only in the documentary and communication field.

The term “information resource” is defined in legislative acts as:

a) a combination of documents in information systems: libraries, archives, data banks, etc.;

b) an organized combination of documented information, including databases, other combinations of related information in information systems.\(^1\)

The Financial Dictionary (2019)\(^2\) defines information resources as a set of data that are systematized for the subsequent effective acquisition of the necessary information.

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The UNESCO special congress introduced such a fixed expression as “information resources”\(^1\). Information resources are a product of intellectual activity\(^2\). Thus, if we consider the information resource as information structured and organized in a certain way and recorded on a tangible medium, which can be stored, transferred, used, and replenished, it is obvious that such a resource has properties of practical significance and usefulness, as well as the possibility of multiple use (“inexhaustibility”).

It is important to note that information accumulated in a specific way and objectively processed determines the quantity and quality of information resources, which leads to the following conclusion: an information resource has a rare property of increasing and developing information capital.

**Properties of an Information Resource**

Looking at the information resource from the viewpoint of information on a value of a digital asset, it is necessary to note the following properties of such information:

a) structured according to certain parameters and categories;

b) recorded on a digital medium;

c) storage, transmission, exchange, use, etc.

These properties determine the nature of a digital asset as an information resource, since the information inherent in a digital asset is ordered and systematic in nature. It should be noted separately that the information about the value is formed directly by its owner.

**Conclusion**

Based on the above-mentioned, we can conclude that the conceptual analysis of the “information resource” determines the correct understanding of the “information resource” component of the digital asset.

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First of all, it should be noted that the term “information resource” is an organic part of the structure of the term “digital asset” due to the fact that a digital asset is an identification of an information resource.

Since the information about a value includes information about a set of rights and restrictions on the value, the object of the relations between owners of digital assets is the information about the value expressed in the information resource.

5.6. Value Aspect

One of the components of a digital asset is the value aspect, which requires analysis of the nature of a value. The pluralism of approaches to understanding the nature of a value is conditioned by the principles of consideration of this concept.

Thus, two aspects of a value can be distinguished: instrumental-indicative and instrumental-commensurate. The instrumental-indicative aspect consists in the fact that through normative and casual regulation, a value indicates those phenomena that are designed to satisfy people’s needs and therefore act as values. The instrumental-commensurate aspect of a value is expressed in the function of ranking social values through the use of special tools ¹.

Nature of Value

As A. K. Abisheva notes, “adaptation, formation, integration and disintegration of values into any field, processes of absolutization of some components and devaluation of others give rise to the so-called background of the action of values” ².

The following factors influence the formation of values:

• a demand in society;
• dynamics, pace and directions of the development of values;
• specifics and nature of the development of public institutions;
• specifics of a particular legal situation;
• existence of different matrixes of advantages and hierarchies of value structures.

It should be noted that society tends to secure values in the normative field, i.e. to reduce them, because the use of any value is more effective if it is expressed and protected by a certain norm.

The process of reducing values is, first of all, a phenomenon of their formalization within normative texts, when within the framework of a legal situation there is a possibility of appealing to a norm, which makes effective protection of interests and desires of a subject.

The Term “Value”

The term “value” has a number of definitions and interpretations that depend on the subject area of their application. In the context of a digital asset, the most appropriate definition of a value is “the cost of a particular object of tangible or intangible goods.

Two approaches are used to defining a value:
• From the point of view of classical political economy (Classical school), a value must be considered as an objective reality, which is measured by means of effort put into the production of certain goods;
• Representatives of the Neoclassical school associate the value with the rarity of the requested goods.

The neoclassical approach is currently prevailing.

The research paper “Substantiation of the Term “Digital Asset”: Economic and Legal Aspects” gives the following definition: “Value is relative worth, utility, or importance, which can also be expressed by

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different measurement units depending on the area of practical use of such a value and the ecosystem in which such a value exists”\(^1\).

In the definition of a “digital asset”, the use of the phrase “derivative of the right to a value” means that, in essence, a digital asset provides a right of access to an information resource that contains information on the value (information on a set of rights to the value and information on the obligations of the owner of the value that the owner of the digital asset has the right to demand to fulfill), through which access to the value itself is possible.

**Conclusion**

Based on the above-mentioned, we can summarize that, in a common understanding, values are formed, first of all, as the needs of human existence or the development of society, the most important of which are regulated. When considering the term “digital asset”, the “value” reflects the essence inherent in a digital asset, thus forming a key element of a digital asset, i.e. its value component.

### 5.7. Digital Asset as a Way of Recording Obligation Legal Relations

From a legal point of view, legal relations recorded using the blockchain technology must be regulated by the norms of the law of obligation. All existing blockchain tokens (cryptocurrencies, virtual assets, digital assets and, etc.) are tokens that confirm the rights of their owners, which match the obligations of the persons that issued them.

Law of obligation is a branch of civil law regulating the relations in the fields of circulation of values (goods, services, works, etc.).

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5.7. Digital Asset as a Way of Recording Obligation Legal Relations

the property right, which determines the state of belonging of property to certain persons, law of obligation mediates the movement of a value.

Parties to obligation legal relations are called “debtor” and “creditor”.

The object of obligation legal relations is something, in relation to which the actions are performed: money, items, etc.

Obligation is a relation, due to which the debtor must perform a certain action in favor of the creditor (transfer property, perform work, pay money, etc.) or refrain from performing a certain action, while the creditor has the right to demand the fulfillment of obligations from the debtor.

A distinctive feature of obligation legal relations is the definite clarity of their participants, which there can be a few of (both creditors and debtors).

The composition of obligation legal relations includes rights, duties and liabilities of parties regarding the fulfillment of obligations.

The analysis of existing legal relations using cryptocurrencies and other virtual assets allows stating the fact that such relations lack an object, a specific value, in relation to which actions are being performed.

Additionally, the main elements of the composition of obligation legal relations based on the blockchain technology such as rights, duties and liabilities of the parties to the fulfillment of obligations are in different legal and technical frameworks. The blockchain records only the token that confirms the rights of its owner, which correspond to the obligations of the person that issued it, while the obligations themselves remain outside the blockchain, which is why they can be altered or unfulfilled. Meanwhile, the liability of the debtor regarding the fulfillment of obligations is absent altogether. Such blockchain tokens have a speculative nature, which is why they are problematic for governments, business entities and natural persons.

To legalize the specified legal relations, they need to correspond to the norms of civil law. Based on the above-mentioned, there is a need to use the blockchain technology to record not only the entire composition of a specific obligation legal relation, but the overall movement of a value.
Thus, it is necessary to introduce the term digital asset into the legal terminology, which is an information resource that circulates in the blockchain by means of a unique identifier with the ability to specify the entire chain of transactions (movement of a value). Such an information resource contains the complete information on the rights, duties and liabilities of the parties, as well as information on the debtor and the object of relations.

Also, a digital asset, being an information resource and an object of intellectual property of the value’s owner, falls into one of the categories of intangible assets (IA), which makes it clear for business entities, citizens and the government and is the foundation for its successful use in the economy.

And we can also state that:
- Public relations are the object of legal regulation, the recording of which occurs using the blockchain technology.
- Digital asset can be viewed as a way of recording any legal relations using the blockchain technology.
- Digital asset is a new way of recording the existing economic legal relations, which already have legal regulation.
- Digital asset is a new regulator of economic relations between parties to obligation legal relations. Digital asset comprises an information resource recorded in the blockchain and units of access to it, which circulate in the blockchain by means of a unique identifier, the possession of which confirms the status of the creditor in this legal relation. It is reasonable to use the term such as “unit of access” to the claim right of the creditor because access means the right to access, therefore, we can state the new legal doctrine “right to the right”.
- The objects of exchange are the rights of creditors, which are based on the norms of law of obligation and recorded in the blockchain, which makes them guaranteed. Such model of relations is a prerequisite for the organization of a new market of exchanging a product for a product without intermediaries and money by means of the blockchain technology.
- Business entity can use its digital assets to organize an accounting system for products and product circulation.
5.8. Legal Regime of Assets, Information Resources and Digital Assets

Assets, Information Resources and Digital Assets as Independent Circulation Objects

The development and active integration of technologies, in particular, of the distributed ledger technology (blockchain), have led to the formation of new public relations that require legal regulation.

Thus, the applied value of a digital asset as a type of blockchain token posed a task to the legislative authorities that lies in developing the legal regulation for the category such as digital assets, as well as similar terms and public relations, which they are the objects of. Digital asset should be understood as an information resource derivative of the right to a value and circulating in the distributed ledger in the form of a unique identifier.

The issue of the objects of legal relations is crucial because only the presence of an object can cause the need of emergence and existence of the legal relation itself. In other words, without understanding the regularities of emergence and further functioning of the object, the proper representation of legal relations at the regulatory level is impossible.

We should note the existence of the pluralistic approach to defining the essence of the category of objects of right. For example, G. F. Shershenevich defines an object of rights as everything that serves as a means of fulfilling the interests separated by law. Whereas V. V. Lazarev believes that an object of legal relations is something over which the legal relation

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itself emerges and exists\(^\text{1}\). According to I. I. Polyakov, an object of legal relations is a mandatory element of legal relations that represents an independent, providing the connection between participants in public relations, object of the tangible world, product of spiritual creativity, personal property or behavior of participants in relation, over which they enter into the legal connection with each other and that is protected by the government\(^\text{2}\). Having analyzed all the above-mentioned definitions, we can state that an object of legal relations means tangible or intangible values, over which the subjects enter into legal relations in order to realize their legal interest.

To choose the most appropriate legal regime and create a solid legal foundation, we need first analyze the nature and characteristic features of objects of legal relations to properly represent them at the regulatory level, as well as to effectively regulate the public relations connected to them. This explains the relevance of reviewing the nature of a digital asset in the system of similar objects of right, such as assets and information resources.

There is a broad range of definitions of the term “asset”, among which the following deserve special attention:

- asset means any object of economic activity that belongs to an individual or corporation\(^\text{3}\);
- asset means any resource or opportunity\(^\text{4}\);
- according to the ISO 55000:2014 International Asset Management Standard, asset represents an item, thing or object that has potential or real value for an organization\(^\text{5}\);

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\(^1\) Lazarev, V. V. *Obshaya teoriya prava i gosudarstva* [The general theory of law and state]. M.: *Yurist*, 1999. p. 423. [in Russian]


\(^4\) ITIL® Glossary of Terms English v.1.0. p.5. URL: https://www.axelos.com/corporate/media/files/glossaries/itil_2011_glossary_gb-v1-0.pdf

5.8. Legal Regime of Assets, Information Resources and Digital Assets

• asset is any object, tangible or intangible, that presents value to its owner.1

Having analyzed the above-mentioned definitions of the term “asset”, we can state that an asset means property and/or rights (property, non-property) of a natural person and/or business entity that present value including digital assets, money and various kinds of works, services.2 Whereas an information resource means information structured and organized in a certain way, recorded on a tangible medium. This information can be stored, transferred, used and replenished. The information resource has the properties of practical significance and usefulness, as well as the possibility of multiple use.3

In turn, the term “asset”, according to the definition presented above, can fall under a number of the existing types of objects of legal relations, which include:

• items of the tangible world (parts of the tangible nature, natural resources, land, mines, forest, etc.);
• things and values (production and consumption items, buildings, securities, money, etc). They are the objects of property legal relations, such as buy-and-sell, donation, pawning, exchange, storage, inheritance, etc.;
• services as a result of a certain behavior, which cause certain rights and duties of subjects of legal relations, take place in the fields of management, public services, business, cultural and other fields of human activity;
• results of intellectual activity (creation of art, music, literature, know-how, computer programs, etc.).4

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3 Zahalna teoriia derzhavy i prava [The general theory of state and law]: textbook for students of law higher schools] / V. Tsvik, A. V. Petryshin, L. V. Avramenko et. al.; edited by M. V. Tsvik, Doctor of Law, Professor, Academician of the National Academy
When talking about the positioning of digital assets and information resources in the system of objects of rights, it is worth noting that this issue, due to its controversial nature, must be left for review by the competent legislative authorities.

**Comparison of the Terms “Digital Asset”, “Information Resource” and “Asset”**

We need to distinguish between the terms “asset”, “information resource” and “digital asset” by conducting the systematic analysis of their interaction to further review the issue of objectivity regarding these terms.

First and foremost, it should be noted that the main feature of an asset is its primary nature in relation to a digital asset. This is evident from the asset digitization procedure, which allows stating its defining role in the process of creating a digital asset. The essence of the asset digitization procedure is reduced to the creation of an information resource based on it, which contains a set of rights and duties of subjects in relation to the asset, as well as to the issue of units of access (right of access) to this information resource, i.e. the digital asset itself.

Now it should be pointed out that, according to the above-mentioned definition of an asset, it can also include a digital asset. Meanwhile both asset and digital asset can exist as independent objects within the same legal relations.

This fact can be explained using the existing in the legal doctrine category “object squared” or “object of objects”. According to I.V. Spasibofateeva, there are a lot of such examples for intellectual property right. Trademark is one of the objects of such right. And the object of a trademark is any designation or any combination of designations. They can include words, especially names, letters, digits, images, colors, as well as combinations of colors or any other combination of such designations. Inventions and utility models are objects of intellectual property, and the objects of inventions and utility models can include products, devices,
elements, etc.\(^1\). When comparing the asset and digital asset through the lens of theory of categories “object squared” or “object of objects”, it should be noted that in order to create a digital asset, an asset should be its foundation, while a digital asset itself can be used as a foundation for backing another digital asset.

The next issue that needs to be considered when reviewing these aspects is the objectivity of an information resource.

It is worth noting that the property of an information resource that lies in its ability to be an independent object of legal relations is explained by the ability of subjects of such legal relations to operate the right to an information resource, which by its nature is derivative of the right to a value, while the value (asset) itself remains in possession of its owner.

In order to discover the fundamental aspects of the nature of an information resource, we need to look at the foundation of its connection to a digital asset.

A digital asset includes units of access (rights of access) to an information resource recorded in the blockchain that circulate in it by means of a unique identifier. In turn, if a person has units of access (rights of access), it confirms that he/she has claim rights in relation to the creditor in legal relations. The allowed list of claims and the terms of exercising the claim right are specified in the Protocol of this digital asset or any other document that provides an external form of realizing an information resource. This construction is explained through the “right to the right” category, which is a principle that allows a subject to operate the right to an information resource derivative of the right to an asset, while the asset itself remains in possession of its owner.

Thus, the difference between an information resource and a digital asset, which allows stating that these are two independent objects of legal relations, is explained by the fact that a digital asset represents a right of access to an information resource, i.e. gives the right to use an information resource.

The right to use is one of the rights within the property right (along with rights to dispose and own). Its essence is reduced to the extraction of useful properties out of the items, which allow satisfying the corresponding needs of an individual or a group. The right to dispose means the ability of an owner to determine the legal or factual fate of an item, while the right to own is, essentially, to secure tangible values with specific owners, individuals or groups, the factual holding of an item in the activity area of these persons.\(^1\)

Moreover, if we compare an information resource and a digital asset using the structure of property right in Anglo-Saxon legal family, the above-mentioned statement will also be applicable to the eleven elements of property right presented by the English lawyer A. Onore, because they are a more detailed version of the classic three elements of property right for the Romano-Germanic legal family.\(^2\) The eleven elements of right proposed by A. Onore include:

- right to own understood as an exclusive physical control over an item or as a right to its exclusive use;
- right to use or personal use of an item when it does not include the two subsequent rights;
- right to manage, i.e. right to decide who and how can use an item;
- right to an income, i.e. to the values that the exercising of the two previous rights gives;
- right of alienation, consumption or expenditure at one’s discretion, change or destruction of an item;
- insurance from expropriation or right to security;
- right to transfer an item;
- unlimited validity term;

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2 Yangurazov, M. V. *Kategoriya prava sobstvennosti v anglosaksonskoj i romano-germanskoj pravovyh sistemah. Pravovoe obespechenie innovacionnogo razvitiya obshestva i gosudarstva* [Category of ownership in the Anglo-Saxon and Romano-German legal systems. Legal support for the innovative development of society and the state]: materials of the international scientific conference of students, undergraduates and graduate students; Minsk, October 29–30, 2010 Minsk, 2011. p.36. [in Russian]
• prohibition to use an item to harm others;
• ability to take an item pack to pay a debt;
• residual nature, i.e. the existence of rules that ensure the restoration of the violated right\(^1\).

Thus, we can sum up that the existence of a digital asset does not mean the existence of a property right to an information resource, which would be reasonable for any of the commonly accepted concepts of the structure of property right and rights it includes.

Meanwhile, we can state that all three terms (“asset”, “information resource” and “digital asset”) are independent objects, which coexist and are similar within certain public relations. For example, due to the understanding of the fact that an information resource is a separate object of right, we can say that there is an intellectual property right to it at the legislative level.

Thus, the statement that allows talking about an asset, information resource and digital asset as independent objects of legal relations has practical significance for the proper selection of the legal regime for their regulation, as well as regulation of legal relations, which they are objects of.

**Transformation of the Legal Regime of an Asset During the Digitization Procedure**

A look at the stages of the asset digitization procedure will allow us to see the main regularities of the system, in which an asset, digital asset and information resource exist. We also have to discover one of the aspects of existence of an asset, in particular, the transformation of its legal nature by going through the digitization procedure.

It is worth noting that, in general, the asset digitization procedure is reduced to the creation of an information resource based on it, which contains a set of rights and duties of subjects in relation to this asset, as well as to the issue of units of access (rights of access) to this information resource, i.e. a digital asset.

The main stages of the asset digitization procedure:

**Stage 1**
A natural person or a business entity creates a unique digital copy based on an asset, which represents the property right to this asset.

**Stage 2**
Creation of an information resource, including unique digital copies of an asset in it and determining the properties, as well as terms and conditions of its use.

**Stage 3**
Creation of a digital asset, which is connected to an information resource by means of its unique identifier circulating in the distributed ledger (blockchain).

It should be noted that, as a result of the asset digitization procedure and creation of a digital asset based on it, the entire set of rights and duties of subjects in relation to an asset is supplemented with the means of legal influence, which the creator of a digital asset, at his/her own discretion, based on the existing claims, specifies in the protocol of this digital asset or any other document that represents an external form of implementation of an information resource. This document establishes certain attributes and properties of a digital asset, terms and conditions of its creation and circulation, as well as the order of its execution.

We would like to note that the asset digitization procedure results in the creation of a digital asset, which leads to the transformation of a set of rights, specifically, to the expansion of the list of rights and duties in relation to this asset. This fact confirms that the range of issues that need to be reviewed when developing the legal regulation for the terms “asset”, “digital asset” and “information resource” includes the emergence of additional and transformation of existing rights and duties of subjects in relation to a specific asset as a result of going through the digitization procedure by this asset, this is the aspect that also needs to be represented at the legislative level.
Conclusion

The detailed examination of the nature of an object of legal relations is of fundamental importance for the legislative authority, which must regulate this object with maximum precision in the adopted legal acts to correctly and effectively regulate the legal relations that arose regarding this object.

The perception of an asset, a digital asset and an information resource as independent objects of right, as well as the study of their characteristic features, is crucial to building a strategy of the legislator regarding the regulation of legal relations arising as a result of circulation of digital assets.

5.9. Legal Doctrine of a Digital Asset

The development of modern technologies and telecommunication systems has led to the emergence of blockchain tokens, in particular digital assets, which for quite a long period of time have been de facto the subject of legal relations and property objects that is a prerequisite for the formation of the legal doctrine of a digital asset. “The allocation of digital objects of right has become an objective need for participants in public relations wishing to make direct transactions with counterparties, excluding intermediaries such as banks, payment systems, and other transaction operators”.

It is important to analyze the features and properties of a digital asset in the context of a legal doctrine.

“Modern digital technologies allowed overestimating tangible assets (objects of the material world), bringing them into line with intangible ones, i.e. digital assets existing in electronic form. The use of the blockchain

technology when creating data registries required to reassess the traditional understanding of property rights as a triad of ownership, use and disposal rights"¹. However, changes that have occurred in the understanding of property rights need to be properly reflected in the relevant legislation on property rights or on the objects of such rights.

According to Natalie Banta, Associate Professor at Drake University — Law School, “…Property law has always mirrored society’s decisions about how to control and allocate resources and our treatment of digital assets are no different. Digital assets themselves function so similarly to property that we must apply traditional property law principles to ensure that our rights over digital assets do not regress into an anti-democratic and archaic form of feudalism in a technologically driven future”².

The feature of digital assets is that “they exist only in electronic form in isolation from the material world, in fact, in the form of cryptographic digital code, which reveals their content”. Actually, since digital assets are electronic information, there is legal uncertainty in their interpretation as an object of right”³. Now, digital assets have become separate objects of transactions, including cryptocurrency, musical works or works of art in electronic form, information on titles to objects of right, etc.

“The emerging digital economic relations require that adequate legal concepts and institutions ensuring modern digital civil circulation be enshrined in the law”⁴. Associate Professor V. A. Vaipan states that if new


⁴ *Pravovoe regulirovanie ekonomicheskikh ottenishien v sovremennyh usloviyah razvitiya cifrovoj ekonomiki* [Legal regulation of economic relations in modern conditions of development of the digital economy]: monograph / exec. editor V. A. Vaipan, M. A. Egorova;
digital objects are not recognized by the legislator, then “it would be impossible to legally influence the circulation of these assets and effectively protect the rights of the persons who operate them”. Therefore, based on the scientist’s statement, the integration of digital assets into the legal system and their inclusion in the list of objects of legal relations are necessary for full protection of property rights to digital assets. At the same time, the basic concepts of the digital environment affecting the rights of citizens should be regulated at the level of basic laws, which will provide for the introduction of point changes to separate legal acts, and the details of regulation should be left at the level of by-laws. According to V. A. Vaipan, a number of experts are against amending the current legal norms in terms of basic definitions and objects of legal relations, as it may violate the stability of circulation. At the same time, Doctor of Law, Professor G. K. Dmitrieva has a different point of view, believing that due to the dispositive nature of the law inherent in the Romano-Germanic legal system, there is no closed list of objects of civil rights. In turn, this means that this list can be supplemented. In addition, if there are terms “other property”, “other tangible and intangible assets” and similar in the

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1 Pravovoe regulirovanie ekonomicheskikh otnoshenij v sovremennyh usloviyah razvitiya cifrovoj ekonomiki [Legal regulation of economic relations in modern conditions of development of the digital economy]: monograph / exec. editor V. A. Vaipan, M. A. Egorova; Moscow branch of the Association of Russian Lawyers; Moscow State University named after M. V. Lomonosov; Association of Russian Diplomats. M.: Yustitsinform, 2019. p. 31. [in Russian]

2 Pravovoe regulirovanie ekonomicheskikh otnoshenij v sovremennyh usloviyah razvitiya cifrovoj ekonomiki [Legal regulation of economic relations in modern conditions of development of the digital economy]: monograph / exec. editor V. A. Vaipan, M. A. Egorova; Moscow branch of the Association of Russian Lawyers; Moscow State University named after M. V. Lomonosov; Association of Russian Diplomats. M.: Yustitsinform, 2019. p. 32. [in Russian]

legislative provisions on the objects of rights, it is possible to interpret them as widely as possible, taking into account modern economic realities and the level of development of information technologies. At the same time, in the absence of special rules for regulating relations connected to new objects of circulation, it is acceptable to apply the rules by analogy with the law or the analogies of rights, taking into account such principles as the inadmissibility of deprivation of property rights, freedom of contract, fairness, good faith, reasonableness, etc.¹.

By analyzing the legislation of different countries, it can be noted that many of them have already secured the term “digital asset” at the legislative level and started regulating the relations arising from its use. For example, in the New York State Senate Act, “Act to Amend the Estates, Powers and Trusts Law, in Relation to the Administration of Digital Assets”², the term “digital asset” means a digital or electronic record in which an individual has a right or interest. The Act provides for the possibility of alienation of digital assets, which makes them the object of circulation. In 2014, the Inland Revenue Authority of Singapore defined the cryptocurrency as a product or service³. In November 2017, the Monetary Authority of Singapore issued “A Guide To Digital Token Offerings”⁴, which distinguishes between tokens that fall under securities law and tokens that fall under the definition of “products”. Such regulations allowed defining digital assets as objects of legal relations.

Thus, it turns out to be possible to classify digital assets and other blockchain tokens as a separate category or a general list of objects of legal

² Act To Amend The Estates, Powers And Trusts Law, In Relation To The Administration Of Digital Assets. URL: https://legislation.nysenate.gov/pdf/bills/2015/A9910A.
³ Jon Southurst. Singapore Government: This is How We Intend to Tax Bitcoin. URL: https://www.coindesk.com/singapore-government-how-we-intend-tax-bitcoin.
relations. Judicial practice already knows a precedent when the contents of a cryptocurrency wallet were recognized as property that had to be included in the tender¹.

However, it is not enough to include digital objects in the list of “other objects” of rights, since from the point of view of civil law as a science, it is not the physical characteristics of property circulation objects that are important, but their legal regime. Digital assets have a non-standard digital circulation environment for objects of rights, unique properties, and, being the subjects of relations, they have legal consequences for participants, since such relations are realized in the distributed ledger environment, which is poorly studied from a legal point of view. In order to regulate digital assets, the full range of aspects must be taken into account.

**Identification of Subjects of Relations**

First of all, the new regulatory environment should be aimed at creating legal conditions for the formation of a unified digital trust environment, which would allow providing the subjects of mutual relations in the field of digital economy with the means of trusted digital remote communications based on the principles of remote identification of subjects for performing legally significant actions². In such relations, the identification of subjects is necessary in order to confirm that specific digital assets belong to the identified person and to further protect the rights to such an object of property. In this case, blockchain-based operating systems that have a procedure for identifying participants in relations solve the problem of restoring “technically lost” digital assets. It is worth noting that the


² Pravovoe regulirovanie ekonomicheskikh otnoshenij v sovremennyh usloviyah razvitiya cifrovoy ekonomiki [Legal regulation of economic relations in modern conditions of development of the digital economy]: monograph / exec. editor V. A. Vaipan, M. A. Egorova; Moscow branch of the Association of Russian Lawyers; Moscow State University named after M. V. Lomonosov; Association of Russian Diplomats. M.: Yustitsinform, 2019. p. 36. [in Russian]
identification of subjects should not contradict the confidentiality of relations, and with a proper verification procedure, the anonymity of the participants remains intact.

**Digital Rights as a New Object of Relations**

A separate aspect is the so-called digital rights. Due to the integration of blockchain tokens (digital assets) into various fields of society, many experts believe that it is necessary to distinguish a separate category of rights, i.e. digital rights. According to L. Y. Vasilevskaya, Doctor of Legal Sciences, the examination of a blockchain token as a digital method for recording property rights allows examining it as a certain property value, the legal regime of which is similar to the “value rights” (Wertrechte), distinguished in the European continental law of the German type\(^1\). As noted by S. A. Sinitsyn, Doctor of Legal Sciences, the modeling of a new type of subjective rights must meet the criteria of individuality and requires recording the defining characteristics (properties) of the law\(^2\). However, in this case, the digitalization of rights did not lead to the emergence of a new type of property rights, but to their digital recording.

In the Federal Law dated March 13, 2019 No. 34-FZ “On Introducing Amendments to Parts One and Two and Article 1124 of Part Three of the Civil Code of the Russian Federation”, which entered into force in October 2019, Russian civil lawyers propose the following definition: “Digital rights are rights under the law of obligations and other rights whose content and exercise should be determined in accordance with the rules of the information system that has the necessary features as established by law”\(^3\). According to the text of the Federal Law, an owner

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\(^3\) Shestakova M. *Cifrovye prava kak novyy vid obektov grazhdanskikh prav. Chto eshe pomenyalos v GK RF?* [Digital rights as a new type of objects of civil rights. What else
of the digital right is the person who, in accordance with the rules of the information system, has the ability to dispose of it. At the same time, the legislator did not propose separate methods for protecting and restoring digital rights, given that their legal regime differs from other property rights.

Thus, it seems appropriate to define a digital asset rather than a digital right as an object of rights.

### Smart Contracts as a Way to Realize Relations

Another important aspect is the environment for the realization of digital asset relations and the exercise of the will and obligations of the participants in such relations. A characteristic feature of the blockchain technology, such as the absence of intermediaries, has become attractive to the participants in the relations arising from the use of digital assets or the technology itself. Trust between the participants in the relations is based on the technological protection of transactions in blocks and in this case does not require legal regulation. Thus, regulation becomes more technical than legal because all transactions and their essential conditions are recorded in a distributed ledger and cannot be altered by the nature of the blockchain technology.

The expression of will and the fulfillment of obligations in such relations are carried out in the digital space and in an automated way through smart contracts. “The essential characteristics of such contracts are reduced to their electronic form, as well as to the automated fulfillment of obligations under them through the execution of digital transactions in the sequence specified by the relevant contracts and under the relevant circumstances (predetermined transaction parameters)”¹. In such relations, a transaction will be considered an offer, and confirmation of the transaction

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will be considered an acceptance. Written certified copies of such transactions are not required; they are considered as executed from the moment of the transaction execution. The execution of such transactions is always monitored in blockchain records, which may prove to be reliable in the event of a dispute. Thus, with the emergence of smart contracts it turns out to be possible to conclude transactions and fulfill obligations in a new automated form.

**Conclusion**

The active use of digital assets in economic, entrepreneurial and other types of activities demonstrates the need to fully secure digital assets in the legislation and the legal doctrine, which will be facilitated by a range of related innovations:

- establishment of a number of terms (blockchain token, digital asset, smart contract, etc.);
- establishment of a new form of conclusion of transactions — their digital form;
- definition of automated contracts as a form of fulfillment of obligations;
- identification and settlement of transactions in a digital space, in particular through the blockchain technology;
- ensuring protection of property rights to digital assets and other blockchain tokens.

On the issue of securing digital assets as objects of legal relations, experts are divided into two groups: some believe that the subject matter is fully covered by the term “other objects” enshrined in civil law; other experts state that digital assets must be defined as a separate new category, the category of digital rights. However, the uniformity in the methodological categorization of digital assets and the normative regulation of digital assets as objects of legal relations require significant legislative and doctrinal innovations, including a comprehensive analysis of digital assets from the point of view of private international law, applicable connecting factors or approaches to the resolution of potential disputes related to a cross-border element in relations to the circulation of digital assets.
5.10. Basic Property of a Digital Asset

Based on the definition of a digital asset as an information resource, which is derivative of the right to a value and circulating in the distributed ledger in the form of a unique identifier, we need to define the property of a digital asset, which determines its relation with the information resource.

Way of Using Information

A digital asset provides a new way of using information on a value, which is presented as an information resource in an information system based on a distributed ledger or the blockchain technology, which opens up new opportunities to operate a set of rights to a value.

Using a digital asset, an owner of the value uses only the right of access (admission) to the information resource, which contains a set of data (information) about the value, while the value itself remains in his/her possession until the owner of the digital asset demands the owner of the value to fulfill the obligations recorded in such an information resource.

Access to an Information Resource

By its nature, a digital asset is a unit of account for the amount of access to an information resource, which is derivative of the right to a value.

When transferring a digital asset, a certain amount of access to the information resource is transferred; which contains information that was embodied by the owner of the value regarding the set of rights to the value and information about the obligations of the owner of the value.

Having 100% access to a specific information resource by one person gives him/her the exclusive right to use such an information resource:

- the right to demand from the owner of the value to fulfill obligations embodied in the information resource;
- the right to exchange available digital assets for other digital assets.

It should be noted that the exchange of digital assets also involves the exchange of a certain amount of access to information resources corresponding to these digital assets.
Information Management

A digital asset allows operating information, which is not just a new way of using information, but includes the process of organizing the interaction between the subjects (the owner of the digital asset and the owner of the value) and the object of management (digital asset), aimed at ensuring:

- the realization of the goals embodied in such a digital asset;
- the implementation of legal relations, the object of which is the right to information, which is derivative of the property right to a value.

Information management through a digital asset is not only a complex, but also a dynamically developing phenomenon. As a social phenomenon, such management arises when there is a need for it.

Information management activities include a continuous innovative component that contributes to the development of the capabilities of the information resource in the course of using the information system. However, such activities contribute to the preservation and functioning of such systems.

Conclusion

Examination of the main property of a digital asset and the established relation between a digital asset as a unit of access (right of access) to an information resource and the property right to a value allows us to speak about a new object of civil legal relations, i.e. the right to use information derivative of the right to a value.

5.11. Tasks of a Digital Asset

Precedents for determining the objects of civil rights clearly demonstrate that objects with obvious value, but not yet falling under the generally accepted notions of private law, periodically appear in circulation.

High development dynamics of modern technologies and globalization of the Internet have contributed to the rethinking of the concepts of tangible
and intangible assets, and therefore the list of civil rights in the XXI century was supplemented with such items as a profile in a social network (account), game artifact, and others. The practical implementation of the blockchain technology added a digital asset to this list.

According to International Accounting Standards, a digital asset as an information resource can be classified as “an intangible asset, i.e. an identifiable non-monetary asset without material form”. Such categorization makes a digital asset understandable for taxation and indispensable for organizing a new type of accounting and control of values by business entities.

The distinctive qualities and properties of digital assets are explicitly realized in the tasks that they perform. In general, the tasks of digital assets can be divided into three groups:

- individual;
- sectoral;
- global.

**Individual tasks** are performed in the process of individual use of a digital asset by its owner in a distributed ledger and depend on the purpose:

- recording and storage of information contained in a digital asset;
- further dissemination of information;
- temporary use of a digital asset;
- recording intellectual property rights through a digital asset, etc.

Thus, the owner of a digital asset independently determines its individual tasks.

**Sectoral tasks** are formed depending on the scope of application of digital assets. For example, the purpose of a digital asset used as an information resource in a state register is to systematically record data. Large state orders, such as the supply of raw materials and equipment, can be recorded and carried out through appropriate digital assets, which will ensure a rational distribution of resources and allow avoiding leakage of funds for other purposes.

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In accounting, a digital asset can serve as a tool for calculating numerical indicators, for reconciling assets and liabilities into a balance sheet, as well as other accounting information. Thus, the purpose of digital assets in the accounting field is to facilitate the operation of a register in which it is possible to identify, track and verify the necessary indicators.

Large companies can display goods and services in the form of digital assets, distribute them as wages and conduct any internal activities using digital assets and the blockchain technology, solving production and information accounting tasks.

**Global tasks** of digital assets include:
- eradication of the shadow economy and double-entry bookkeeping;
- rational allocation of resources for their intended purpose;
- elimination of corruption and fraudulent transactions in the field of relations connected to the circulation of values.

One of the solutions to the above-mentioned tasks is to form decentralized communities based on the blockchain technology. This technology allows reducing the time of executing transactions, and also gives users of the distributed ledger the opportunity to fully own their assets, recording information about a set of rights to a value in digital assets, with the possibility of further accounting and management, as well as an equivalent and secure exchange of this value without intermediaries.

**Conclusion**

The list of tasks of a digital asset, the implementation of which is conditioned by its functional capabilities, allows us to conclude that the use of a digital asset is possible in all fields of society, in particular: social, economic, political, and others. Solving the individual, sectoral and global tasks of a digital asset contributes to the creation of new public relations based on the blockchain technology in any of the above-mentioned fields, as well as to the emergence and updating in real time of reliable registers and databases for recording, storing and circulating information embedded in a digital asset.
SUMMARY

Transformational processes caused by the emergence and spread of the blockchain technology are fundamentally changing the approach to working with information. The principles of blockchain’s operation not only contribute to its systematization, they also transform the value characteristics of such information. Thus, information acquires importance, which can be reflected in the increase in demand for its consumption and the formation of value.

Moreover, the blockchain technology shifts the paradigm of perception of assets, material values and property rights, since information, despite its intangible nature, becomes one of the values alongside the objects of the material world. The asset digitization procedure helps to ensure that a digital asset is a digital representation of structured and ordered information about an object that becomes valuable in the environment of its circulation. Thus, a peculiar evolution of the usual circulation of material values takes place, because the object of circulation based on the blockchain technology is an information resource in the form of a unique identifier.

Such changes in the principle of objects circulation require a rethinking of property rights in particular and legal regulation in general. Law, as one of the most important social regulators, must respond to the needs of society and the transformation of social relations. At the same time, it is important to identify the potential of innovative technologies such as blockchain.

Using the objects of the material world in the digital environment as one of the possibilities of blockchain helps to simplify circulation of goods, allows subjects to exchange information about such an object without its actual transfer, as well as to manage information about such an object to third parties, while the object itself is held by the owner. Essentially, a new type of legal relations arises: the “right to the right”. Legal consciousness is transformed under the influence of these processes, and, as a result, a socioeconomic effect arises.
The technological advantages of blockchain make it possible to exclude intermediaries (financial intermediaries, banks and/or third parties) from relations between entities, which, as a result, allows you to optimize financial expenses and time costs.

It should be noted that the blockchain technology has become the basis for a new way of managing information through a digital asset.

The blockchain technology is aimed not only at improving the everyday life of citizens, but also at improving the quality of goods and services, eliminating administrative barriers in the work of business entities, providing public services, increasing the competitiveness of the economy, openness and transparency in the activities of public authorities.

New ways of using information lead to the emergence of a new market, which is the market of information resources and services based on the blockchain technology. It should be noted that these changes will not necessarily lead to staff reductions, but rather to the need for retraining in the direction of information technology and law.

Thus, the blockchain technology brings radical changes in the socioeconomic, political, legal and other fields of society. However, legal changes should be such that a balance can be struck between the preservation of fundamental social and legal values and the unimpeded implementation of the blockchain technology. The suspension or rejection of changes at the state level will obviously lead to a natural lag in the industry and related economic stagnation.

In addition, the procedure of digitization and distribution of innovative technologies in the economy determine a new direction for the development of law in the modern world, which requires a comprehensive theoretical study, justification and development of new types of relations in the legal field.
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328


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332


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The dynamic development and implementation of advanced technologies set in motion the expected transformation of social relations.

Thus, the rapid development of the blockchain technology and its active integration into various fields of activity served as a starting point for the formation of a new type of socioeconomic relations, the regulation of which should be carried out in the legal field.
Наукове видання

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ЦИФРОВІ АКТИВИ
ТА ЇХ ПРАВОВЕ РЕГУЛЮВАННЯ
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ТЕХНОЛОГІЇ БЛОКЧЕЙН

Монографія

(Англ. мовою)

Видається в авторській редакції

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