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Blockchain Disrupting Fintech and the Banking System †

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Abstract: Nowadays society is profoundly changed by technology, velocity and productivity. While individuals are not yet prepared for holographic connection with banks or financial institutions, other innovative technologies have been adopted. Lately, a new world has been launched, personalized and adapted to reality. It has emerged and started to govern almost all daily activities due to the five key elements that are foundations of the technology: machine to machine (M2M), internet of things (IoT), big data, machine learning and artificial intelligence (AI). Competitive innovations are now on the market, helping with the connection between investors and borrowers—notably crowdfunding and peer-to-peer lending. Blockchain technology is now enjoying great popularity. Thus, a great part of the focus of this research paper is on Elrond. The outcomes highlight the relevance of technology in digital finance.

Keywords: banking system; fintech; blockchain; Elrond

1. Introduction

Digital transformation is considered a mechanism that is focused on the improvement of entities by involving changes through the power of information, communication and technology [1]. Certainly, the banking system must be conscious regarding the expectations of its customers. The future of banking will be decided by the effective players in this market, those willing to change and be ingenious. Customers will become more and more informed, with less free time and completely involved in professional activities. Thus, there are plenty of transactions that can be done through digital devices, like mobile phones, laptops or tablets. Clients receive fast and efficient answers to their requests. They can order banking transactions no matter where they are or at what time, be that day or night. At the same time, they pay lower commissions than before. In addition, technological progress and changing customer preferences have led to the development of alternative channels for conducting banking transactions.

The banking system is threatened by fierce competition from digital financial institutions. The main advantage of these fintech companies comes from the low costs charged to clients, so they do prefer to work in the same way. Likewise, their popularity among young people is steadily increasing due to their digitalization and their increased appetite for all that the advanced technology brings.

Traditional products and services have been rethought and fintech companies have launched other digital products and services for easy and cost-effective use. Genuinely important and worth noting are the peer-to-peer lending and crowdfunding platforms. Banks, on the other hand, have begun to work more intensively in the online environment. Advanced internet and mobile banking platforms are in continuous development, managing to surprise customers. None of these improvements could be made without the help of machine to machine (M2M) technology, internet of things (IoT), big data, machine learning and artificial intelligence (AI). Additionally, thanks to these elements, the world is more united than ever before. Further, blockchain, a digital register launched by Satoshi

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Nakamoto—a pseudonym—in 2008, has led to a major change in the financial world. A local example is Elrond, which is analyzed in this research paper.

We conducted research on the current financial market, analyzing perspectives of the future based on the innovations of the moment in fintech companies and the banking industry, focusing on the influence of blockchain.

2. The Modern Approach of the Banking System

Digitalization thoroughly transforms the banking industry, bringing new products, services and business models to the fore. This transformation takes time, pushing banks to adopt and embrace new technologies in order to develop a sustainable business strategy. This new wave brings the power of innovation, the digital transformation of the banking industry being one of the key challenges of the moment.

The digital revolution has influenced the European markets. Although some countries, notably Romania, have taken small steps towards technological progress, they have nevertheless made a breakthrough. Thus, European countries have registered an increase in the use of internet banking platforms from 2018 to 2019, as it can be observed in Figure 1.

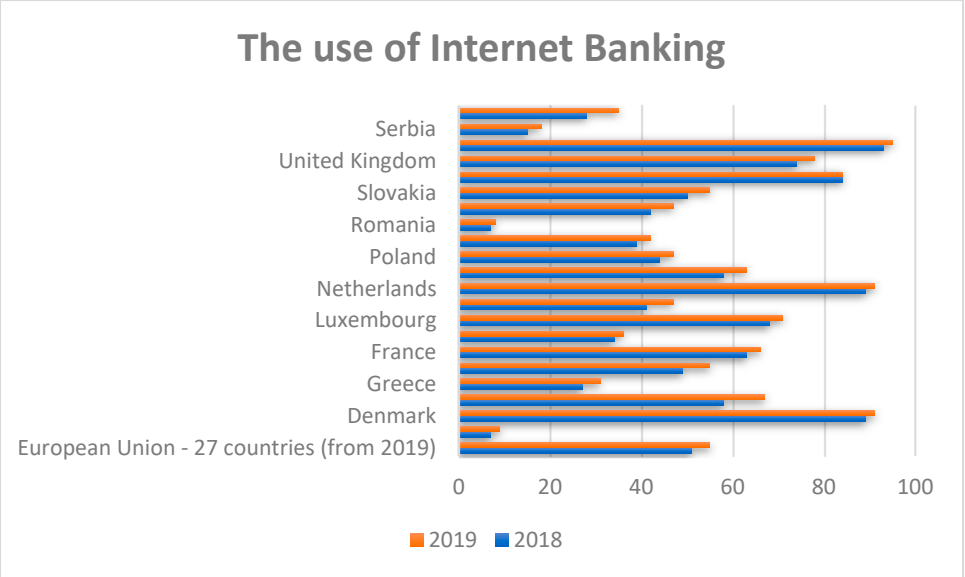

Figure 1. Comparison of the use of internet banking based on DESI indicators in European countries in 2018 and 2019. Source: Authors' sketching based Digital Economy and Society Index, Eurostat, Internet: https://ec.europa.eu/digital-single-market/en/desi (accessed on 21 February 2020).

In this case, for the use of online banking, authentication and biometric authorization are elements of artificial intelligence that should be noted. The access to internet or mobile banking requires authentication through personal credentials [2]. Users can log in either through a password consisting of alphanumeric characters to increase security, or fingerprint or face recognition, depending only on the device. The development of digital banking is due to technological progress. Mobile phone companies are developing new features that help users in banking transactions, as well.

Apple's Siri, Amazon's Alexa, Google Assistant and other virtual assistants are becoming part of everyday life. From the simple flicking of a light switch to setting the temperature of central heating thermostats, tasks can be done remotely, in a smart way. People are using devices that improve their quality of life. Consequently, banks are trying to target this niche. In this regard, banks have launched voice banking. People can check their account balance, find information regarding their IBAN code, products and services from the bank's portfolio, or they can ask for a statement of their account. It is still not accessible to all users around the world [3]. Technically speaking, a user's voice is saved

through an algorithm, a series of ones and zeros, making it less susceptible to phishing or hacking.

The 5th generation of the network (5G technology) will interconnect all devices and machines. It is of real help to the banking industry, as its performance is influenced by these new features:

- Video communication (or electronic meetings) between customers and back-office specialists is happening in real time, at a higher speed;
- Online banking is customized according to the client's needs;
- ATMs can be located easier, not being influenced by poor internet connectivity [4].

Therefore, banks are adapting to technological progress. Nowadays, the internet is more helpful than before. The COVID-19 pandemic has affected common banking activities. Thus, banks offer more advanced services on online banking platforms. Customers can now open a 100% online account and order a debit card to be delivered directly to their home through a courier service. The same process applies to loans: customers can apply and get unsecured credit right from their bank's website, by signing a contract online. Money is transferred to the current account and the beneficiary can either withdraw it from an ATM or make payments with a debit card. Moreover, due to the serious effects in terms of personal finances, the banks offer the possibility of delaying monthly loan payments. In general, this process is accomplished through contact with an expert from back-office, online or through a call center. The customers do not have to go to a bank; the documents will be scanned and attached to an email.

Although this pandemic is having serious effects on humankind, banks can enhance the client's ability with the use of internet and mobile banking platforms. Once customers are familiar with these, they will continue to use them even when everything returns to normal and when they will be able to leave their homes without restrictions.

3. Digital Products and Services of Fintech Companies

Fintech is a sign of the technological evolution in financial services, allowing the improvement of advanced business models, products and services with immediate effect on financial services through the use of information technology and innovative communication. Financial companies consider innovation as an excellent way of gaining competitive advantage. Consumers respond positively to digitalization and they are increasingly willing to use innovative financial services through remote electronic channels, namely the internet and mobile devices.

In order for fintech companies to develop, different technological means have been used. The most useful ones are machine to machine (M2M), internet of things (IoT), big data, machine learning and artificial intelligence.

Machine to machine, abbreviated as M2M, represents the communication between machines, with no human interaction. Any device can be seen as a machine, from computers to pharmaceutical engines, being considered as a heterogeneous environment. The European Telecommunications Standards Institute, known as ETSI, is an active organization in the M2M field, managing issues concerning telecommunication, broadcasting and any alternative in electronic communication. By developing the Harmonized European Standards, ETSI is supporting the European regulations [5]. Thus, ETSI creates standards for 5G technology, the internet of things (IoT), cybersecurity, blockchain, connected cars, satellite communication and any other areas of digital transformation.

IoT represents the dynamic worldwide network, distinguished by self-configuring effectiveness, based on standards and virtual "things" with different identities, material features and virtual identities, using intelligent interfaces. Additionally, it is integrated into the information system [6]. IoT is considered a digital image of the real world, interacting with technology and being adaptable to business models in the high-tech environment. This can be either elementary or exceptionally complex and either local or global [7]. In fact, IoT is divided into three types:

- People to people,
- People to machines,
- Machines to machines.

Velocity, variety, volume, veracity, variability, visualization and value—these are the 7Vs that define big data. This concept refers to the exceptional multiplicity of data in modern lives [8]. It simplifies the analysis of large sets of data, in order to reveal trends, patterns and associations, principally related to human behavior. While big data records this kind of information, machine learning algorithms work in order to create an efficient and secure experience for online customers. As can be seen in the figure below (Figure 2), machine learning has two features:

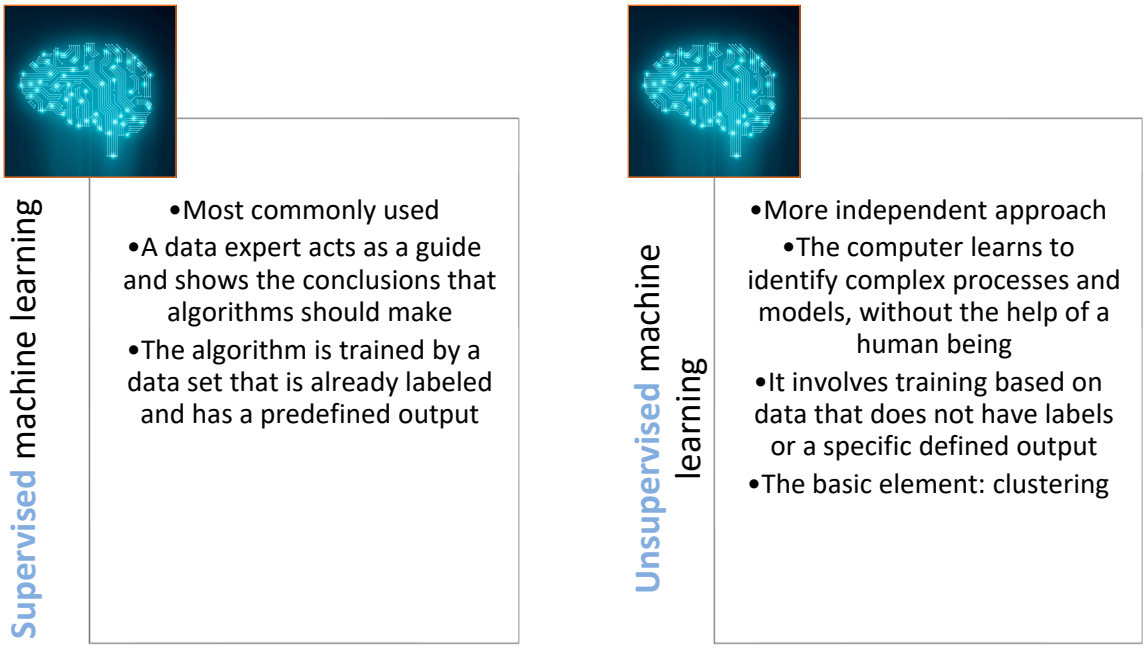

Figure 2. Types of machine learning. Source: Authors' sketching based on Oracle, "Ce este machine learning?" Internet: https://www.oracle.com/ro/artificial-intelligence/what-is-machine-learning.html (accessed on 3 April 2020).

4. Technological Competitive Innovations

4.1. Crowdfunding

With the help of crowdfunding, an entrepreneur asks for money online, from as many people as possible, for a well-defined project, such as the launching of a new product. Usually, in the crowdfunding campaign, the startup offers the product at a discounted price to obtain money in advance from the first customers, those needed to produce the new product. In other words, crowdfunding is one of the most interesting and innovative ways to attract funding for a business idea from the community, borrowers or even strangers, generally from those who truly believe in the project.

A good example of an AI-based startup from Denmark that attracted cash through crowdfunding campaigns is Go Dogo. Hanne Jarmer, the founder, launched an interactive toy that works based on a dog's mind, using exercise and treats to enhance motivation. In fact, the game is gradual, starting with an invitation for the dog to come and pay attention to the TV. The level of difficulty increases, avoiding the possibility of getting bored. Additionally, it is interactive, giving audio feedback for the dog after completing a task. The user may follow the progress of the dog from a smartphone and, if wanted, can schedule play time [9]. Indiegogo and Kickstarter platforms were used in order to achieve the company's financial goal. On Kickstarter, the goal was $65.518, but it achieved only $8.331 up

until 24 October 2019, indicating Go Dogo was an unsuccessful project [10]. On the other hand, the Indiegogo crowdfunding project raised Kr 52.918, or 106% of the goal.

Thus, crowdfunding is an alternative to a loan from a bank, mainly for startup companies and SMEs (small and medium enterprises). The main advantage is that it does not involve a third party, being directly connected with the investor, either an individual or a firm.

4.2. Peer-to-Peer Lending

The first such lending platform launched in 2005, named Zopa, and was established in the United Kingdom. Known also as crowdlending, there are various types of these platforms. Basically, these can be divided into two generic types: commercial and non-commercial. Commercial crowdlending is restricted to the national markets, the investor looking for a reasonable interest rate in accordance with the risk he is taking. On the other hand, non-commercial platforms are worldwide, but the lender would rather make small loans than expect an interest rate [11].

4.3. Digital Currencies—the Case of Elrond

Currencies such as the Indian rupee, Russian ruble, Danish krone or Moroccan dirham are geographically linked to a single country or a community. Their use is limited. However, unlike conventional currencies, cryptocurrencies have no geographical constraints. People can store these cryptocurrencies online or offline in crypto portfolios. Likewise, there are many types of cryptocurrencies. Right now, there can be counted 5.315 cryptocurrencies, on 21.176 markets [12], and the first one in terms of market capitalization is Bitcoin.

Technology is developing at the moment and the future seems bright. Since the launch of Bitcoin and blockchain technology, digitalization is no longer a secret. Everyone has heard of these new connections with the digital sphere, but few understand them correctly. Companies have taken advantage of these opportunities; new startups have emerged and investors have become increasingly interested in blockchain though, as competition grows fiercer, every technology company needs to stand out.

A new blockchain architecture, started from Sibiu in Romania, Elrond is known as one that works to improve transfer and execution speeds, with low costs. Two crucial advances were made in order to achieve the company's goal: an innovation called adaptive state sharding and, in the search for scalability, a secure proof of stake. In fact, M2M and IoT are working successfully with Elrond [13]. In other words, Elrond can be used for issuing, storing and transferring digital assets, as well as processing scripts as smart contracts that allow the implementation and execution of processes at different levels of complexity. Beniamin Mincu together with his brother Lucian Mincu and a tech entrepreneur, Lucian Todea (the one who founded Soft32, invested in MobilPay, TyingDNA and SmartBill) launched Elrond, a product even more efficient regarding processing capacity, cost and speed. Thus, Elrond can process more than 10,000 transactions a second, while Bitcoin can process not more than 5 to 7 and Ethereum 15. Elrond is creating a considerably more advanced new blockchain platform, and this technology also comes with its own cryptocurrency, also called Elrond.

In fact, there is a list of challenges that must be taken into consideration when a startup decides to enter the market with an original and ingenious blockchain solution, as Elrond did:

- Scalability: It should have a high scalability in order to enable the network to have a performance above that of other centralized counterparts, being measured in transactions per second (TPS). TPS is also known as throughput, thus the formula is:

  Average number of users in the system = average response time * throughput

$$N = (R + Z) * X$$

N = number of users

R = average response time

Z = think time

X = TPS or throughput

- Decentralization: There should be full decentralization, removing any third party;
- Efficiency: Minimum energy should be involved in the process of performing all network services needed;
- Security: There is a need to avoid any attack through a known attack vector. Hence, all transactions should be secure;
- Cross-chain interoperability: Communication with external services should be unlimited;
- Bootstrapping and storage enhancement: The storage of data and its synchronization should be at a competitive cost. [14]

Therefore, two main ways should be noted in which Elrond contributed with innovative details regarding the way in which blocks are built:

- The state sharding approach,
- The mechanism of the proof of stake (PoS).

Scalability, the ability to grow, develop and handle high demand, is an indicator of competitiveness, strength and stability on the market. Looking for this, Elrond used database sharding. A method that helps distribute data beyond numerous machines, sharding was initially operated in databases. It can be used in blockchain technology, helping with the partition states and the processing of transactions. A node processes only a fraction of all the transactions, alternatively with other nodes. There must be enough nodes to check each transaction in order to maintain reliability of the system. Thus, by splitting a blockchain into many shards, many transactions can be processed at the same time, as represented in Figure 3. In this way, efficiency will increase considerably.

It should be noted there are three fundamental sharding types:

- Network sharding: This is used for optimizing the communication process, by handling how nodes are divided into shards. Accordingly, the message is easily transmitted through a shard, quicker than to the entire network. This is considered a weakness for attacks, because an attacker may be in control of a shard;
- State sharding: The main important aspect is that each and every shard works with a portion of the state. Transactions that are in different shards have to transmit messages in separate shards. On the other hand, shards must be reorganized often in order to avoid attacks;
- Transaction sharding: This type has to map the transactions to the shards before being processed [15].

Elrond mixes these three—state, transaction and network sharding—using a significant approach, with specific objectives:

- Avoiding having effects on availability, because of scalability. This is due to the increasing and decreasing number of shards, but it should affect only small nodes, without any serious trouble;
- Promptness and instant traceability;

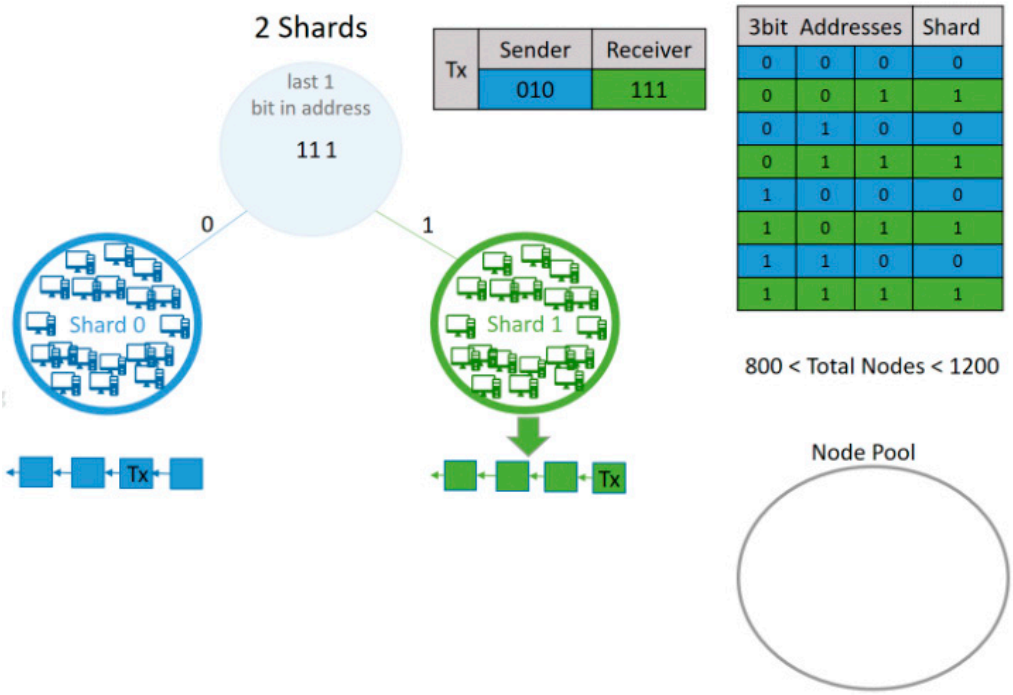

Figure 3. Adaptive state sharding approach of Elrond, last stage, Tx finalized. Source: Elrond, https://docs.elrond.com/learn/adaptive-state-sharding, Elrond–Docs (accessed on 17 May 2020). Adaptability and effectiveness [16].

On the other hand, proof of stake, or simply PoS, was first mentioned by Sunny King and Scott Nadal, in 2012, aiming to reduce high energy consumption during mining. In order not to avoid depending energetically on the miners' work, Sunny King and Scott Nadal suggested an alternative method called staking, where an algorithm chooses the nodes according to the coins held by each user. Thus, stakers are more likely to be selected to add a new block to the chain and claim the reward. These two hoped that this would reduce energy costs and the difficulty of hashrate. In fact, the computer algorithms proof of work (PoW) and proof of stake (POS), are used for cryptocurrencies to achieve the distributed consensus. Unlike proof of work, proof of stake saves energy and does not waste resources. Thus, Elrond uses proof of stake also because it is more secure; a possible attack from a miner is not a risk [17].

Accordingly, Elrond introduced a secure PoS mechanism with some valuable elements:

- It introduced an innovative element that helps with reducing abeyance. Nodes in the shard easily find the consensus group at the starting point of a specific round;
- Usually, a random committee selection takes around 12 s, while for Elrond, the time is estimated to be under 100 milliseconds. Again, abeyance is reduced as well at this level;
- Rating is introduced, a weight factor additionally added to a common consensus mechanism;
- Formal verifications are taken into consideration regarding protocol implementation. All the algorithms used are intended to be correct and complete.

In other words, Elrond associates random validators' selection, rating and also stake, generating eligibility for the consensus group. Afterwards, when consensus is achieved, the metachain receives each block header of shards, as seen in Figure 4.

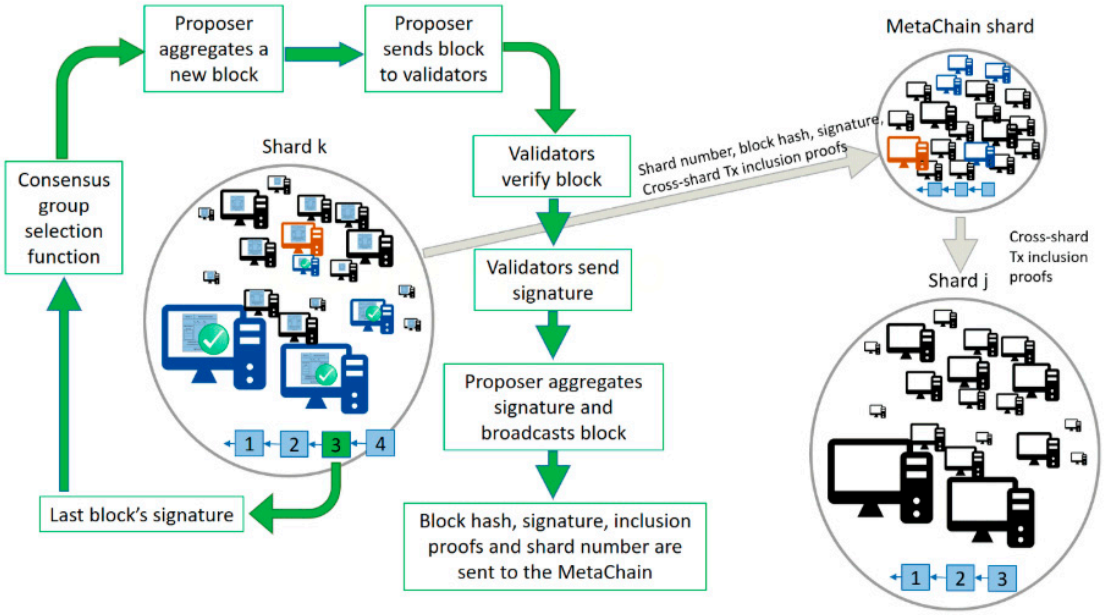

Figure 4. The implementation of secure proof of stake (PoS) in Elrond. Source: Elrond, https://docs.elrond.com/learn/secure-proof-of-stake, Elrond–Docs (accessed on 17 May 2020).

Buying an ERD (Elrond Network) is only the first step to joining the Elrond ecosystem. Once a user owns an ERD, he can start discovering how he can actively contribute to it and be rewarded while doing so. ERD can be used in the staking process by running a validator node or delegating coins to someone else running such a node. The staking process of ERD by running an Elrond node can be much more profitable, but at the same time, more complex in terms of technology. If a user wants to support Elrond in the long run, without investing resources and extra time, the amount of the ERD can be delegated and it will generate passive income.

A crypto wallet is a kind of digital equivalent of a bank account that allows the user to deposit, send and receive cryptocurrencies. Crypto wallets have two important components, namely: a public key and a private key. The public key is an address of the wallet that anyone can see and use to send coins, while the private key is both an authentication method and a password used to access the funds. Additionally, crypto wallets do not store cryptocurrencies in a physical form. When someone sends cryptocurrencies, what happens is the ownership of those coins is transferred from the sender to the new owner. The transaction is confirmed by a blockchain registration and a change in the balance of the two wallets. Based on this, Elrond created Elrond Wallet. Through this, users can transfer quickly and securely and receive and store Elrond tokens. The access to the wallet is easy but it is necessary to create a wallet or to access an existing one. Because of security reasons, there are three ways to access a wallet:

- Keystore (drag and drop the keystore file and the password set when creating the Elrond wallet);
- PEM (drag and drop the PEM file);
- Ledger (this is not yet available, but it will be possible to connect through this means in the near future) [14].

To sum up, Romania is known for its cryptocurrencies, and Sibiu can be glad to have produced Elrond, which has become internationally renowned. It is a solution that brings an important improvement in transfer speed and processing capacity not only for the cryptocurrency, but also the blockchain technology behind it. Thus, Elrond is creating a considerably more advanced blockchain platform, with an incredible speed.

5. Conclusions

Financial systems are changing with technological progress. With each new software, each new application and new kind of payment, financial companies grow and the niche customer type is increasing.

The banking system has adapted to clients' requirements, setting short-term and medium-term objectives for digitalization. Banks should be present in the online environment to increase awareness of their brands and always be available for their customers. 5G technology and voice banking will increasingly contribute to a successful future for banks.

Furthermore, fintech companies rely on a whole new world. This world is defined by five technological wonders: M2M, IoT, big data, artificial intelligence and machine learning. Crowdfunding together with peer-to-peer lending are modern alternatives for financing, obtaining money directly from individuals or companies and allowing borrowers to easily connect with investors. Likewise, Elrond is an outstanding example of digital currencies in general, but also of cryptocurrencies in particular. Designed in Sibiu, Elrond is now a worldwide success.

Hence, it is advisable for the digital world to continue to develop and increase its global reach. The more countries enter into this technological revolution, the more benefits will be seen. Banks and fintech companies should be up to date with the wide array of information technology in order to make use of it properly.

Concerning the abovementioned subject, it is recommended to make an analysis of the global environment and the developments in each country, discovering the elements that fintech companies and also banks should apply in order to achieve recognition and appreciation. Discussing the issue with specialists can be of real help in understanding accurately the digital transformation. Furthermore, it is imperative to keep an eye on the news of the moment as it is a fast changing environment.

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