



BLOCKCHAIN TECHNOLOGY, AN ALTERNATIVE TO THE TRADITIONAL BANKING SYSTEM

Bianca-Ioana NICOLAE, Student*

With the advent of new technologies and the rising trend of digitalization, the financial sector is being reshaped, evolving, and adapting to improve its efficiency and keep pace with people's needs. One of the most current technologies that has the potential to develop the financial sector is Blockchain technology. The main idea of this technology is that it is based on a decentralized public registry, which allows transactions to be performed in a secure, efficient way and has several advantages that are not found in the traditional banking system we know. Blockchain and cryptocurrencies could become one of the most important innovations in the financial sector, capable of creating a digital economy, based on decentralization, since they have features that optimize and simplify transactions, without the need for an intermediary, compared to the traditional banking system.

Keywords: Blockchain; transactions; cryptocurrency; decentralization; evolution.

Introduction

In the scientific field, Blockchain technology is an important technological innovation, considered a technology that has the potential to significantly change the financial sector, which is undergoing more and more transformations.

The technological era and the current context of the Covid pandemic¹⁹ require the financial sector to adapt and adopt new digital technologies designed to reshape payment systems, insurance, and focus on reducing fraud. (Erik, et al. 2021, 53)

Today, the digital economy is based on the reliance on a trusted authority, both at the transaction level and at the relational level, of a third party, such as banks, to ensure the security (Dragomir, Alexandrescu and Postolache 2018, 34-38) and confidentiality of our accounts. The problem with these entities is that they are vulnerable to attack and can be compromised at any time (Laerte, et al. 2011, 186), and Blockchain is a solution.

Blockchain technology and cryptocurrencies are considered to be revolutionary inventions, as is the advent of the Internet. These could have a major impact on the financial sector, due to the advantages it offers in terms of transactions, such as lower costs, much faster transaction execution, and transparency (Michael, et al. 2016, 19), compared to the traditional banking system, which does

not have these benefits. As for cryptocurrencies, they are perceived as investments, digital assets, without a central authority, and despite their high volatility (Christian, Anessa, and Eric 2020, 218), some of them have higher economic capital than some banks. This shows that people are confident in investing. Moreover, people who invest in cryptocurrencies prove to be young, educated, passionate about technology, and prefer to invest in the long run, not speculate (Auer, and Tercero-Lucas 2021).

Socio-economic changes and the challenges of the future will make money the destiny of becoming digital (Miller, Michalski and Stevens 2002, 11). As reality shows, the popularity of cryptocurrencies has increased significantly lately, and the most powerful virtual currency is called Bitcoin. It is the first currency to be perceived as being successfully implemented, as it can make large amount transfers in a very short time and is expected to be associated as a form of digital gold in the future (Ammous 2018). It has several properties such as decentralization, security, transparency and is a tool for fraud prevention (Nakamoto, n.d.), as any transaction is visible and verifiable.

Therefore, we can say that a new door is opening for the development of a digital economy, based on decentralization, which creates extraordinary opportunities and a revolution of the economic space (Dragomir, Dumitriu, and Bărbulescu 2021, 1-4). However, concerning Blockchain technology, there are two hypotheses, that the adoption of the technology will become an

*"Carol I" National Defence University
e-mail: biancaioananicolae11@gmail.com

alternative to the banking system, and on the other hand that banking institutions will take advantage of it to take steps towards evolution. To date, there is no clear picture of the implications of blockchain for banks (Martino 2021, 4).

Therefore, the paper addresses how blockchain technology and cryptocurrencies could be an alternative to the traditional banking system and how they can be considered a competitor to banks rather than a step towards their evolution.

Bitcoin

Blockchain technology was originally support for Bitcoin virtual currency. The context that favored the emergence of this currency was the global financial crisis, since 2008. At that time, many considered that the whole financial system would collapse, and the reaction of governments and central banks can be considered dramatic, by the attitude they had, in the sense that they printed money on an unprecedented scale in all of human history (Frisby 2014, xxiii).

This behavior clearly shows us that the way money is created, whether it is euro, dollar, lei, gives banks and governments immense power over the financial system. While the population is losing, they are taking advantage of their status, which leads to inequality between the two actors.

The global crisis also had a positive effect, namely an opportunity for Satoshi Nakamoto, which gave rise to an electronic payment system based on decentralization, which differs from a centralized system in that there is no authority, and any participant in the network has access to transactions, which is a great benefit.

The specialized works do not present Satoshi Nakamoto in all his economic development, and at the moment his identity has remained completely

unknown (Frisby 2014, 2).

The main feature behind the electronic payment system created by Satoshi is the Peer-to-Peer system, which allows online payments to be made from one user to another, without the need for processing by a banking institution (Frisby 2014, 2), in which the devices participating in the network are called peers and have the same rights and responsibilities (Antonopolous 2017, 93)

The key innovation of this electronic payment system is called Proof of Work. This is an algorithm used by Bitcoin miners to verify transactions, ensure security, and add new blocks to the Blockchain network (Antonopolous 2017, 231). The process consists of using processing units and electronic circuits to solve complex mathematical puzzles, and also prevents the modification of a block in the network (Nakamoto, n.d., 3), providing the quality of immutability.

Blockchain

The entire trading system is based on Blockchain technology. The blockchain register stores all transactions performed, where a number of transactions form a unit of the database called "block", and each of them contains data about the previous block, and "hash", a unique fingerprint that has the role of identifying a block and its contents. Once a block appears in the chain, its hash is calculated, and once the first transaction takes place inside the block, the hash change takes place (Antonopolous 2017, 195).

Thus, in the Bitcoin system, transactions are linked in blocks, and then they are interconnected through what we call Blockchain. All blocks are arranged in chronological order, and as can be seen in the figure below, each block contains the hash assigned to the previous block.

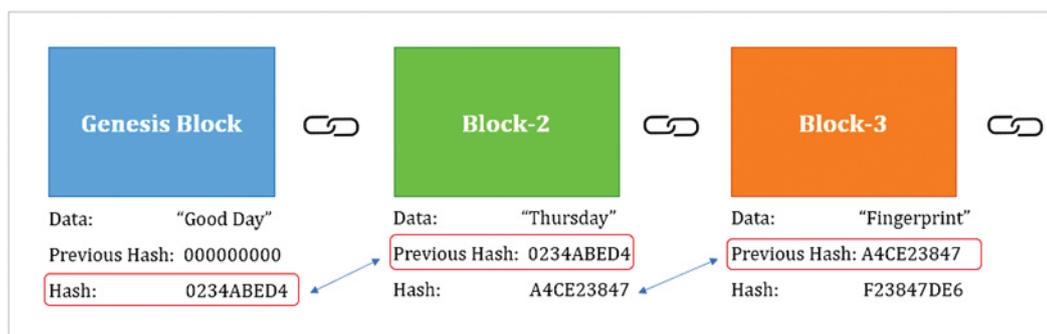


Figure 1 Blockchain system based on cryptographic hash

Source: <https://medium.com/swlh/blockchain-characteristics-and-its-suitability-as-a-technical-solution-bd65fc2c1ad1>, accessed on 25.11.2021.



The science behind blockchain is cryptography. The blocks formed in the chain are linked and secured by cryptography, and to trade securely on this system (F. L. Dragomir 2016, 235-242), users use public and a private key.

Cryptography ensures security and allows communication between two people, where a third party does not need to have access. (Stinson 2005, 1) For example, the information that Andrei wants to pass on to Alexandru can be a text, numerical data, or any other nature. In this case, the text encrypted by Andrei can be viewed by Alexandru, only with the decryption key. If a third party named Adrian wants to view the text, it will be impossible because it does not have the decryption key.

There is a private and a public key to blockchain transactions. We can associate the public key with the bank account number (IBAN) and the private key with the PIN code that gives us access to that bank account. (Antonopolous 2017, 56) Thus, the public key, in this case, allows the receipt of amounts, and the private key is used to confirm transactions and to send amounts to other users.

Each user has a digital wallet. The digital wallet was created to avoid the many problems that a physical one has, such as the fact that it can be lost or stolen. It also provides greater security because the data is encrypted and there is a backup option (Balan and Ramasubbu 2009, 100-102).

The wallet allows the management of keys and addresses, offers the possibility of tracking, signing, and creating transactions. According to Andreas M. Antonopolous from a programmer's perspective, the digital wallet "refers to the data structure used to store and manage a user's keys". (Antonopolous 2017, 93)

Users have a digital wallet, an address of letters and numbers and a QR code as shown in the figure 2.

Blockchain, an alternative to the traditional banking system

First of all, Blockchain technology was created precisely to eliminate the need for "trusted parties". Until its inception, payment systems relied on people's trust in intermediaries, but Satoshi Nakamoto created this electronic payment system based on cryptography to facilitate transactions between two parties without the intervention of an intermediary.

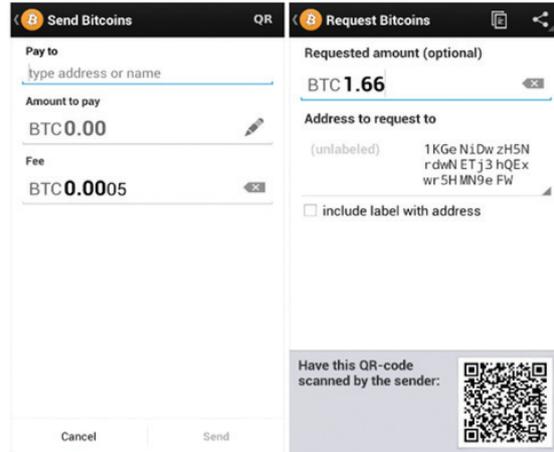


Figure 2 Digital Wallet

Source: <https://bitcoin.org/ro/intrebari-frecvente#cat-deficil-este-sa-facem-plati-cu-bitcoin>, accessed on 25.11.2021.

Secondly, transactions on this system are much faster than traditional ones and require much less effort compared to the traditional system where SWIFT codes, IBANs, BIC codes are required to transfer money today. Customers pay significant fees, and geographical location or time zone differences may increase the transfer time.

The popularity of Blockchain technology is due to the many benefits it offers as compared to the traditional system. Among the most important are the following:

Decentralization

In the traditional financial sector, intermediaries play an important role in validating transactions. Blockchain eliminates the need for intermediaries and makes a transaction between two parties possible securely and efficiently.

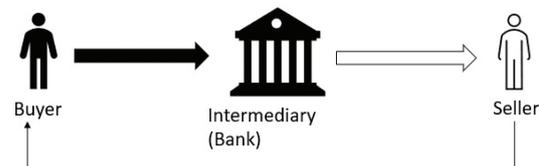


Figure 3 Transaction based on traditional banking system
Source: Author conception

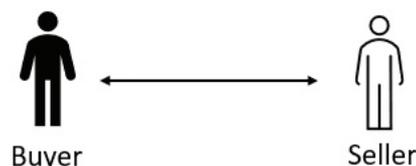


Figure 4 Transaction based on Blockchain
Source: Author conception

Security

In a centralized system, such as the traditional banking system, security depends on access control and continuous checks to keep bad actors out of the system. In the case of a decentralized system, such as bitcoin, the responsibility and control depend on its users (Antonopolous 2017, 269). Thus, users must comply with certain security policies, including choosing a secure digital wallet, encrypting the wallet with solid passwords, signing offline transactions, and regular backups (Bitcoin.org, n.d.).

Regular payment systems also contain the user's credentials, such as their credit card number (Antonopolous 2017, 270). A malicious actor may access the system and compromise a transaction, steal the card data, and make payments on behalf of the user whenever he wants.

From this point of view, bitcoin is completely different. A transaction with bitcoin authorizes a single value to a certain recipient, and the transaction once registered cannot be modified. Also, the system does not disclose private information such as the identities of the sender and the recipient, and cannot be used to authorize other payments. This system leaves security in the hands of the user, and the biggest responsibility is to protect the keys of his wallet (Antonopolous 2017, 270).

Table no. 1

DURATION OF TRANSACTION PROCESSING

Payment Methods	Duration of transaction processing
Transilvania Bank	1-2 days
PayPal	Instantly, but takes 2 days to withdraw the money
Western Union	Instantly, only cash
SEPA	Up to 3 days
Bitcoin	0-60 minutes

(The data in the table were extracted from the official websites, on 28.11.2021.)

anywhere in the world, without being conditioned by the banks' schedule, geographical position, or time zone differences.

Privacy

One of the biggest benefits of this system is privacy. At present, online commerce depends exclusively on financial institutions, which serve as third parties to validate transactions. Blockchain technology is revolutionary in this regard, as it completely replaces the need for third parties, offering in return, the guarantee of the transaction by cryptographic methods.

Transparency

There has been speculation that Bitcoin could be a good means of payment for terrorists

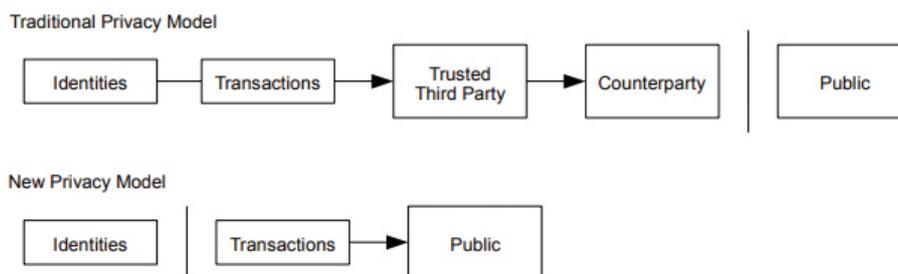


Figure 5 Comparison between Traditional Privacy Model and New Privacy Model

Source: Satoshi Nakamoto, Bitcoin: A Peer-to-Peer Electronic Cash System, The Bitcoin Whitepaper, p.6.

Rapidity

In the following table, a comparison was made between PayPal, Western Union, SEPA, Banca Transilvania, and Bitcoin, in terms of transaction processing.

Therefore, the electronic payment system created by Satoshi Nakamoto is much more efficient in terms of the speed of processing transactions, compared to banking institutions or other payment systems. We can send any amount of money instantly, at any time of the day or night,

or criminals, and this has remained in people's minds (Stein 2017). But the reality is completely different because the transactions registered on the blockchain are immutable and accessible.

The transactions made can be verified at any time because they are on an open-source system, and all their data can be viewed if we enter the transaction number or the recipient id on the website <https://www.blockchain.com/explorer>.

Once an address is assigned an identity, all transactions associated with it are easily



identifiable. The bitcoin system has allowed the identification and arrest of many drug dealers who have used it as a means of payment, as they have relied on the fact that bitcoin helps them remain anonymous (Ammous 2018, 239).

So people's trust in this system comes from the fact that it is open-source and decentralized. Anyone who wants to check how the system works can access the source code and all transactions can be viewed in real-time by anyone.

Also, all payments can be made without the need for third parties, and the entire system is based on cryptographic algorithms that secure the network, and no organization or individual can control bitcoin. Control is in the hands of users.

The impact of cryptocurrencies

At this moment, cryptocurrencies have a capital of over 3 trillion dollars (Osigner 2021), surpassing some of the most important banking institutions (Cuthbertson 2021), which shows that people trust this system and feel the need for decentralization, the need for a financial system without the involvement of central institutions (Chen and Bellavitis 2019, 5).

There is a possibility that Bitcoin is the future of our payments, or as an investment because it is perceived as a form of digital gold.

El Salvador is the first country in the world to adopt Bitcoin as a legal tender. The Bitcoin law, adopted on September 7, 2021, was a great success, voted with 62 of the 84 votes available in Parliament (Renteria, Wilson and Strohecker 2021).

Citizens of El Salvador now own a digital

wallet called Chivo Wallet, where the government offers them \$ 30 worth of bitcoin when they download the app, which is available on Apple and Android phones (Robertson 2021).

To date, the position of European states regarding the recognition of Bitcoin as a means of payment is not finalized. Although it is not recognized as an official currency in any European state, countries such as Estonia and Germany consider it as an alternative means of payment or financial instrument (Banca Națională a României n.d.). It remains to be seen whether countries will begin to adopt and legally regulate the use of Bitcoin.

Conclusions

Blockchain is a decentralized registry that stores data, which is publicly accessible to all network users. Due to its cryptographic techniques, it offers many benefits such as transparency, privacy, speed, security, and the most important element that distinguishes it from the traditional banking system is decentralization.

Integrated into the financial sector, Blockchain can have a major impact on the way transactions are conducted, as by its nature, it eliminates the need for third parties needed to validate transactions.

Although it is not yet regulated, and it is not known exactly what impact it will have on the banking system, its popularity and that of cryptocurrencies has increased significantly in recent years, and this shows the interest of people and the need for decentralization. We can conclude that Blockchain technology has the potential to develop a new digital economy, based on decentralization.

BIBLIOGRAPHY

- Ammous, Saifedean. 2018. *The Bitcoin Standard, The decentralized Alternative to Central Banking*. New Jersey: Wiley.
- Antonopolous, Andreas M. 2017. *Mastering Bitcoin*. Sebastopol: O'Reilly.
- Auer, Raphael, and David Tercero-Lucas. 2021. "Distrust or speculation? The socioeconomic drivers of US cryptocurrency investments." *BIS Working Papers*. No 951. Bank for International Settlements. <https://www.bis.org/publ/work951.pdf>.
- Balan, Rajesh Krishna, and Narayanasamy Ramasubbu. 2009. "The Digital Wallet: Opportunities and Prototypes." *Research Collection School of Computing and Information Systems (IEEE)* 42 (4): 100-102. https://ink.library.smu.edu.sg/sis_research/762/.
- Banca Națională a României. n.d. *Pozițiile exprimate de către statele europene cu privire la monedele virtuale*. Accessed November 25, 2021. <https://www.bnr.ro/Pozi%C8%9Biile-exprimate-de-catre-statele-europene-cu-privire-la-monedele-virtuale-12132-Mobile.aspx>.



- Bitcoin.org. n.d. *Securizarea portofelului tău*. Accessed November 25, 2021. <https://bitcoin.org/ro/securizeaza-portofelul#offline>.
- Chen, Yan, and Cristiano Bellavitis. 2019. "Decentralized Finance: Blockchain Technology and the Quest for an Open Financial System." *Stevens Institute of Technology School of Business Research Paper*. doi:<http://dx.doi.org/10.2139/ssrn.3418557>.
- Christian, Conrad, Custovic Anessa, and Ghysels Eric. 2020. "Long- and Short-Term Cryptocurrency Volatility Components: A GARCH-MIDAS Analysis." In *Alternative Assets and Cryptocurrencies*, by M.Hafner Christian, edited by MDPI, 218. Journal of Risk and financial Management. doi:<https://doi.org/10.3390/jrfm13010007>.
- Cuthbertson, Anthony. 2021. *Crypto market now worth more than top dozen largest banks combined*. Accessed November 14, 2021. <https://www.independent.co.uk/life-style/gadgets-and-tech/crypto-market-cap-price-bitcoin-ethereum-2021-b1950555.htm>.
- Dragomir, Florentina Loredana. 2016. "Models of Trust and Reputation in eCommerce." *Acta Universitatis Danubius. Œconomica* (Universitară Danubius) 12 (6): 235-242.
- Dragomir, Florentina Loredana, Cristian Ştefan Dumitriu, and Alina Bărbulescu. 2021. "Recommendation Systems - Modeling Abusive Clauses in E-commerce." *International Conference on Electrical, Computer, Communications and Mechatronics Engineering*. IEEE. 1-4. doi:10.1109/ICECCME52200.2021.9590828.
- Dragomir, Florentina-Loredana, Gelu Alexandrescu, and Florin Postolache. 2018. "Tools for Hierarchical Security Modeling." *eLearning & Software for Education* 4: 34-38. <https://web.p.ebscohost.com/abstract?direct=true&profile=ehost&scope=site&authtype=crawler&jrnl=2066026X&AN=129436870&h=pXR3RkPPoKePpS8JNSTcCkJWZh13Pe8tEielZO2KApQtYoHRRCWbB26zrG8BrvSATEee8gHQaH7CnQ60aqB6WA%3d%3d&crl=c&resultNs=AdminWebAuth&resultLocal=Er>.
- Erik, Feyen, Frost Jon, Gambacorta Leonardo, Natarajan Harish, and Saal Matthew. 2021. "Fintech and the digital transformation of financial services: implications for market structure and public policy." *BIS Papers*, July 13, 117 ed.: 53.
- Frisby, Dominic. 2014. *Bitcoin: The Future of Money?* London: Unbound.
- Laerte, Peotta, D. Holtz Marcelo, M. David Bernardo, G. Deus Flavio, and de Sousa Jr Rafael Timóteo. 2011. "A formal Classification of internet Banking attacks and vulnerabilities." *International Journal of Computer Science & Information Technology* 3: 197. doi:10.5121/ijcsit.2011.3113 .
- Martino, Pierluigi. 2021. *Blockchain and Banking*. Cham: Palgrave Macmillan. doi:<https://doi.org/10.1007/978-3-030-70970-9>.
- Michael, Crosby, Nachiappan, Pattanayak Pradhan, Verma Sanjeev, and Kalyanaraman Vignesh. 2016. "BlockChain Technology Beyond Bitcoin." *Applied Innovation Review*, Iunie 2: 19. <https://j2-capital.com/wp-content/uploads/2017/11/AIR-2016-Blockchain.pdf>.
- Miller, Riel, Wolfgang Michalski, and Barrie Stevens. 2002. "The Future of Money." *The Future of Money*. Luxembourg: OECD.
- Nakamoto, Satoshi. n.d. "Bitcoin: A Peer-to-Peer Electronic Cash System." *The Bitcoin Whitepaper*. https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&cad=rja&uact=8&ved=2ahUKEwivk7iNyOb3AhUh_rsIHfQIA5AQFnoECAMQAQ&url=https%3A%2F%2Fbitcoin.org%2Fbitcoin.pdf&usq=AOvVaw05-4mYD7EyyKjwcHh8i0Vw.
- Osigner, Joanna. 2021. *The World's Cryptocurrency Is Now Worth More Than \$3 Trillion*. Accessed November 25, 2021. URL <https://time.com/6115300/cryptocurrency-value-3-trillion/>.
- Renteria, Nelson, Tom Wilson, and Karin Strohecker. 2021. *In a world first, El Salvador makes bitcoin legal tender*. Accessed October 20, 2021. <https://www.reuters.com/world/americas/el-salvador-approves-first-law-bitcoin-legal-tender-2021-06-09/>.
- Robertson, Harry. 2021. *A third of El Salvador population is actively using bitcoin wallet Chivo, President Nayib Bukele Says*. Accessed November 10, 2021. <https://markets.businessinsider.com/news/currencies/el-salvador-bitcoin-crypto-chivo-wallet-president-nayib-bukele-2021-06-09/>.



Stein, Mara Lemos. 2017. "The Morning Risk Report: Terrorism Financing Via Bitcoin May be Exaggerated." *Wall Street Journal* 4. Accessed November 20, 2021. <https://www.wsj.com/articles/BL-252B-12305>.

Stinson, Douglas R. 2005. *Cryptography Theory and Practice*. Ontario: Taylor & Francis Group.