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DIGITALISATION OF THE BANKING SYSTEM AT EU LEVEL - QUANTITATIVE APPROACHES

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Abstract
Digitalization has already influenced many industries, including the banking industry. Thus, there is an urgent need to research the implications of digitalization on the banking industry, which is constantly dynamic and dependent on IT technologies. Digitalization changes the classic banking, causing the reconfiguration of the territorial networks of credit institutions, in a situation in which the population will be more and more open to new technologies. As a result, the present research has as a pillar for research the quantitative analysis of the implications of digitalization on the current banking industry in the European Union.

Key words: *banking system, classic banking, DESI index, digitalisation*

JEL Classification: *G21*

I. INTRODUCTION

In the 21st century, digitalisation is no longer a simple choice or a whim of banks, but has become a new standard in the financial services industry. Digitalisation has already influenced many industries, including the banking industry. The importance of the banking sector in the economy is recognized globally because economic activity is still largely financed by banks (Sbarcea, 2019). "The banking industry - one of the most traditional and conservative sectors of the economy - has been confronted with potentially disruptive technology-driven innovations and Internet-based solutions since the 21st century" (Hornuf et al., 2018).

The digitalisation of the banking system does not only mean online banking, internet banking, mobile banking or the lack of paper documents, but the application of new technologies for transforming the existing banking business model into a new one (Apetri et al., 2019).

In recent years we have witnessed the acceleration of the digitalisation of the banking sector worldwide, and, to a lesser extent, at the local level. "Banking must move on the path of digitalisation in order to keep pace with customer expectations, with the change of the consumer profile, with the change of generation, as well as with the wave of technology that is gaining on more and more companies and industries, some competing directly with banks on certain issues." (Medrega, 2018).

Thus, credit institutions need to adapt and take appropriate measures to maintain both the traditional business model, which involves the existence of branches and physical agencies, as well as the model based on digitalisation, for attracting and retaining customers wishing to carry out their banking operations on their own laptop, tablet or phone Under such conditions, it is necessary not only a new business model, but also a digital infrastructure to support the attraction of digital customers.

Digitalisation is, however, a major challenge for banks, the main obstacles in accelerating its penetration in credit institutions being related to the relatively slow transformation of processes, starting from the tools available to banking staff serving customers, internal processes, databases, new digital skills and abilities that require continuous professional training of employees.

The banking industry is undergoing a fundamental transformation. Attracting and retaining customers, underwriting and risk management, trading and settling compensation - all these areas are subject to change due to digital innovations (Morosan, 2017). Studies in the field show that today's banking system is based on high-tech techniques, electronic contact has taken the place of face-to-face contact, and employees are being replaced by robots (Khurana, 2019).

Based on these considerations, this paper is structured as follows: introduction, the second part reflects an evolution of the digitalisation phenomenon and highlights the advantages and disadvantages of digitalisation, the third part presents the measurement of the digitalisation phenomenon, the fourth part contains the results

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quantitative analysis on assessing the impact of digitalisation on the EU banking system. The paper concludes with a part regarding the conclusions of the research carried out.

II. DIGITALISATION OF THE BANKING SYSTEM - ADVANTAGES AND DISADVANTAGES

In an age of digitalisation, it is only natural that banking should be more accessible. New technologies influence the way banking services are provided, increasing simplicity, speed and accessibility. "The client wants convenience, that is, everything is extremely fast. In the future, the interaction between the customers will take place at any time and in any situation. I think that we will interact with the bank through voice, through web banking and wearables accessories, and the payments will no longer be just the prerogative of the banks, but of all the financial entities"(Ciutacu et al., 2019) said Sergiu Oprescu, President of the Romanian Bank Association (ARB). Under these conditions, "the priority objectives of credit institutions are limited to significant investments in the digitalisation of banking processes and services. Technological innovation and new capabilities are changing the way in which the banking service must reach its customers and the general public" (Baciu, 2018) said Sergiu Manea, CEO of BCR.

There are a variety of applications that allow you to perform various home operations. An analysis in Romania shows that some banks grant online loans, allow the opening of online deposit accounts (TBI Bank, Idea Bank), others use digital signature (BCR, UniCredit, ING Bank), contactless payment service with mobile phone (BT Pay, ING Pay), digital platforms (George - BCR, ING Home' Bank). There is also a bank that has abandoned traditional cash registers and replaced them with special ATMs (ING Bank), using robots in interaction with customers.

Among the advantages of bank digitalisation can be mentioned (see www.e-zigurat.com):

- Considerable improvement of the customer experience;
- Using digital data to make quick decisions, which is useful for both banks and customers;
- Reduction of human factor error;
- Increasing the number of customers due to the convenience of services that saves time;
- Reduce costs for customers and banks by using ATMs and cashless transactions.

Today, internet-banking services has made it possible to satisfy a large segment of customers and, thus, have gained priority on the market, but, in addition to the many advantages that some banks have, "digital banking" has also some traps.

„The major drawback of online banking is the security issue which most of the times is compromised for the sake of convenience" (Khurana, 2019). In this context, banking institutions need to strengthen their guarantees. This does not require the development of sophisticated defence strategies. First, „install the latest updates, properly manage access rights, use strong passwords, make backups" (Enria, 2019).

The digitalisation of the banking system could affect the financing of banks through deposits. The new digital tools allow depositors to change their bank preferences for opening a deposit account with just a few clicks. In this way, competition becomes more intense, which is a good thing, but at the same time, deposits become a less reliable source of financing.

Thus, the banking industry is "strongly affected by digitalisation, because the expectations of its customers are higher and higher, which generates the need to adapt to the strategies used to get as close as possible to them" (Schirmer et al., 2017).

III. MEASURING THE LEVEL OF DIGITALISATION

With the intensification of the digitalisation process, arose the need to measure and analyze the level of digitalisation of each country. To this end, a number of indicators have been identified that quantify different aspects of digitalisation and, in the end, the foundations have been laid for a specific index that would sum up all the defining elements of the process of digitalisation namely the Digital Economy and Society Index (DESI). DESI is "an online tool for measuring the progress of EU Member States in the digital economy and society". Thus, it encompasses a set of relevant indicators and the mix of digital policy pursued by the EU. For the first time, this index was calculated in 2014 (referring mainly to the data of 2013). The majority of DESI indicators come from Eurostat surveys (statistical office of the European Union). Some broadband indicators are collected by special commissions set up in the Member States through the Communications Committee. Other indicators come from studies carried out by the European Commission.

The DESI online tool is quite flexible and allows users to experiment with different weights for each indicator and analyze the effects on overall scores.

The index consists of 5 main digital policy areas, which represent a total of over 30 indicators: connectivity, human capital, use of internet services, integration of digital technology and digital public services (EU, https://ec.europa.eu/digital-single-market/en/digital-economy-and-society-index-desi).

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To calculate a country's overall score, the European Commission's experts assigned a specific weight to each set of indicators. Connectivity and Human Capital, considered the foundations of the economy and the digital society, each contribute with 25% to the total score (the maximum digital performance score is 1). The integration of digital technology is 20%, as the use of information and communication technology by the business sector is one of the most important growth drivers. Finally, Internet Utilization and Digital Public Services each contribute with 15%.

The year 2020 also ended with new performances in the digital field for all European Union countries. Finland, Sweden, the Netherlands and Denmark have the highest ratings in DESI 2019, thus becoming the global leaders in digitalisation. These states are followed by the United Kingdom, Luxembourg, Ireland, Estonia and Belgium. However, there are countries that still have a long way to go, and the EU, as a whole, needs improvements in order to be able to compete globally, which can be seen in Figure 1:

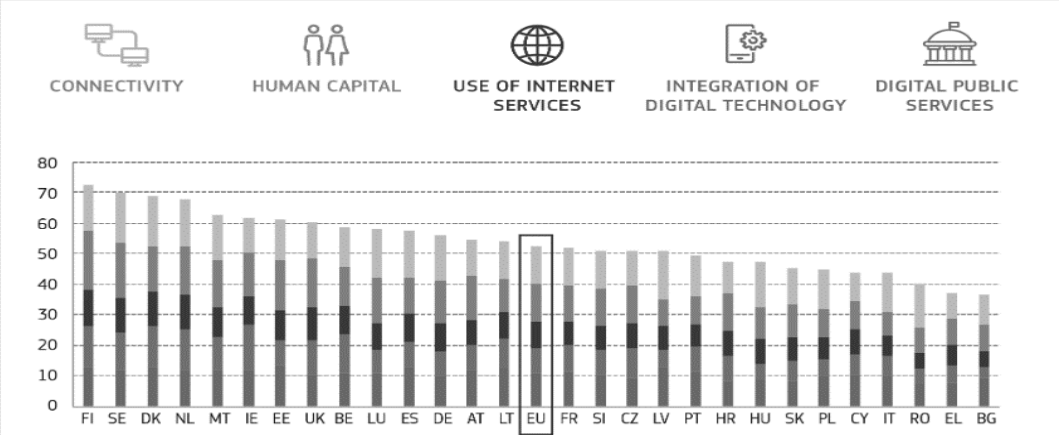

Figure 1 – Digital Economy and Society Index 2020
Source: https://ec.europa.eu/digital-single-market/en/digital-economy-and-society-index-desi

Since 2014, the year in which the Digital Economy and Society Index was calculated for the first time, and so far the 5 countries in the index have recorded new performances from one year to the next, the greatest progress being attributed to Conectivity:

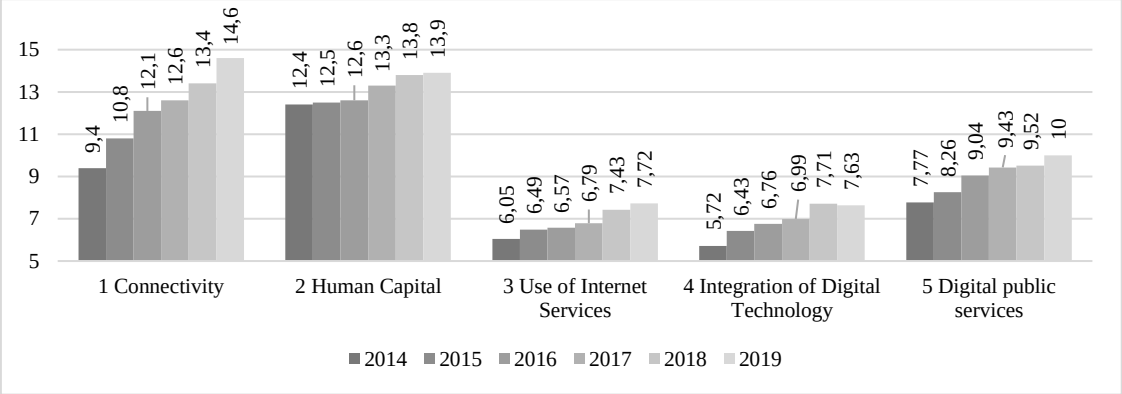

Figure 2 – Evolution of DESI components (% weight)
Source: adaptation after https://digital-agenda-data.eu/datasets/desi/visualizations

According to the graph above we notice that all 5 dimensions (see Figure 2) of the index have had a strictly increasing evolution, with significant or less significant changes during the years for which DESI was calculated.

The Connectivity dimension had an ascending trend of evolution, from 9.4% in 2014 to the value of 14.6% in 2019. In this sense, Connectivity has increased by about 55% in the last year compared to the one presented before, which denotes the fact that a lot of work has been done so that the process of digitalisation of both the economy and society as a whole to cover as wider sphere as possible.

The same meaning of evolution was registered by the Human Capital. In this case, the percentage change values from one end of the Human Capital to the other are relatively smaller compared to the annual changes in Connectivity. The share of this dimension in the DESI framework in the analysed time interval increased from 12.4% in 2014 to 13.9% in 2019.

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The use of internet services increased by about 1.67% in 2019 compared to 2014. The biggest changes were registered in 2015, 2017, 2018 and 2019, with a faster growth rate of the share of internet use in last years.

The fourth dimension is the Integration of digital technology, which increased by almost 2 percentage points in 2019 compared to 2014, a very good result compared to the other dimensions, except for Connectivity.

Digital Public Services have changed significantly over the years. Their share increased by 2.23% in 2019 compared to 2014. Based on the fact that Digital Public Services has a share of 15% in the DESI framework, the European Union is quite close to the value established in the framework.

With the initiation of the monitoring of the digital competitiveness of the Member States of the European Union through the calculation of the Digital Economy and Society Index (DESI), a multitude of reports are elaborated, with the relevant country profiles for each member. Romania also has such a country report, which places it in 26th place out of the 28 member states in the DESI framework (see Figure 1).

Although Romania has made little progress in almost all of the 5 measured DESI dimensions, the position it holds in the ranking has remained relatively the same, largely due to slow overall progress. In 2018, Romania managed to climb on a position of the European ranking that it maintained in 2020:

Table 1. Romania's evolution towards the EU average

	Romania		**EU**
	Place	Scores	Scores
DESI 2020	26	40,0	52,6
DESI 2019	26	36,5	52,5
DESI 2018	26	35,1	49,8
DESI 2017	28	32,0	46,9

Source: Developed by the author after https://ec.europa.eu/digital-single-market/en/desi

The component analysis of the DESI index shows that the best results in Romania were recorded in the Connectivity dimension (see Figure 3).

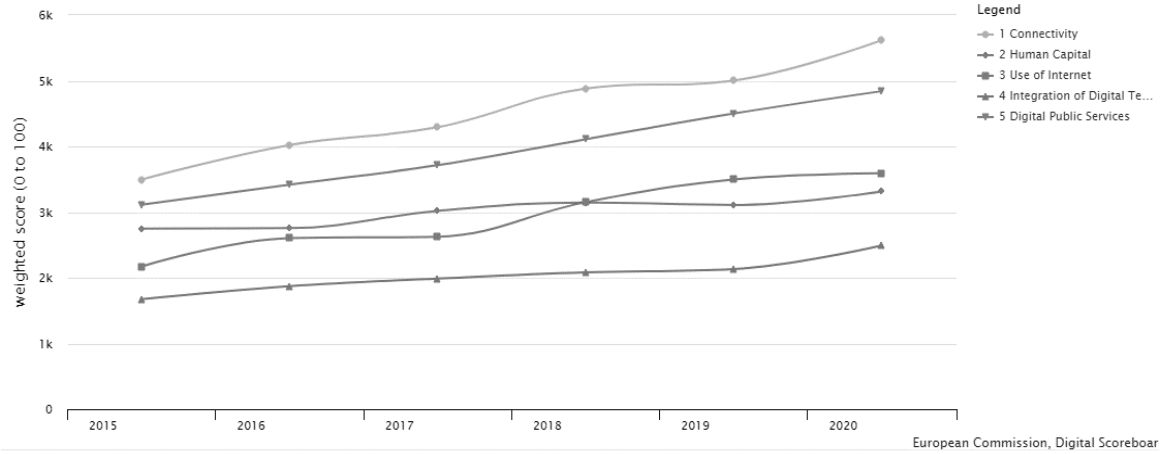

Figure 3 – Evolution of the DESI index by components for Romania
Source: Taken from https://digital-agenda-data.eu/charts/desi-see-the-evolution-of-an-indicator-and-compare-breakdowns#chart={%22indicator%22:%22desi_sliders%22,%22breakdown-group%22:%22desi%22,%22unit-measure%22:%22pc_desi_sliders%22,%22ref-area%22:%22RO%22}

This was due in particular to fixed broadband networks of high and very high speeds. According to the latest DESI report, 49% of households in Romania are subscribed to very high speed broadband services (at least 100 Mbps), making Romania ranked 5th in the EU. However, the digitalisation of the economy has lagged behind, given that almost a fifth of Romanians have never used the Internet and less than a third have at least basic digital skills. Romania is well positioned in terms of ICT graduates, ranking fifth, with 5.6% of all graduates (EU average: 3.6%). However, the digitalisation of the Romanian economy lagged far behind the European Union average.

IV. IMPLICATIONS OF DIGITALISATION ON THE BANKING SYSTEM

Over the years, it has been noticed that the digitalisation of banking has been easily accepted on the market, some customers giving up the traditional environment in favor of the virtual one. Digitalisation changes the classic banking, causing the reconfiguration of the territorial networks of credit institutions, in a situation where

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the population will be more open to new technologies, will no longer need numerous bank branches. The remaining minimum can also be modernized through digitalisation.

Lately, many "non-traditional" players have appeared in the banking industry with the help of which customers can pay their bills, recharge their mobile cards, etc. In this struggle for the protection of one's own interests, the attempts of credit institutions to adapt to new trends cannot be left unmentioned.

Thus, the financial-banking system is constantly evolving, in line with the new requirements of the digital economy. Through digital change, business models and ideas for the development of the banking sector are improving: from the emergence of internet banking to changes in the field of financial transactions. Thus, modern evolution serves as the main basis for a sustainable and long-term growth of banking performance.

However, even if the banking system has registered good results in the implementation of new technologies and adaptation of its business models to the current conditions, digitalisation of the banking system has also some negative aspects.

In recent years, against the background of the phenomenon of digitalisation, there is a downward trend in the number of credit institutions, as shown in Figure 4:

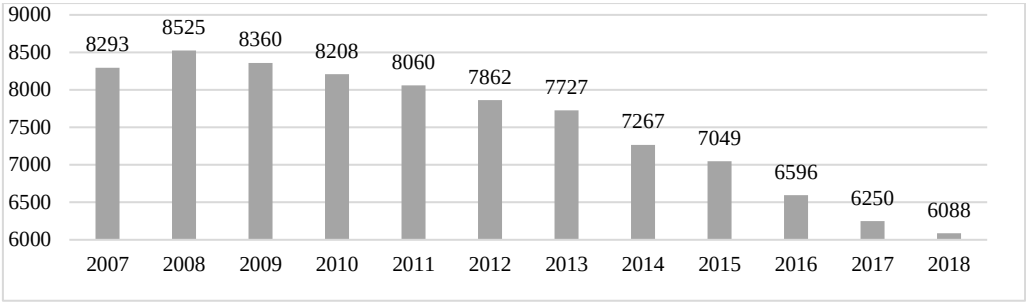

Figure 4 – Credit institutions within the European Union
Source: developed by the author after https://www.ebf.eu/facts-and-figures/structure-and-economic-contribution-of-the-banking-sector/

The decreasing trend of the number of EU credit institutions, which started in 2009, continued in 2018, their number decreasing to 6,088. This year marks a decrease of 2.6% compared to a previous year and 2,437 (-29%) in total, since the contraction started.

A similar trend is registered in the case of bank branches, the number of which is constantly decreasing, reaching approximately 174,000 in 2018. Compared to 2017, the number of branches in the European Union decreased by 5.6% or approximately 10,000 of subsidiaries, the largest decrease since the financial crisis. The number of branches has decreased by 27% since 2008 or by almost 65,000. "This trend continues to reflect the increasing use of digital banking by consumers, because more than half of EU individuals, 54%, used internet banking in 2018, up from 51% in 2017 and 25% in 2007" (EBF). This situation is shown in Figure 5:

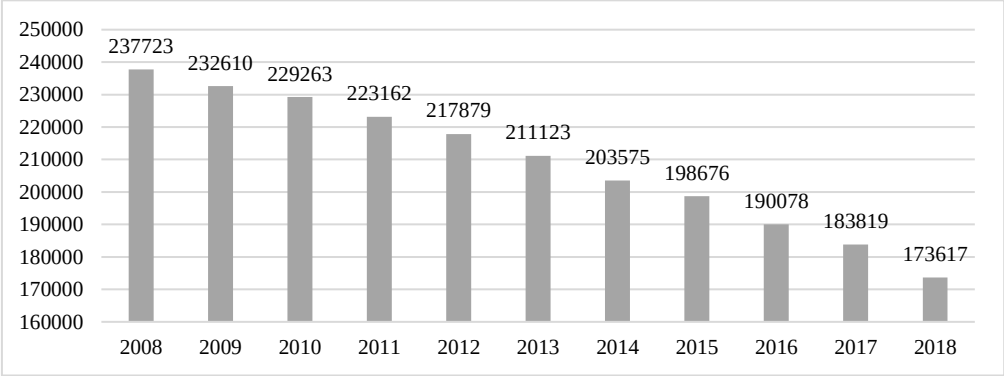

Figure 5 – Number of bank branches at EU level
Source: developed by the author after https://www.ebf.eu/facts-and-figures/structure-and-economic-contribution-of-the-banking-sector/

Another very important aspect to mention is the fact that credit institutions have a large share in companies as job creators, as they have employed approximately 2.7 million people in the European Union by the end of 2018. This value is approximately 72,000 lower than in 2017, "which represents the new lowest level since the ECB's data series was registered in 1997" (EBF). The evolution of the number of employees is presented in Figure 6:

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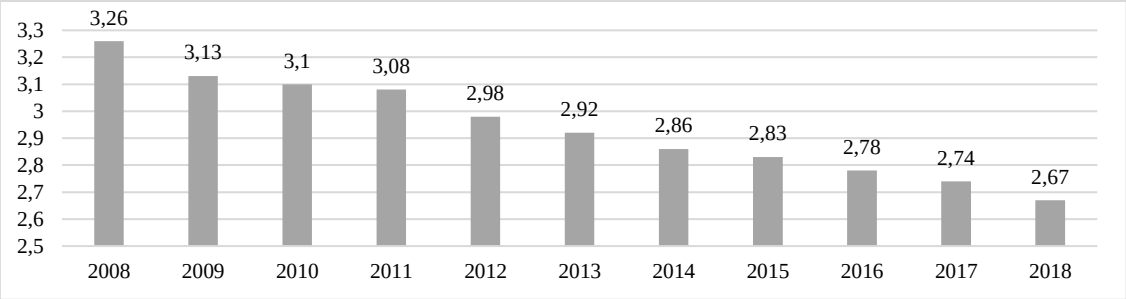

Figure 6 – Number of employees in the banking sector (in millions)
Source: developed by the author after https://www.ebf.eu/facts-and-figures/structure-and-economic-contribution-of-the-banking-sector/

It is not surprising that the countries with the highest number of jobs in this sector are the largest financial centres in Europe: Germany, France, Great Britain, followed by Italy and Spain. These 5 EU economies employ approximately 67% of all EU employees. Data for the countries with the highest number of employees and the banking sector are presented in Figure 7:

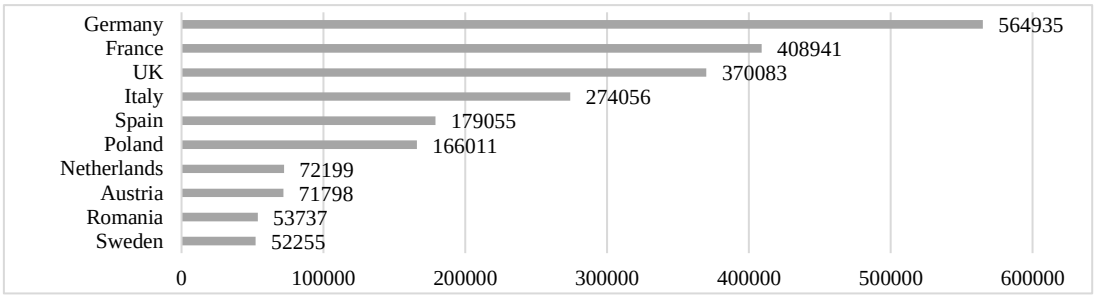

Figure 7 – Number of employees in the banking sector in some EU Member States
Source: developed by the author after
https://www.ecb.europa.eu/pub/pdf/annex/ecb~10913d25c1.pr190604_ssi_table.pdf

At the same time, as the number of employees and credit institutions decreased, the average number of inhabitants per member and bank staff in the EU Member States increased. Thus, the value of 187 inhabitants per employee, registered in 2017, increased to 192 in 2018. The average number increased in each year from 2008 when it was 153. This evolution can be observed in Figure 8:

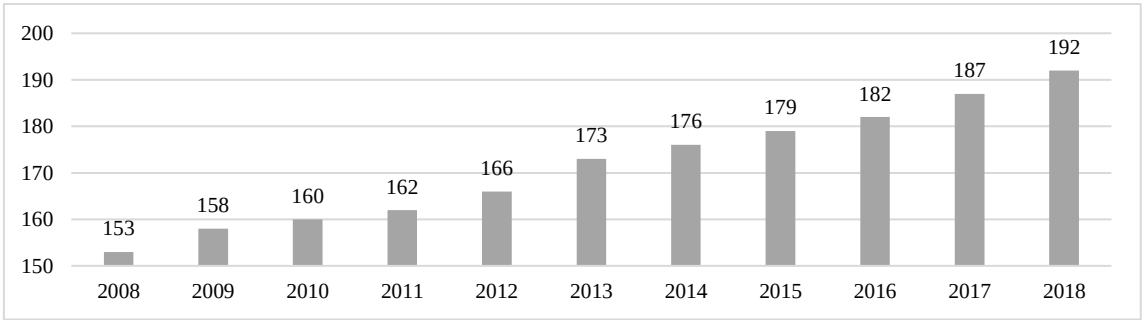

Figure 8 – Inhabitants per employee of the banking sector
Source: developed by the author after https://www.ebf.eu/facts-and-figures/structure-and-economic-contribution-of-the-banking-sector/

V. CONCLUSION

An important aspect analysed in the paper was the analysis of the DESI index and the study of the degree of financial inclusion of EU member states. Following the analysis, Finland, Sweden, the Netherlands and Denmark have the highest ratings in DESI 2020, thus becoming the global leaders in digitalisation and, at the same time, at the highest level of financial inclusion. The analysis regarding the situation of Romania from the point of view of digitalisation through the DESI index highlights the fact that, in 2020, Romania holds the 26th place out

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of 28. This position denotes the fact that Romania still has a long way to go in creating a digital economy and society.

By analysing the impact of digitalisation on the EU banking system, we found that the spread of digitalisation within the EU banking system has significantly influenced the number of credit institutions and bank branches, which have been on a downward trend over the last 10 years. A similar evolution was identified among the employees of the banking system, their number having a decreasing trend. Simultaneously with the reduction of the number of branches and employees, the number of inhabitants per employee of the banking system increased.

The current COVID-19 pandemic demonstrates how important digital assets have become for the economies of the world's states and how networks and connectivity, as well as basic and advanced digital skills support economies and societies, enabling work to continue. Digitalisation is the future, because it does not only help us in times of panic or in other crisis situations. Digitalisation, considered the fourth industrial revolution, will affect all economic or public entities in the next period, including the banking sector, due to the increased appetite of users to order goods and services through the digital interfaces available on mobile devices. In this context, for a more detailed analysis, the research will be extended to other banking systems in the EU and capitalized on in future publications.

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