

Newest Digital Technology in Management of National Economic System

Nataliia Kraus

*Department of Finance and Economics
Borys Grinchenko Kyiv University
Kyiv, Ukraine
k2205n@ukr.net*

Kateryna Kraus

*Department of Management
Borys Grinchenko Kyiv University
Kyiv, Ukraine
k23k@ukr.net*

Oleksandr Manzhuira

*Vise Rector
Poltava University of Economics and Trade
Poltava, Ukraine
manzhura11@ukr.net*

Abstract. The content of some latest digital technologies in managing of national economic system, including Blockchain NEM technology are described in the article. Key benefits of using NEM in business management are outlined, including high efficiency, ease of use, flexibility and reliability. Among the advanced features of Nanowallet, authors describe Namespaces, Mosaics and Apostille. The areas of use of Harvesting in management of national economic system and highlights the benefits of its practical application are generalized in the article. Authors have developed a four-layer architecture that can be considered a key advantage of Catapult's newest digital technology performance in managing the economic system. It outlines its main advantages and outlines the options for using Catapult in managing of national economic system. Proof-Of-Importance factors for the work of latest digital technologies are highlighted and substantiated. Blockchain 3.0 protocols and service layers, on-line and off-line protocols, decentralized applications are defined.

Keywords: *digital technologies; Blockchain NEM technology; Harvesting in management; national economic system.*

I. INTRODUCTION

21st century can safely be called as digital time in management of economic systems, changing the approach to doing business, as well as the requirements for used information technology: marketing, sales and service management systems; telephony and messengers; systems of document circulation and personnel management; accounting systems and many other corporate applications [1; 2; 3; 4].

II. RESULTS

Newest digital technology in management today is called GovTech. We are convinced that GovTech can be safely attributed all IT products; solutions; development; services that help solve the problems of coordination and management of public sector. GovTech solve such problems:

- Participation. Creating platforms for citizens' co-operation, electronic petitions, and crowdsourcing. Enhancing e-identification capabilities. These technologies are more commonly known as CivicTech.
- Infrastructure (digital sensors, control sensors).
- Provision of services in education, health care.
- Regulation (decision for the assessment of objects,

conducting inspections).

- Administration – licensing, cloud management, software management [5; 6].

We are convinced and stand in the position that digitization of Ukrainian economy is a complex of mechanisms, motivations and incentives for the development of digital technologies in management of national economic system, and hence the extensive domestic digital infrastructure, in order to take advantage of country's capabilities, enhance its competitiveness, and increase the well-being of society.

We affirm that the concept of digital technology development involves the implementation of a series of activities aimed at overcoming "digital divide" by introducing and using the newest communication and data transmission technologies, as well as the comprehensive introduction of digital technologies – from the introduction of digital jobs to digital agenda of modern world and managing them.

The first in the world of Blockchain smart-assets [7, p. 12; 8; 9, p. 82], built from scratch for productive management of national economic system is NEM. Blockchain NEM technology provides a world-class platform for practical management of any type of asset of economic system, namely: currencies, supply chains, notarial certifications, registration of ownership, etc.

Regardless of whether a new, better mobile application is being built, or whether Blockchain is being implemented in the existing business infrastructure, NEM makes Blockchain the one that works with maximum efficiency. Based on this, we concluded that blockchain NEM provides an open and self-developed platform for developers, and access to all capabilities is realized through digital simple API NEM. The benefits of using NEM in business management are given in Table 1.

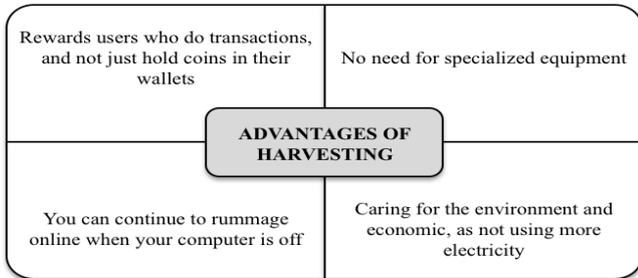
NEM is built from scratch to be easy to use for developers. Regardless of whether the consumer wants to build something over NEM using his favorite programming language or interact with NEM core using Java (soon C++), Blockchain NEM has many proposals in power, scalability and ease of use. We believe that if an entity is newbie in Blockchain area, NEM can be the point of entry into this industry for a new business entity. But if an entity is experienced, NEM has power required to create the most advanced applications on Blockchain. To get started with NEM, only the client will need to access network.

TABLE I. ADVANTAGES OF USING NEM IN BUSINESS MANAGEMENT

NEM advantages	Features of NEM in business management
<i>High efficiency management</i>	1. Reducing infrastructure costs up to 90 %, which is confirmed by the real Proof of Concept cases. Easy and understandable integration of NEM into business. Full functionality thanks to API, which can be used with any programming language.
<i>Easy to use and manage</i>	2. Maximum flexibility in setup. With the smart-assets system, NEM allows you to focus as closely as possible on the design of what you need: FinTech systems, logistics tracking, ISO, notarization, decentralized authentication.
<i>Enhanced flexibility</i>	3. Speed of work. Blockchain NEM platform is designed, programmed from a clean sheet to achieve some of highest transaction speed and uncompromising performance stability indicators, by consensus proof of the importance of proof-of-importance.
<i>Reliability and safety</i>	4. Reliable protection. Using a unique reputation management algorithm for Eigentrust++ nodes, which provides exceptional protection against malicious attacks and ensures stable operation of all Blockchain NEMs.

Developed by authors

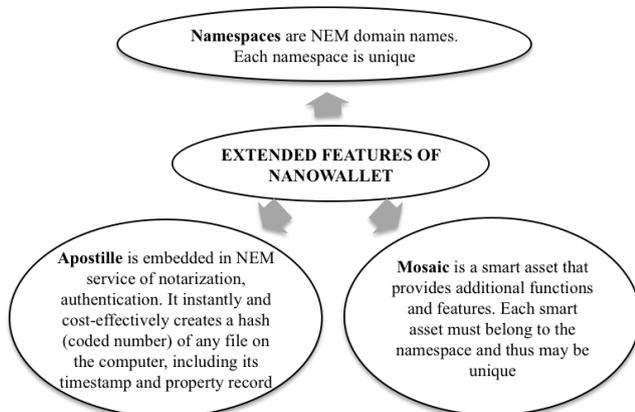
NanoWallet is a client-based browser that will use all features of digital technology NEM with ease. To do this, just download NanoWallet with nem.io., the extended features shown in Fig. 1.



Developed by authors

Fig. 1. Advanced Features of Nanowallet

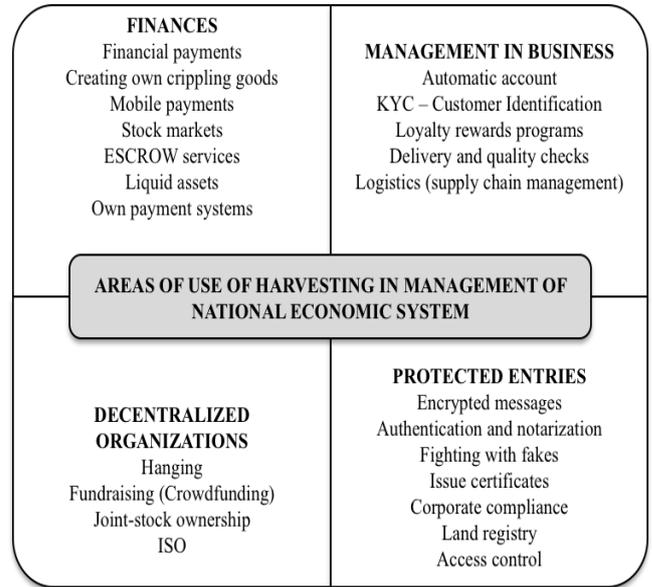
Blockchain NEM’s own currency is XEM, which can be considered “fuel” for the entire ecosystem. It is used to pay for a transaction and as an incentive for a network of public nodes. This means that XEM has a real fundamental value as the currency of a functioning economy. Harvesting is a process similar to that of other cryptographic trades, but it uses unique methods of evidence validation and delegated chartering to determine reward recipients [10, p. 64] (Fig. 2).



Developed by authors

Fig. 2. Advantages of Practical Application of Harvesting in Management of Economic System

We are convinced that NEM is the first Blockchain that implements delegated harvesting without revealing private keys. To do this, you must connect the account to existing network node and use its resources to complete blocks on its own behalf. Grounded by the authors areas of use of harvesting in management of national economic system are presented in Fig. 3.



Developed by authors

Fig. 3. Areas of Application Harvesting in Management of National Economic System

Blockchain is optimized for business data management. For example, Catapult is a full-featured Blockchain engine that can provide both private and public networks with its unique smart contract plugins and manage them. These plugins allow you to create secured digital assets, decentralized swaps, advanced account systems, and business logic modelling. At the next stage, the Catapult will become the core engine of NEM platform.

In addition to offering great improvements in speed and scalability, Catapult offers aggregated transactions and multi-level multi-signature accounts. All this gives you new uses that were not previously available to any of the existing Blockchain.

Aggregated transactions combine many transactions into one, allowing for unwanted swaps, automatic Cross Chain transactions, and other advanced logic. Catapult does this by generating one-time smart-contract. Once all the parties have approved the transaction, all its structural components are immediately executed. Today Catapult is only Blockchain with this functionality.

We highlight another feature of Catapult is multi-tier multi-signature accounts. For the first time on any Blockchain, it adds a “and/or” logic to multiparty transactions. You can also think of this as a “signed signatures”. This allows us to use a wide range of quality business logic management. This example shows how a high-security account can be made easier to use.

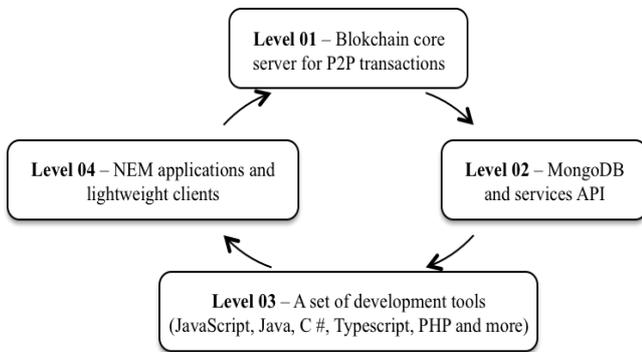
Transactions are only confirmed by hardware wallet or phone and an artificial intelligence system to detect fraud [11, p. 112; 12]. We believe that this allows protocol-level security configuration kits to protect customers from hacker

attacks. You can set up your account so that it can only be restored through approval of signatures from special accounts, such as friends or family accounts.

Catapult accounts can be much larger than sending currencies. They are able to send any digital data such as certificates and reports. Multi-level multi-signature Catapult can interact with items such as delivery scanners and automated devices in production.

In this case, the manufacturer delivers product as a pharmaceutical preparation. Product receives a quality certificate only when its record in Blockchain shows its production date, information from safety inspections and the fact that product has been delivered at correct temperature. Sensors in the delivery container notify the temperature data every 5 minutes and collect it in a daily report.

Catapult is fast, because it is built on a four-layer architecture (Fig. 4). This allows each layer to be protected from slowing down the influence of other layers so that ARI calls and data requests can respond quickly even at high traffic information. It also allows developers to update any of these layers without interrupting others, improving security and enhancing security.



Developed by authors

Fig. 4. Four-layer architecture as the advantage of the productivity of newest digital technology Catapult in management of economic system

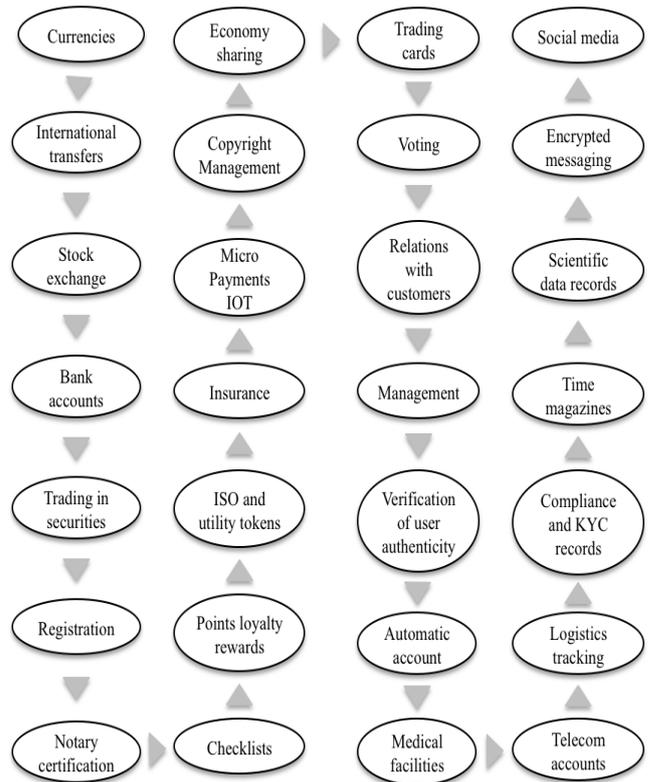
We highlight the following advantages, that is, the positive effects and convenience of multi-level multi-signature Catapult, as newest digital technology, are as follows:

- Escrow transactions with lots of assets. If a buyer purchases tickets for a concert with payment in XEM, he makes a purchase during a promotional campaign, then he receives a voucher for a live t-shirt. On other Blockchain, these types of combined transactions that don't need trust are quite impractical. Catapult makes them simple and safe.
- Decentralized swaps. In the case when buyer wants to purchase a license (for example, media usage rights) for 3000 XEM. The license is for sale on stock exchange, but buyer wants to keep all private keys outside the exchanges. The Catapult automatically creates three remittances required for the implementation of trust a swap: 3000 XEMs are passed to seller; the license is transferred to buyer; exchange Commission in the amount of 6 XEM is transferred to stock exchange.
- Automatic commission fee per transaction. If buyer sends \$ 50 to seller using a bill for payment, but does

not have any XEM to pay for the transaction commission in Blockchain, then Catapult can automatically convert USB to XEM to pay for the commission.

As a result, buyer and seller can use Blockchain Catapult without even having to buy or maintain an XEM. From the moment an account developer can place his own branding on an account for open source payments, buyer and seller may not even know that they are using Catapult.

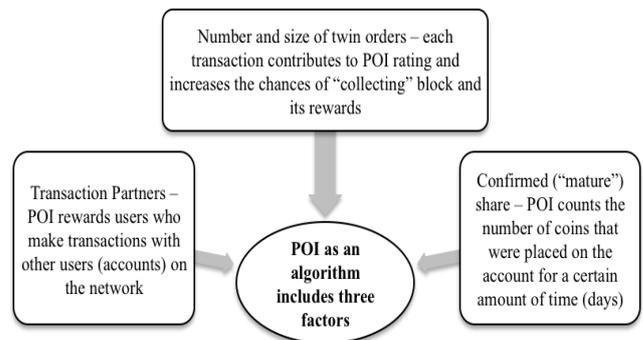
As a result of scientific research, we came to the conclusion that today there are many options for use Catapult in economic system that are presented in Fig. 5.



Developed by authors

Fig. 5. Options for using Catapult in management of national economic system

Proof of importance (POI) is one of major innovations in Blockchain industry (Fig. 6). This is newest consensus algorithm and reward calculation that uses network data to assign a ranking of the importance of each online account.



Developed by authors

Fig. 6. POI factors for the work of newest digital technologies

Among the protocols of consensus POI we highlight following:

- PoI is the mechanism of consensus Blockchain presented by NEM. Its function is similar to the proof of the particle, where nodes need to accumulate and keep amount of currency in order to have the right to create blocks. However, in PoI, the importance of users is determined by number of tokens they have and number of transactions carried out with them and their wallet. In POI, and the volume of transactions is also a factor as one of the components of network support and trust.
- Proof of storages (PoSt) is proof of capacity, a method in which a single node allocates a nontrivial amount of disk space to solve a task that service provider puts in place. PoSt is very similar to proof of work (PoW), the difference is that instead of computing, you use a computer repository. The storage proof is relevant, but differs significantly from functions associated with memory and proof of possibility of their recovery.
- Proof of bandwidth (PoB) – ProximaX will use several proxy validation mechanisms to report and check the contribution of P2P nodes to network.

We suggest to consider Mijin’s newest digital technology as a private Blockchain that addresses the issue of keeping confidential information in business, and combines all the power of NEM platform functionality. Developed by its technological and innovative giant Tech Bureau Corp, and tested by more than 300 companies in real economy sector in Japan.

Main benefits of using Mijin digital technology are: low infrastructure costs; management of access rights; high speed; low development costs; lack of idle time; lack of commissions and transactions.

ProximaX’s Information and Digital Technology is a decentralized valuable Blockchain-based repository as well as a content delivery network. It is developed by the same creators-innovators that create Blockchain platform NEM. ProximaX is a scientific and technological “leap forward”, providing a holistic solution that combines on-chine and off-chin protocols and services.

ProximaX’s Information and Digital Technology is specifically designed for real-world use, it is a suitable substitute for traditionally centralized technology architectures that gradually change each other as a result of dynamic development of new digital technologies. ProximaX is a revolutionary Blockchain modification that has been redefined and evolved.

Blockchain 3.0 ProximaX protocol we are considering extension of distributed registry technology and Blockchain with rich functionality of services and protocols (Fig. 7). Business, enterprises and innovators can avoid costly and unsustainable centralized management architecture crashes by using an all-in-one rack platform that provides complementary security, content delivery, repository and streaming media.

ProximaX expands traditional Blockchain protocols by integrating the number of off-chains, peer-to-peer service components, such as Content Delivery Network (CDN) and

cloud storage offerings. Primary services include messaging, storage and media streaming – all based on reliable consensus protocols to ensure network integrity. We are convinced that in future, services will allow measuring, confirming and stimulating decentralized workforce to prosperity and growth on a scale.

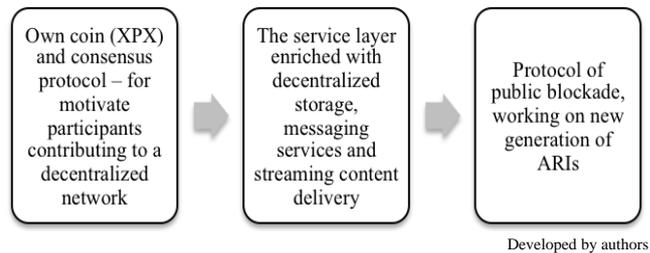


Fig. 7. Blockchain 3.0 Protocols

ProximaH is designed to provide solutions to the problems of the past by creating a new platform on Blockchain, which consists of the following on-chains and off-chains protocols, forming a wide range of decentralized services with infinite capabilities (Fig. 8).

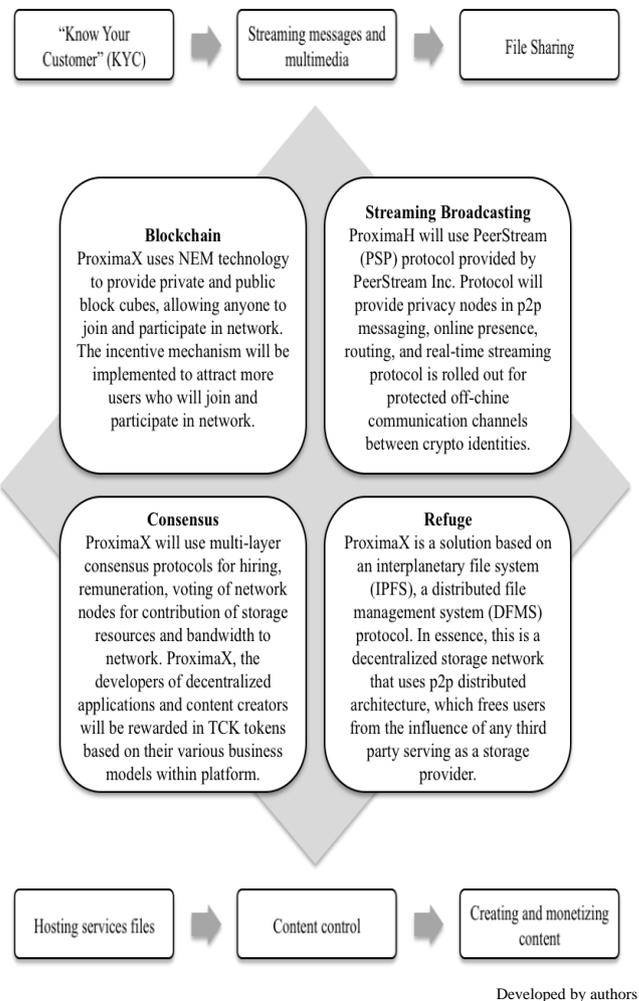
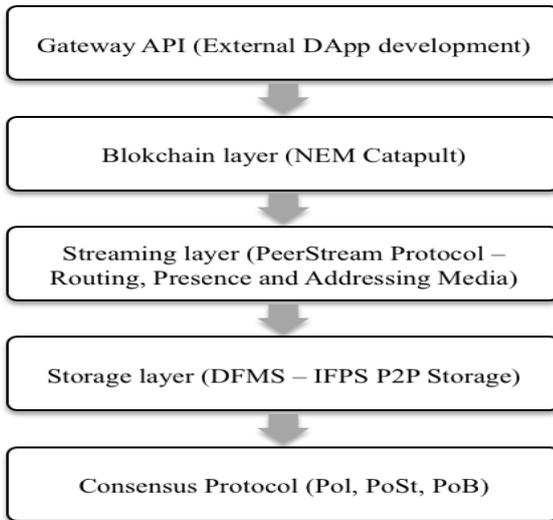


Fig. 8. Protocols and layers of service, on-chine and off-chin protocols, decentralized use

ProximaX Projections: KYC Policy Processes; ensuring business continuity; management of medical, accounting, IoT records; Big Data application; recording and reporting systems; registers; data tracking; legal and notarial services;

video streaming; corporate co-operations and messaging; supply chain management.

The components of ProximaX's digital technology are presented in Fig. 9.



Developed by authors

Fig. 9. Components of Proxima X's Digital Technology

Following examples of the use of digital technologies in management at macro and macro levels indicate a new high quality in customer acquisition of services/products, thus it becomes obvious that the development of digital technologies for Ukraine has a fundamental and priority character, because stopping economic downturn, accelerating social development on the basis of innovation can only be conditional on digital transformation in part of new quality management of national economic system.

III. CONCLUSIONS

Priority should be given to harmonizing and managing business rules, eliminating barriers to entry into the innovation market for newly created enterprises, new quality management of education systems and training on the basis of digitalisation, overcoming institutional barriers that impede comprehensive implementation of newest digital technologies in management of Ukrainian economy at different levels of economic aggregation.

Blockchain is a multifunctional and multilevel information and communication technology that aims to make the accounting of various assets reliable and instantly accessible. Reliable storage technology for keeping records of all transactions that have not taken place.

Blockchain is a chain of data blocks that is steadily increasing as new blocks are added with records of recent transactions. It is a chronological database, that is, a database in which the time when the record was made is inextricably linked to the data itself, making it non-commutative.

One of the major benefits of Blockchain technology comes from being able to speed up processes and reduce transaction complexity and risk. New advantages will emerge as this technology can be integrated with outdated IT, legal laws and existing assets such as currencies, stocks, bonds. For this reason, existing financial services can be

strengthened by blockchain systems, enabling financial institutions to come up with potentially lower costs, better products and accelerate time to market. Blockchain is a global distributed ledger that facilitates the movement of assets worldwide in seconds, with a minimal transaction fee. These assets are different in value and can be represented in digital form.

The use of Blockchain technology has great potential in terms of simplifying and improving efficiency in various fields of activity, primarily financial, through the creation of a fundamentally new financial services infrastructure. However, the transition to new technology will not succeed so quickly, for a number of reasons. First of all, due to uncertainty in the legal and regulatory spheres. In addition, large-scale implementation of Blockchain requires considerable investment and efforts in terms of standardization and unification.

Blockchain multilevel infrastructure needs to be built and consumers and regulators have confidence in this technology. At the same time, Blockchain's capabilities and growing interest in it testify to its great potential and ample opportunity to develop and improve performance across industries.

REFERENCES

- [1] Memorandum on the implementation of blockade technology was signed. Transparency International Ukraine, 2019. [Online]. Available: <https://ti-ukraine.org/news/pidpysano-memorandum-iz-vprovadzhenia-tekhnologii-blokchein/>. Accessed on: May 25, 2019.
- [2] Future strategies New era of digital transformation Central and Eastern Europe, 2019. [Online]. Available: https://www2.deloitte.com/content/dam/Deloitte/ua/Documents/research/c500/CETop500_2016_ua.pdf. Accessed on: June 20, 2019.
- [3] Digital economy and society index 2017: DESI 2017 list of indicators, 2017. [Online]. Available: <https://ec.europa.eu/digital-single-market/en/news/digital-economy-and-society-index-desi-2017>. Accessed on: June 11, 2019.
- [4] Digital economy and society index 2017: methodological note EUROPEAN COMMISSION directorate-general for communications networks, content and technology, 2017. [Online]. Available: <https://ec.europa.eu/digital-single-market/en/news/digital-economy-and-society-index-desi-2017>. Accessed on: May 21, 2019.
- [5] D. Tapscott, and A. Tapscott, *Blockchain revolution: how the technology behind Bitcoin is changing money, business, and the world*. Penguin Books, 2016.
- [6] M. Svon, *Blockchain: Scheme of a new economy*. Moscow: Olympus business, 2017.
- [7] K. V. Yakushenko, "Digital transformation of information support for managing economies of EAEU Member States", *Science and Technology News*, no. 2 (41), pp. 11–20, 2017.
- [8] V. A. Efimushkin, "Infocommunication technological space of digital economy", *T-Comm: Telecommunications and Transport*, vol. 11, no. 5, pp. 15–20, 2017.
- [9] V. P. Kupriyanovskii, S. A. Sinyagov, A. A. Klimov, A. V. Petrov, and D. E. Namiot, "Digital supply chains and blockchain-based technologies in a joint economy", *International Journal of Open Information Technologies*, vol. 5, no. 8, pp. 80–95, 2017.
- [10] A. Pogosyan, "Innovative payment instruments in digital economy", *Scientific notes of young researchers*, no. 3, pp. 63–67, 2017.
- [11] G. T. Karcheva, R. Ya. Leratovich, and V. Ya. Kavetsky, "Using of technology blokcheyn as a factor in improving the efficiency of financial sector", *Banking*, no. 2, pp. 110–119, 2017.
- [12] How banks will develop blockchain solutions in 2017. 2017. [Online]. Available: <https://geektimes.ru/company/wirex/blog/284556/>. Accessed on: May 29, 2019.