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THE IMPACT OF INDUSTRY 4.0 ON THE TRANSFORMATION OF THE BANKING SECTOR

UTICAJ INDUSTRIJE 4.0 NA TRANSFORMACIJU BANKARSKOG SEKTORA

Summary: Industry 4.0 or Digital Revolution is changing the way we live, changing interactions with clients and companies, which inevitably implies that both existing business methods and financial services are not exempt from this change. In the banking world, accelerated digitalization has made banks intensively re-examine traditional business models, which means that they have to respond quickly and efficiently to the demands of their clients while offering safe and simple services for use. Security and trust are still key determinants, and banks have developed innovative banking services and products over the past few years, including secured systems that reliably protect data and money of clients. However, just like any industrial revolution, both Industry 4.0 and its impact on the transformation of the banking sector carry with themselves both positive and negative consequences of this transformation. Digitalization of the banking sector is in full capacity, with the fact that this process also includes other component parts of the Industry 4.0, such as blockchain networks, artificial intelligence, IoT, biometrics, cooperation of banks with FinTech companies, preparation of the platform and other services for the Generation Z and other.

In this paper, we explore how increased competition, new legislation, and all the changes that came with digitalization, will affect the banking sector in the upcoming period, will the banking sector look significantly different in the upcoming years, and will, despite all technological changes, human factor, trust and security still be the key determinants.

Keywords: Digital Revolution, Industry 4.0, Digitalization, FinTech

JEL classification: L52, O32, O33

Rezime: Industrija 4.0, ili digitalna revolucija, mijenja način života kojim živimo, mijenja interakciju s klijentima i kompanijama, što neminovno podrazumijeva da i postojeći načini poslovanja i finansijskih usluga nisu izuzeti od ove promjene. U svijetu bankarstva, ubrzana digitalizacija učinila je da banke intenzivno preispituju tradicionalne modele poslovanja, što znači da moraju brzo i efikasno da odgovore na zahtjeve svojih klijenata, a da pri tome nude sigurne i jednostavne usluge za korištenje. Sigurnost i povjerenje su i dalje ključne odrednice, a banke su tokom posljednjih nekoliko godina razvile inovativne bankarske usluge i proizvode, uključujući i osigurane sisteme koji pouzdano štite podatke i novac klijenata. Međutim, kao i svaka industrijska revolucija, i industrija 4.0 i njen uticaj na transformaciju bankarskog sektora sa sobom nosi kako pozitivne, tako i negativne posljedice ove transformacije. Digitalizacija bankarskog sektora je u punom kapacitetu, s tim što se u ovaj proces uključuju i ostali sastavni dijelovi industrije 4.0 kao što su blockchain mreže, vještačka inteligencija, IoT, biometrija, saradnja banaka sa FinTech kompanijama, priprema platforme i daljih usluga za generaciju Z i ostalo.

U ovom radu istražujemo kako će pojačana konkurencija, nova zakonska regulativa i sve promjene koje donosi digitalizacija uticati na bankarski sektor u narednom periodu, da li će bankarski sektor izgledati znatno drugačije u godinama koje dolaze i hoće li, i pored svih tehnoloških promjena, i dalje

Ključne riječi: Digitalna revolucija, industrija 4.0., Digitalizacija, FinTech

JEL kalsifikacija: L52, O32, O33

INTRODUCTION

In the past three centuries civilization has gone through three industrial revolutions, while according to the opinion of the world's leading economists, the fourth industrial revolution is ongoing or as it is also popularly called the Industry 4.0. Each of these industrial revolutions was characterized by technological innovations that had a key impact on the development of the entire mankind. What is characteristic for the Industry 4.0 is that it already in different ways affects all business activities, while simultaneously developing digital and other technologies, but also affecting the entire lifestyle in the world. After the process of globalization and the connection of the world into one global market, which resulted in an unobstructed expansion of business, a new era began, which can be called the age of digital transformation. The basic characteristic of the new, digital age is that it takes new dimensions and new forms, from one day to another. Although, by their structure, form of business and other characteristics, banks are less likely to accept changes, yet they have largely adjusted their business to changes in the business environment and, consequently, adopted and applied certain processes imposed by the digitalization process. The continuous process of creating new banking products and services which are directly linked to the digitalization process, is a clear sign that the banking sector has seriously understood the upcoming changes, which certainly result in the creation of a competitive advantage and a better position on the market. Of course, big competition on the market, the emergence of various services offered in parallel with banking services; demonstrate market overload and certainly it presents the biggest challenge for banks in the upcoming period. It should be especially borne in mind that in this situation, banks are not just competition one

to another, but also high tech companies dealing with similar services that have emerged in the last few years and started offering this kind of service are also competition to them. These companies have their own payment systems and customer databases, which results in a deduction of part of the banks' profit. All this clearly means that banks have to work intensively on innovations in the banking field and develop new business strategies and models that will be adapted to new demands on the market. Certainly, in addition to the activities related to the introduction of new services, as well as their adjustment to the market, the focus must still be on the client of the bank i.e. banks must pay attention to the optimum quality of services that will satisfy existing clients and also attract new clients to the bank. It is very important that the transformation process of banking services is accompanied by continuous listening to the market and clients' needs, since it should not be forgotten that all banks have and will have traditional customers in the future, who will certainly use the standard banking services, as well as clients who certainly will not use digital banking services in a certain period of time. Because all of this, the banks will have to seek the optimal measure in transforming their business units and introducing digital bank branches that would completely replace human resources. Essentially, the process of digitalization in the banking sector is, besides the great advantages for banks and their clients, also bringing with it certain challenges that banks need to take care of. The research "A Brave New World for Global Banking" says that banks in Europe are at risk of loss which can be almost a third of their profit. The next, even more rigorous phase of digital transformation will further reduce the banks' profit in the upcoming years, which will be a consequence of even greater competition



and the continuation of the decline in banks' margins. Banks, in all of this, are trying to compete with the introduction of innovative services, available through mobile devices, however, in this, a lot of their revenues are taken by small digital marketing companies that are increasingly involved in work that was reserved only for commercial banks until yesterday. If banks plan to position themselves on the market in an adequate way and adapt

to new changes, it will be necessary to quickly change their business models they work on, by transforming themselves from exclusively financial institutions into institutions whose platform will be based on data analysis and offer of appropriate products and services with which they will compete on the market, as well as by opening up greater opportunities for cooperation with Fin-Tech companies.

1. INDUSTRY 4.0 AND DIGITAL ECONOMY

Industry 4.0 or so called the fourth industrial revolution i.e. the digitalization of industry has been a key topic for several years, where people are trying to find the answers to how the economies can be more competitive on global markets. *Klaus Schwab, the Founder and Chairman of the Davos Forum, deals with this issue in the book "The Fourth Industrial Revolution"*, in which he analyzes the consequences of development that is different from everything that has ever happened to the mankind (Schwab, 2018). However, one should think well about the consequences of the fourth industrial revolution because, according to the conducted surveys, the use of digitalisation in industry of the modern countries could result in the loss of a significant number of jobs in the upcoming period. What does Industry 4.0 actually mean?

The essence of Industry 4.0 is in the new approach i.e. networking of smart digital devices with products, tools, robots and people, while its primary goal is smart factories that are flexible and that efficiently integrate clients and business partners into a unique process. This would increase productivity and efficiency and thereby ensure competitiveness on the global market. One of the interesting features of this revolution is that it is scheduled in advance i.e. out of necessity due to the

crisis, the recession and the slowdown in economic activity that made the leading European Union states look for an answer how can their economies strengthen the global competitiveness. Action Plan 4.0 of the Industrial Revolution is composed of four directions:

- to enable all industrial companies, especially small and medium-sized companies, to have easier access to digital infrastructure and taking over the innovation;
- to enable the automotive and aviation industry to take over the leadership over the digital industry;
- training of the labour force, with the promotion of digital skills, education and training;
- adoption of adequate regulatory solutions that will arrange security and accountability as a basis for further digitalization process.

The digitalisation process itself essentially involves the conversion of analogue to digital form, without losing information in this transformation, and thus facilitates faster flow, information exchange and better information of all participants.

The first association when it comes to digital economy is the economy of Internet business, e-commerce, e-banking and other services offered on a daily basis, however digital economy is a much

wider concept than that. Digital economy represents an economy based on digital technologies, primarily through the use of information technologies in all areas of the economy, including internal and external activities between business entities and individuals.

It is also possible to find definitions that treat the digital economy as a new, post-industrial, global economy, based on Internet transactions and advanced technology i.e. as a global network of economic activities based on information communication technology, or more simply, as an economy based on digital technology (TechTarget, 2018). Essentially, digital economy is an economy based on information,

knowledge, ideas and innovations. According to certain information, it is estimated that the digital economy is growing seven times faster than other economies and that in developed countries it makes 10% of gross domestic product, which means that digital economy is in constant growth and it is certain that modules of classical economic business will increasingly move towards digital form.

According to researches conducted by the *European Banking Federation (EBF, 2018)*, a Digital Single Market is expected to boost the development of companies operating in this system and to serve for the well-being of all clients, further economic growth and further employment.

And the Industrial Revolution (the second half of the 18th century and the first half of the 19th century)	
technological changes	the emergence of steam engines, the development of rail transport
economic changes	the transition from manual to mechanical and industrial production, the development of the textile industry and the abandonment of villages and agriculture and the movement of population into urban centers
II Industrial revolution (second half of the nineteenth and early twentieth centuries)	
technological changes	the emergence of electricity and machines based on electric power
economic changes	mass production and line production lines
III Industrial Revolution (from 1960 to 1995)	
technological changes	computer revolution, mainframe computers (1960), microprocessors and personal computers (1970-80)
economic changes	computerized production and massive use of computers in all processes and private lives
IV Industrial Revolution (1995 - the first decade of the 21st century) - digital smart revolution	
technological changes	Internet expansion, smart devices, social networks, artificial intelligence, IoT, neurotechnology, 3D printers
economic changes	network - digital economy, virtual products, etc., information as a key economic resource and source of growth, the economy of the platform and free stuff

Table 1. Technological and economic changes marked by industrial revolution so far

Source: Lazarević & Đuričković, T. Digitalna ekonomija, 2018, p. 27.

As seen from the review, previous industrial revolutions, in addition to technological changes, caused changes in the economy and in the entire society. However, economic science, although it developed like any other science, did not change its postulates based on industrial production i.e. economy, with technological revolutions. The fourth industrial revolution brought fundamental and essential changes and resulted in a completely new economy - the digital economy (Lazarević, Đuričković 2018, 27).

The essential question is what constitutes the digital economy in the structural terms and in terms of statistical and economic coverage. In this respect, it is grateful to begin with the definition given by *Thomas Mesenbourg* as well as from the understanding of the digital economy, as defined by the *OECD* in 2012. *Mesenbourg* recognizes three main components of the digital economy (Lazarević, Đuričković 2018, 27), as follows:

- e-business infrastructure (hardware, software, telecoms, networks, human capital, etc.);
- e-business (the focus is on how business is realized / conducted, that is, any process that an organization conducts over computer-mediated networks);
- e-commerce (transfer of goods, for example when a book is sold online).

The *OECD* under the digital economy implies "an umbrella term used to describe markets that focus on digital technologies. It involves the trade of information goods or services through electronic commerce. It operates on a layered basis, with separate segments for data transportation and applications (Tojo, 2018).

STARTER: TECHNOLOGY AND INNOVATION		
Position /100	Country / Economy	The result 0 - 10 (the best)
1	United States	8,5
2	United Kingdom	8,0
3	Switzerland	7,9
4	Netherlands	7,7
5	Finland	7,4
6	Singapore	7,4
7	Sweden	7,3
8	Germany	7,2
9	Hong Kong SAR	7,1
10	Canada	7,1

Table 2. Countries at the top of the scale for technology and innovation

Source: Readiness for the Future of Production Report 2018. World economic Forum. www.weforum.org, 2018.

The role of banks in this transformation is that they are not only innovative partners who invest in innovative financial technologies, but contribute to economic growth and development in the overall financial market.

Table 2 shows that a certain number of countries have achieved a high level of technology and innovation. This primarily includes countries that are technological leaders in the world, as well as drivers of new ideas and innovative solutions.

STARTER: TECHNOLOGY AND INNOVATION		
Position /100	Country / Economy	te result 0 - 10 (the best)
91	Paraguay	3,1
92	Algeria	3,0
93	Mongolia	3,0
94	Guatemala	2,9
95	Tanzania	2,8
96	Honduras	2,7
97	Zambia	2,7
98	El Salvador	2,6

Table 3. Countries at the top of the scale for technology and innovation

Source: Readiness for the Future of Production Report 2018. World economic Forum. www.weforum.org, 2018.

As it is evident that a large number of countries have made great progress in the level of technology and innovation, however, on the other hand there are those countries that are still stagnating and do not show any progress in technology development and innovative solutions. In principle, these are countries that are burdened with a number of problems such as: low living standards, insufficiently developed infrastructure, poverty and other problems (Table 3).



Chart 1. Phases in the E-Readiness Process

Source: GeoSINC International (2002). e-Readiness Guide. How to develop and Implement a National e-readiness action Plan Developing Countries Washington, DC: infodev-The WorldBank

According to the strategic e-readiness framework proposed by *Geo SYNC International Group*, the complete e-readiness process can be implemented in three stages:

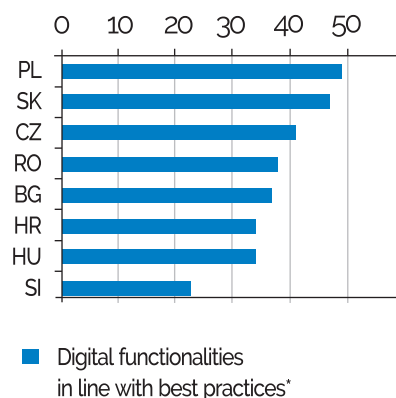
- Stage I - estimation
- Stage II - development of strategy and preparation of action plan
- Stage III - implementation of the action plan.

The strategic framework for assessing e-readiness and its implementation varies from country to country, with only one segment or one area insufficient to make its full contribution in terms of investing, accepting and using this framework.

2. INDUSTRY 4.0 IMPACT ON TRANSFORMATION OF THE BANKING SECTOR

The process of banking digitalization in the past few years, from the terms discussed only in the context of the upcoming changes, has become an integral part of the strategic plans and decisions for majority of banks. The reasons for this are surely in the fact that there has been an accelerated progress in digital technologies, which inevitably led to an increase in competition in the field of financial services. Another reason for such change in banks lies in the fact that the regulatory changes happened, that came into force in 2018, and they are primarily related to the *PSD 2 Directive* (Donnelly, 2016, pp. 827-839).

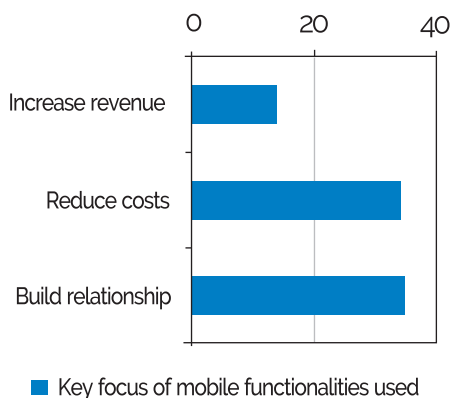
According to the study conducted by the Central Europe Deloitte Team, called “*Digital Banking Maturity 2018*”, which aimed at showing a real and comprehensive picture of digitalization in the EMEA area, some data were found showing the current situation in banks when it comes to the digitalization process. Given that all banks are striving to adopt new technologies as soon as possible and to introduce new digital products, in the overall competition there is a competition between them and market game in which everyone claims to be leaders in this field. The study was conducted in 248 financial institutions in 38 countries, and their performance was measured through three critical areas: functionalities benchmark, the importance of activity for client and mobile user experience of the client.



Graph 1. Market and the level of digital maturity

Source: Deloitte CE Digital Maturity study November 2016 <https://www2.deloitte.com/content/dam/Deloitte/global/Documents/About-Deloitte/central-europe/ce-digital-banking-maturity-study-emea.pdf>

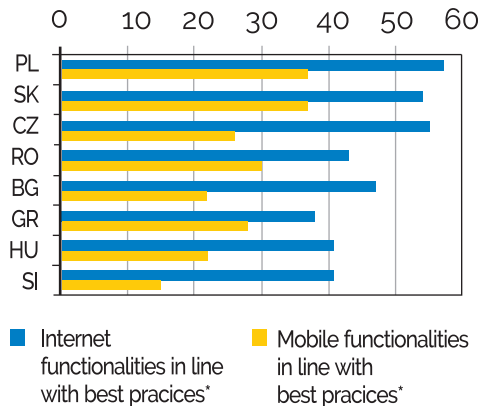
Graph 1 shows that the countries leading in the digital maturity are Poland, Slovakia and the Czech Republic belong to the group of "Digital Champions"; while countries such as Hungary, Romania, Serbia and Croatia belong to the "Digital Adopters" group, introduce new technologies into banking operations.



Graph 2 Focus digital functionalities

Source: Deloitte CE Digital Maturity study November. 2016. <https://www2.deloitte.com/content/dam/Deloitte/global/Documents/About-Deloitte/central-europe/ce-digital-banking-maturity-study-emea.pdf>

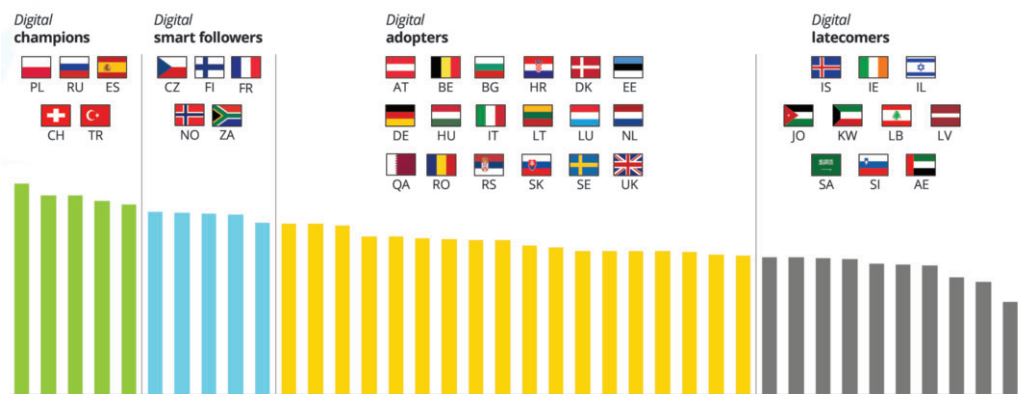
From Graph 2 it is visible that the focus of digital functionalities is referring to the increase in revenues, the reduction of costs and, above all, the development of mutual links.



Graph 3. Internet and mobile maturity

Source: Deloitte CE Digital Maturity study November. 2016. <https://www2.deloitte.com/content/dam/Deloitte/global/Documents/About-Deloitte/central-europe/ce-digital-banking-maturity-study-emea.pdf>

It is evident from the review that when it comes to digital maturity about the scope of mobile and Internet services, it is mostly represented in Poland, Slovakia and the Czech Republic.

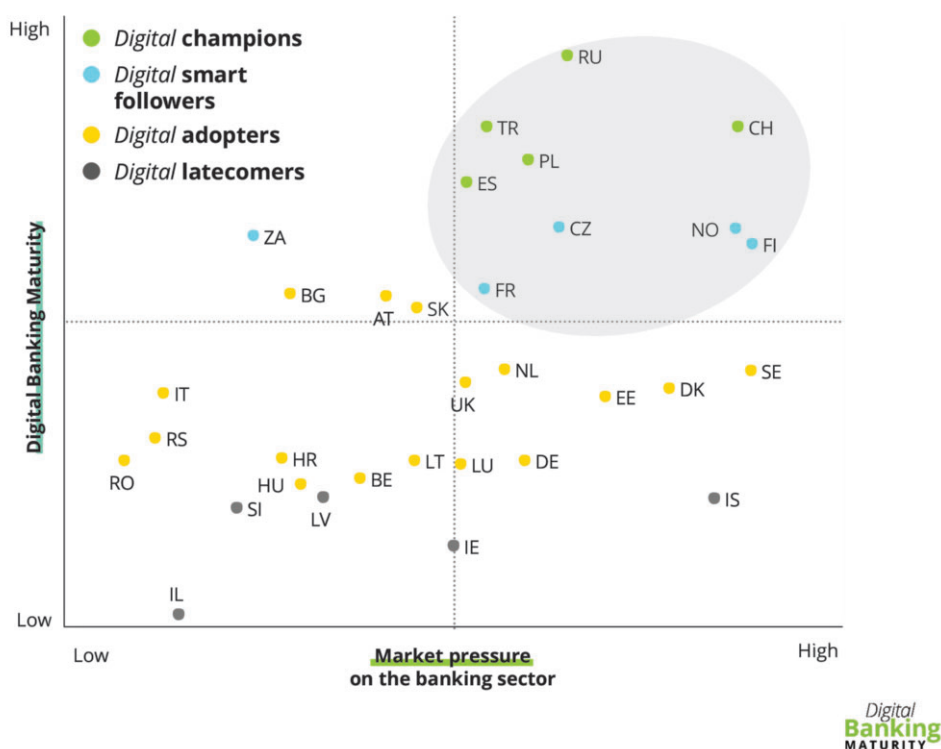


Graph 4. Stages in the digitalization of the banking market

Source: Digital Banking Maturity Study EMEA – Deloitte. 2016. <https://www2.deloitte.com/content/dam/Deloitte/global/Documents/About-Deloitte/central-europe/ce-digital-banking-maturity-study-emea.pdf> p. 9.

Graph 4 shows the stages in the digitalization of the banking market in the countries that participated in the study. It is visible that the leaders ("Digital Champions") are Poland, Russia, Spain, Switzerland and Turkey, while Serbia and Croatia belong to the category "Digital Adopters". This clearly shows that in our region there is still room for significant improvements of this process, as well as the possibility of creating a further plat-

form for the digitalization of banking services in the upcoming period. Adoption of new business philosophies of banks is a precondition for further continuation of the digitalization process, which for the ultimate goal has strengthening the market position, increase the income of banks, as well as transfer to higher levels of digital maturity i.e. to the level of "Digital Smart Followers" and "Digital Champions"



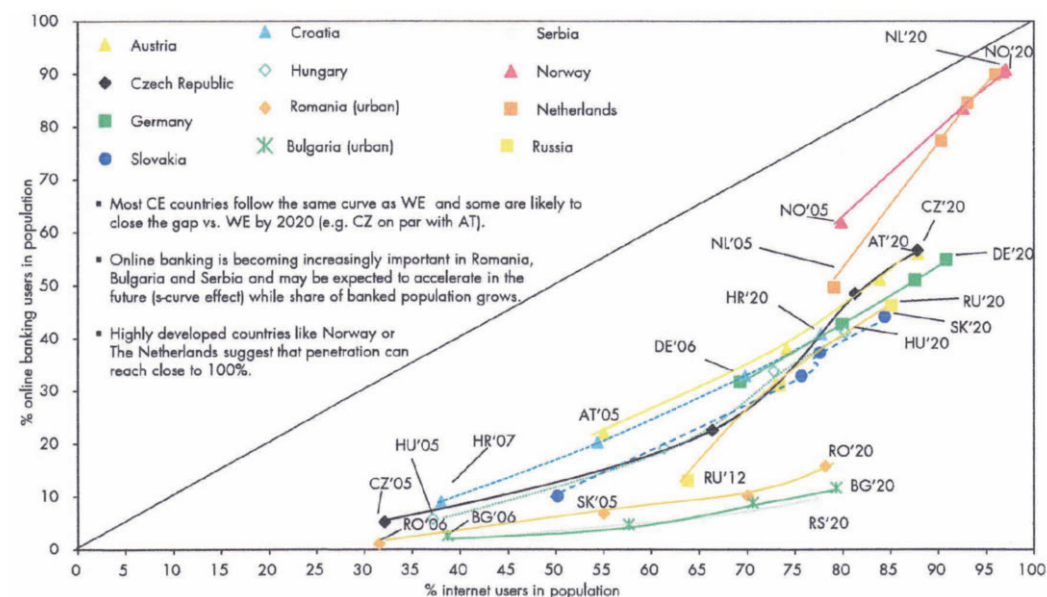
Graph 5. Digital maturity of the market in line with market pressures

Source: Digital Banking Maturity Study EMEA – Deloitte. 2018.

<https://www2.deloitte.com/content/dam/Deloitte/global/Documents/About-Deloitte/central-europe/ce-digital-banking-maturity-study-emea.pdf> p. 10.

The results of the study showed that the category of banks that reached the highest level of digitalization of services include banks with the following characteristics:

- banks that provide a wide range of services to their clients;
- banks that fulfil or exceed clients' expectations;
- banks that provide a modern and intuitive mobile experience of service users.



* typically in 5 year steps 2005/2010/2015/2020 (subject to data availability); Source: Correlation of data sources from Eurostat, eMarketer, Statista

Graph 6. Internet penetration and use of online banking

Source: Digital Banking Maturity Study EMEA – Deloitte. 2016.

<https://www2.deloitte.com/content/dam/Deloitte/global/Documents/About-Deloitte/central-europe/ce-digital-banking-maturity-study-emea.pdf> p. 11.

3. DIGITALIZATION PROCESS IN BANKING

The banking digitalization process inevitably brings with itself new elements and possibilities for expanding new banking services, and in line with that, new opportunities for increasing the key performances of the business, especially the profitability of the bank. One of the basic oppor-

tunities for improving business results is reflected in the technological possibility for better interaction with the bank's clients, as well as a more detailed and precise insight into their needs, habits and possibilities.

Digital transformation in essence implies a

way of business operations that relates to the change of internal and external strategies. With the assistance of these strategies, the use of modern technologies will provide more efficient work of employees and even better quality relations with clients. An essential transformation will only happen if all resources are used to implement new strategies.

Banks of the future will certainly be efficient, modern and with technologically equipped bank branches with no long queues and services will be provided through appropriate self-service machines and computers that will focus on clients, which is the main goal of the bank.

The basic goals that banks need to implement in the future through the process of digital transformation are to adapt the services and ways of servicing with new ways of business operations, the introduction of services based on personal experience, as well as the application of the concept of ethical banking.

3.1. Digital Bank of the future and the use of artificial intelligence

The key change concerning the digital bank branches is in interactions i.e. in relation between the bank and clients. Today it is enabled through various tablets and computers where all banking services can be performed, which can also serve as advertising boards at the same time.

In addition to this, another keyword for digital bank branch, in addition to interactions, is the word of innovation i.e. a continuous process of innovation that besides services offer other activities in the digital bank branch. Other services may include a part of bank branch for reading newspapers and free use of the Internet, presentation of local exhibitions, cooperation with insurance companies, etc. The digital bank branch of the future must offer to its clients an attractive and mod-

ern banking environment based on interactions and innovation that will offer clients a proactive and quick access to the information they need (The Banker, 2018, p. 21).

The future of banking is definitely in digital technologies, but only the transition from traditional banking to digital banking will be enabled, but of course, the client and the bank relation will continue to be in the focus. In addition, digital bank branches will certainly be based on new methods of communication, personal access, easier access to information and services, and attractive and interactive branches.

Banks that will respect these principles will surely have a comparative advantage and will surely have greater customer satisfaction, organic business growth and recognition on the banking market. One of the most frequently mentioned topics lately is the role and the notion of artificial intelligence, and it is well known that the data we possess are the engine nowadays, and that artificial intelligence is synonym with the new power of modern times.

In addition to improving user manuals and providing quick information, without error, artificial intelligence can also be used to automate processes at the bank. Essentially, the digitalization process is heading in the direction where everything that can be digitalized will be digitalized. However, we should not forget that the key thing is trust that can not be digitalized, so that everything that can not be digitalized will become very important and required, which are certainly emotions, creativity, imagination, ethics, empathy, intuition and trust, so that algorithms can replace everything except what is based on this. When it comes to banks, some banks have already created a "Chat Banking" platforms based on artificial intelligence, through which clients communicate with the bank through Facebook and Viber applications. "Chatbots" are the first steps in the use of artificial intelligence in the banking sector. Their

role is in that banks quickly and efficiently respond to customers' inquiries about products and services. Artificial intelligence will certainly be very significant both in the area of servicing the customer and in the area of consulting the customer. "Cognitive Computing", which is a mix of robotics, artificial intelligence and work with a large amount of data, is intensively used today in the world. There is also a platform being prepared for the use of cognitive automatization that is more advanced than the robotics of the process and will be able to work with unstructured data.

The key is that the integration of artificial intelligence brings added innovation, speed and agility of financial operations, but at the same time to maintain trust as the basic postulate of banking operations.

The goal of artificial intelligence is that its application provides positive implications for the existing brand and reputation that the company has on the market, to increase business efficiency, but in a way that it is directed and applied to repetitive activities, and become routine, so that employees can be focused on more creative work that brings added value both individually and for the company in which they work.

3.2. GAFA

GAFA (Google, Amazon, Facebook and Apple) in the future represent the biggest competition for banks in the part of providing payment services. The question arises whether, by applying the new PSD 2 Directive, these companies will take part of the earnings from banks and to what extent they will take over their business.

According to certain surveys, it is expected that these companies can take part of the earnings from banks. First of all, the revised PSD 2 Directive on Payment Services enables third parties to provide financial services, whether they are fintech companies or gigantic such as Google, Apple,

Facebook and Amazon. GAFA (Google, Apple, Facebook, Amazon) are currently working to create their own mobile payment system, within their platforms. Instagram, along with Facebook, is trying to install payments within its platform, while Amazon is looking for a partner bank, and Google has TEZ India and the new Google Pay Wallet in the United Kingdom and the United States. The fact is that four banks already (Erste Group, Bank of Montreal, Caixa and Commerzbank) joined the initiative that UBS and IBM companies launched in 2016 to build a new world trade platform based on blockchain technology. The new platform, called "Batavia," was created to provide open access to organizations of all sizes anywhere in the world, and can support trade finance in transactions across all modes of trade, whether goods is transported by air, land or sea.

Platform Batavia's goal is to eliminate the necessity for handling and comparing documents, allowing buyers, sellers and their banks to execute transactions with a high level of efficiency and transparency.

Bearing in mind that blockchain technologies require the participation of IT companies in its development and implementation, it is absolutely expected that they take part of the "transactional banking" earnings, and taking into account the fact the blockchain technology characteristics, that is, a blockchain computer file consisting of data blocks which are interconnected, it is logical that its development and application can not bypass large IT companies, and, in line with that, take part of their profits.

Although the results so far are disputable, the potential of technological giants to take a large part of the global banking market remains big. There is no bank in the world that can say that just as Facebook it has 1.5 billion users actively using their services, while at the same time there is no such bank in America with a market share of 70%



just as Amazon with its Prime brand. According to the global survey of Ernst & Young, more than 50% of respondents said they would have no problem in the future to direct banking operations to some technological giant, but the question remains whether this potential will be realized.

Nevertheless, what should not be ignored is that the main postulate of banking operation is the word "trust". Whether technological giants will retain the trust they currently have is questionable, because bankers know best how trust is difficult to obtain and can easily be lost.

3.3. Blockchain technology and cryptocurrencies

One of the trends that is characteristic for digitalization of banking is certainly the appearance of blockchain technologies and it is related to the appearance of cryptocurrencies. The appearance of digital money i.e. cryptocurrencies is an inevitable consequence of Industry 4.0 revolution and digital economy. A lot of cryptocurrencies appeared, with only some of them experiencing popularity and full affirmation. One of the most famous cryptocurrencies is certainly Bitcoin, which has been popular in the last few years. The basic characteristic of this type of money is that it functions completely independently from monetary authorities and from the amount of traditional money in circulation. Historically, Bitcoin has gained its full affirmation in the last few years, primarily thanks to the growth of its value (the value of bitcoin rose to \$ 17,000 in just one year). Bitcoin was created as a prize for participants who worked on certain social projects and received awards in the form of cryptocurrencies for their work. Relations between participants and their

contribution to the system function on the "peer to peer / P2P" principle).¹

Blockchain can have impact on business in the same way that the Internet has influenced communications, because these networks are changing completely the way how things are done and they are part of the digital technologies that transform all sectors. Different banks got involved and joined specialized companies engaged in these businesses, and in this way platforms for digital financing of trade based on blockchain technology are jointly developed. In addition, such institutions enable, besides banks, also other companies and specialized institutions to have simpler financing and trading processes, thus reducing the risk of failure to fulfil obligations. The advantage is that they can negotiate and fulfil orders, negotiate the terms of trade agreements and access to financial services offered on the platform with complete security and trust. The situation on the world's market is such that companies are still experimenting with blockchain, so they have not yet transferred it to complete production.

Blockchain technology will change banking to a great extent, because it enables quick, secure, and cheap transfer of fast shipments, without intermediaries, and it almost excludes the possibility of hacking. Blockchain will change banking, just as the Internet has changed communications and the media, because blockchain allows everyone to send money almost immediately and with relatively low costs (fees).

Many banks have already started introducing blockchain technology in some areas of their business. Several large central banks are among them, such as the Central Banks of Russia, the Netherlands and Canada. After the initial projects, the conclusion was made that the new technology,

¹ P2P (peer to peer) - applications that share tasks and work between equal participants in the process

besides its advantages, has certain shortcomings. The mentioned banks have raised the question whether the blockchain can respond to their needs and can it really increase efficiency and reduce costs? It turned out that technology is on the right track, but there are still shortcomings that are typical for developing technologies. One of the main objections relates to the speed of transactions when they are executed in real volume i.e. in everyday business. A significant element of the blockchain that brought a revolution in its application is the fact that the need for any trust between the parties involved in the transaction is abolished. It is not even necessary to trust a third party that guarantees the reliability of transactions. Instead of trust, the role was taken over by cryptography.

The SWIFT system currently in use for financial transactions is still dominant and it manages to carry out a huge number of transactions with high reliability, but one should have in mind that SWIFT is actually the product of the same private company.

- The benefits that can be gained by the use of blockchain technology are multiple, precisely because:
- Blockchain can be used for anything that implies and requires a transaction, to record these transactions in a safe way;
- The concept of blockchain technology was created with the idea of bringing a revolution not only to the financial industry, but also to many aspects of business, management, and even in our everyday lives, which includes:
- Enabling smart contracts, digital identification and signature systems, patents, distribution of energy produced at the local level, greater transparency in charity organizations, trade in real estate and much more;
- Keeping of government records such as wedding papers, business registrations,

medical documents, and similar. Governments of countries such as South Korea, Estonia or the United Arab Emirates (specifically the City of Dubai) have already introduced these concepts;

- Tracking the overall movement of all types of goods - from food to diamonds - as long as the goods is going through the chain of trade, starting from the manufacturer, through the distributor, to the buyer. Many reputable companies already use blockchain technology to ensure that products in their retail chain come from the right sources;
- Verification and monitoring of ownership over intellectual property rights, from recording and monitoring intellectual property rights for musicians to the photography rights.

3.4. New legal directive – PSD 2

The application of new legislation i.e. the PSD 2 Directive will mark the end of the "silent war" between traditional banks and financial and technology companies, united by FinTech, and it is likely to receive an epilogue this year and the next year when the application of this Directive comes into force in the European Union. The Payment Services Directive (PSD), drastically liberalizes the market of financial services in the European Union and forces banks to develop their own responses to the threat of new competition or have the opportunity to cooperate with it. The Directive came into force in January 2018, but in this year it should become fully operational, and its goal is primarily to introduce the European payment system into a new digital age, to offer users of services more options and lower prices, and to make the entire system more transparent.

Essentially, key element of the new rules refers to the obligation of banks to provide access to



their customer data, which means that companies like Amazon, for example, will be able to use customer accounts data, of course with their permission, thus completely bypassing the banks. In this way, large technology companies such as Amazon, Google, Alibaba and others, will be able to provide direct banking services to their customers in a simple and fast manner, without intermediaries, which makes it clear why this legal Directive is important in the financial sector that functions on the principle of remuneration of services.

On the other hand, a market game and a diverse range of services can certainly lead to a reduction in fees, which automatically does not mean that banks' income must be reduced, if banks adjust and offer some new products. This is the main goal of the PSD 2 Directive, which will allow other market participants to enter the payment segment, which on the other hand conditions banks to intensively enrich and offer new services to their customers.

New legislations regulating the digitalization of banking services, primarily the PSD 2 Directive, introduce payment services and new service providers, introduces information services about accounts and payment initiation services. Payment service providers commit themselves to the application of secure and open standards of communication and reliable authentication of clients. In addition, new requirements for the security of electronic payments and customer service protection are being implemented, and the services of information about accounts and payment initiation are introduced, and they will be available to users through existing and new service providers.

From a security point of view, the PSD 2 Directive obliges payment service providers to apply open standards of communication, in particular

when a user of the service accesses his/her payment account on the Internet, initiates an electronic payment transaction, or performs any action at a distance that may imply the risk of fraud associated with payment or other form of abuse.

Qualified certificate for electronic stamp is used to provide solid proof of authenticity and integrity of the transaction, which proves that the transaction was sent by a legal entity whose identification data is entered in the certificate.

In 2019, when the PSD 2 Directive comes into force in full capacity, all certification institutions will be able to access the data of bank clients through standardized API standards², of course, with their consent, with the fact that the same applies vice versa i.e. all banks will have access to the clients of the company, with their consent.

3.5. Financial literacy

By its definition, financial literacy represents the ability to use the knowledge and skills necessary for the useful management of human resources for achieving financial benefits, while financial education is a process by which people improve their understanding of financial products and services, so that they are able to make the best business decisions through the information.

Financial literacy and its significance for citizens, financial institutions and society as a whole are certainly one of the most important preconditions for a successful process of digitization of the banking sector and the financial industry as a whole. Low level of financial literacy and insufficiently organized institutional framework can create many problems for individuals and financial institutions as a whole.

² API standard - Application Programming Interface, a set of functions and procedures that allow the creation of applications that access the data of an operating system, application, or service

Managing personal and business finance is becoming more and more challenging for both individuals and companies. We can say that financial resources, like all other resources, certainly exist in the limited scope. To what extent companies and individuals will be aware of the resource limitations, will depend on the knowledge and resources they manage and how they are managed.

In the time to come, the full application of industry 4.0, the digitization of all areas of life, especially the intensive digitalization of financial services, leads to the inevitability of greater financial literacy in all categories of society. In developed countries, special attention is paid to financial literacy, which is implemented through various areas and aims to make it easier and quicker to understand the changes that are coming.

The fourth industrial revolution requires the involvement of all market participants, as well as the mobilization of all people who have shown talent and knowledge for the future, with the need for maximum state support in order to maximize their potential. Support must be institutional, through investment in education, science, research and digitization, and financial. Financial literacy, as an integral part of this process, is very important for the benefit of the society as a whole, because making good financial decisions leads to the prosperity of the company, but also to greater sustainability of business, where the focus of learning activities is shifting from memorizing to developing creativity, innovation, and analytical thinking, all of which directly affect the level of education at the level of the whole country.

If we observe the market of Bosnia and Herzegovina, we can speak of the insufficient level of financial literacy because, in addition to the population, most managers and owners of small and medium-sized enterprises have insufficient level of knowledge of the financial and ability to read and analyze financial reports. What is worry-

ing is that the strategy of raising the level of financial literacy has not yet been defined precisely, so Bosnia and Herzegovina is the country that at least makes up the level of financial awareness and financial literacy of citizens in relation to its environment. If it is unable to adopt a national strategy for raising the level of financial literacy, in Bosnia and Herzegovina it would be necessary to use the existing institutional capacities to increase the level of literacy of all structures and groups of the population.

3.6. Security, advantages and disadvantages of the digitization process in banks

Cyber Risks (cybercrime, leak of information, technical failures associated with IT technology) are the biggest concerns of companies in the world, as well as innovative banks that focus on digitalisation of services.

Regarding European regulations, in order to make electronic payments more secure, PSD2 introduces improved insurance measures that must be implemented by all payment service providers, including banks. EBA (European Banking Authority) will develop comprehensive safety standards in this respect.

Regarding domestic regulations, regulatory authorities, within the activities of preserving and maintaining financial stability, identify potential risks that could endanger financial stability and contribute to raising awareness among potential stakeholders of potential risks. In this sense, the regulatory authorities have certainly identified new information and technological risks due to innovations and digitalisation of financial services, and recommend increasing the resilience of information systems by introducing the latest protection measures and adopting appropriate procedures.



The security environment brings new challenges, threats and developmental chances for a collective solution to the problems IT industry faces.

The demands of different users of banking services and new clients are reduced essentially to the demands of different generations of users. Regardless of the conviction that the largest users of digital services of the younger generation, so-called With the generation, which grew up in the era of the digital age, it is interesting that research has shown that older generations quickly adopted and mastered digital methods of communication and digital business. Different client groups have noticed the great advantages of digitizing services, and the advantage of the banks that introduce these services is as follows:

- more efficient business models;
- reduction of operational costs in banks;
- conquering new client segments;
- cheaper customer transactions;
- rate of transactions;
- penetration into new markets;
- offer new services on the market;
- increased income of banks;
- tracking trends in other areas of business;
- contribution to better internal organization of the bank and external to clients.

However, regardless of the adoption of new products and services by different groups of clients, however, digitization of banking brings with it certain deficiencies that we must count on:

- transition from traditional to digital banking;
- dismissal of the labor force in the banking sector;
- closing bank branches;
- loss of traditional clients.

Analyzing the current trends in the development of digitalisation of banking services, it is evi-

dent that banks will have to change their business models and adjust them or accelerate changes in the market or make an alliance with big technology companies, as well as smaller companies that have complementary solutions like those of banks. In addition, banks will have to act proactively towards regulatory authorities and reduce their operating costs so that they can play a market game. From an organizational point of view, all future changes will be based on the technologies and capabilities of banks to quickly master new methods of processing ever-increasing amounts of data. Many banks become partners with FinTech companies and have joint investments in technological projects.

It is important to note that in parallel with the digitization process, it is necessary and adequately regulate the financial framework in order to eliminate or mitigate systemic risks. First of all, it is necessary to protect clients and their data in the digital economy, to harmonize companies that deal with similar businesses and to apply the same rules to all market participants. This implies that it is necessary to find the appropriate balance between competition, innovation, security and client protection. It is strategically important that the impact of industry 4.0 on the transformation of the banking sector must not jeopardize security at the expense of competition and innovation. From all of the foregoing, it is clear that industry 4.0 has a major influence on the transformation of the banking sector, with strict regard to certain constraints and the legal framework that would prevent any possible negative consequences of this process. Banking of the future will certainly be marked by a further process of digitizing banking products and services, which means that banks that want to participate in a market game must invest in new technologies, which will certainly mean additional revenues they can count on, but also the costs of additional investments at this stage of the bank's transformation. This is certainly

an unused part of banking that can enable banks to position themselves on the market in time.

In the period ahead, one of the biggest changes expected in digital banking is that the PSD2 directive will significantly change the dynamics of competitiveness in many markets.

By deleting the borders, and enabling banks, but at the same time to FinTech companies, to compete for users in the market, PSD2 certainly creates a positive business environment for most digital mature banks. All these banks will be ready to meet the challenges ahead of them because they have invested in digital innovation and infrastructure on time. In this way, they also take over the role, and therefore the income of banks that have not adapted themselves in time to market conditions. In the coming years there will certainly be a trend of "open banking", especially after the introduction of new regulations, PSD2, which certainly sets the foundations in the open banking ecosystem, with the further development of products and services of banks that will be based on this platform, as well as offering innovative services and solutions from FinTech intermediaries.

The financial sector will develop towards open financial services, which will further affect banks and other participants in the financial industry to further customize their business and services. Of course, blockchain and artificial intelligence will have a big impact in the transformation of the financial sector, which will result in further reduction in business process costs, improved personalization of services, greater security of business and a new combination of products from different manufacturers. The application of these technologies can result in a large loss of bank profits, as well as the possibility for banks to introduce new business models that could bring them new sources of income. It is certain that it will take some time until such scenarios become part of

our everyday life, with the first condition that for the acceptance of such innovations there is also the structure of the population that has to adopt a certain technological project mentally and infrastructurally, and the second is a legal requirement, which very often hinders the development of innovation. If we make a review of the banking market of the Republic of Srpska and Bosnia and Herzegovina, there are definitely certain limitations and facts that influence the further process of digitization in banks, which refers to the following:

- Cash transactions are still at the level of 30% (in the European Union it is between 3% and 8%);
- There is a gray economy problem;
- Further strengthening of the national economy will reduce the use of cash;
- To enable the amendment of the legislation (the problem of introducing a digital signature);
- respect for the client's habit, entering the bank, traditional clients, the elderly population;
- Business risks;
- high costs of investing in digitalisation of services;
- Financial literacy as a prerequisite for digitization.

Of course, the success of digitization will also depend on other factors, from which we can highlight only some:

- Further education reforms with emphasis on financial literacy;
- model of human resources development;
- overcoming administrative barriers;
- strategic support to the development of the banking sector;
- Retention of experts in this field in the RS and BiH.

Whether they want it or not, understand it or not, new technologies are coming up un-





remittingly, bringing with them completely new concepts that require us to change our thinking. If we are thinking the same way as before, we expect the new technology to bring us only benefits, without clear analysis and involvement in all processes, it is very likely that we are on the wrong path. Digitizing financial services is not only about the application of new technologies, but also implies a completely different approach and a completely new concept of thinking of all participants.

Given the accelerated changes, we can say

that the banking future will surely look different in the coming years, it is certain that artificial intelligence will replace numerous processes, contribute to speeding up communication and better quality banking services.

However, in the end, we can say that in spite of the accelerated digitization processes, both in banking and in other areas, the human factor will continue to play a key role in the future, and the focus will continue to be trust, security and the client of the bank.

4. CONCLUSION

Analyzing the current trends in the development of digitalisation of banking services, it is evident that banks will have to change their business models and adapt them to either accelerated market changes or to form an alliance with large technology companies, as well as with smaller companies that have complementary solutions just like the banks. In addition, banks will have to act proactively towards regulatory authorities and reduce their operating costs so that they can play a market game. From an organizational point of view, all future changes will be based on technologies and capabilities of banks to quickly overcome new methods of processing constantly increasing amounts of data. Many banks become partners with FinTech companies and have joint investments in technological projects.

It is important to emphasize that parallel to the digitalization process, it is necessary to adequately regulate financial framework in order to eliminate or mitigate systematic risks. First of all, it is necessary to protect clients and their data in the digital economy, to harmonize com-

panies that deal with similar transactions and apply the same rules to all market participants. This implies that it is necessary to find the appropriate balance between competition, innovation, security and client protection. It is strategically important that the impact of Industry 4.0 on the transformation of the banking sector must not jeopardize security at the expense of competition and innovation. From all the above mentioned, it is clear that Industry 4.0 has a major influence on the transformation of the banking sector, with the fact that certain constraints and the legal framework that would prevent any possible negative consequences of this process must be taken care of. Banking of the future will certainly be marked by a further process of digitalization of banking products and services, which means that banks that want to participate in a market game must invest in new technologies, which will certainly mean additional revenues they can count on, but also the costs of additional investments at this stage of the bank's transformation. This is certainly an unused part of banking that can enable

banks to position themselves on the market on time.

In the period ahead of us, one of the biggest changes expected in digital banking is that the PSD 2 Directive will significantly change the dynamics of competitiveness on many markets. By abolishing the borders and enabling banks, but at the same time FinTech companies as well, to compete for users on the market, PSD 2 certainly creates a positive business environment for most of the digitally mature banks. All these banks will be ready to meet the challenges ahead of them because they have invested in digital innovation and infrastructure on time. In this way, they also take over the role, and therefore the income of banks that have not adapted themselves timely to market conditions. In the upcoming years there will certainly be a trend of "open banking", especially after the introduction of new regulations, PSD 2, which certainly sets the foundations for the open banking ecosystem, with the further development of the products and services of banks that will be based on this platform, as well as offering innovative services and solutions from FinTech intermediaries.

The financial sector will develop towards open financial services, which will further affect banks and other participants in the financial industry to further customize their business and services. Of course, blockchain and artificial intelligence will have a big impact in the transformation of the financial sector, which will result in further cost savings for business processes, improved personalization of services, greater security of business and a new combination of products from different manufacturers. The application of these technologies can result in a large loss of profits for bank, as well as the ability of banks to introduce new business models that could bring them new sources of income. It is certain that it will

take some time for such scenarios to become a part of our everyday life, with the first condition that for the acceptance of such innovations there is also a population structure that has to adopt a certain technological project mentally and infrastructurally, and the second condition is legislation which very often obstruct development of innovations. If we make a review of the banking market of Republika Srpska (RS) and Bosnia and Herzegovina (BiH), there are definitely certain limitations and facts that influence the further process of digitalization in banks, which are related to the following:

- cash transactions are still at the level of 30% (in the European Union it is between 3% - 8%);
- problem of grey economy is present;
- further strengthening of the national economy will reduce the use of cash;
- to enable the changes of the legislation (the problem of introducing a digital signature);
- respecting the client's habit, coming to the bank, traditional clients, the elderly population;
- business risks;
- high costs of investing in digitalisation of services;
- financial literacy as a prerequisite for digitalization.

Of course the success of digitalization will depend on other factors as well, out of which we can only highlight some:

- further educational reforms with emphasis on financial literacy;
- human resource development models;
- preventing administrative barriers;
- strategic support to the development of the banking sector;
- maintenance of experts from this field in the territory of RS and BiH.



Whether we want it or not, understand it or not, new technologies are unstoppably coming, bringing completely new concepts that require us to change the way we think. If we think the same way as we did so far and we expect the new technology to bring us only benefits, without clear analysis and involvement in all processes, it is very likely that we are on the wrong path. Digitalization of financial services is not only about the application of new technologies but it also implies a completely different approach and a completely new concept of thinking for all participants.

Having in mind the accelerated changes, we can say that the future banking will surely look different in the upcoming years, it is certain that artificial intelligence will replace numerous processes, contribute to the acceleration of communication and banking services with higher quality.

At the end, we can say that besides the accelerated digitalization processes, both in banking and in other areas, the human factor will continue to play a key role in the future, and the focus will remain on trust, security and client of the bank.

REFERENCES

Banking trends in CEE. Overview: Digital Banking in CEE, 2017.

Business solutions. (2016). Trendovi koji diktiraju transformaciju bankarstva danas i u budućnosti. <http://digitalizacija-bankarstva.hr/>

Deloitte. (2019). <https://www.deloitte.com>

Deloitte. Digital disruption. Threats and opportunities for retail financial services. 2016.

Digital economy definition.TechTarget, searchCIO, searchcio.techtarget.com, march, 2018.

Digitalna zrelost banaka 2018. Deloitte-EMEA Region, 2018.

Ernst & Young. (2019). <https://www.ey.com>

Euromoney. (2019). <https://www.euromoney.com>

GeoSINC International (2002). e-Readiness Guide. How to develop and Implement a National e-readiness action Plan Developing Countries Washington, DC: infodev-The WorldBank

Johannes Corenalis de Man, Jan Ola Strandhagen. (2018). An Industry 4.0 Research agenda for sustainable business models. Elsevier. www.sciencedirect.com

Jose, Tojo. (2017). What is Digital Economy? www.indianeconomy

Josef Horak. (2016). Does industry 4.0 influence efficiency of financial management of a company. The 10th International Days of Statistics and Economics, Prague, September, 8-10, 2016.

Kopaonik business forum. (2019). What Industry 4.0 can (and can not) do for banking industry transformation. <https://www.youtube.com/watch?v=wpS4gVqKj0o>

Krstić, N., & Tešić, D. (2016). DIGITALNA TRANSFORMACIJA BANKARSKOG POSLOVANJA - OPASNOST ILI PRILIKA?. *Bankarstvo Magazine*, 45(2). <http://www.ubs-asb.com/Portals/0/Casopis/2016/2/UBS-Bankarstvo-2-2016-Krstic-Testic.pdf>

Lazović, V., Đuričković, T. (2018). Digitalna ekonomija. CIP - Katalogizacija u publikaciji, Nacionalna biblioteka Crne Gore, Cetinje, 2018.

Mayank Pratap. (2019). Digital Transformation in Finance. Digitalization disrupting the Finance Industry.

McMaster, R. (2018). Is the Fourth Industrial Revolution relevant to you?. *Nursing & health sciences*, 20(2), 139-141.

Radivojac, G., & Grujić, M. (2018b). Dometi i ograničenja primjene kriptovaluta i blokčejn tehnologije u međunarodnom poslovanju i na finansijskim tržištima. *Acta Economica*, 16(29), 79-102. <https://doi.org/10.7251/ACE1727281R>

Schäfer, M. (2018). The fourth industrial revolution: How the EU can lead it. *European View*, 17(1), 5-12.

Schwab, K. (2016). Četvrta industrijska revolucija. In World Economic Forum, Ženeva.

Schwab, K. (2018). The Global Competitiveness Reports. Chapter 3: Benchmarking Competitiveness in the Fourth Industrial Revolution, 2018. Geneva: World Economic Forum. [http://re-](http://reports.weforum.org/global-competitiveness-report-2018/chapter-3-benchmarking-competitiveness-in-the-fourth-industrial-revolution-introducing-the-global-competitiveness-index-4-0/)

<ports.weforum.org/global-competitiveness-report-2018/chapter-3-benchmarking-competitiveness-in-the-fourth-industrial-revolution-introducing-the-global-competitiveness-index-4-0/>

The Banker. Branches of the future-changing for the digital age. May, 2018. page 21.

The Banker. Publication from the Financial Times. May, 2018. pages 20-25

The Economist Magazine. (2019). <https://www.theeconomist.com>

World economic Forum. (2018). Readiness for the Future of Production Report www.weforum.org, 2018.

Xu, M., David, J. M., & Kim, S. H. (2018). The fourth industrial revolution: opportunities and challenges. *International Journal of Financial Research*, 9(2), 1-6.

