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THE ROLE OF DIGITALIZATION IN THE FINANCIAL SECTOR, WITH REFERENCE TO THE BANKING SECTOR

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Abstract: *Digitization in technology is changing the way the financial sector works. Advanced applications developed in digital technologies used in financial services are used to change the interface between consumers and service providers in financial transactions, while improving communication and increasing their mediation.*

Digitalization forces organizations to continuously evaluate and innovate their business models. Digital innovations in particular are leading to fundamental changes in the financial services industry. Agile and innovative financial technology startups are known to drive these changes, as they address new customer requirements by developing innovative technology-based solutions with user-centered approaches.

In recent years, the banking and financial sector has undergone radical changes in order to improve services, the constant development of digitalization, through new business models, in the concept of developing the field of Internet copper through monetary transactions between consumers and the copper sector. These new models of digitalization in the financial sector require employees to adapt to a fast working environment and change the overall state of change in the financial sector.

Today, digital currencies are increasingly used "Cryptocurrencies" as a means of exchange. In most countries, they are not strictly regulated by law, and in some countries they are even prohibited. Banks are not obliged to store data on cryptocurrency transactions, every bitcoin transaction, they are stored by computers of all users in a common database called blockchain. These transactions are processed much faster than the banking sector. no commissions, and easier payment between states. Bitcoin provides its users with security when paying, without authentication, although the blockchain shows transactions, it does not show who is behind that transaction.

Managing change through digitalization is currently one of the main turmoil in the financial market, which can forever affect the banking business, and mismanagement can have disastrous results. The banking and financial sectors are expected to grow faster than ever in the coming decades, and therefore changes in the digital sector are at a turning point in terms of changing the positions needed to gain a market advantage over the competition.

Banks in Serbia have included e-banking services in their offer in order to provide services tailored to the specific needs of clients, improve the quality of these services, retain existing and attract new clients and finally reduce business costs by streamlining business processes. In this way, banks try to follow trends by digitalizing their business and offer innovative and safe solutions to meet the expectations and needs of their clients as much as possible.

Keywords: *digitalization, electronic banking, mobile banking, e-wallet, bitcoin, cryptocurrencies.*

DIGITALIZATION

Digitalization represents the modern trend of technologies that originate, since the 1980s, home computers have become commonplace in consumer markets, opening new channels for consumers to be aware that by using these benefits they can efficiently provide themselves with a safer service of better quality in a shorter time. Modern technology and digitalization eliminated the modern society barriers, such as time, space, data collection and inclusions, which allows the consumers a greater freedom to interact with other parties, regardless of the time and space.

Digitalization can be defined as the use of digital technologies in order to create new business models and provide new opportunities for generating revenue and value. It is a process

that could be marked as a digital business acceptance on one hand, and integration of digital technologies into everyday life on another.¹

By digitizing financial services, it gives companies the opportunity to increase the level of their services, by switching to digital business and integrating digital technologies into everyday life, improving their business activities as well as quality of life and thus becoming more efficient and increasing their earnings. The business digitalization in corporations contributes to business improvement, raises the level of corporate culture, organization efficiency and a better establishment of business processes. Digitalization is mostly expected to contribute to the improvement and transformation of business operations, business functions, processes and activities as well as the wider use of existing business data generated in the system. Digitalization doesn't represent a one-time solution, but a long-term process that should continuously prepare the corporation for future challenges in a specific economic environment.

The purpose of digitalization is to enable automation, increase the quality and security of data, as well as to structure and collect them so that they can be used by more advanced business applications. The anticipated result of introducing digitalization should be more efficient processes, better business control and lower costs.

The underlying motives for the implementation of business digitalization in corporations may differ, but what should be common is the fact that we should start thinking about future business today. By investing in digitalization processes, is investing in business processes, due to survival in a competitive market, and today it is not a trend but a need for the development of the company and especially the banking sector.

Corporations which don't adapt or approach the business digitalization in a timely manner will have significant challenges in resolving administrative and financial difficulties, which can be harmful to maintaining a quality service and a profitable business. The most common challenges corporations face today are large amounts of documents, maintenance of large quantities of printing devices, planning and reporting, as well as other complex processes that require a big amount of time and a serious human resources engagement. Digitalization of these processes largely solves these problems.²

Digital transformation is the implementation of digital technology in any business environment, significantly changing the way companies operate and provide products and services to their customers. It is a process that starts from the moment the corporation starts thinking about the introduction of digital technologies in all business areas and lasts until the moment of their complete integration. It represents a major change in business and process organization, the ability to fully seize the opportunities offered by new digital technologies. It is necessary to understand that digital transformation is not just an application, but rather a business logic change.

It should be noted that the liberalization of the financial sector with the entry of various companies in this area, which are getting closer to banking by offering their products and services, had not only negative but also significant positive sides, primarily for users of these services. I am increasing competition and expanding the amount of services, resulting in a weakening of state control - deregulation - in the financial sector.³

DIGITALIZATION AND THE BANKING SECTOR

The implementation of the digitalization process in the banking sector can be observed in two segments, as follows:

1. Improving business processes within the financial institution in order to achieve a better quality in work, efficiency, reduction of operating costs and thus better profitability.
2. Improving the quality of service and raising the level of efficiency towards financial services users, i.e. commercial banks clients.

Digitalization of business processes in the banking sector, related to administrative tasks in regards to the receipt and recording of documentation, greatly increases the efficiency, reliability and contributes to cost savings generated by complex documentation management tasks.

Improvement of documentation records in the banking sector is achieved by implementing a

1 Matt, C., Hess, T. & Benlian, A., (2015), "Digital Transformation Strategies", Business & Information Systems Engineering, vol. 57, no. 5, pp. 339-343.

2 Kaličanin, Z., Perić, M., Kaličanin, M., (2020), Models of corporate governance and their impact on sustainable development of corporations, *Ecologica*, Vol. 27, No. 99, p. 421-428.

3 Pantelić S., (2018), Nickel money from 1925, *Banking*, Vol. 47, Br. 4: pp.134-143.

digital office for receiving documentation. Additionally, the introduction of smart scanners (eg Deus OCR) automatically and accurately extracts data from electronic and scanned documents. What does that mean? OCR receives and processes individual or group documents from a variety of sources, including a scanner, e-mail, network, or computer. Each type of document is automatically identified by supplier and the desired data is extracted. The extracted data is subsequently either automatically sent to the bookkeeping application, DMS, network folder or it is presented to the user for verification through workflow. By using OCR, we can also automatically search for this extracted data in relation to the database and point out any inaccurate or inconsistent information. OCR can automatically convert documents to PDF, Word and Excel. It also has connectors for file output (XML, CSV and Excel), database, DMS.

Many banks use e-signature as a common service throughout the organization. Although a single line of business may require an immediate solution, a bank organization is likely to have a need for digital business processes such as centralized accounting or HR services. E-signatures are increasingly being used as a service that can be easily accessed by any department. This decomposes silos internally, saves developers time, accelerates deployment and creates a consistent user experience.⁴



Figure 1. Principle of digital signature operation.⁵

The second segment refers to the possibility to improve the quality of service through the digitalization process and to raise the level of efficiency towards users of financial services i.e. clients of commercial banks, which after all is the subject of consideration in this scientific work. Due to the imposed trends with digital business implementation, the banking sector is forced to adjust the business to these requirements. Newer trends in attracting customers are becoming easier and more efficient than the old conservative ways. The number of bank branches and sub-branches is on decline, the conservative approach and the contact with clients is being changed and digitalized, because more and more banking services are provided in a way that clients just need to fill out online forms and submit them electronically, together with the necessary documentation.

The digitalization of money transactions and the user experience improvement through technology has been a noticeable trend in the banking sector over the last few years. When comparing the progress of digital business in the banking sector with other industries, we can say that banks are the drivers of digitalization trends in the financial sector, which have brought internet banking, mobile and tablet applications to the consumer market.

By digitizing services, using innovative and creative mobile applications, which are the product of technological progress and positive customer experience, the banking sector achieves better results in providing financial services. Digitalization itself as a key part of the strategy enables banks to provide better and more efficient customer support and thus improves customer satisfaction. Digitization skips routine processes, thus exploring more efficient opportunities to improve existing service models, where the banking sector seeks to increase and maintain competitiveness in the capital market.

The reason for the introduction of modern communication technologies in the banking sector lies in the development opportunities and the advantages of using new banking products and services that serve as a prerequisite for offering adequate packages of products and services to customers within the banking system. The information technologies development has led to structural transformations in banks, distribution channels, market performance dynamics, achieving a competitive advantage of banks and processes of communication with clients.⁶

4 Beke-Trivunac, J., (2019), Accounting standards for sustainable business reporting, *Ecologica*, Vol. 26, No. 93, p. 31-46.

5 Author's work.

6 Ignjatijevic S., Cogoljevic M., Milenkovic N., (2018), Economic assessment of the significance of education in the development of a knowledge-based economy, *Industry*, 2018, Vol.46, Issue 3: pp. 185-200.

ELECTRONIC PAYMENT

With the digitalization of services in the banking sector, banks have become increasingly customer-oriented. Improving the user experience is one of the key elements. With the constant development and advancement of technologies, as well as for data security, banks are creating innovative banking applications for easier payment of banking services. Large technology companies have become interested in developing electronic payment methods, creating business models outside the usual banking sector.

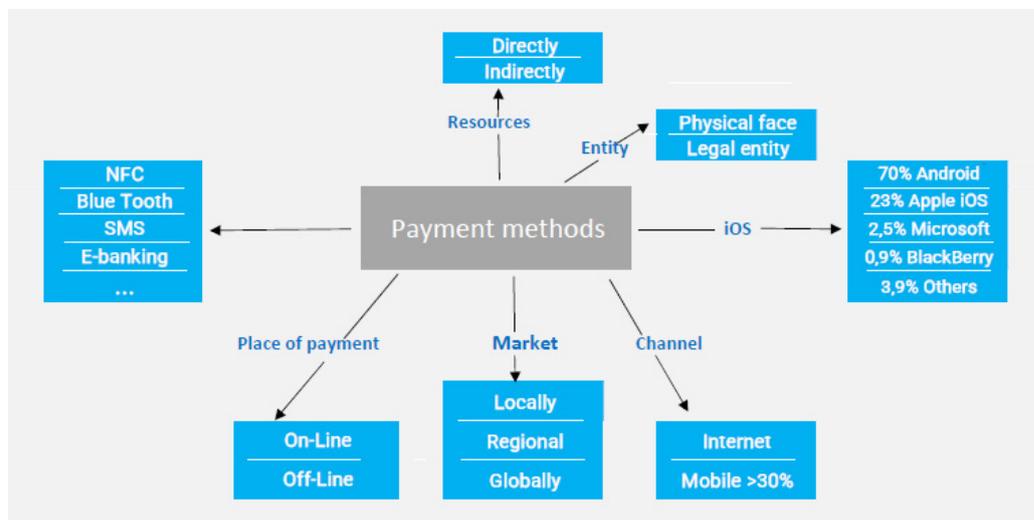


Figure 2. E-payment methods.⁷

Electronic payment is a financial transaction that is executed without the use of paper documentation, such as checks or orders. Payment is made through a number of electronic channels that enable innovations in the field of electronic forms of payment, and are based on various technologies that represent the industry itself. By electronic payment, banks improve the ability of consumers to trade money and thus reduce the need for interaction between bank employees and customers. They can thus reduce costs and improve their customers' experience at the bank. By paying via mobile apps, users can easily make small amount of money transactions between their friends and family through a number of electronic channels.

MOBILE BANKING

Mobile banking is the latest trend in the development of electronic banking. These are new channels that enable payment using electronic devices, so-called "smart" devices (mobile phones, tablets, etc.), which have the ability to connect to the Internet, and provide users with access to the bank and perform the desired transactions. With the help of mobile technology, the bank enables clients to control their own transactions, and the biggest advantage is reflected in mobility (communication anywhere and anytime), as well as in ease of use.

Mobile banking contributes to the digitalization and development of the whole society, while the mobile phone gets a new use and becomes a device for connecting banks and clients. In addition to the many benefits that mobile banking has brought to customers, it also brings many benefits to banks and manufacturers of various mobile banking applications. It is certain that in the future, in order to meet the ever-growing needs of mobile banking users, the development of mobile applications will have to follow the trends imposed by the big data era.⁸

Banks in Serbia do not lag behind the banking sector of Europe because they apply the most modern mobile banking technologies. It is estimated that about 76% of the population of Serbia owns new generation mobile phones, with 13.3% of them being smartphone users. Currently, about 500,000 people in Serbia use mobile banking services. However, it is interesting that about

⁷ Aleksandar B., (2016), Electronic and mobile payments in the world and in Serbia, Project Development of electronic business, Belgrade, Bigraf Plus, p.21

⁸ Lukić, J., Mirković, V., (2014), "Information and communication technologies as a stimulus to the evolution of the electronic administration towards lean administration" *Ekonomika*, Vol. 60, April-June No. 2 p. 199-208.

20% of Serbian banks are yet to introduce mobile banking, but they're planning to introduce it in the coming period.⁹

Today, consumer needs have changed drastically in terms of payment. Cash payment is a thing of the past, while the future is the electronic wallet, which has great potential in the e-commerce market. More and more users are practicing transactions via e-wallets, instead of cash.

DIGITAL WALLET

As Internet users grow rapidly day by day, consumer needs for mobile payments have changed drastically. Digital payment is increasingly present, while cash payment is going down in history. Thus, e-wallets have an increasing potential in the e-commerce market. More and more users are advocating the advantages of e-wallet transactions, instead of using cash. Payments can be made anytime and anywhere with e-wallet, as well as money receiving, storing and sending. The Internet application creators have close collaborations with banks and companies in order to offer banking services to their subscribers. Through the "money transfer" option, money can be sent from the account to any subscriber anywhere and anytime, which is similar to a real-time transfer, where funds can be bought and sent to another subscriber in the same network in real time.

The term electronic wallet means various forms of electronic payment, from the simplest to the most complicated. Digital Wallet is a software application, which allows users to digitally manage their funds, and contains various forms of payment and storage of money, identification, digitization of documents, which can be stored and accessed digitally.

E-wallet is essentially an encrypted memory device, which contains a credit card and other financial information needed for performing electronic transactions. Digital wallets are increasingly being designed for various transactions, but they also have a role for electronic authentication of users.

PayPal is an electronic online payment service that allows payments to be made electronically between merchants and banks or credit card companies. He is a buyer and seller, where transactional parties provide Paypal with insight into their bank accounts or credit card information. The process itself is simplified, like remembering an email address and password, which people are used to using numerous websites on the Internet every day.

Since its launch in 1998, PayPal has grown significantly faster than almost any other company in history in terms of both customers and revenue. Thousands of individuals and businesses around the world come to PayPal looking for a solution that will meet their online payment needs. PayPal is now available in over 100 countries and 17 currencies, with an even wider expansion planned for the future. PayPal is the fastest growing currency in the world and it is clear that PayPal is creating a new standard in online payments.¹⁰

Alipay is the largest digital wallet, the largest electronic payment service in China. The main product is the digital wallet Alipay, includes a mobile application, which allows users across the country and the world to make transactions through their smart devices, most often mobile phones. Through this application, each company tries to reach a critical mass of Chinese customers, both nationally and internationally. It is spreading through other countries and is currently available in 70 markets and is accepted in over 80,000 retail outlets worldwide.

AliPay is the Chinese equivalent of PayPal. Both AliPay and PayPal provide users with e-wallet services, enabling them to make mobile payments. The AliPay e-wallet app allows users to store their debit or credit card information within the app and use their mobile phones to pay, instead of cash or bank cards. AliPay e-wallet is widely used by people living in China for all kinds of different transactions, from in-store and online payments to receiving international money transfers from abroad. It is also a great time now for tourists and business travelers visiting China to sign up and get a 90-day pass to use the service¹¹.

MasterPass™ Wallet is an electronic digital platform that allows consumers to use payment cards in electronic form, thus avoiding the use of plastic cards. Through the use of MasterPass™ Wallet, online payments are simpler, whether it is a trade or other payments anywhere in the world.

9 Dušica Sanader, (2018), Mobile Banking: A New Trend in the Modern Banking Sector, Banking 5, UDK 004.4: 336.71, pp.102-103.

10 *History of PayPal: Timeline and Facts*, <https://www.thestreet.com/technology/history-of-paypal-15062744>, visited on 13.09.2020.

11 *Why Alipay is more than just the Chinese equivalent of PayPal*, <https://www.techinasia.com/talk/online-payment-provider-alipay-chinese-equivalent-paypal>, visited on 13.09.2020.

MasterPass is a free digital wallet service that allows you to integrate different wallets into your Masterpass network. The main idea is to allow consumers to choose the wallet of their choice and to enter their payment information only once, and they will be able to reuse the memorized data for future online purchases in many online stores.

MasterPass-linked wallets allow banks, merchants and partners to offer their e-wallets. Through this wallet, consumers can safely store their data (cards, directories, etc.) in the security cloud. Consumers can use other branded MasterCard products through this e-wallet, such as credit, debit and prepaid cards.

Visa Checkout is a digital wallet that securely stores payment and shipping information. It supports all major types of credit and debit cards, including Visa, MasterCard, American Express and Discover. Visa Checkout has a high increase rate that goes far beyond traditional billing and allows their customers to make quick and easy payments on all of their devices.

Visa Checkout is a digital wallet version of the Visa credit card network, designed to facilitate online shopping. Users can store their credit and debit card information in Visa Checkout and they can access it quickly when shopping on merchant websites or in merchant apps. Visa Checkout is not a mobile application, nor is it a paying method in the store register, such as Apple Pay or Google Pay. You can use it on websites or in vendor applications that accept Visa Checkout.

QIWI - an electronic payment system, will be used in Russia at the end of 2007. This electronic wallet allows consumers to make electronic bill payments for utilities, mobile phones, the Internet, shopping and bank loans online. QIWI offers a wide range of products and services. Through history, the first service was the ability to make payments to selected partners through cash terminals. The company manages virtual wallets co-branded with Visa and runs cash collection terminals and kiosks.

Users pay money at the company's ATMs and thus use the money for secure and fast electronic payment (mobile phone bills, online purchases, utility bills and more), or simply keep the sheep on the platform for later use. Once the payment is done, the invoice will be created in the user's QIWI wallet account. Then, they can choose to pay the invoice "immediately" using the existing e-wallet balance or "later" in cash on any payment interface that supports the QIWI wallet.

"QIWI's" success secret can be formulated as a will, as well as a desire to push the possibility boundaries. If we look at the QIWI products evolution, we will see that each new product has completely cannibalized the previous one.

Skrill is a global e-commerce company that enables online payments for industries such as gambling, online games and social networks, B2B payments or retail. For an individual user, Skrill offers an online deposit account (e-wallet); Skrill offers merchants the ability to accept online payments via major payment cards, Skrill's own online accounts, as well as other local payment methods.

As a general term, "digital wallet" refers to an increasingly important payment method on the Internet. The user deposits money to their virtual wallet using a standard credit or debit card, money transfer or direct debit. This digital wallet allows users to shop at any online store that accepts digital wallets as a payment method.

Skrill Digital Wallet is the current payment option that requires only a password, without the need to include any sensitive financial data. Skrill allows any registered consumer to make online payments, as well as to send and receive money transfers. All you need in order to pay is your email address and a password.

HCE-NFC WALLET ANTELOP SOLUTIONS

Today, banks have a unique opportunity to digitize cards on a mobile device and enrich their application for Android banking with secure NFC payments, based on HCE - Host Card Emulation technology. The industry card digitization consensus is strong. Digitized cards are easier to deliver, it's faster to replace them and it's cheaper to discover their unlimited potential for value-added experiences of banks, such as: instant issuance on a mobile device, real-time digital card management, credit payment options etc.

Antelop offers an NFC wallet with a "white label" that transforms your banking application into a secure NFC mobile payment solution with your brand and visual identity. It comes with a certified SDK, with multiple products that support main cards (Visa, Mastercard). The

current card digitization can be done in the application and is done through their PCI DSS cloud platform which is directly related to the scheme's tokenization.

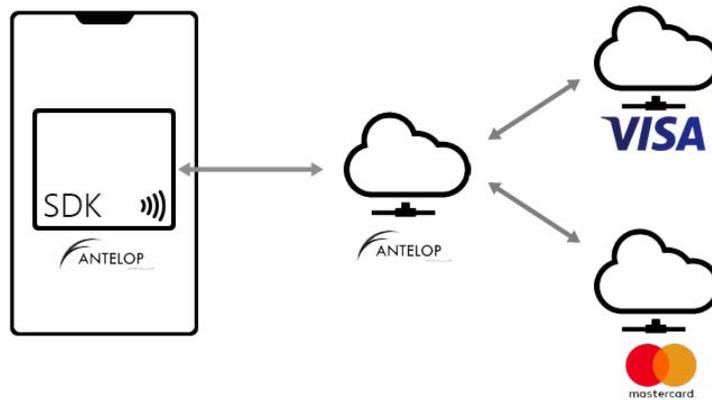


Figure 3. Antelop system.¹²

The SaaS solution has already certified Visa and Mastercard bank cards for simplified payment. You only need to integrate the SDK with the agile Antelope support, and that's usually done in less than 2 months. To facilitate integration and reduce time-to-market, Antelop can also provide a user interface or a white-labeled application with your own look and style.

Customers can now “touch and pay” using their banking application, without payment restrictions and any connections with data transfer. Just moving the phone towards the POS terminal opens your application. The solution originally includes a strong user authentication (PIN, fingerprint, unlocking device, face recognition) that can be set up for payment depending on the amount of the transaction.

CRYPTO CURRENCY AND BLOCKCHAIN

With the growing popularity of the crypto market, great attention is being paid today to a large number of unregulated cryptocurrencies. Both the cryptocurrencies and blockchain are colossal topics. There are several hundred cryptocurrencies and numerous applications of blockchain technology. Blockchain is a decentralized transaction and data management solution, known for being the technology behind the success of bitcoin cryptocurrencies. Its main goal is to create a decentralized environment in which no third-party controls transactions and data. This technology is common today because it solves problems in a way that people previously could not by creating business value.¹³

Basically, a blockchain represents a distributed replicated database. It is organized in the form of a single-linked list (chain), where nodes are in form of blocks with transactions data, which, after grouping, are protected by using cryptographic methods. Hence the name blockchain. It is a system that enables the realization of digital transactions without intermediaries.¹⁴

A blockchain consists of blocks that are strung or connected in a chain where each of the blocks has a series of records. The blocks are connected by an algorithm that uses a hash function. The connection between the blocks is very difficult to forge or hack, because it is also an algorithm that uses high-level cryptography. As the name suggests, a blockchain consists of a series of blocks that are chained together. A block is a data structure that contains information. It consists of a header where metadata and lists of digital information or data of a certain length are entered. In the block header itself, we encounter technical information about itself and all the information related to connecting to other blocks that are also part of the blockchain. Weight tag and nonca are meta-data, their application is visible only when adding an individual block to the blockchain.

Simply put, a blockchain can be thought of as a distributed database. The addition to this database is started by one of the members, who creates a new “block” of data that can contain

12 <https://www.antelop-solutions.com/nfc-issuer-wallet>, visited on 11.09.2020.

13 Garrick Hileman and Michel Rauchs, (2017), Global cryptocurrency benchmarking study. Cambridge Center for Alternative Finance, pp. 35.

14 Miroslav M., (2017), Blockchain technology: Possibilities of use outside cryptocurrencies, Faculty of Organizational Sciences, Conference: INFOTECH, p.102.

all kinds of information. This new block is then broadcast to all the network parties in encrypted form (using cryptography), so that the transaction details are not publicly available.

The very definition of cryptocurrency is not an easy task. Cryptocurrency is a modern word for a wide range of technological developments in cryptography techniques, similar to those that use blockchain techniques. Cryptography is a technique of encryption, protection of information in an illegible format, which can be decrypted only with a key, by the user. Many cryptocurrencies are secured with this technique, public and private digital keys. Cryptocurrencies, such as bitcoin, are virtual currencies that can be bought with traditional money and can be used to buy both digital and real products and services.

BITCOIN

Bitcoin is the first decentralized ‘peer-to-peer’ cryptocurrency that was created in 2009. The main specificity of this currency is the fact that its issuer does not exist. On the other hand, this currency in the market is software limited and programmed. The characteristics of this currency are, among other things, secure payments, low transaction costs, anonymity of the owner of the currency, impossibility of counterfeiting, irreversibility of transactions, while the big drawback is the instability of the exchange rate. Despite its many advantages, the use of this currency is the subject of numerous discussions, as this currency is prone to various abuses and criminal activities. In that sense the future of this one as well as similar currencies depends on these currencies use and security, as well as on the legal regulation of such payments.¹⁵

Each transaction contains the digital signature of the user who initiated it. A digital signature, without going into the details of the algorithm, is generated from a combination of the transaction message itself and the user’s private key. It is easy to conclude that the signature is different in each message, which practically makes forgery impossible without the original private key. Each user also owns a public key that is in some mathematical relationship with the private one. A triplet (message, signature and a public key) is used as the input of a certain mathematical function that determines whether a given combination is possible or not. In this way, other nodes in the network can validate the transaction without private key information.

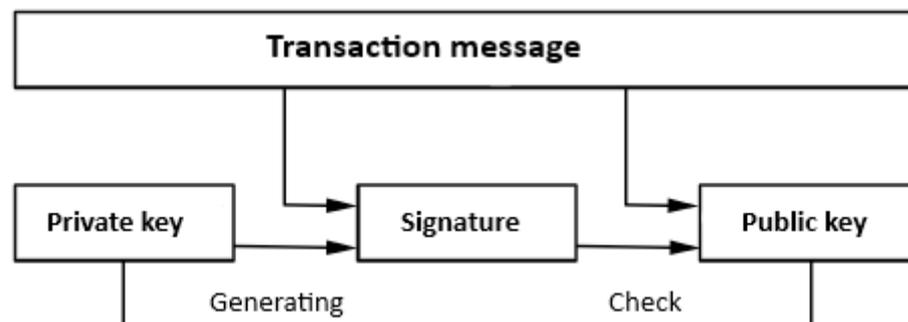


Figure 4. Illustration of the process of generating and validating signatures.¹⁶

These basic bitcoin characteristics can be illustrated by the following sentence: “The foundation of the bitcoin philosophy is a combination of cryptographic security of the digital world consisting of a large number of computers connected to a strong and indestructible peer to peer network and limited resources available such as silver and gold (the maximum number of bitcoin coins is 21 million, currently in circulation there is around 11.5 million, creating such a strong and stable so-called cryptocurrency on the Internet but not physically present in any country in the world.¹⁷

ANALYSIS OF CRYPTOVOLUTE, BITCOIN

Digital currencies are a relatively modern concept. There is a crucial difference between digital currencies and the currencies currently issued by countries around the world. First, it is necessary to distinction between digital money and digital currency. Bitcoin is a payment

15 Barber, S., Boyen, X., Shi, E., Uzun, E. (2012) Bitter to Better - How to Make Bitcoin a Better Currency. Lecture Notes in Computer Science, p. 399-414.

16 <https://coinfisherman.com/2018/02/17/sta-je-bitkoin-i-kriptovalute/>, visited on 11.09.2020.

17 Bitcoin.org, 2019, <https://bitcoin.org/en/faq#how-does-bitcoin-work>, visited on 09/11/2020.

system based on open-source software. Payments are recorded in the public ledger using your own account unit, also called bitcoin. The easiest way to put money in bitcoin is to link a bank account to a Coinbase account. Bitcoin can be stored as a network exchange, e-wallets, etc., and the money can be transferred back to the bank account and converted into other currencies.

Nowadays, bitcoin in the financial market operates without regulations. There is no clear position on the cryptocurrency itself, the financial market is still unexplored. Since it is not taxable, it makes it attractive as an investment opportunity, and compared to national currencies, it can lead to competition problems. As the future is constantly changing, it is not possible that the currency will be widely accepted in the people's period, but for now it is difficult to predict what the situation on the bitcoin market could be in a few years.

The virtual currency has had an unstable trading history since its creation in 2009. The first price increase occurred during 2013, when one bitcoin traded at around \$1,124 (USD) in November. Four years later, bitcoin experienced a meteoric rise and reached record highs, with some exchanges at the end of 2017 having the price of one bitcoin at around \$20,000 (USD). However, prices soon began to fall in the months that followed.¹⁸

In recent years, interest in Bitcoin has been growing at an increasing rate. At the end of August 2019, the total available bitcoins were estimated at over \$1.5 billion (USD), and in December 2019 it was reported that the Bitcoin network processing power was "approximately 300 times greater than the total power of the first 500 supercomputers" and it's been stated that it's because Bitcoin supporters see it as "the ideal currency for regular consumers and customers." To cut the long story short, high liquidity, reduced costs and the high speed of the partially anonymous Bitcoin system make this currency so interesting.¹⁹

In early 2011, 1 bitcoin could be purchased for \$0.30. The currency jumped above \$15, but ended the year at around \$3. By the end of 2012, Bitcoin had grown to \$12.56. During 2013, Bitcoin by November grew steadily to \$198.51, but experienced a significant jump, ending the month at \$946.92.

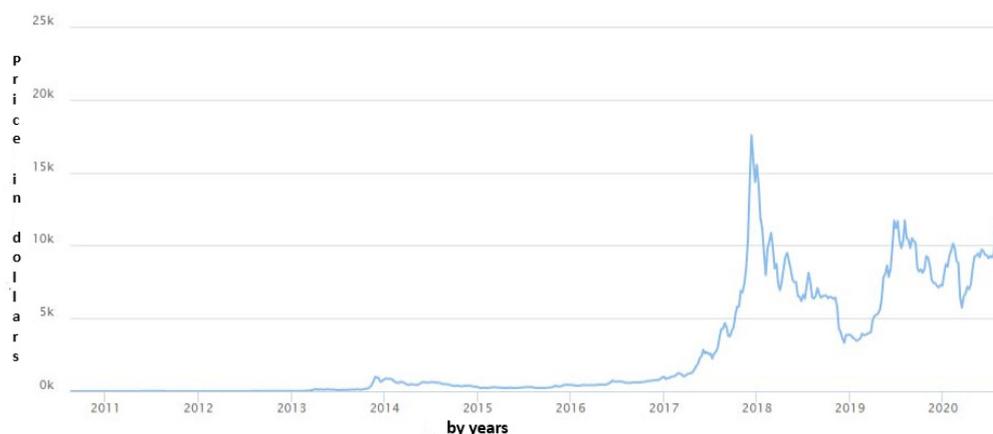


Figure 5. The price of bitcoin today and history.²⁰

The only year so far in which Bitcoin ended lower than it started was 2014. After continuing the set from the previous year, it reached a peak of about \$850 in February, ending the year at \$378.64. The price of bitcoin continued falling for several months in 2015, but towards the end of the year rose to \$362.73 on December 1. In 2016 and 2017, there was a steady rise in prices, with a big jump at the end of 2017. Prices fell significantly in 2018, but increased during 2019, although they did not quite reach the peak in 2017. In 2020, there were about 18 million bitcoins in circulation, with a global value of all bitcoins, approximately 118 billion USD

In order to be able to draw a conclusion about the bitcoin investing profitability, it is necessary to consider its development in the financial market. A more significant development of bitcoin begins in 2011, when the first larger value increase was recorded at around \$30 (USD). In the boom phase, the greatest attention to bitcoin was paid during the financial crisis in 2013, when the value of one bitcoin exceeded \$ 250. During this period, the number of users and the number of transactions increased sharply, and the first online exchange offices were

18 <https://www.statista.com/statistics/326707/bitcoin-price-index/>, visited 14.09.2020

19 Greenberg R. Bitcoin: An innovative alternative digital currency. *Hastings Science and Technology Law Journal*. 2019; 4: 160–207.

20 <https://www.buybitcoinworldwide.com/price/>, visited on 14.09.2020

established. Also, bitcoin began being more and more accepted as a means of payment, and when it was accepted by one of the largest Chinese internet giants, there was a sharp rise in the price. Bitcoin seemed to be on its way to becoming a global substitute for currencies regulated by monetary authorities. It also seemed that bitcoin, as a cryptocurrency that is not under the influence of institutions, would be a safe haven for keeping the value of money, and that it would not be subject to inflation.²¹ Such expectations have created a prediction that bitcoin will gain in importance in the future thus become a generator of rising demand and rising prices.

The reason for the bitcoin value decline lies in the fact that the previous sharp rise in prices was a phenomenon known as an investment bubble. Figure 4 shows the movement of the weighted price of bitcoin, and Figure 5 shows the movement of the volume of bitcoin trade.

Looking at the number of bitcoins sold, it can be concluded that there was a stable demand until the first significant price increase. Then a maximum of over 668 thousand bitcoins sold is reached, which can be related to the period of the first big sale in Figure 5. The next big bitcoin sale occurred at a time of its high price when the investors left their positions and sold bitcoin. Looking at the charts, one can see a great similarity between the movements of the bitcoin price and the usual investment bubble movements, which implies the need for a great investment caution.

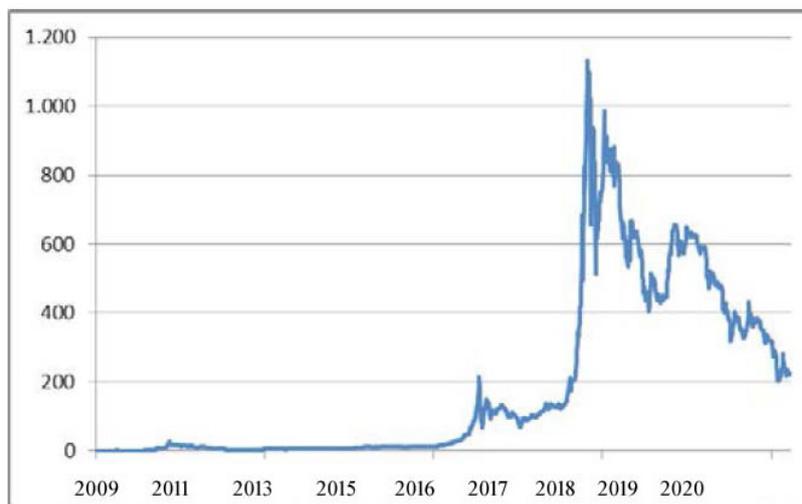


Figure 6. Movement of the bitcoin price from 2009 to 2020 (in \$).²²

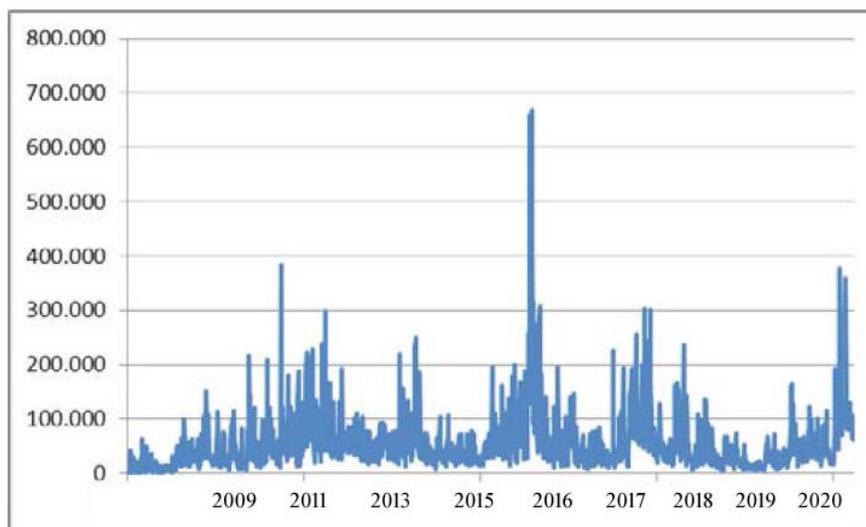


Figure 7. Volume of traded bitcoins from 2009 to 2020.²³

21 Kaplanov, N.M., “Nerdy Money: Bitcoin, the Private Digital Currency, and the Case against Its Regulation,” *Loyola Consumer Law Review*, 25, 2019.

22 <https://www.blockchain.com/charts/n-transactions-per-block>, visited on 16.09.2020.

23 <https://www.blockchain.com/charts/median-confirmation-time>, visited on 16.09.2020.

Cryptocurrency forecasting and research teams (CPR) predict the price for several types of currencies, namely bitcoin, bitcoin cash, Ethereum, Litecoin and stellar. This research covers the valuation methods used for the future prediction of cryptocurrency prices, with special reference to bitcoin, under the model “exchange equation”.

The exchange equation model represents the actual approach to cryptocurrency valuation. This means that the stated valuation model, based on assumptions about changes in supply and demand, further target the price at which the cryptocurrency should cost. Noting that the absolute valuation approach is inspired by the exchange equation, the percentage of the total market in this model can be used to estimate the future valuation of the cryptocurrency.²⁴

	Current	2020	2025	2030	2033
Bitcoin	\$9,263	\$19,044	\$341,000	\$397,727	\$395,270
Ethereum	\$208	\$331	\$3,549	\$3,644	\$3,441
Litecoin	\$44	\$83	\$1,216	\$2,252	\$2,299
Bitcoin Cash	\$235	\$414	\$6,690	\$13,016	\$12,941
Stellar	\$0.07	\$0.09	\$2.40	\$7.81	\$8.26

Table 1. Exchange prediction equation for crypto asset prices.²⁵

After examining “all variable and addressable markets”, CRR researchers came up with future price estimates for BTC, ETH, LTC, BCH and KSLM. The price of bitcoin is estimated to rise to \$19,044 in 2020, \$341,000 in 2025 and \$397,727 in 2030. The price of Ethereum is expected to reach \$331, \$3,549 and \$3,644, while the price of bitcoin cash should rise to \$414, \$6,690 and \$13,016. during the same time periods.

The National Bank of Serbia issued two announcements, one on October 2, 2014,²⁶ and the other on May 4, 2016, to clarify that “anyone who invests in bitcoins or engages in any other activity involving virtual currencies must do so on their own responsibility, bearing all financial risks and risks in terms of non-compliance with regulations governing foreign exchange operations, taxation, trade, etc²⁷. Explaining that bitcoin is not a legal tender in the Republic of Serbia, and therefore cannot be the subject of financial services by banks or exchange offices. The law requires that the prices of products and services be expressed in Serbian dinars, and not in virtual currencies, as a means of payment, and the use of virtual currencies is not in accordance with the law, in the foreseeable future there will be a need for regulatory or other deals with the issue of cryptocurrencies in terms of obligations and responsibilities.

Today, we see that bitcoin is not a perfect currency, with its disadvantages, but there are also many advantages that physical currencies do not provide to their users. As bitcoin is a relatively new currency, in order to succeed, more people need to understand how it works and not allow their preconceived notions to distort the concept of digital currencies.

BANKING SYSTEM 4.0

The very name Banking 4.0 is a model that refers to technology that is included in all areas of society, production, finance, services, transport and communications. Digital integration drives such development, all with automation with devices and processes capable of transmitting and processing huge masses of data, or machines that are accessible and capable of performing such tasks in ranges from medium to high complexity. The proliferation of the Internet and smart devices, along with the emergence of new technologies such as the Internet of Things, biometrics, big data, advanced analytics, artificial intelligence, blockchain, etc., creates an organizational focus on designing and developing customized products and services so personalized to each user. which services he uses.²⁸

24 <https://cryptoresearch.report/>, visited on 16.09.2020.

25 <https://news.bitcoin.com/bitcoin-price-20k-2020-398k-2030/>, visited on 16.09.2020.

26 <https://www.nbs.rs/internet/cirilica/scripts/showContent.html?id=7607&konverzija=no>, visited 15.09.2020.

27 <https://www.nbs.rs/internet/cirilica/scripts/showContent.html?id=7607&konverzija=no>, visited 15.09.2020.

28 Becker, Tilman, Catherina Burghart, Kawa Nazemi, Patrick Ndjiki-Nya, Thomas Riegel, Ralf Schäfer, Thomas Sporer, Volker Tresp, and Jens Wissmann. 2019. Core technologies for the internet of services. In *Towards the Internet of Services: The THESEUS Research Program*. Edited by W. Wahlster,

As a result of advances in technology, the banking industry has changed a lot, but those changes continue. Digital technology has revolutionized financial services in the world, and banking is no exception. Today we have a generation of younger people entering the financial system on their own, without advice from financial advisors in the field of digital currencies.

Nowadays, by easily searching the Internet or calling a toll-free number, simple answers can be obtained, where ordinary users reading from the screen of smart devices, might be interested in helping, or who want to sign up for a particular product, can get two with a certain commission. As there are more and more applications for mobile phones, a trend has been launched that now allows for a wider connection of personalized services with banks. Applications have evolved from simple transaction bases to the next new, voice communication via artificial intelligence. Achieving all these affiliations and characteristics of users is no longer possible with existing banking services, and is only possible with the use of applications that have tools, technology and mechanism of the fourth generation. The transition to Banking 4.0 has two different benefits: meeting new needs through new products and processes, and second, higher productivity by applying process innovations.²⁹

As new generations of clients enter and operate in the cryptocurrency market, which requires a thorough review of existing services and products in the banking sector. Innovative products, improved productivity, fast transfer of currencies and funds, real-time information systems are all advantages in the efficient management of digital technologies in the banking sector.

Extremely high rates of technological change in the entire banking and economic ecosystem, have contributed to the significant impact on digitalization, in the sphere of individuals as well as in socio-political communities. Machine learning based on artificial intelligence, the growing use of data, digital technologies are all important roles that play in the process of digitalization.

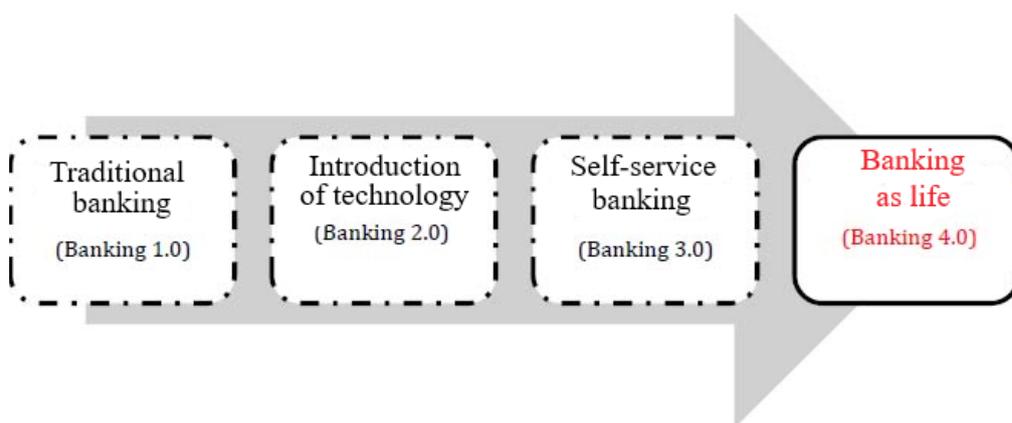


Figure 8. Banking revolution.³⁰

The process of digitalization in banks is based on conditions that are discussed only in the context of the forthcoming changes, and has become an integral part of the strategic plans and decisions of most banks. The reasons for this are that in the last few years there has been an accelerated progress in digital technologies, which brings competitiveness in the field of financial services. Today, all banks are trying to change the old and introduce new technology as soon as possible, by introducing digital products, since there is generally competition between them and the entire market where everyone claims to be leaders in this field.

A banking services digitalization study has been conducted in 38 countries, with the impact being measured in three critical areas: a measure of functionality, the importance of activities for the client and the mobile user experience of the client.

Figure 9 shows the digitalization degree of the banking market in 38 countries. It can be seen that the leaders (“Digital Champions”) are Poland, Russia, Spain, Switzerland and Turkey, while Serbia and Croatia fall into the category of “Digital Adopters”. This undoubtedly shows that in our environment there is room for significant improvements in the future, in terms of digitalization of the banking sector, as well as opportunities for further improvement of banking conditions in digitalization platforms. The business of banks in adopting new philosophies

H.-J.Grallert, S.Wess, H.FriedrichandT.Widenka, Heidelberg: Springer, pp. 59–88.

29 Bret King (2018),: Bank 4.0: banking everywhere, never at a bank, Marshall Cavendish Business, e-ISBN: 978 981 4828 38 3, pp. 157-158.

30 Author’s work.

of financial services is a precondition for further continuation of the digitalization process, which has the ultimate goal of strengthening the market position, increasing banks' income, as well as moving to a higher level of digital maturity, ie "Digital Smart Followers" and "Digital Champions".



Figure 9. Degree of digitalization of the banking market.³¹

The analyzed results show that banks in the category of digitalization, which have reached the highest level of digitalized services, belong to those with the following characteristics:

- by providing a wide range of services to its customers;
- banks that meet or exceed customer expectations;
- by providing a modern and intuitive mobile experience to its service users.

By adopting new technologies, in terms of developing and maturing if it is "Internet of everthing" (IoE), where by creating connected networks between human networks, processes, data, objects, etc., through values, blockchain technologies, cloud technologies, advanced robotics, virtual realities, sensor miniaturization and the exponential development of new technologies and innovations encounter completely different generations of banking.

In the context of financial liberalization, the foundations have been laid for the emergence of private and foreign banks, which initially develop in developed countries and then in developing countries, necessitating a paradigm shift from a concentrated market structure under financial repression to a competitive banking services framework. Banks need to know how to attract their attention and preferences without directly interacting with the client, rather than starting with their business-oriented design and market share, thus achieving business goals today.

FINTECH BANKING DEVELOPMENT

Financial technology (FinTech) is evolving at a rapid pace and is perceived as one of the most important innovations in the financial industry, largely driven by the filtering economy and information technology. Using elemental technology, FinTech systems provide new and advanced business models, such as P2P and B2B, so the traditional banking business model faces a great challenge.

In addition, FinTech is seen today as a good platform for implementing ideas based on the sharing economy and group FinTech is nowadays one of the better platforms for implementing ideas in terms of group financing and saving data. There are several reasons why FinTech solutions are better in the eyes of consumers in terms of ease of account opening (43.3%), more attractive rates / costs (15.4%), access to various products and services (12.4%), better services (10, 3%), internet experience and performance (11.2%), digitized products compared to other products in other banks (5.5%). In terms of user experience, knowledge management of FinTech solutions products and services, barriers accepted by consumers (53.2%), lack of need for their use (32.3%), tendency to use traditional financial service providers (27.7%), lack of knowledge on how to use them (21.3%), not trusting them (11.2%) and who have used Fin-tech that has

³¹ <https://www2.deloitte.com/content/dam/Deloitte/global/Documents/About-Deloitte/central-europe/ce-digital-banking-maturity-study-emea.pdf>, visited 26.09.2020

been used in the past but do not want to use it again (0.8%)). Instead of attacking each other, banks and FinTech are increasingly cooperating with each other (see Figure 9)³².

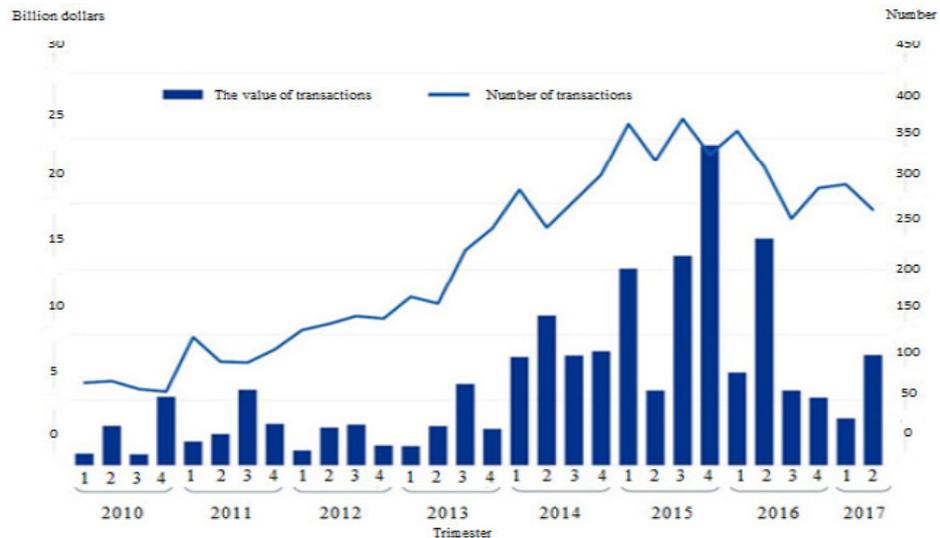


Figure 10. Investing in FinTech companies.³³

At the very center of the FinTech ecosystem, are entrepreneurs and their companies, which represent the essence of the banking 4.0 industry in the best way. In fact, Banking Industry 4.0, are organizations that improve services in financial transactions; financial aggregation, capital market, providing lower operating costs, targeting niche markets and providing personalized services compared to traditional companies.³⁴

As the importance of the FinTech industry grows, especially today as a factor of change in various parts of financial markets and monetary systems, including micro payments, money transfers, lending, comparison and online sales of various types of insurance policies, capital increases and asset management. Among other things, Bitcoin is a new paradigm in FinTech systems. The finTech industry has expanded the number of digital solutions in the above fields, and has become the most serious threat in the management of traditional banking and its portfolio.³⁵

FinTech is defined as progress in the continuous process of financial services, in which finance and technology evolve together. It will, that is, transform the financial industry by reducing costs, improving the quality of financial services and creating a more diverse and stable financial environment. In the end, this can be seen as a FinTech revolution.

BLOCKCHAIN TECHNOLOGY AND CRYPTO CURRENCY

It was stated earlier that one of the trends, characteristic in the field of banking and its digitalization, is the appearance of blockchain technology, which is increasingly connected with the appearance of cryptocurrencies. The advent of cryptocurrencies (digital money) is an inevitable phenomenon in the 4.0 banking system and is a consequence of the digital economy revolution. But only some cryptocurrencies have found popularity and full affirmation in digital banking. The most famous cryptocurrency is certainly bitcoin, which is becoming more and more popular day by day. This cryptocurrency is characterized by the fact that it operates completely independently of the monetary authorities and the amount of traditional money in circulation.

The same way the internet has affected communication so blockchain can affect business, because these technologies are changing in the same way, they are part of digital technologies that are hand in hand transforming their sectors. Banks are teaming up with specialized

32 Lee, I., & Shin, Y.J. (2018). Fintech: Models, Investment Decisions, and Challenges. *Business Horizons*, 61, 35–46.

33 KPMG (2017), The Pulse of Fintech Q2 2017 Global analysis of investment in fintech, downloaded online: www.kpmg.com/fintechpulse, visited on 22.09.2020.

34 Perić, M., (2018), “Change management in corporate finance in the function of improving corporate governance”, doctoral dissertation, Union University, Belgrade Banking Academy, Faculty of Banking, Insurance and Finance, Belgrade.

35 Bret King (2018), *Bank 4.0: banking everywhere, never at a bank*, Marshall Cavendish Business, e-ISBN: 978 981 4828 38 3, pp.213-215.

companies that deal with these businesses, and in this way, platforms for digital financing of trade based on blockchain technology are being jointly developed. In addition, such institutions, in addition to banks, allow other companies and specialized institutions easier financing and trading, thus reducing the risk of default. The advantage is that they can negotiate and fulfill orders, negotiate the terms of trade agreements and access the financial services offered on the platform with complete security and trust. The situation on the world market is such that companies are still experimenting with blockchain, so they have not yet transferred it to complete production.³⁶

As Blockchain technology largely enables fast, secure and cheap transfer of financial services, without intermediaries, almost eliminating any possibility of identity theft, Blockchain technology will greatly change banking. Just as the Internet has changed communication and media, so Blockchain will change banking, as current mutual financial services (transactions) are enabled at relatively low costs and fees.

ELECTRONIC SIGNATURE

Customers today require a faster service, suitable for them. Customers must have the ability to do banking transactions on a daily basis, as well as to open accounts, sign loans and much more, anywhere, anytime and on any device. Users today require a multi-channel experience, to start a transaction in one place with ease and flexibility and complete it in another. Based on all this, the result of the usual ways of signing forms and documents changes - from paper to paper. This requires electronic signatures.³⁷

Electronic signatures are an essential part of a company's digitalization strategy. There is a huge interest among financial institutions of all sizes in removing paper from business processes and digital use. Many financial market transaction organizations (commercial banks, credit unions, lenders) use electronic signatures for their financial services for various applications. As digitalization efforts mature, and financial institutions realize the benefits of user experience, compliance, efficiency, and cost savings, they are expanding beyond the original applications and look for ways to extend those benefits quickly to every business line, channel, and area of an organization.

With the introduction of electronic banking, banks have approached their customers by providing access to services through the Internet from locations that suit customers the best. However, any additional service would require some paper signing, that, at best, the bank would deliver to your home address. For instance, by applying an electronic signature, banks manage to eliminate paperwork from this procedure - no paper and no waiting for the courier involved, as everything is online.

The use of electronic signatures, especially digital signatures, helps to strengthen trust in a paperless environment where information, documents, financial transactions or personal data are all transmitted in a secure manner. However, this also includes potential risks, some of which are known and understandable, others being known but less understandable, and some are unknown.³⁸

ARTIFICIAL INTELLIGENCE AND ITS APPLICATION IN BANKING

Banks' digital branches are key changes in the interaction between the bank and their customers. today, this can be done through smart devices (tablets, smartphones, computers) on which all banking services are performed, and among other things, services that can have potential in advertising are provided.

The future is certainly the transition from traditional to digital banking, in long-term technologies, where the relationship between the client and the bank is, of course, still in focus. Banks' digital branches are based on new methods of communication, personal access, easier access to information and services, as well as attractive and interactive branches.

Increasingly, artificial intelligence is being used to automate banking services, improving user instructions and providing the necessary information without errors. The process of digitization goes in such a direction that everything is digitized, which can be digitized. But

36 Ibid, pp.161-162.

37 <https://www.onespan.com/products/esignature>, visited on 25.09.2020.

38 Kaličanin, Z., Dimić, M., Kaličanin, M., (2020), Stress tests in the function of risk assessment of credit placements in the banking sector in crisis conditions, *Ecologica*, Vol. 27, No. 97, p. 37-48.

certain crucial things cannot be digitized, those that are very important and necessary, such as emotions, creativity, imagination, ethics, empathy, intuition and trust, so algorithms can replace everything but things based on this.

Artificial intelligence will certainly be very important both in customer service and customer consultation fields. “Cognitive computing”, which is a mixture of robotics, artificial intelligence and working with a large amount of data, is used intensively in the world today. “Cognitive computing”, which is a mixture of robotics, artificial intelligence and working with a large amount of data, is used intensively in the world today. A platform is also being prepared for the use of cognitive automation that is more advanced than process robotics and will have the ability to work with unstructured data. As for banks, some of them have already created platforms such as “Chat Banking”, based on artificial intelligence, through which customers communicate with the bank via Facebook and Viber applications. “Chatbots” is the first step in the use of artificial intelligence in the banking sector. Its role is to ensure that banks respond quickly and efficiently to customer products and services inquiries.³⁹

The key is that the integration of artificial intelligence brings additional innovations, as well as financial operations speed and agility, but at the same time maintains trust as the basic postulate of banking.⁴⁰ The artificial intelligence goal lies in its application providing positive implications for the existing brand as well as reputation that the company has in the market, in order to increase business efficiency, with the focus being on applying the repetitive activities so that they become a routine, which helps bank employees to focus on more creative tasks, bringing individual value, for the benefit of the company in which they work.

ARTIFICIAL INTELLIGENCE ASW: MAXIMUS

Maximus is a system that learns from data and helps in creating business strategies and making decisions. Its main functions are alarm and anomaly detection, prediction, simulation and automation. The system analyzes historical data on the entire business of the company, both the numerical and the semi-structured and unstructured. During the analysis, in real time, the maximus observes data with a high level of accuracy, and in this data, patterns, associations, regularities and trends are being revealed. Maximus is based on the latest technologies in machine learning and neural networks and it represents a universal platform - a system that learns from data and relies on the asw: sapiens (BI) system and the ASW: dominus (ERP) system.

ASW maximus has machine learning and artificial intelligence models that run automatically and give a prediction of a given client metric. For instance: turnover, sales volume, price difference, etc. The result is an accurate prediction for the following year on a weekly or monthly basis. Predictions come from the level of an organizational unit, brand or a product group, all the way to the level of an individual item in one organizational unit. These models use historical business data, down to the level of an individual account, learning and taking into account all the hidden regularities its trends, in order to give accurate predictions. They are based on the latest artificial intelligence technologies such as neural networks and boosting algorithms.⁴¹

In essence, it is a DWH (Data Warehouse) with data analysis tools above it in which the reports necessary to manage the user’s business system are generated afterwards.

A few years ago, the whole world started talking about Big Data, and today, when we look at it, all ASW users have data that is exactly based of the Big Data model. For example, the domestic companies Štampa and Futura, which create a one business system, have 300 thousand accounts a day, and have been using ASW software for ten years, and with all of this in mind, you can easily calculate how big that set of data is. A cursory glance at the tables, intuition as well as many years of experience are not enough here, and without thorough data analysis there is no quality mechanism for making business decisions.

For more than two decades, ASW Engineering has been marketing its own products in the field of information technology and implementing complex projects to meet the diverse needs of users. Their 60 engineers along with the IT experts, develop modern and complete software

39 Bret King (2018), *Ibid.*, Pp.118-120.

40 Sikimić, U., Kaličanin, M., and Kaličanin, Z., (2019), Method of measuring the bank’s collateral position when approving placements, *Ekologika*, Vol. 26, No. 95, p. 409-414.

41 <https://asw.eu/proizvodi/asw-maximus>, visited on 26.09.2020.

solutions, and the company's activities include consulting and optimization of business process organization, with the aim of improving business and improving the client's business results.⁴²

CONCLUSION

Year after year, we see that the financial industry is witnessing the so-called "financial revolution". As we enter the age of digitalization, everyday business in the banking sector is becoming faster, cheaper and easier to use, so every bank strives to adapt its business to the needs of demanding customers.

The landscape of the traditional financial industry has been largely transformed by the emergence of information technologies such as cloud computing, big data, blockchains and artificial intelligence. Financial-technological interconnection has resulted in various new forms of financial services and products, such as digital banking, bitcoin, as well as a growing mobile payments sector.

The mobile wallet use awareness has been spread among people, and this has further encouraged the use of the mobile wallet. Security issues have been exacerbated and risk factors have been reduced, which, with the mobile wallet adoption, automatically increase. In addition to these benefits as well as the ease of use, it can be concluded that there will be a huge improvement in the mobile wallet adoption in the upcoming years.

Blockchain is a decentralized solution for transaction and data management, it's the technological weapon of choice behind the success of Bitcoin and other cryptocurrencies. As both the number and diversity of existing blockchain applications continue to increase, banks should focus on choosing the best support for their decentralized applications, rather than developing new ones. We can agree that the future of e-commerce lies in digital money and cryptocurrencies. Trading in bitcoin and other cryptocurrencies is not prohibited or strictly regulated by RS laws, but when exactly that will happen depends on the moment when banks and investment funds become interested in this payment method, i.e. when they see their chances at making a profit.

Banks have no choice, the digital environment has posed new challenges to which they must respond, and the situation has been further exacerbated by other organizations entry into banking. They have to face the digital structural change challenges and redesign their operational models. By strategically linking their business to the vast amount of data available to them, they can build an intelligence on the customers evolving needs, which can later lead to added value.

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