

DOI: <https://doi.org/10.46793/6461-101.186D>

Original Scientific Article

CHARACTERISTICS AND SPECIFICITIES OF THE APPLICATION OF BLOCKCHAIN TECHNOLOGIES IN BUSINESS AND THE GREEN ECONOMY

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Abstract: In this research paper, based on a systematic review of the latest research in the field of applying new technologies in business, the emergence and evolution, characteristics, as well as advantages and disadvantages of blockchain technology will be presented. Given its relevance, importance and the fact that blockchain technology changes the way we store and transfer data, without intermediaries and with maximum security, research papers on this topic are highly desirable. The goal is to contribute to a better understanding and approach to understanding blockchain technology and to explore the main obstacles to its widespread application. The research will consider the development phases, types, trends and future and perspectives of blockchain technology. In this sense, research in practice will include an analysis of the possibilities of applying blockchain technology based on the responses received from the questionnaire, and the level of user awareness of the effects of applying this new sophisticated technology will be determined. Blockchain technology is based on DLT technology, i.e. it is a decentralized distributed database in which transactions are stored permanently and unchangeably. In addition to the above, the paper will provide basic guidelines for a better understanding of the types of blockchain technology on which cryptocurrencies function. The paper applies a combined research methodology, while for the purposes of the research, based on previous works, a questionnaire was adapted and created from which, through statistical analysis, answers to the research questions are provided.

Keywords: *Digitalization, electronic business, blockchain technology, green economy.*

INTRODUCTION

Blockchain technology is the foundation of the digital revolution that is changing our daily lives, from trading cryptocurrencies to protecting sensitive financial transactions [5]. As an extremely powerful technology, blockchain technology can drastically transform business models and revolutionize the economy. The term Blockchain is not an official term that is generally accepted in this sense; the lack of a single definition and independent legal definitions by different countries have led to its meaning being continuously improved and upgraded. Blockchain is an innovative protocol for exchanging and storing information [4]. In this context, blockchain technology represents a very demanding, complex and relatively new area. Although blockchain is a relatively new technology, companies in Serbia are increasingly applying it in their work. The development of blockchain technology has been rapid, but not without challenges, from early beginnings to current maturity. The existing literature in this area, until recently, was more general in nature and did not describe each area in detail. Eminent authors point out that blockchain technology has a great impact and potential to change several areas of business and disrupt traditional business models [19]. Chronologically, the theoretical basis for the development of blockchain tech-

nology was laid in 1989, when Leslie Lamphorn developed the Pakos Protocol and published it in 1998 under the title "The Part-Time Parliament". Also, although one of the first ideas of the concept related to blockchain technology (BCT) was presented by Haber and Skonto Stornett (1991), the beginning of BCT as we know it today dates back to 2008. After the publication of the white paper, in which the pseudonymous Satoshi Nakamoto in 2008 presented the concepts for blockchain technology and bitcoin and the linking of blocks, which went from idea to reality in 2009. In this context, one of the ideas was to create a decentralized way of using money without being tied to or waiting for permission from any institution [21].

Characteristics and types of blockchain technology

With blockchain, the basic building block is a block, which contains one or more data, thus we get a special type of database, known today as a chain of blocks[6]. Significantly, copies of this database can be found on thousands of computers around the world. What is characteristic of this process is that it is not possible to change the history of the block chain, and this is not visible in the block chain itself, that is, one of the key characteristics of the blockchain is its immutability, which means that once recorded information cannot be changed or deleted [7]. Chronologically, several scholars have categorized the evolution of blockchain technology into three generations: BCT 1.0, BCT 2.0 and BCT 3.0 [9]; [12]; [15]. However, a fourth phase can also be found in the literature, one of such divisions is listed below [8]. The first phase of Blockchain 1.0 (2008–2013) development of blockchain technology is related to the emergence of the cryptocurrency bitcoin and transactions. The second phase of Blockchain 2.0 (2013–2015) represents the development of a new blockchain technology network system, called Ethereum, as well as smart contracts. Research in practice shows that one of the main shortcomings of BCT 1.0 and 2.0 is their lack of scalability. In this context, the third phase of Blockchain 3.0 (2018) development appears, namely decentralized applications (dApps), which are applications that run on a distributed P2P network system. Some authors state that it is BCT 3.0 that solves the ongoing challenge of scalability by exploring solutions such as sharding and layer 2 scaling, which increase the capacity of BCT networks and make them more adaptable to a global user base [12]. During this period, the literature states that there is significant potential for improvements in terms of the speed and ease of implementation of BCT innovations. In this regard, it is expected that the emergence of BCT 4.0 will respond to these challenges and improve the user experience in business [3]; [8]. The fourth phase Blockchain 4.0 (2019–) represents the current phase, focused on innovation, which according to Benafa 2022 can be divided into two parts: 1. Web 2.0 – the current, second generation of the Internet, which was revolutionary in opening up new opportunities for society. 2. Web 3.0 – the future, third generation of the Internet, which focuses on decentralization. In this context, one of the key innovations could be the virtual reality Metaverse, a project of technological giants such as Facebook, Microsoft, Nvidia, to create a virtual reality space with artificial intelligence, VR, cloud

computing, blockchain technology, etc. [13]. As shown in the following Figure 1, according to well-known authors BCT can be divided into four basic categories: consortium, public, private and hybrid [23]; [2]; [20].

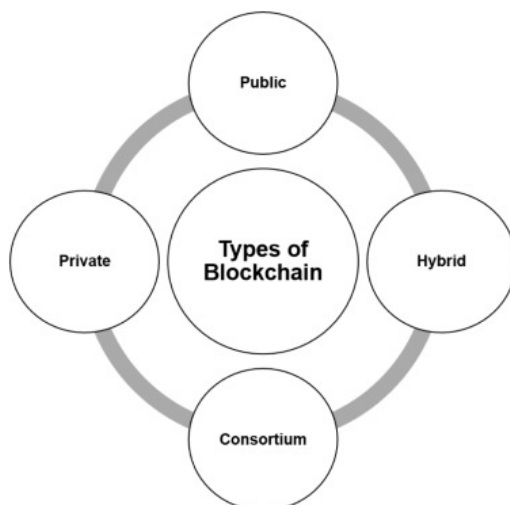


Figure 1. Types of blockchain technology [16].

Understanding the four main types of BCTs – consortium, public, private, and hybrid – provides unique characteristics suitable for different applications. Each of them offers different advantages, from complete openness to strict privacy protection. According to the authors Zou et al., there are four known characteristics of blockchain technology [24]:

- Traceability of technology - blockchain enables each transaction source to be traced only through the data storage structure in that structured block chain.
- The resistance of the system to various interventions means that the transaction information stored in the blockchain cannot be changed either during or after the block generation process.
- Anonymity in technology means that each user of the system has a virtual identity that is anonymous. For example, a user of the Bitcoin network has public keys for transactions, which are not hidden.
- The decentralization of blockchain technology means that no central institution is needed and that every hub is equal.

As already mentioned blockchain technology is the underlying technology of cryptocurrencies/digital currencies such as Ethereum, Bitcoin and others. According to Yaga et al., there are four key characteristics of the blockchain network[22]:

- Security – The entire blockchain system is cryptographically secure. This guarantees us that the data distributed in the records have not been changed and that all the data in those records have been confirmed.

- Sharability – Records are shared among all participants, which ensures complete transparency among all participants of the blockchain network.
- Distributed record (main book/Ledger) – Blockchain technology uses a record that only has the function of adding data, which guarantees that the history of transactions is visible. Unlike traditional databases, it is not possible to correct errors or change block values. When the transaction is successful, it is completed.
- Distribution - The technology allows network expansion by increasing the number of nodes, which makes the network more resistant to attacks. With a larger number of nodes, the possibility of attacks within the network decreases. Also, this affects the consensus protocol on which the network operates, ie. a block is only confirmed if more than 51% of nodes accept the new block.

MATERIALS AND METHOD

The methodological framework of the research combines various research methods, including quantitative and qualitative research methods. In the theoretical part, based on a review of secondary sources obtained through a detailed insight into professional and scientific literature, using a descriptive method, the concepts of blockchain technology on which cryptocurrencies function are described. In the empirical part, a quantitative survey method will be applied. By conducting an online survey, data will be collected that will be analyzed using descriptive statistical methods.

RESULTS

The results of a studious review of the literature and conducted research in practice show that the application of blockchain technology is particularly noticeable in areas such as finance, energy and real estate, where decentralized solutions are making significant progress. In the implementation of blockchain technology, the following stand out: Japan, China, Lebanon, Switzerland, South Africa, the United Kingdom, Singapore, the Bahamas, the United States of America and Estonia. The well-known company Gartner has predicted that by 2025 the value of blockchain-related business will reach 176 billion dollars, and by 2030 it will reach over 3.1 trillion. It is interesting that 64% of respondents in Serbia believe that blockchain technologies and cryptocurrencies will improve their lives in the future. According to official data, in 2018 there were approximately 130 blockchain developers in Serbia, while in 2019 there were between 700 and 800. However, despite this growth and many advantages, the transition to blockchain technology in many companies and business systems did not go without certain problems and challenges. In this regard, the renowned firm Deloitte highlights problems with regulation, security and lack of expertise as

the main obstacles [19]. In Serbia, there are more than 20 companies that specialize in blockchain technology development. It is only a question of the number of those who are specialized in this technology, but there are, in fact, significantly more of them. The research shows that the respondents are motivated most by the possibility of earning, and the lack of time and the cost of education about blockchain technologies and cryptocurrencies hinder them the most. Functionally, proper integration of blockchain with IoT and cloud storage can cause a revolution, although there are certain challenges such as identity management and legal compliance. The Startup Genome report for 2020 ranked Serbia fifth in the world in terms of the number of blockchain developers. "According to an international survey, out of 10,000 developers working in blockchain worldwide, 400 are in Serbia. Previous research, according to the interpretation of well-known authors, shows that investments in blockchain technologies, i.e. cryptocurrencies, in relation to the gender of the respondents are mainly concentrated in men[1]. In this context, future directions of development, i.e. main trends, include blockchain technologies, cryptocurrencies, decentralized finance, global supply chains and the development of blockchain applications [13], [10]. When the number of only these 20 companies from Serbia is compared with Germany, i.e. Berlin, which is considered one of the centers of blockchain technology and has 70 such companies, it can be concluded that Serbia is relatively well ranked.

DISCUSSION

The results of a review of scientific and professional literature and practical research show that blockchain technology can solve many business problems, optimize and improve business operations. The research shows that respondents prefer to learn about blockchain technologies, i.e. cryptocurrencies, in their free time, and they are most interested in creating profits and earnings, i.e. the topic of investing in blockchain technologies and cryptocurrencies. However, despite the increasing awareness and familiarity with blockchain technologies, many companies and business systems still do not understand its functional value, often associating them only with Bitcoin. The results of practical research show that companies that have adequately implemented blockchain technology in their business have long-term benefits from blockchain technology, such as reduced operating costs, improved efficiency and improved security, and clearly overcome business challenges. One of the questions asked to respondents in the survey was whether they believe that blockchain technologies, i.e. cryptocurrencies, will improve their lives in the future. The results of the responses to this survey question are shown in Figure 2 and show that 64% of respondents believe that blockchain technology and cryptocurrencies will improve their lives in the future, and 36% of respondents do not believe that they can improve their lives.

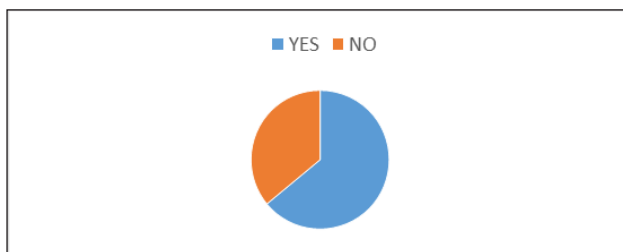


Figure 2. Respondents' response to the question of whether blockchain technology will improve our lives in the future.

CONCLUSION

The results of the research show that blockchain technologies are currently increasingly being used, for example, wherever any type of transaction takes place, and it also serves as a tool for tracking goods. Also, research in practice indicates numerous advantages that include better user experience, cost reduction, greater traceability and simpler administrative procedures. In this sense, the well-known company Gartner predicts a large growth of the blockchain market, but points out that the biggest challenges are ignorance and lack of standards. Research highlights that blockchain is not just a tool to improve efficiency; it is a transformative force that provides businesses with the opportunity to innovate, diversify and maintain competitiveness in a rapidly evolving digital environment. In practice, blockchain brings a competitive advantage through security, transparency and efficiency, and investments in cryptocurrencies can further increase value, it also enables transparency, improving security and automating processes. The advantages of blockchain are also represented by decentralization, transparency, security and flexibility, however, in these projects there are also challenges related to implementation, regulation and knowledge. It is predicted that the continuous evolution of blockchain technology and its application in various sectors will likely continue to shape the business landscape, offering enterprises and business systems new challenges and unprecedented opportunities to generate profits and positive business results. Further research into best practices and case studies will be invaluable in guiding businesses on how to best integrate blockchain technology into their operations.

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