

THE IMPACT OF BLOCKCHAIN TECHNOLOGY ON THE TELECOM TRANSFORMATION IN UKRAINE

ВПЛИВ ТЕХНОЛОГІЇ БЛОКЧЕЙН НА ТРАНСФОРМАЦІЮ СФЕРИ ТЕЛЕКОМУНІКАЦІЙ В УКРАЇНІ

The article explores the characteristics of the Blockchain technology market worldwide and presents the perspectives of Blockchain technology on the telecom transformation in Ukraine. The Blockchain use cases in Telecom are suggested in the article. Benefits and remaining challenges of using Blockchain technology for telecommunication industry are given. Blockchain development companies in Ukraine are described. The impact of this technology on the telecom transformation in Ukraine is defined.

Key words: Blockchain technology, telecom transformation, digital services providers, communications service provider, impact.

У статті розглянуто характеристики технологічного ринку Блокчейн у світі та представлено перспективи технології Блокчейн для перетворень сфери телекомунікацій в Україні. Запропоновано варіанти використання Блокчейн у сфері телекомунікацій. Наведено вигоди і проблеми використання технології Блокчейн для телекомунікаційної галузі. Описано компанії-розробники Блокчейн в Україні. Визначено

вплив цієї технології на телекомунікаційну трансформацію в Україні.

Ключові слова: блокчейн-технології, трансформація телекомунікацій, цифрові постачальники послуг, постачальник послуг зв'язку, вплив.

В статье рассмотрены характеристики технологического рынка Блокчейн по всему миру и представлены перспективы технологии Блокчейн для преобразований сферы телекоммуникаций в Украине. Предложены варианты использования Блокчейн в сфере телекоммуникаций. Приведены выгоды и проблемы использования технологии Блокчейн для телекоммуникационной отрасли. Описаны компании-разработчики Блокчейн в Украине. Определено влияние этой технологии на телекоммуникационную трансформацию в Украине.

Ключевые слова: блокчейн-технологии, трансформация телекоммуникации, цифровые поставщики услуг, поставщик услуг связи, влияние.

UDC: 004.056

Drokin N.I.

Candidate of Economic Sciences,
Associate Professor of Marketing
Department
State University of Telecommunications

Problem statement. Blockchain is currently one of the most talked-about technologies. Across industries, organizations are exploring blockchain's potential impact in their space and how they can benefit from this emerging technology. The communications service provider (CSP) or telecom industry is no exception. The good news is the opportunity to benefit appears real. The core attributes of blockchain's shared ledger approach help provide trust, security, transparency and control across the participating ecosystem for all points in a transaction process. This results in the potential for lower costs, faster throughput and improved experiences for all players. According to IBM Institute for Business Value report, recent global consumer survey, CSPs typically are among the most trusted organizations for handling personal data and securing privacy-even exceeding the trust level of financial institutions and governments in some countries.

This leaves them well positioned to monetize Blockchain. For the CSP, Blockchain opens up the potential for improved efficiencies as well as new revenue growth. IBM's industry model shows the development of two key plays: the customer experience/efficiency play to become digital services providers (DSPs) and the growth play to become digital services enablers (DSEs) [1, p.1].

Analysis of recent researches and publications. Conceptual principles of Blockchain technology set out in the scientific works of Wright & De Filippi [2], S.Nakamoto [3], J.Kehril [4], M.Pilkington [5] and others. In the scientific works of these schol-

ars, concept and technical aspects of Blockchain work has been used, in particular structured connection of Blockchain's blocks, main principles and business value of Blockchain technology, technological implications. Blockchain is a new technology, which has a huge potential for implementation in a variety of industries. It is commonly discussed merely as an underlying technology of the Bitcoin cryptocurrency. However, the areas of the technology implementation are not researched thoroughly and not limited to the financial sector. Therefore, it is necessary to study the issues of the impact of Blockchain technology on the telecom transformation in Ukraine.

Formulation of the problem. The aim of this research is to determine the basic tendencies of Blockchain and define the impact of this technology on the telecom transformation in Ukraine.

Presentation of the main research material. Blockchain is an innovation that allows secure, fast, and decentralized transactions that have never been possible before. Recently, the news about cryptocurrency has taken over nearly all of the media. The potential influence of Blockchain on the global economy is huge, beyond all doubt. Statista reports that the size of the worldwide Blockchain technology market will grow from \$375 billion in 2017 to \$2312.5 billion by 2021 [6].

Telecommunication or Telecom in short refers to interchange of information by electronic and electrical means over near and quite significant distances. It is rather a generic term used for a wide range of info transmission technology like mobile phones, lan-

dlines, Broadband, VoIP and broadcast networks. In telecoms, information are transmitted among the communication participants in form of electrical signals referred to as carrier waves, which can be modulated into analog and digital signals for transmission, and then demodulated into its original data form i.e. image, audio or video. Telecom technicians play major roles in delivering Internet, phone and digital services to their customers.

Communication is one of the extremely important aspects, not only for people around the world, but also for small to mid-sized and large businesses. If communication were to fail, then the world would not be what it is now and would go into a stand still. Though there are numerous challenges being faced in the telecom sector, the recent advancements promise to take care of the flaws and resolve the issues lurking in this. Blockchain is one such aspect of technology that holds tremendous potential to influence the telecom industry and projects a promising future trajectory for communications to move forward [7].

Telecom industry today has the most complex operations framework, involving many partners, vendors, customers, distributors, network providers, VAS providers. There are a lot of trust issues and transparency challenges due to the involvement of multiple entities. Also, there are no clear mechanism to track end-to-end activities of every entity.

Alternatively, Analysys Mason [8], an analytics firm, defines the following domains for the Blockchain introduction:

Delloite [9] believes that the Blockchain can make the biggest difference in key governance frameworks and added value services offering opportunities to reduce costs through increased performance of processes and to step up revenues from new offers. Here are some things we can expect with the Blockchain being brought in telecom industry (tabl. 1).

The impact ultimately depends on how actively the adoption of use cases is driven by CSPs. Going forward, there is a need to further facilitate Blockchain benefits and to overcome the remaining challenges (tabl. 2).

In conclusion, the benefits of adopting a Blockchain in the core and auxiliary operations of a Communications Service Provider are plenty, as highlighted above. CSPs should take a long term view of Blockchain and its potential to add value to the enterprise in both their current and new business models (fig. 3).

There will be challenges to adoption of the Blockchain, as with any new technology that holds the promise of significant disruption. However, CSPs would do well to work together to enable the full realization of the benefits, just as many of the global financial institutions are currently doing (e.g. in the R3 Consortium). Working in a silo will limit the potential of Blockchain, as disintermediation, robustness, and the need for trust at the intersection of many stakeholders drives real value. Organizations such as the GSMA, which represents the interests of many mobile CSPs globally, could equally take a more active role in exploring and promoting Blockchain use cases in the industry.

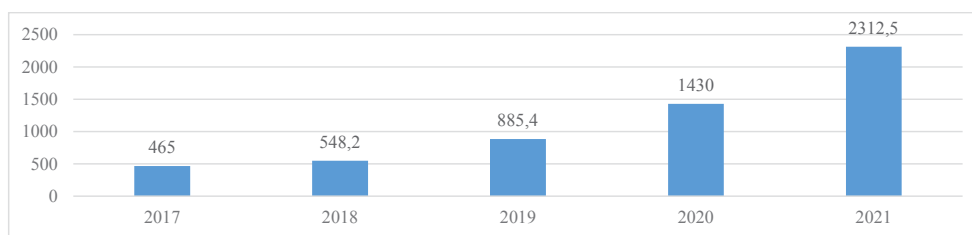


Figure 1. Size of the Blockchain technology market worldwide from 2017 to 2021, in billion U.S. dollars

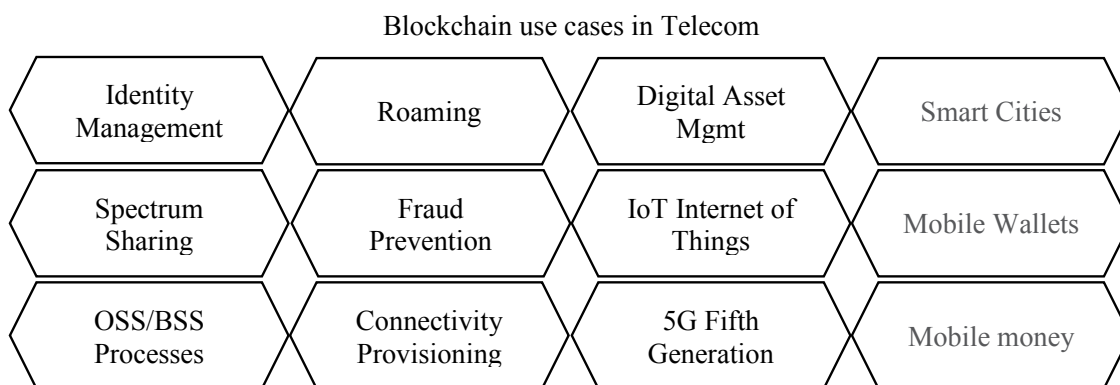


Figure 2. Areas where telecoms operators could deploy Blockchain technology

Blockchain use cases in telecom industry

| | |
|--|--|
| Roaming | Blockchain could possibly solve the problem of operators to integrate costly systems and provide authentication or access settings to enable roaming call across operators and networks. Blockchain can also enable complex and numerous data sets across multiple parties, in real-time providing security and trust to establish subscriber's identity. |
| Internal operations | Process like the OSS (Operation Support System) and the BSS (Business Support System) process like billing and number portability databases can be streamlined with blockchain. The billing can be validated without hassle. It is possible with the help of blockchain shared among customers, VAS providers, HPMN, VPMN and telecom companies. Also, migrating customers could be easily on-boarded onto the network after receiving a porting request, if the receiving operator shares any blockchain with the porting customer's operator. |
| Smart connections | With the help blockchain, operators can provide device connection to multiple local hotspots and WIFI based on permission and adherence to provided terms and conditions. Blockchain also helps with automatic generation of billing amount, transactions and payment receipts. |
| Mobile money | Blockchain has enabled cost-effective international remittances across the globe with very minimal transaction charges. Telecom operators can become global remittance providers. |
| Smart transactions | Blockchain has enabled purchasing of digital assets, including music, mobile games, gift cards and loyalty points with the use of Cryptocurrency. |
| Privacy | Operators could develop identity management tool that are accessible to organizations, devices and applications. |
| Compliance | Blockchain solutions are instrumental in enabling inter-operability between internal as well as external systems for telecom companies. This can bring down infrastructure as well as compliance cost, and save operators from roaming/identity fraud. |
| Newer revenue models | Smart Contracts (contracts written on code) will be used for autonomous M2M transaction scenarios such as electric cars paying an autonomous charging station for power. Blockchain will also enable micro-payment business models for mobile operators. And businesses will be able to offer 'Blockchain as a service' to content providers who can use this infrastructure for access control and payments. |
| Cybersecurity and Fraud Management | The Wannacry ransomware attack exposed the vulnerabilities that exist in the existing cyber defence systems. Since immutability is a key characteristic of blockchain technology, it will be difficult to make alterations to existing records without them being rejected entirely by the network. Also, by continuously tracking changes on the network, blockchain will provide a trail of transactions that can detect fraud, and diagnose faults and errors much faster than today. |
| Data management | Telcos can leverage blockchain to provide data management services to users. By providing easy and secure access to data, the technology will pave the way for enhanced data security. |
| Identity management and Authentication | Blockchain-based platforms can easily enable authentication across devices and organisations by using the decentralised blockchain principle with identity verification. A lot of companies are already doing significant work in this space. |
| Accelerated 5G Implementation | Operators can easily use blockchain to overcome barriers around network provisioning and real-time processing and reduce the friction required for implementing 5G networks. By using smart contracts for invoking the automatic execution of rules and agreements between different access mechanisms and the real-time supply of network resources (e.g. public Wi-Fi), blockchain technology will help speed up network implementations and the management of users interacting with third-party value added services. |
| Smart Cities | Public blockchains will power the smart cities of the future which will be run on IoT-enabled devices. Technology giant IBM is already collaborating with the city of Dubai to help it run a city-wide blockchain pilot. Telcos will also be able to find newer opportunities by investing in public blockchains. |
| Support BSS/OSS processes | Through standardization and process simplification, blockchain will support a number of BSS/OSS processes such as number portability, billing and flexi eSIM provisioning. For number portability, the technology can assist by removing third-party clearing houses and allowing number porting events to be routed from one operator's blockchain to another, with validation by each operator's network. Blockchains can also be used to counteract roaming fraud. Today, the home network typically cannot detect subscriber fraud until after it has been perpetrated – leaving it without a redress mechanism. This type of fraud can be mitigated by establishing a permissioned blockchain with the relevant home network and visitor network as parties to a smart contract-enabled roaming agreement. Every time a subscriber accesses a visitor network, the contract executes automatically and sends the relevant roaming traffic to the home network, allowing it to calculate and charge the relevant amount in real-time [10]. |

Table 2

Blockchain benefits and remaining challenges [11]

| Benefits | Challenges |
|---|--|
| A blockchain's 'enabled' trust improves coordination between various partners, due to a shared view of transactions and liabilities. This in turn permits the elimination of third parties, resulting in cost savings. | Since a Blockchain retains all historical data, the size of an established Blockchain at each node might become unsustainable. Instead, a mechanism to archive historical data needs to be looked at. Several alternatives are currently being explored in this regard by various players in the blockchain ecosystem. |
| Facilitates a single view of data instead of the need for consolidation across various disparate systems. Also allows for reliable audit trails due to the history of all transactions being available in the ledger. | The Blockchain concept is not widespread yet and there are only a few successful initiatives based on this modern technology at this time. That is a major hurdle because we don't have many successful blockchain models to follow which creates an uncertain situation. |
| Implementation of smart contracts in roaming and other cases allows for near-instantaneous charging, thus leading to improved revenue assurance and fraud reduction. | Clear regulatory frameworks need to be defined for the implementation of agreements as digital, smart contracts |
| Potential to facilitate new business models for revenue generation for Communication Service Provider who are looking for new avenues to increase both top and bottom lines. | Conforming to existing data standards in terms of both structure and transport for sharing of information could prove to be an initial hurdle. |
| A blockchain can act as the ledger that enables, for example, an M2M economy to prosper based on the common platform available, in which M2M transactions can be recorded. It can thus act as the enabler for an IoT ecosystem. | The cost of establishing and maintaining a healthcare blockchain is unknown yet and no one can seriously consider this technology without knowing about its expenses ahead of time. |

Telecom operators like Orange, Verizon, du, Telstra have all invested in Blockchain related projects, startups, prototypes and frameworks in the last 1 to 2 years. British Telecom and AT&T have filed multiple patents related to Blockchain in telecom. Companies like IBM, Microsoft have shown significant industry events that combines telecom with Blockchain suggesting they are working on Blockchain based platform & services for telecommunications. Swisscom, Fujitsu, NEC, Huawei, Nokia, Cisco, Samsung are members of the "Linux foundation project" called Hyperledger, although forum is yet to come out with a telecom related project [13]. Companies such as Orange and Verizon, amongst others, have already invested in startups in the Blockchain area to explore the synergies and potential use cases. Many more players are researching potential use cases in-house. It is time for everyone to agree on a unified approach to enable meaningful realization of benefits [14, p. 21].

Ukraine is well-known for its skilled and talented developers that made the country the most popular outsourcing destination in Europe. What's more, outsourcing the Blockchain project to Ukraine is cost-reasonable as well. Cryptocurrency market receives much attention in Ukraine as well as elsewhere in the world. Ukraine took up the Blockchain trend eagerly, and developers across the country conduct researches of development of Blockchain in different spheres of economy.

In Ukraine, cryptocurrency is not forbidden by the law but is not recognized by it as a currency either. The legal status of cryptocurrency in this country is to be determined in the nearest future. Even though the state level stores cannot accept payments in cryptocurrency, numerous entrepreneurs in Ukraine are now investing into the mining of cryptocurrency eagerly. In fact, Ukraine was among the pioneering countries that took up the bitcoin mania back in 2013.

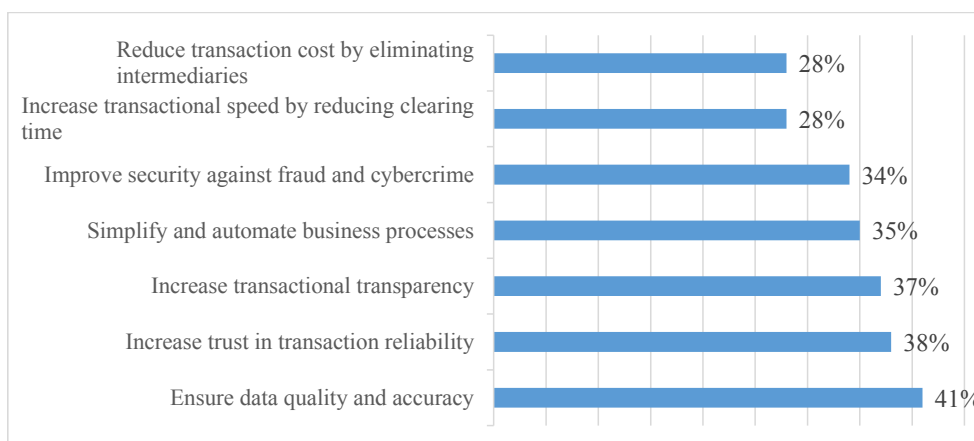


Figure. 3. Bringing Blockchain to telecommunications [12]

According to the results of the EY: Global telecommunications study on the state of ICO in the world it became known that Ukrainian projects received \$ 30 million. Thus, Ukraine has reached the 16th position in the rating for ICO-investment collections among all countries of the world [15].

Cryptocurrency mining is rather popular in Ukraine. Numerous IT-companies in this country recently started providing Blockchain development services to keep up with the booming trend and to contribute to its expansion. Apart from the large IT-companies, small existing and emerging startups are working at applying the most challenging Blockchain solutions [6] (tabl. 3).

Blockchain community of Ukraine is very strong too. Last October, Ukraine Blockchain & Bitcoin Con-

ference took place for the 4th time in Kyiv already. Among the participants of the conference, there were Blockchain developers, entrepreneurs, and experts in legislation. Investors and startup authors who have practical experience of participating in ICO were special guests of this year's event.

Education sector does not lag behind either. Blockchain is already included in the academic program of five technical universities in Kharkiv. They established a partnership with Distributed Lab to launch Blockchain courses. This will increase the blockchain awareness of the young generation and help Ukraine get a strong blockchain expertise [16].

Even though the number of Ukrainian companies creating blockchain solutions is still not big, this technology is soon going to become one of the

Table 3

Blockchain development companies in Ukraine

| Site | Location | Employees | Founded | Pricing |
|--|------------------------|---------------|---------|----------------|
| ELEKS – For over 26 years, they have been working as a software innovation partner to Fortune 500 companies, big enterprises and technology challengers. Their team of 1,100+ professionals provides with a full range of software engineering and consultancy services | | | | |
| https://eleks.com/ | Ukraine, United States | 1,000 – 9,999 | 1991 | \$25 – \$49/hr |
| S-PRO offers custom cross-platform mobile app development services and Blockchain development. They provide full cycle development solutions for Startups and small businesses. During years of MVP development they create own flow how to turn idea into a valuable product. React Native is a core technology that they use in mobile development. Also the team know how to use Blockchain technology on project | | | | |
| https://s-pro.io/ | Zaporizhia, Ukraine | 50 – 249 | 2013 | \$25 – \$49/hr |
| N-ix is an Eastern European provider of software development services with 800+ expert software engineers that power innovative technology businesses. Since 2002 they have formed strategic partnerships with a variety of global industry leaders including OpenText, Novell, Lebara, Currency Cloud and over 50 other medium and large-scale businesses | | | | |
| https://www.n-ix.com/ | L'viv, Ukraine | 250 – 999 | 2002 | \$25 – \$49/hr |
| Blackthorn Vision was founded in 2009 in Lviv, Ukraine as a custom development provider specializing in software development using Microsoft technologies. They offer an entire package: from initial concepts to final delivery of an outsourced project of any size. The company employs over 60 software engineers | | | | |
| http://blackthorn-vision.com/ | L'viv, Ukraine | 50 – 249 | 2008 | < \$25/hr |
| QuartSoft – Web development company specialized in creating eCommerce, SaaS, PaaS, real estate, fin-tech, tourism, rental and social network systems | | | | |
| https://quartsoft.com/ | Kramators'k, Ukraine | 50 – 249 | 1999 | \$25 – \$49/hr |
| 4ire Labs is using blockchain, mobile, web and machine learning for decentralization, process optimization and better service. The team at 4ire Labs specializes in custom development on the most popular blockchains – Bitcoin, Ethereum, Hyperledger. | | | | |
| https://4irelabs.com/ | Kyiv, Ukraine | 10 – 49 | 2017 | \$25 – \$49/hr |
| Lvivity is a software development company that provides appropriate solutions to customers from all over the world in desktop, web and mobile development | | | | |
| https://lvivity.com/ | L'viv, Ukraine | 50 – 249 | 2013 | \$25 – \$49/hr |
| Diceus – is a full-service software development company that specializes in developing complex web and mobile solutions. The company extensive experience in developing and maintaining large solutions | | | | |
| https://diceus.com/ | Kyiv, Ukraine | 50 – 249 | 2001 | \$25 – \$49/hr |
| Vakoms is a one-stop software development company, which startups, SMEs, & industry giants choose to build great products and make their business more efficient. They specialize in web, mobile, and desktop app development as well as 3D modeling, VR & AR development, IoT & embedded systems engineering. | | | | |
| https://vakoms.com/ | L'viv, Ukraine | 50 – 249 | 2010 | \$50 – \$99/hr |
| Fevernova Mobile develops iOS and Android high-quality apps in different areas. They are proficient with Swift, Objective-C, iOS SDK, Android SDK, Java, Firebase, Google Services, AFNetworking, Core Location, Core Graphics, PHP, CoreData/MagicalRecord, SQLite, Social networks frameworks, FMDB, Restful APIs, push notifications, HTML5, CSS3 etc. | | | | |
| http://www.fevernova.mobi/ | Kharkiv, Ukraine | 10 – 49 | 2016 | \$25 – \$49/hr |

most demanded on the market. It is going to have a massive impact on telecom industry. Blockchain will probably affect many other industries as well. Ukrainian developers are already working on blockchain-based projects, which may simplify the voting process or service exchange, increase security, regulate communication between parties etc. Blockchain development companies in Ukraine are launching educational initiatives to create regular classes and practical workshops in order to extend the pool of programmers specializing in this technology. Moreover, a number of courses and hackathons organized in Ukraine have already engaged a lot of engineers in this development field. So, the Blockchain expertise in Ukraine is growing and we'll see more innovative Blockchain projects in telecom developed here [17].

Conclusions. Blockchain will play a critical role in the future growth of telecom systems, offering the potential to enable efficient, secure and cost-effective ecosystems and open up newer revenue opportunities for telecom players. It can also help to streamline BSS/OSS processes and make them more powerful and scalable.

CSPs will most probably see the greatest impact of Blockchain in their core management systems and in adjacent services, providing opportunities for cost reduction through process efficiency gains, and revenue growth through new value propositions. Four use cases help illustrate the potential of Blockchain for CSPs: Fraud Management, Identity-as-a-service and Data Management, 5G enablement, and secure IoT connectivity.

Above-mentioned use cases provides plenty of ways that telecom can invest in the development and implementation of Blockchain -based products. It is expected that within the next few years, the use of Blockchain technology by the telecommunications industry will become more widespread and eventually become the norm in services like Identity management and registries to start with. As is often the case with any new technology, Blockchain technology is being developed and implemented at a faster rate than the existing regulations and government's frameworks. Regulatory authorities should also enable flexible legal and specification frameworks (e.g. Data protection laws etc.) for faster implementation of technologies such as Blockchain in telecom.

REFERENCES:

1. Reimagining telecommunications with blockchains. From concept to reality / Executive Report // IBM Institute for Business Value. : <https://public.dhe.ibm.com/common/ssi/ecm/gb/en/gbe03901usen/reimagining-telecommunications-with-blockchains.pdf>.
2. Wright, A. & De Filippi, P. (2015). Decentralized Blockchain Technology and the Rise of Lex Cryptographia. Accessed 2 October 2017. – Retrieved from: <http://ssrn.com/abstract=2580664>.

3. Nakamoto, S. (2008). Bitcoin: A Peer-to-Peer Electronic Cash System. Accessed 2 October 2017. – Retrieved from: <https://bitcoin.org/bitcoin.pdf>.
4. Kehril, J. (2016). Blockchain Explained. Niceideas.ch. Accessed 2 November 2017. – Retrieved from: https://www.niceideas.ch/blockchain_explained.pdf.
5. Pilkington, M. (2015). Blockchain Technology: Principles and Applications. Research Handbook on Digital Transformations, edited by F. Xavier Olleros and Majlinda Zhegu. Edward Elgar, 2016. Accessed 10 October 2017. – Retrieved from: <https://ssrn.com/abstract=2662660>.
6. How Much Does It Cost to Make a Blockchain App in Ukraine [Electronic resource]. – Retrieved from: <https://medium.com/@MLSDevCom/how-much-does-it-cost-to-make-a-blockchain-app-in-ukraine-3072f3cb1233>.
7. How could the blockchain disrupt the telecommunications industry? Ukraine [Electronic resource]. – Retrieved from: <https://www.quora.com/How-could-the-blockchain-disrupt-the-telecommunications-industry>.
8. Blockchain in Telecom: a New Digital Transformation Tool [Electronic resource]. – Retrieved from: <https://www.billing.ru/en/blog/blockchain-telecom-new-digital-transformation-tool>.
9. Blockchain to blockchains: Broad adoption and integration enter the realm of the possible. Tech Trends 2018 // Deloitte Insights [Electronic resource]. – Retrieved from: <https://www2.deloitte.com/insights/us/en/focus/tech-trends/2018/blockchain-integration-smart-contracts.html>.
10. Blockchain Opportunities for Telecoms Businesses [Electronic resource]. – Retrieved from: <https://www.cerillion.com/Blog/September-2017/Blockchain-Opportunities-for-Telecoms-Businesses>.
11. 5 Top Benefits & Challenges of Using Blockchain in Healthcare Industry [Electronic resource]. – Retrieved from: <http://www.mtbc.com/learningcenter/blockchain-technology-benefits-challenges/>.
12. Blockchain Investment in the Telco Industry [Electronic resource]. – Retrieved from: <https://www.ashurst.com/en/news-and-insights/legal-updates/blockchain-in-telecoms-industry/>.
13. Blockchain in Telecom: Hype or Reality? [Electronic resource]. – Retrieved from: <https://www.netmanias.com/en/post/blog/13145/blockchain/blockchain-in-telecom-hype-or-reality>.
14. How Blockchain can impact the telecommunications industry // Deloitte [Electronic resource]. – Retrieved from: https://www2.deloitte.com/content/dam/Deloitte/za/Documents/technology-media-telecommunications/za_TMT_Blockchain_TelCo.pdf.
15. Украина и ICO: итоги года [Электронный ресурс]. – Режим доступа: <https://kiev.bc.events/ru/article/ukraina-i-ico-itogi-goda-81457>.
16. Top blockchain development companies in Ukraine [Electronic resource]. – Retrieved from: <https://www.goodfirms.co/directory/country/list-blockchain-technology-companies/ukraine>.
17. Blockchain Development in Ukraine: Companies, Solutions & More [Electronic resource]. – Retrieved from: <https://www.n-ix.com/blockchain-development-ukraine-companies-solutions/>.

REFERENCES:

1. Reimagining telecommunications with blockchains. From concept to reality / Executive Report // IBM Institute for Business Value (n.d.). public.dhe.ibm.com. Retrieved from <https://public.dhe.ibm.com/common/ssi/ecm/gb/en/gbe03901usen/reimagining-telecommunications-with-blockchains.pdf>.
2. Wright, A. & De Filippi, P. (2015). Decentralized Blockchain Technology and the Rise of Lex Cryptographia. Accessed 2 October 2017. Retrieved from: <http://ssrn.com/abstract=2580664>.
3. Nakamoto, S. (2008). Bitcoin: A Peer-to-Peer Electronic Cash System. Accessed 2 October 2017. Retrieved from: <https://bitcoin.org/bitcoin.pdf>.
4. Kehril, J. (2016). Blockchain Explained. Niceideas.ch. Accessed 2 November 2017. Retrieved from: https://www.niceideas.ch/blockchain_explained.pdf.
5. Pilkington, M. (2015). Blockchain Technology: Principles and Applications. Research Handbook on Digital Transformations, edited by F. Xavier Olleros and Majlinda Zhegu. Edward Elgar, 2016. Accessed 10 October 2017. Retrieved from: <https://ssrn.com/abstract=2662660>.
6. How Much Does It Cost to Make a Blockchain App in (n.d.). medium.com. Retrieved from <https://medium.com/@MLSDevCom/how-much-does-it-cost-to-make-a-blockchain-app-in-ukraine-3072f3cb1233>.
7. How could the blockchain disrupt the telecommunications industry? Ukraine (n.d.). www.quora.com. Retrieved from <https://www.quora.com/How-could-the-blockchain-disrupt-the-telecommunications-industry>.
8. Blockchain in Telecom: a New Digital Transformation Tool (n.d.). www.billing.ru. Retrieved from <https://www.billing.ru/en/blog/blockchain-telecom-new-digital-transformation-tool>.
9. Blockchain to blockchains: Broad adoption and integration enter the realm of the possible. Tech Trends 2018 // Deloitte Insights (n.d.). www2.deloitte.com. Retrieved from <https://www2.deloitte.com/insights/us/en/focus/tech-trends/2018/blockchain-integration-smart-contracts.html>.
10. Blockchain Opportunities for Telecoms (n.d.). www.cerillion.com. Retrieved from <https://www.cerillion.com/Blog/September-2017/Blockchain-Opportunities-for-Telecoms-Businesses>.
11. 5 Top Benefits & Challenges of Using Blockchain in Healthcare Industry (n.d.). www.mtbc.com. Retrieved from <http://www.mtbc.com/learningcenter/blockchain-technology-benefits-challenges/>.
12. Blockchain Investment in the Telco Industry (n.d.). www.ashurst.com Retrieved from <https://www.ashurst.com/en/news-and-insights/legal-updates/blockchain-in-telecoms-industry/>.
13. Blockchain in Telecom: Hype or Reality? (n.d.). www.netmanias.com Retrieved from <https://www.netmanias.com/en/post/blog/13145/blockchain/blockchain-in-telecom-hype-or-reality>.
14. How Blockchain can impact the telecommunications industry// Deloitte (n.d.). www2.deloitte.com. Retrieved from https://www2.deloitte.com/content/dam/Deloitte/za/Documents/technology-media-telecommunications/za_TMT_Blockchain_TelCo.pdf.
15. Ukraina i ICO: itogi goda [Ukraine and ICO: year's results]. / kiev.bc.events. Retrieved from <https://kiev.bc.events/ru/article/ukraina-i-ico-itogi-goda-81457>. (in Russian)
16. Top blockchain development companies in Ukraine (n.d.). www.goodfirms.co. Retrieved from <https://www.goodfirms.co/directory/country/list-blockchain-technology-companies/ukraine>.
17. Blockchain Development in Ukraine: Companies, Solutions & More (n.d.). www.n-ix.com. Retrieved from <https://www.n-ix.com/blockchain-development-ukraine-companies-solutions/>.

Drokina N.I.

Candidate of Economic Sciences,
Associate Professor of Marketing Department
State University of Telecommunications

THE IMPACT OF BLOCKCHAIN TECHNOLOGY ON THE TELECOM TRANSFORMATION IN UKRAINE

Blockchain is currently one of the most widely discussed and hyped technologies. There are not many industries that shouldn't be either excited or worried about its future potential, with use cases, proof of-concepts, and full-fledged business models based on blockchain technology coming out at an increasing pace.

Telecom industry is huge and often complex. In the past decade or so, telecom operators are hit by a number of disruptive technologies decreasing their revenues and increasing operating costs e.g. competition from over the top players. Also, the telecom industry is in the midst of transformation as it moves towards Identity Management, IoT connectivity, Fraud Management, Data management, 5G Enablement, Roaming, Instantaneous Connectivity and Transaction and a virtualized ecosystem. So adding blockchain into this equation must offer some measurable and quick benefits to current operations as well as towards the enablement of future opportunities.

Now blockchain is gradually gaining traction in Ukraine and influences both its software development industry and its public sector. Ukrainian developers consider mastering this technology since it offers great prospects and opens new ways of cooperation with global companies. So let's discover what is happening on the blockchain development market in Ukraine and how Ukrainian developers are building expertise in this technology.

Blockchain will not fundamentally revolutionize telecom service provision itself, but the concept of the blockchain and services built using it offer a range of interesting opportunities to alter business processes and also

to underpin some creative service and business model development. It is a potential platform for innovation in the development of complementary services. It could add new mobile payment capabilities for service provider financial service projects (with particular interest in areas with large numbers of unbanked people) to enable autonomous transactions within IoT platforms being built by network operators and vendors, and to help solve issues of identity and fraud management.