

# DIMENSIONS OF DIGITAL TRANSFORMATION FOR THE BANKING INDUSTRY. EVIDENCE FROM EU COUNTRIES

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## Abstract

*The purpose of this paper is to have a comparative analysis regarding digital transformation among the countries of European Union, in a regional context, in an attempt to explain the unequal evolution of the digital financial services. The development of digital skills, of the financial one in particular and the digital access to banking will be analysed using economic and social drivers of the trend. The analysis includes data from some Central and Eastern Europe countries: Bulgaria, Croatia, Czech Republic, Greece, Hungary, Poland, Romania, Slovakia, Slovenia for the period 2002-2019, in order to identify a best practice of digitalization, focused on the financial banking market. Policy makers, public institutions and non-profit organisation involved in financial digital transformation can benefit from this analysis and conclusions just as much as researchers can. The question that arises is whether there is a correlation between the access to digital services, the education level and the use of financial banking services.*

**Keywords:** financial education, digital transformation, digital financial services

## Introduction

The decrease of the monetary mass in circulation, the emergence of crypto currencies, and the digitization process are the causes of the acceleration of the money circulation in the economy. The result is that the banks, including central banks, have to adapt and reconfigure their processes.

Nowadays, digital technology has advanced so much that its presence in everyone's life is normal. Digitising and transforming European industry and services is one of the focus areas of the biggest EU Research and Innovation programme, Horizon 2020. We have overcome the moment when we wondered if AI is a threat to humanity and it has become clear to entrepreneurs that the technological future does not expect you to be ready for it. The faster a company in a field of activity adapts to the digital age and implements technological innovation, the faster it gets to differentiate itself from competitors. To stay in the market, one

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needs to adopt digital technology. The speed with which entrepreneurs understand this, makes the difference between leaders and followers (Weill *et al.*, 2017).

Understanding financial products and services requires a certain level of financial literacy. Between the date of purchase of a financial service or product and the satisfaction of use, a long period can be recorded. Sometimes, dissatisfaction may occur if the evolution of an investment product is negative and the associated risk has not been understood and assumed from the beginning.

The complexity and period of the use of financial products and services expose the consumer to a large range of emotions. At the same time, consumer's behaviour changes and evolves over time, it adapts quickly to environmental changes, technological and social progress.

The banking industry is characterized by a fast adaptability rate of competitors. Innovation in banking is a competitive advantage that can be quickly replicated by competitors. The differences in the choice of consumers are given by the smallest details and each mistake costs.

In the context of globalization and the single market concept, the Romanian banks are adapting their strategy continuously, in order to keep up with the changes that appear in the global financial system. This paper presents a comparative analysis among the following countries in Central and Eastern Europe: Bulgaria, Croatia, Czech Republic, Greece, Hungary, Poland, Romania, Slovakia, and Slovenia. The group will be referred to as East EU countries-EEU. The analysis presents the way in which these countries have evolved compared to the average evolution of the European Union, observes what progress has been made, where progress has been faster and where it has been slower than the average progress of European Union countries, in order to highlight which country had the most effective strategy, as a best practice.

## 1. Financial inclusion in EEU countries

In the context of the crisis caused by the COVID 19 epidemic, the whole world began to reconsider access to technology<sup>1</sup>. Digitization has provided the premises for access to services in conditions of social distancing. At the same time threats to cyber security have increased. On the other hand, during this period, we began to have a broader understanding of what human closeness for each person means. Excessive digitalization of the relationship with customers also calls into question the risks of disclaiming the customer when accessing financial services, raises challenges customers retention and non-performance of loans (Ari *et al.*, 2020; OECD, 2020).

One of the most relevant indicators in terms of digital performance in the European Union is DESI (Digital Economy and Society Index). This is an indicator composed of five sections, each with a certain weight in total: connectivity, human

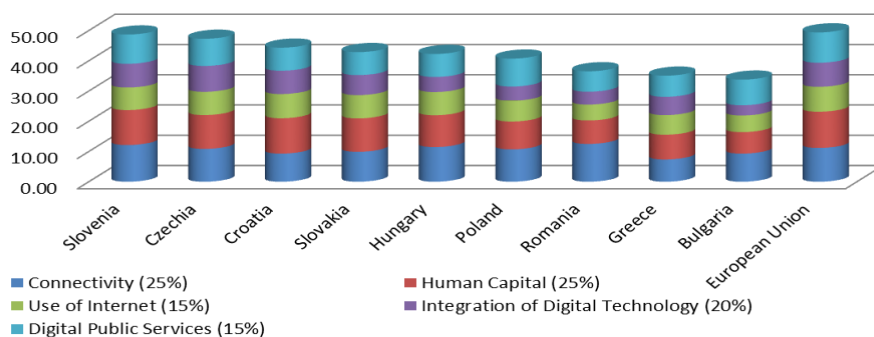
<sup>1</sup> OECD (2020), "Connecting businesses and consumers during COVID-19: trade in parcels", OECD Policy Responses to Coronavirus (COVID-19), (retrieved from <http://www.oecd.org/coronavirus/policy-responses/connecting-businesses-and-consumers-during-covid-19-trade-in-parcels-d18de131/>)



capital, use of internet, integration of digital technology and digital public services. Each section has several sub-components.

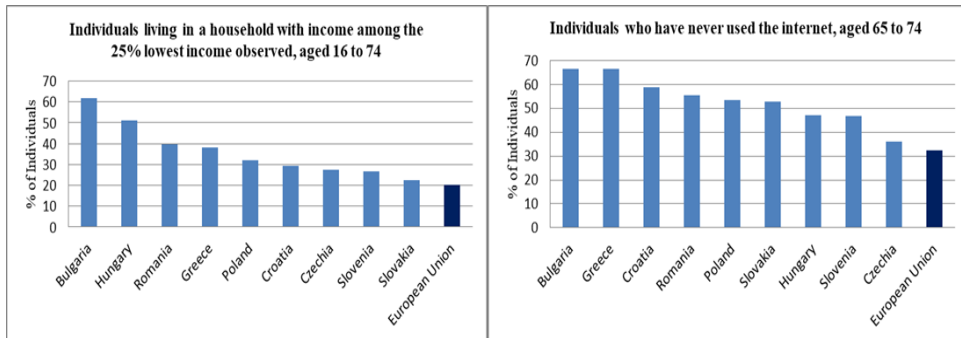
For the countries included in the analysis, the DESI index is below the average of the European Union countries (see Figure 1). A more in-depth analysis is required to identify the sources of the gap so that efforts to recover it are as effective as possible.

**Figure 1. Digital Economy and Society Index (DESI) 2019**



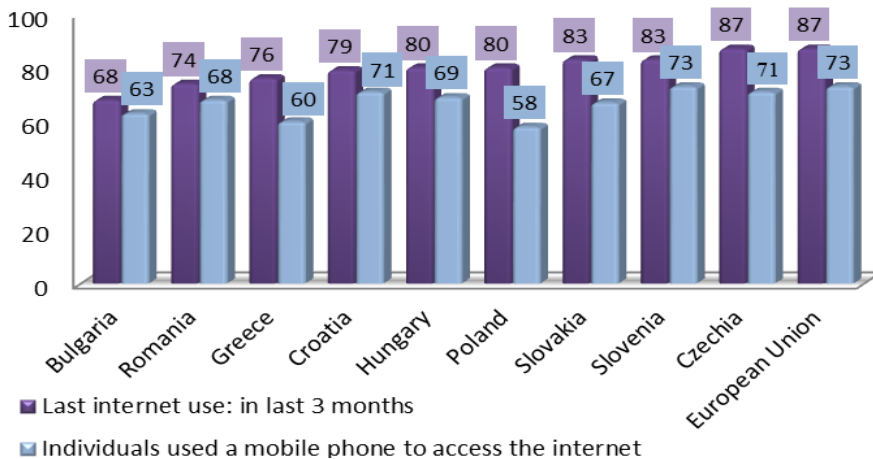
Source: author's representation based on European Commission data

Analysing the DESI sub-components, one can notice that in terms of connectivity there are 3 countries with connectivity above the EU average of 11.19. Romania has the highest score (12.5), followed by Slovenia (12.4) and Hungary (11.48). In the Integration of Digital Technology subcomponent we find the Czech Republic with a high score of 8.54 compared to the EU average of 7.95. However, a significant share of the population faces difficulties in terms of digital skills. This may be the result of large gaps between different social categories. The young, urbanized population with a higher level of education has digital skills well above average but there is also a significant share of poor population in rural areas and older population without low or any digital skills (see Figure 2). The development of digital skills is considered essential to ensure the necessary conditions to promote a modern and competitive economy. Particular attention to the process of digital transformation is needed from state authorities in order to protect these social categories from exclusion as far as the increasing digitalization of services is concerned. At the same time, the involved factors need to develop strategic campaigns that provide assistance to the population in the use of digital services and help people understand the benefits of digital transformation. According to Eurostat data, individuals who have never used the Internet, for personal or work interest are 9% in the Czech Republic and 24% in Bulgaria. Thus in the DESI score we find the score for Internet use, broken down by the two subcomponents: individuals who have never used the internet and internet users.

**Figure 2. Individuals who have never used the internet, vulnerable categories**

Source: author's representation based on Eurostat data, 2019

We analysed the information regarding the internet access and the purpose for which it is used, as well as the subcomponents of the DESI indicator regarding the internet access. Compared with the EU average one can observe that in the EEU countries there are differences in terms of the frequency with which the internet is used (see Figure 3).

**Figure 3. Internet access, EEU countries vs. UE average\**

Source: author's representation based on Eurostat data, 2019

According to Eurostat data, internet access is widely used in EU countries, 87% of households have accessed the internet in the last 3 months. The Czech Republic is at the level of this average, the other EEU countries have a gap to recover, the biggest gap is observed in Bulgaria, of 19%. Figure 2 shows that the handiest device to access the Internet is the mobile phone. Similarly, it can be seen that in the EU 73% of households are using mobile phone to access internet and the only



country in the EEU that is found at this level is Slovenia. The biggest gap from the EU average is of 15 percentage points in Poland. As stated before, lack of digital skills in individuals can become a factor of social exclusion.

Analysing in detail the reasons why the internet is accessed by the population of the EEU, compared to the average results of the EU, a distinct behaviour in the EEU states can be identified.

The ways that internet is used shows how to increase the interest of the population for digitization. It also allows the identification of the causes of gaps: lack of access to infrastructure in some countries, delayed development of digital adoption in the business area, lack of public digital platforms, widely publicized fraud and security breaches, lack of information or lack of digital education.

Authorities can boost or curb digital adoption through their degree of involvement, both through direct investments in the digitization of their own services but also through the creation of a legislative framework to support private initiatives. In the context of COVID 19, the importance of digital public health, online education and digital public administration services has become more evident. Internet use has increased due to circulation restrictions during the pandemic. Online communication has grown rapidly both on social networks and in the entertainment area. This happened due to companies adopting teleworking wherever possible, to constraints in order to have education predominantly online and to increasing volumes of online shopping. One can observe (see Figure 4) how in 2019 internet connectivity was used in EEU states mainly to socialize and send instant messages or e-mails but less with a practical utility: taking online courses, interacting with the authorities or accessing services of internet banking.

If we take a look at the percentage of people who use the internet to interact with online authorities, we also need to look at the presence of digital public services compared to existing services in other EU countries. In the case of the EEU countries, the digitization of public services, although it has been accelerated in recent years, does not yet rise to the average level of digitization of the European Union, so the population has fewer alternatives to use the Internet for this purpose.

When evaluating the usage of digital internet banking services we first need to analyse whether banks operating in the market offer digital services that consumers consider intuitive and secure so that the premises of consumer confidence in using these services should exist.

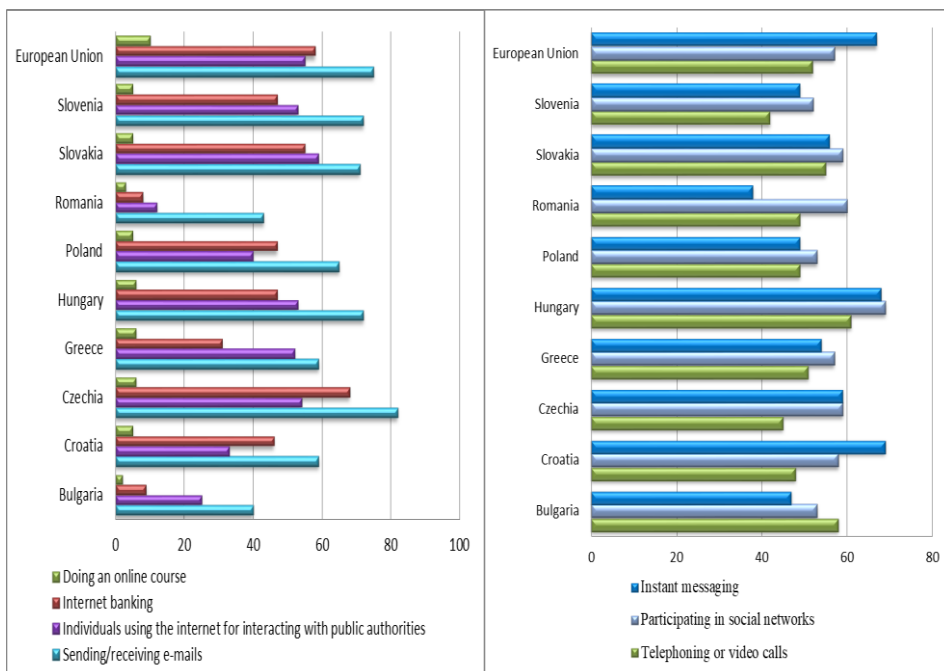
The level of population confidence in banks has decreased because of banking public scandals about security breaches, non-compliance with anti-money laundering regulations and Global Financial Crisis. The level of banking consumer confidence is also eroded by the practice of forcing the sale of products without taking into account the customer's need for that product or by offering products that are more complex and not well understood by customers.

There are three ways of regaining the lost trust of the banking customers: enhancing digital banking by investing in IT software solution, transparency of operations and enforcing customized banking services (apud Ahmed *et al.*, 2020).



According to the study presented in the article Banking System Trust, Bank Trust, and Bank Loyalty (van Esterik-Plasmeijer *et al.*, 2017), six determinants matter when it comes to bank trust and loyalty: integrity, competence, customer orientation, transparency, value congruence and stability. Clients with above average financial knowledge, are healthier financially, are more satisfied with their relationship with the bank, and are more likely to trust certain banks.

**Figure 4. Reasons of internet use, EEU countries**



Source: author's representation based on Eurostat data, 2019

Financial education contributes to the trust in the banking system. Financial education and financial literacy have become in recent years part of the economic and social development strategies. OECD provides high-level principles on National Strategies for Financial Education. This is one part of the challenges set by OECD in order to increase the overall stability of financial system. The purpose is to share best practice and co-operate for increasing financial inclusion, financial education considering a proper policy for financial consumer protection.

The biggest worldwide financial knowledge study dates back to 2014, Standard & Poor's Ratings Services and Global FinLit Survey. It measured Financial Literacy in 143 countries and developed a Financial Literacy Score (FLS) to compare the level of financial literacy and evolution between countries and special groups with the purpose to prevent financial exclusion and develop programs for increasing financial education and wellbeing within respective population in way that is more effective. A



person was considered financial literate if he/she answered correctly to three out of the four survey questions. In European Union, the average of people considered financially literate was 52. Observing the EEU countries we see that Czech Republic (58) and Hungary (54) were above this average, Slovakia (48), Greece (45), Croatia, Slovenia (44), Poland (42), Bulgaria (35) and Romania (22) were under this average. Romania had the lowest score in the European Union Countries. The percentage of adults considered financially literate worldwide was 33.

Regarding financial inclusion, the most comprehensive study is The Global Findex Database 2017, (Demirgüç-Kunt *et al.*, 2017). From this database we calculate the average percentage of adults in European Union who have an account with a financial institution or through a mobile money service (93%), saved money at a financial institution (47%) and borrowed money (17%). Comparing these averages for all EU countries with the data for the selected EEU countries, there are big gaps (see Figure 5). We see how Greece adult's financial behaviour was affected by government-debt crisis. Even though the percentage of adults who own an account is 91%, almost on the average of European Union, people are still reluctant to save and borrow money. A specific situation can be observed also in Romania where the percentage of adults who own an account is 59% and is decreasing compared to 2014 database (61%). Only 14% of the adults have savings at a financial institution, comparing with the average of 47%. In contrast to the low interest in saving at financial institutions we can observe that Romanians are more interested in borrowing from a financial institution, being at the average of European Union (17%). Romania is the only country, in EEU, where people are borrowing more than saving at a financial institution. Worldwide 69% of adults have an account with a financial institution or through a mobile money service, according to World Bank Global Findex Report, 2017.

A study of financial literacy was released by OECD in 2020 for South East European Countries. Data from Bulgaria, Croatia and Romania were collected among other countries that aren't in EEU studied group. This study revealed that the score of East European Countries is lower than the score obtained for EU and OECD countries in which the same methodology was used. People are unsatisfied with their financial situation, they are confronted with financial stress more likely because of low incomes compared to the cost of living than the one caused by excessive debt.

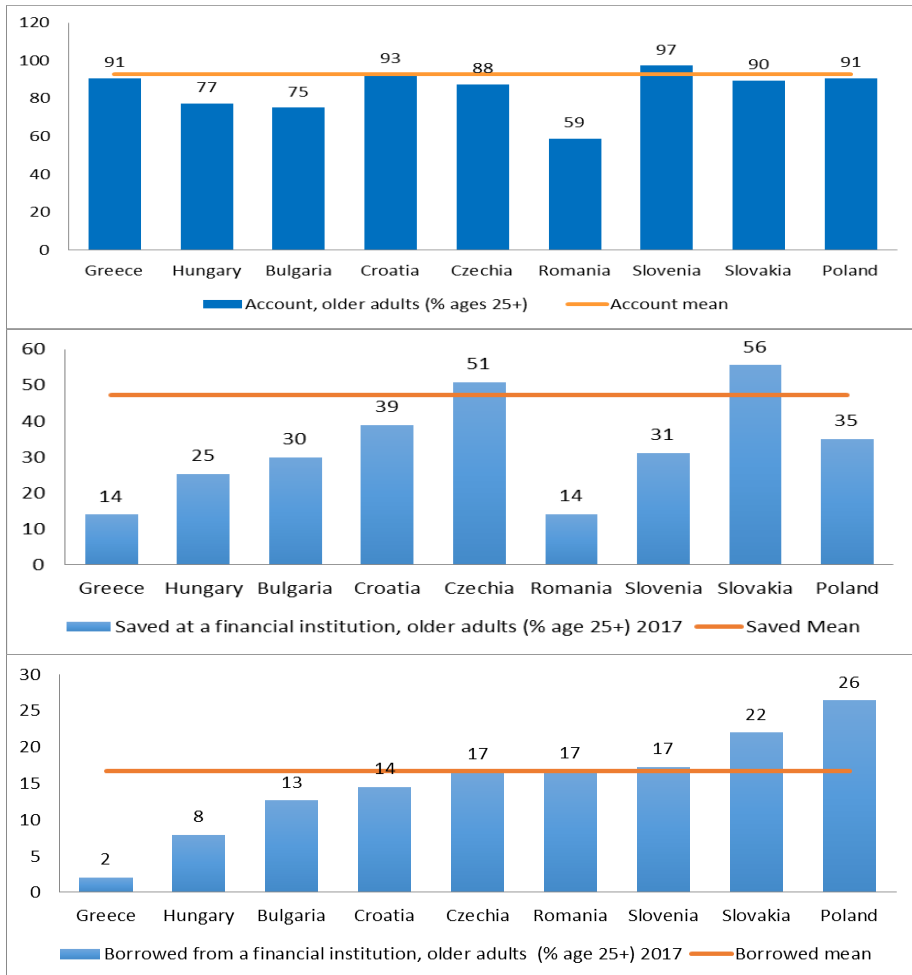
This study reveals that people prefer to save their money in cash at home or in the wallet (Croatia 50%, Romania 53% Bulgaria 62%) than saving in to a deposit account (Croatia 38%, Romania 20%, Bulgaria 29%).

A financial shortfall experience was reported in the past 12 months by 51% of Bulgarians, 46% of Romanians and 33% of Croatian people. The reaction to this shortfall experience was to spend less instead of borrowing (Bulgaria 50%, Romania 45%, and Croatia 44%) or to ask help from family and friends (Bulgaria 27%, Romania 34%, Croatia 10%). The most trusted source of financial education was the National or Central Banks in Romania (36%), Bulgaria (33%) and Croatia (32%).





**Figure 5. Financial inclusion, EEU countries, EU mean, percentage of adults over 25 years old who borrowed, saved or have an account.**



Source: The Global Findex Database 2017, World Bank.

The Members States of the United Nations, in 2015, adopted an agenda for 2030 sustainable development with 17 goals. Expanding access to financial services is part of the 2030 sustainable development goal referring to decent work and economic growth. IMF data of Financial Access Survey<sup>2</sup> helps monitor the number of ATM's and commercial banking (see Table 1).

<sup>2</sup> Chhabra, E. and Das, B. (2019) Financial Access 2019 Trends and developments, Survey Financial Institutions Division of the IMF's Statistics Department.





**Table 1. Financial Access Survey, International Monetary Fund, 2019**

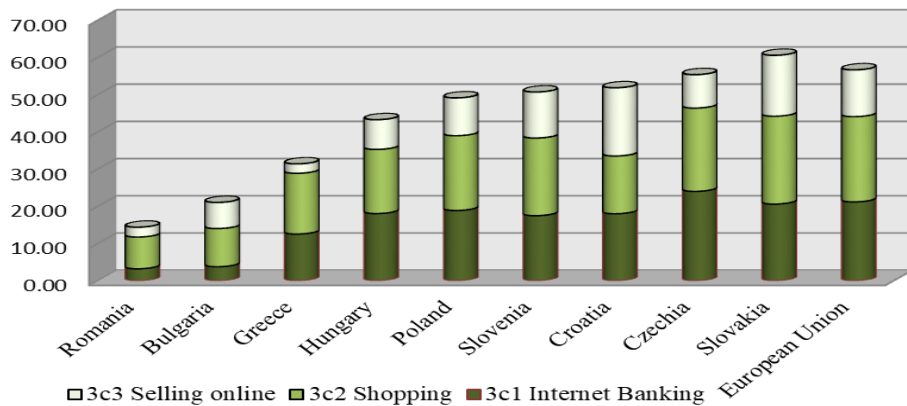
Country 2019	Number of ATMs per 100,000 adults	Number of commercial bank branches per 100,000 adults	Outstanding deposits with commercial banks (% of GDP)	Outstanding loans from commercial banks (% of GDP)
<b>Bulgaria</b>	94.33	57.89	69.24	50.22
<b>Croatia</b>	156.71	28.34	69.65	52.96
<b>Czechia</b>	58	20.57	68.51	50.94
<b>Greece</b>	63.4	19.25	79.15	80.53
<b>Hungary</b>	60.95	23.42	40.24	31.68
<b>Poland</b>	70.55	28.95	48.25	46.97
<b>Romania</b>	64.44	23.68	31.6	24.22
<b>Slovakia</b>	61.84	24.81	51.3	58.19
<b>Slovenia</b>	87.16	27.76	54.69	42.22
<b>Average</b>	79.71	28.30	56.96	48.66

Source: author's representation based on data from <https://data.imf.org>

Observing data collected from this survey for EEU countries, we see that Czechia has the lowest number of Automated Teller Machines and second lowest number of commercial bank branches. This happens in context that Czechia has a financial literacy score that shows a population with a financial education above the EU average, the highest financial literacy score in the EEU countries. Also it can be observed that Czechia has a high percentage of people using internet (87%, Figure 1) and internet banking is used above de EU average (left Figure 4). The identified reasons for these good results are given by the fact that Czechia has developed a well monitored National Strategy for Financial Education. There schools have financial education in their curricula as a mandatory subject for a while now. In Romania the number of ATM's and commercial banks are above EEU average; this comes with low results on financial knowledge indicators and on financial inclusion. These may be prerequisites for financial exclusion of some communities. It can be noticed that a lack of coordination of a National Strategy for Financial Education does not create premises and hope for the future. Only 8% of individuals are using internet banking (see Figure 4). A particular situation can be observed in Croatia, with the largest ATM's infrastructure, but 18% of the people have never used internet. The FLS score is 44, below the EU average (52). Bulgaria has the biggest number of commercial bank branches per 100.000 adults (57) and the second biggest number of ATM's. In Bulgaria, only 35 percent of adults are financially literate (FLS is one of the lowest in EU), 24% of Bulgarians have never used internet (figure 2) and 9% used internet banking, 75% had an account, 30% saved and 13% borrowed through a financial institution. We can conclude that a highly financial educated population has no need

for big banking infrastructure and a big number of ATM's and branches infrastructure does not necessarily relate to high financial inclusion. Financial education seems to help reduce costs not only for banks but also facilitate people's access to financial services at lower costs and with higher frequency. Analysing DESI sub-component online transaction for EEU countries (see Figure 6) high differences among EEU countries can be observed. Romania, Bulgaria and Greece are far behind others on using internet banking, online shopping and selling.

**Figure 6. DESI 2019 3c Transaction online**



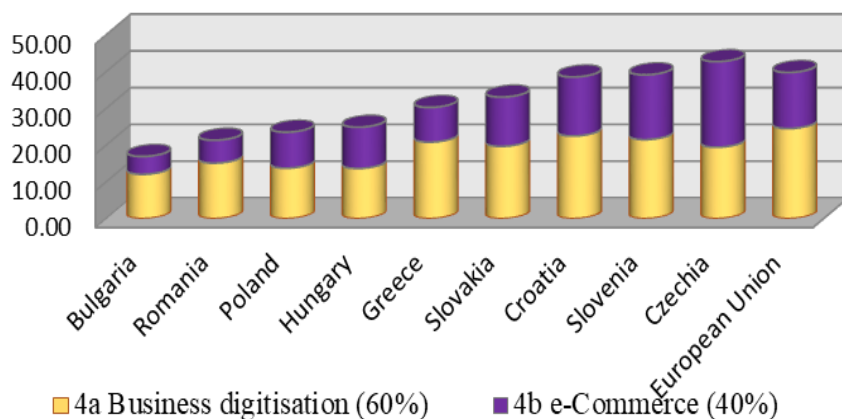
Source: author's representation based on DESI data, 2019

In order to see if people have enough possibilities to use internet for online transaction the data for business digitalization and e-commerce from DESI component referring to integration of digital technology was extracted (see Figure 7). One can notice that Czechia has the integration on digital technology DESI score above the EU average, the highest from EEU group countries. The infrastructure that offers online transactions opportunities is not so well developed in EEU countries. The reasons for not having online transactions in these countries can be a matter of slow digital technology development and integration.

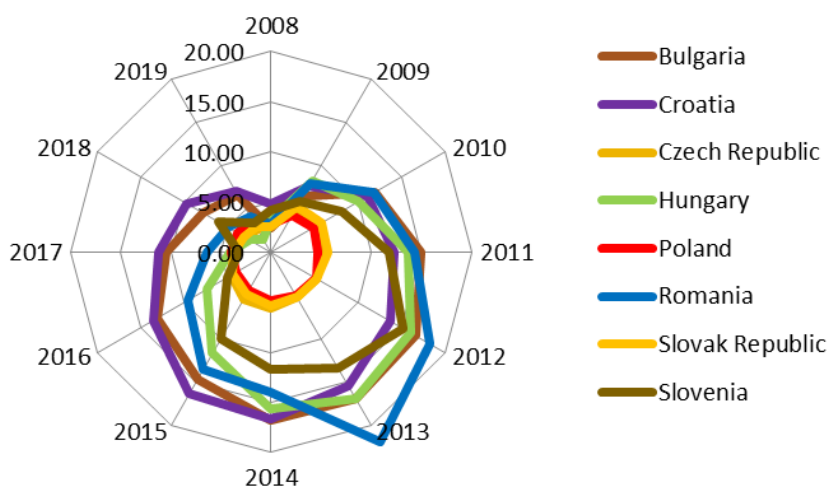
The statement is valid in both senses: without a market interest in online shopping there is no interest in investing in the creation of e-commerce platforms and without these platforms the possibilities for online shopping are limited. That circle can be pushed beyond resilience by external factors as it happened with the current pandemic situation. Outside of crisis situations, this push on e-commerce can happen within a convenient environment created by public authorities through fiscal facilities.

Nowadays, online credit is growing more and more in the market. Traditional bank loans are still the most used, especially by the companies but now crowdfunding platforms are offering alternative channels for financing. In EEU countries people still prefer to borrow from family or friends as much as from financial institution (Word Bank, 2018).



**Figure 7. Integration of Digital Technology**

Source: author's representation based on DESI data, 2019

**Figure 8. Non-Performing Loans evolution, 2008-2019, EEU countries**

Source: author's representation based on World Bank data

In order to see if there is a specific cause of the reluctance of the population from the EEU countries to resort to loans, the history of default credit was also analysed. Some of these countries have faced the problem of foreign currency credit with the appearance of large variations in foreign exchange rates.

Analysing NPL history, in other EEU countries than Greece, it can be observed that Romania has also confronted increased NPL (figure 8), a maximum of 21.87% was reached in 2013. Behaviours can be explained through this experience.

In Greece, a cause of withholdings from financial inclusion can be the debt crisis that affected most of the population, and which eroded confidence in the banking financial system. The proportion between banks nonperforming loans and total gross loans (NPL %) grew up to a maximum of 45.57% in 2017.

## 2. The EEU state progress, 2015-2020

An analyse of the actual situation of digital economy needs to be completed with the progress registered in each country. A graphical comparative analysis, on each component of Digital Economy and Society Index, was made for 2015-2020.

The progress of each country from 2015 till 2020 and the actual status for each DESI component (see Figure 9) can be observed.

The comparative analysis with the EU mean shows four quadrants:

1. Countries with less progress and lower index than the EU average
2. Countries with higher progress and lower index than the EU average
3. Countries with higher progress and higher index than the EU average
4. Countries with less progress and higher index than the EU average.

Bulgaria made some progress in Human Capital and Digital Public Service and is above the EU average but it still has one of lowest score in Connectivity, Use of internet and Digital Integration and because of this, it has the lowest progress in the EEU countries.

Croatia made a higher progress than EU made in Human Capital, Use of internet and Digital Public Services but less progress in Connectivity (the growth is similar to EU but gap needs to be recovered) and Digital Integration (similar level in 2020 with EU but the growth is slower).

The Czech Republic progress is slower in Connectivity, Human Capital and Use of internet than in EU. It has Better results than the EU average in Digital Integration and a higher progress in Digital Public Services.

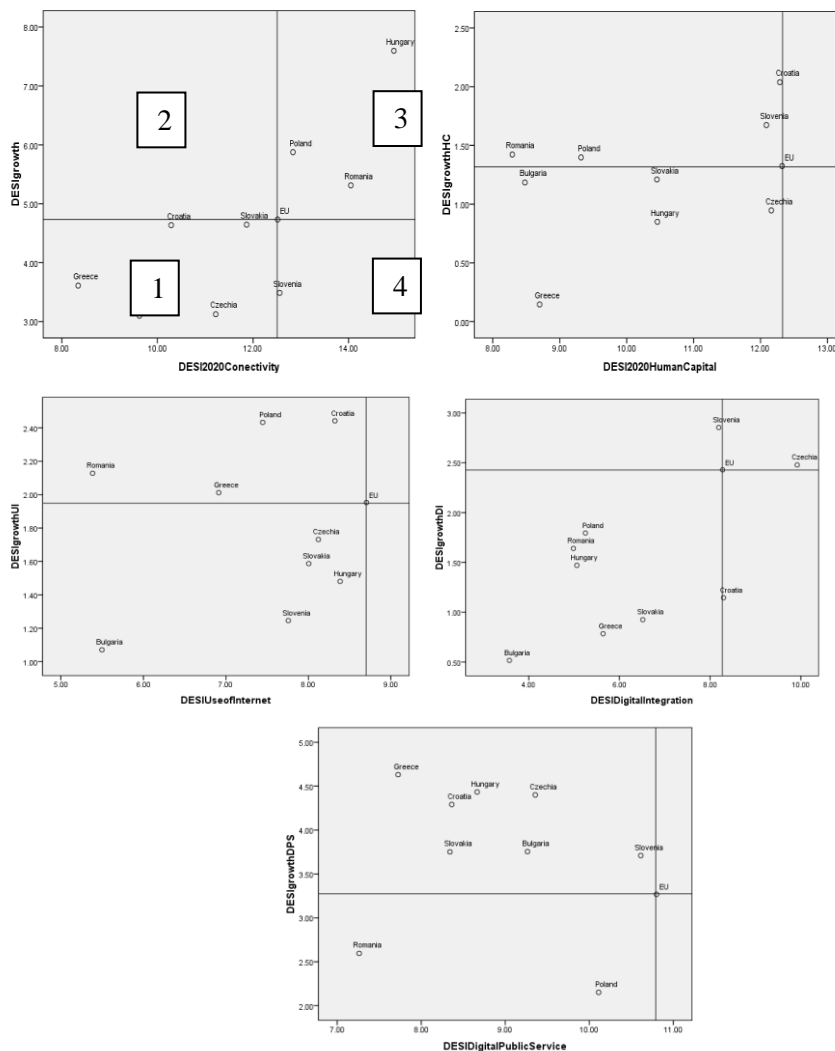
Greece registered less progress than EU mean on Connectivity, Human Capital and Digital Integration and higher progress in Use of Internet and Digital Public Services. In 2020 all components of DESI are above the EU average.

Hungary has the highest progress and the highest index (2020) in Connectivity in EEU, higher progress in Digital Public Services and less progress and lower index for the others component of DESI.

Poland has higher progress and a higher index than the EU average in Connectivity, higher progress also in Digital Public Services and less progress and lower index for the other components.

Romania has a higher progress and a higher index than the EU average in Connectivity, higher progress in Human Capital and Use of internet but slower progress than EU average in Digital Integration. In Digital Public Services Romania has a slow progress but also the lowest score index among the EEU countries.

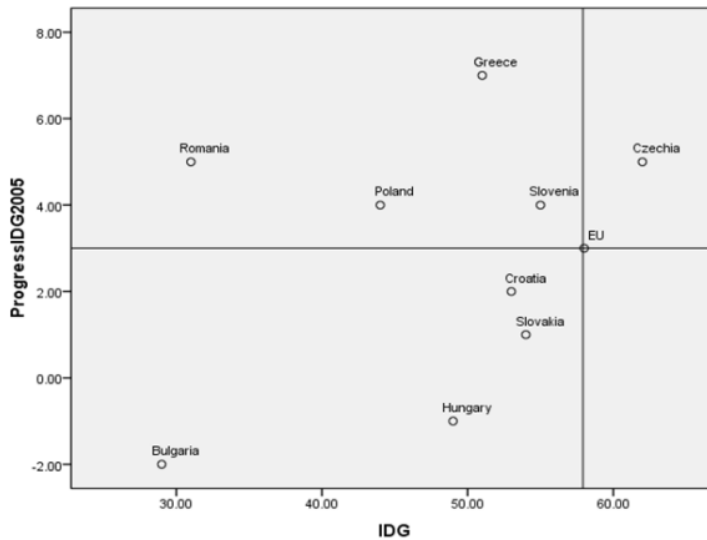


**Figure 9. DESI, EEU countries growth 2015-2020**

Source: author's representation based on European Commission, DESI connectivity/DESI Human Capital/DESI Use of Internet/DESI Digital Integration/ DESI Digital Public Services 2020.<sup>3</sup>

<sup>3</sup> European Commission, Digital Economy and Society Index (DESI) 2020, (retrieved from OECD (2020), "Connecting businesses and consumers during COVID-19: trade in parcels", OECD Policy Responses to Coronavirus (COVID-19), (retrieved from <http://www.oecd.org/coronavirus/policy-responses/connecting-businesses-and-consumers-during-covid-19-trade-in-parcels-d18de131/>).

**Figure 10. Percentage of individuals who have basic or above basic overall digital skills in EEU Countries (2019) and progress from 2015**



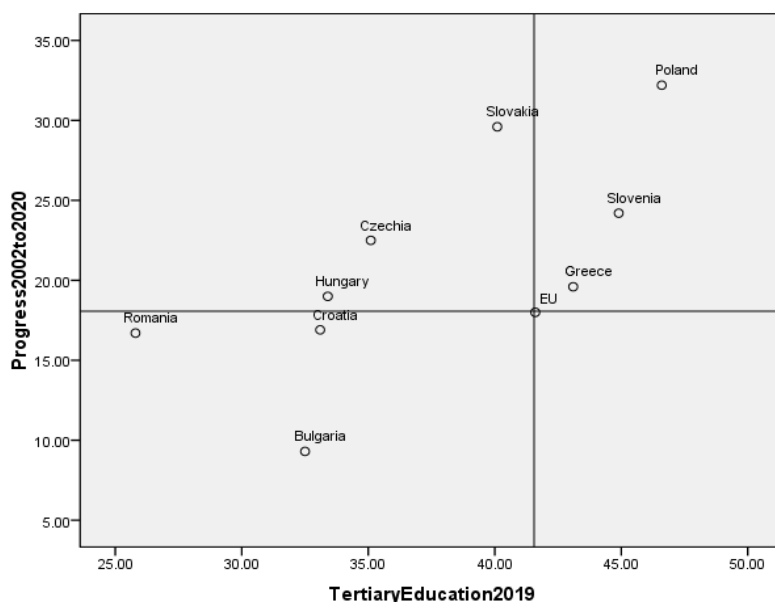
*Source:* author's representation based on Eurostat data

Slovakia almost kept the same progress as the EU average in Connectivity and Human Capital, better progress in Digital Public Services and less progress in Use of internet and Digital Integration with a lower level of all DESI components than the EU average.

Slovenia has above EU mean the progress in Human Capital, Digital Integration and Digital Public Services and less progress in Use of internet. It slowed down the progress in Connectivity in 2020 as compared to 2019.

Observing the 2019 Eurostat data on individuals aged 16-74 who have basic or above basic overall digital skills (for certain selected activities on the internet) the ranking for EEU countries (figure 10) is: Czechia, Slovenia, Slovakia, Croatia, Greece, Hungary, Romania and Bulgaria. There are some similarities between the countries on the top and on the bottom. Greece has the biggest progress (7%) among EEU Countries in increasing the number of individuals who have basic or above basic overall digital skills, during 2015-2019. Four countries registered bigger progress than the EU average, two countries have made less progress and Hungary and Bulgaria are in regress. Czech Republic with 62% of individuals with basic or above basic overall digital skills is above the EU average with 4 percent and has a five-point progress since 2015.



**Figure 11. Tertiary educational attainment (2019) and progress since 2002**

Source: author's representation based on data from Eurostat, 2019

Analysing similarities in the situation of education in general, from the perspective of tertiary education (figure 11) we see that Romania, Bulgaria and Croatia have low tertiary educational attainment in EEU Countries with the lowest progress made since 2002, so it is difficult to recover the gap.

### 3. Principal Components Analysis of the EEU countries

Using all the above-described indicators, we applied the Principal Components Analysis (PCA) in SPSS to describe the status of the selected East European Countries.

The PCA method emphasizes a number of components taking into consideration the number of Eigenvalues identified as greater than 1. In order to have a better view of the variable correlation, we applied PCA as an extraction method to reduce the numbers and the linear combinations of the original set of items. We see (Table 3) that four components were extracted. Those four new component variables explain 90,7% of the total variance.

The linear combinations of significant variables define the four components, which are named by us. The statistical units are representative for either the positive or the negative direction of the component. First component explains 45% of the total variance, the second 23%, the third 13% and the fourth only 8% from the total variance. A model with four components is quite difficult to interpret.



**Table 2. Definition of the indicators**

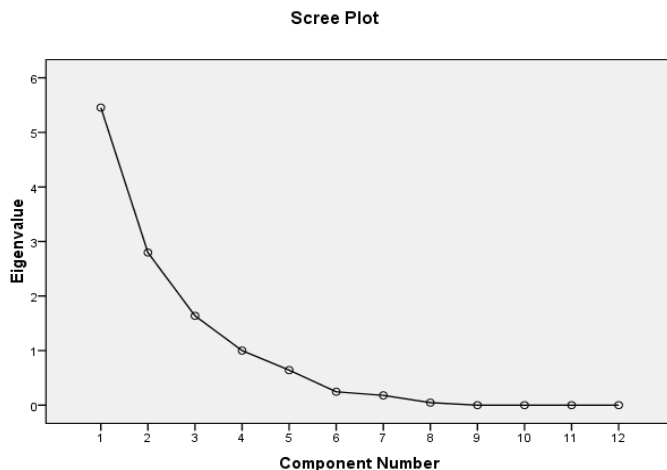
ATM=Number of ATMs per 100,000 adults, FAS, IMF
BSD=Business digitisation, European Commission, DESI
DEP=Outstanding deposits with commercial banks (% of GDP), FAS, IMF
ECM= e-Commerce, European Commission, DESI
FLS=Financial Literacy Score, S & P Ratings Services Global FinLit Survey
IBU=Internet banking use, Eurostat
IDG= Individuals who have basic or above basic overall digital skills, Eurostat
LON= Outstanding loans from commercial banks (% of GDP), FAS, IMF
NBK=Number of commercial bank branches per 100,000 adults, FAS, IMF
SEL= Selling online, European Commission, DESI
SHP= Shopping online, European Commission, DESI
TEA=Tertiary educational attainment, Eurostat

**Table 3. Total Variance Explained**

Total Variance Explained						
Component	Initial Eigenvalues			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	5.455	45.459	45.459	4.720	39.336	39.336
2	2.797	23.308	68.767	2.747	22.895	62.232
3	1.637	13.645	82.412	1.732	14.429	76.661
4	1.000	8.335	90.747	1.690	14.086	90.747
5	.642	5.349	96.096			
6	.245	2.040	98.136			
7	.178	1.484	99.620			
8	.046	.380	100.000			
9	.000	.000	100.000			
10	.000	.000	100.000			
11	.000	.000	100.000			
12	.000	.000	100.000			

**Source:** extraction method Principal Component Analyses



**Figure 12. Eigenvalue of the component number**

Source: Scree Plot of Factor analysis.

To choose components that have eigenvalues bigger than one we have the Scree Plot in figure 12. After extracting the 4 components we have a Rotated Component matrix in Table 4.

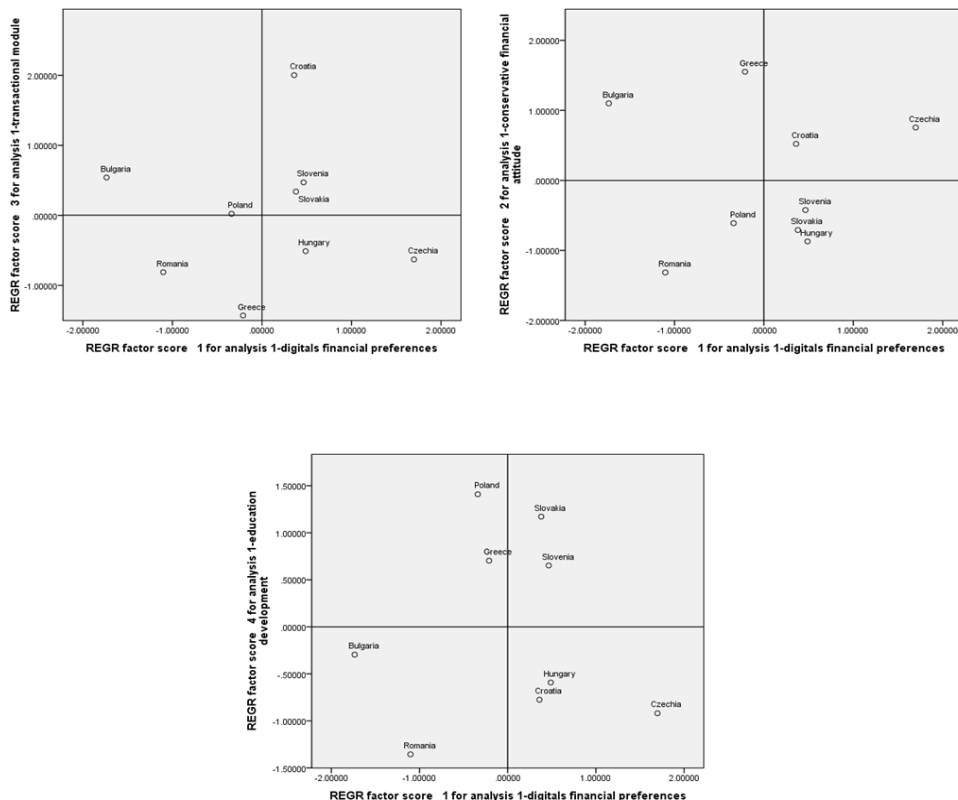
**Table 4. Rotated Component Matrix**

Rotated Component Matrix <sup>a</sup>				
	Component			
	1	2	3	4
TEA	.256	.136	-.034	.909
IDG	.949	.154	.058	.219
IBU	.933	-.035	.133	.271
SHP	.797	-.059	.044	.568
SEL	.426	-.125	.841	.240
FLS	.844	.262	-.007	.169
BSD	.025	-.965	-.104	.142
ECM	.931	.109	.192	-.059
DEP	.141	.967	.151	.123
LON	.123	.771	-.069	.501
ATM	-.094	.262	.867	-.209
NBK	-.665	.273	.417	-.026

Source: Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.

We observed that first component comprises variables: individuals who have basic or above basic overall digital skills, internet banking, shopping online, e-commerce and financial literacy score with positive correlation coefficient and number of commercial bank branches with negative correlation coefficient. This could be the first component of *the digitals financial preferences*, referring to the abilities of people and their leaning skills for using digital alternatives. The second component has a very strong negative correlation with business digitization, a very strong positive correlation with outstanding deposits (DEP) of commercial banks and a strong correlation with outstanding loans (LON) from the commercial banks. This component can present aspects related to *a conservative financial attitude*. The third component has strong correlation with variables: selling online and number of ATMs. This component seems to represent *the transactional module*. The fourth component is represented only by tertiary educational attainment. This component is that of *education development*.

**Figure 13. Chart of individual position of EEU countries, digital preferences versus financial attitude, transactional module and education development.**



*Souce:* own representation



In this stage of the research, interpreting the position of EEU countries in the chart we notice a widely spread (see Figure 13). Only Slovenia and Slovakia are very similar in the results of each component. Hungary has digital financial preferences above the average but it is above the average for the other three components. Romania is placed below the average level, with one standard deviation lower to the average of the EEU countries for all four components, with almost -1.5 deviation in education development.

Each country has a different evolution with little or no similarities. The countries with better results than the others are the Czech Republic, Croatia, Slovakia and Slovenia.

The number of the variables must be reduced in order to reduce the number of components, in order to clarify the model. This will be a future work subject useful to identify the influence factors and to build explanatory models.

The conclusion of this analysis is that the EEU countries will not easily recover the gaps of financial digitalization. Real progress is slow and not efforts are made in order to achieve leverage digital development in the EU countries in the near future.

## Conclusions

The United Nation established in 2015 a list of Sustainable Development Goals to improve the life of worldwide people till 2030. The goal referring to economic growth contains a special objective to strengthen the capacity of domestic financial institutions, to encourage and expand access to banking, insurance and financial services for all. A positive culture of long term planning and savings may help improve attitudes alongside with encouraging prudent financial behaviours.

Researchers and policymakers should work together to find the most effective ways to increase access to financial services that improve life and welfare of citizens. Digital access to financial services helps reducing financial exclusion alongside with increasing digital skills and financial literacy. The crises caused by COVID-19 provide better understanding of digital needs and use. High financial literacy is associated with the use of digital financial services. Indicators on digital performance follow the evolution of digital competitiveness in all the countries. Policy makers in EEU countries should accelerate the implementation of the European digital agenda. A first priority is the digital transformation of public services, followed by the provision of financial facilities for innovation and for the entrepreneurs who turn their business into a digital one. On a long term, a strategy for reforming the education system in each country is needed. This can be achieved by digitizing the education system, training the teachers to use the Internet and using digital teaching methods.

Romania is last country of the European Union in terms of implementing the digital agenda. It has a lot to recover in terms of the coherence of the digitization strategy on a medium and long term. A good connectivity is not enough. It is



necessary to develop the supply of high quality digital services in both the public and private sectors, alongside with education campaigns on population.

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