Digital competence development in a few countries of the European Union

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Abstract. *The first computers were made as early as in the 20th century, but the rapid development of digitalisation took place in the 21st century. Nowadays, Industry 4.0 has created a network connection between man and machines. Without computers and the Internet, the world is unthinkable. Digitalisation is pervading every part of our lives. Whether at work or in our leisure activities, digitalisation and the use of digital tools are present. The digital revolution was started by computers and is now an indispensable our lives, for example with the internet, mobile phones, cloud solutions and self-driving cars. It's no coincidence that digital competence is no longer an expectation, but an obligation for employers and employees alike. Several studies have undertaken to define digital skills; however, we can talk about a rather complex competence. The current study examines the question in the dimension of the European Union from a multitude of aspects. The authors use the DESI index and EU statistics on this topic to find correlations between digital potential, use of tools and the exploitation of opportunities offered by digitalisation in thirteen countries. The authors primarily examined the impact of the level of digital infrastructure and the frequency of Internet use on digital skills. It is outlined from statistics that Scandinavian countries have a leading role in the digital competition. Nevertheless, our results throw light on the individual level that digital skills forcefully improve during browsing on the internet, and practical activities have a significant role in development, which the authors named PMP.*

Keywords: digital competence, EU, internet, DESI index.

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Introduction

Technological changes throughout the history (every industrial revolution) have also reformed the requirements from labour force, that is, company needs have changed regarding the skills required from employees. It creates a challenge for companies in a digitalised business environment to find and employ such employees who are able to analyse a multitude of data or use the assets of digitalisation, e.g., artificial intelligence, robots, virtual and augmented reality. Both workers and employers need to adapt to digitalisation and its requirements.

Before companies rethink jobs in a digitalised business environment, they must systematically identify the capabilities they need (Marion et al. 2020). However, digitisation does not only appear in corporate operations, production and services, as there are more and more so-called smart product.

Digital competence, however, means much more than the use of tools, and is closely linked to other 21st century skills, e.g., problem solving, communication skills, collaboration, creativity, critical thinking, etc. (Ala-Mutka, 2011). Digital competence and digital literacy are not considered innate abilities, much less linked to a generation. It should be seen as a set of knowledge, skills, and attitudes that can be developed and is to be developed for all concerned (Szabó, 2019). One model of digital competence is named after Calvani et al. (2008), who defined it as a set of three dimensions. The dimensions are: 1) Technological dimension, 2) Cognitive dimension, 3) Ethical dimension. The intersection of these three dimensions is the integrated digital dimension.

Businesses and individuals cannot therefore avoid integrating digitalisation into their own competences and being open to new technological achievements.

The aim of the study is to examine digital competence statistics from 13 EU countries. The data will be analysed to find out in which areas of life countries are using digitalisation, what correlation can be observed between the development of digital competence and the usability of service areas.

Literature review

Digital competence in the life of organizations

The 21st century can be defined by the thorough development of the industry 4.0. Today, it is not money capital that primarily determines economic growth but innovation (Schumpeter, 1939) and the human factor (Fogel, 1994; Schultz, 1961). Innovation starts with people and makes the human capital of workforce crucial. In a rapidly changing knowledge-based economy, 21st century digital skills increase the competitiveness and innovation capacity of organizations. Although such skills are considered crucial, the digital dimension integrated into 21st century skills is not yet well-defined. What is certain is that 21st century skills are broader than digital skills. In addition, unlike digital skills, 21st century skills are not always supported by infocommunications. Thus, for example, the seven basic skills (technical, information management, communication, collaboration, creativity, critical thinking, and problem solving) are not only – or even not primarily – to be interpreted in the digital space. The same can be said for the five contextual skills, *viz.*: ethical awareness, cultural awareness, flexibility, self-management, and lifelong learning (Van Laar et al., 2017).

The computer has become part of our everyday lives. Non-professionals are generally unaware of attacks in cyberspace and are unable to assess their threat. Therefore, digital competence has become increasingly important for both society and the individual since the 20th century. Due to the spread of digital devices and the internet, basic IT skills have become indispensable for everyone (Nyikes, 2017b). Czeglédi and Juhász (2020) examined the level of digital competences and the possibilities of acquiring and using them competitively in the Hungarian population with higher education. Their results show that men are more open than women in both the acquisition and application of digital competences. In addition to gender, age, education and labour market status are also influencing factors, and it does not matter where and how someone acquired digital skills (Juhász, 2020). The influential role of age is clear: today's young people (starting with Generation Z) have virtually no offline experience as their days are already spent online. In addition to the automatic use of tools, however, it is questionable to what extent they have other competences. The role of education was examined by Eszenyiné (2020), who showed that university students attending infocommunications and business informatics programs are the most competent, nearly 90 percent of whom have at least intermediate level competence but most of them are at an advanced level. Comparing this result with that of intellectual workers with a university degree, it was found that only one third of the latter have advanced and another third have intermediate competence. Concerning information processing it is important to consider our cognitive skills as well (Sipos et al., 2006).

Industry 4.0 has resulted in an unprecedented level of job digitisation. The competences of white-collar workers were analysed by semi-structured interviews with Oberländer et al. (2020), primarily asking information technology professionals. Their results show that although there is overlapping content, each perspective adds unique content to the concept of digital competences at work. Creating a coherent and detailed 25-factor framework and definition enhances the applicability of professional learning and the development of digital competences in the workplace

In addition to job and industry definition, a company's business model also has an impact on employee competence. In their study Cimini et al. (2021) scrutinized the relationship between digital servitisation (integrated product-service systems) companies and Industry 4.0 and concluded that, in this group of companies, the primary focus was on the development of Industry 4.0 skills and there was a lack of developing social and personal competence.

According to Flores et al. (2020), Industry 4.0 represents a paradigm shift in corporate operations, changing traditional corporate operations, thinking, structure, which also has a significant impact on employees. As a result, the relevant competences also change. However, technological transformation, digitalisation and its relationship to employee competence are not one-way. This is also pointed out by the study of Kozanoglu and Abedin (2020) that the literacy of employees plays a role in the digital transformation of companies, i.e., the digital literacy of employees is one of the key skills needed for the digital transformation of companies. According to a study by McKinsey (2018), automation and artificial intelligence (AI) change the nature of work, transforming the demand for employee skills, as well as work organization.

Ivanenko and Artamonova (2020) suggest that digital skills and digital competence are not synonymous. Having reviewed several definitions, it was concluded that digital skill was the ability to use information and communication technologies (ICT) while digital competence was a broader concept. Ilomäki (2011) summarises the content of digital competence. According to him, this competence includes technical skills to use digital tools;

ability to use digital technologies in work, study, daily life; the ability to critically evaluate digital technology; and motivation to participate in digital culture.

In their study, Murawski and Bick (2017) developed a number of publications on digital competence, which concluded that there was a lack of scientific depth in the definition of digital competence in the workforce with very little scientific work in this area, and most definitions were too practical, inaccurate, and subject to the context, and defined specific digital competences. They conclude that the digital competence of the workforce at the individual level is a collective concept that includes on the one hand the general digital competence required for each occupation and, on the other hand, occupation-specific digital competence that differs from occupation to occupation.

Overall, digital competence encompasses all the knowledge, skills, abilities, and attitudes required to work digitally. The research of Oberländer et al. (2020) highlighted the lack of scientific research on digital competence in a workforce context. At a general level, digital competence has been defined as a specific combination of knowledge, skills, abilities, and other characteristics that enable an employee to do his or her job in the digital workplace. In addition, they highlighted that there was a gap between science and practice, with practitioners focussing more on implementing the concept, while researchers emphasised the importance of aspect.

Flores et al. (2020) identified five competences that employees must possess in identifying workforce competences that have changed because of Industry 4.0, only one of which is digital competence. However, they point out that the impact of digital competence on Industry 4.0 is very significant and that learning and mastering it is no longer an option for future employees, they will be forced to adapt these skills.

Employees' digital competences vary from job to job. This is pointed out by several studies examining digital competence in each job area. In their study, Periánez-Canadillas et al. (2019) examined the digital competence of students pursuing business studies in terms of their suitability for a given job. They define digital competence as the knowledge, skills, and attitudes that make a workforce fit to use digital media. In this case, digital competence was defined on the basis of 4 aspects such as communication, content creation, security and problem solving, which included 13 skills.

Marion et al. (2020) identified the competences of the workforce working in innovation in digitized corporate operations. Four key business-oriented competences have been identified for those working in future innovation, namely (1) omniscience, (2) entrepreneurial mindset, (3) bottom-line focus, (4) ethical intelligence.

Karaevli et al. (2020) defined the competences of employees working in the field of information technology (IT), given that their work is fundamental in digital business. Their research identified four behavioural competences that IT workers needed to learn to fulfil their new and redefined role in the digital corporate environment. 'Learn to manage role complexity', 'Connect, collaborate, and integrate knowledge swiftly', 'Embrace and manage contradictory demands', and 'Master continuous learning and adaptation' are the competences that enable IT workers to continually update the skills that are relevant to a particular IT field. Related tasks are required to perform. It was emphasised that in the digital corporate environment, only technological skills are no longer sufficient for IT workers, i.e., company managers must also take into account the defined behavioural competences in the selection of employees, further training and development.

In addition to digital competences specifically defined for jobs, this area can also be examined in terms of employees' careers. Two types and their combinations were identified by Bokek-Cohen's (2018) study, i.e., standard digital competences that can be derived from corporate policy are consistent with the job, and exclusive competences that are fundamentally personal, can be derived from personal characteristics, which adds up during your time in the world of working work. They highlighted that digital competences provided greater security for workers throughout their careers than knowledge gained in formal education. Therefore, it is important that older workers shall also acquire digital competences, thus supporting their own career.

Workforce competences, such as digital competences, differ not only across jobs, but also across industries. McKinsey's (2018) study identified 25 basic job skills, which he divided into 5 main groups (physical & manual, basic cognitive, higher cognitive, social & emotional, technological). Of these, the largest growth by 2030 is projected to be in technology skills, which range from basic digital skills to advanced programming. Their study was conducted in several industries. One of the general findings of the analysis was that the skills required vary from industry to industry but all workers in the industries studied need to have an increasing capacity to adapt.

Digital competence in the European Union

The development of the European Digital Competence Framework started in 2005 and the first version (DigComp 1.0) was published in 2013. The latest version will be made now, in January 2021 (DigComp 2.2), and is expected to be released in early 2022 (Molnár & Orosz, 2020). This framework combines knowledge, skills, and attitudes (thus including values, habits, abilities). Competences have been formulated in line with the Recommendation on Key Competences for Lifelong Learning. The current version 2.1 (Carretero et al., 2017) identifies five competence areas: information literacy, communication-cooperation, digital content, security, and problem solving. The EU has developed a separate framework for consumers (Brečko et al. 2016), which aims to make consumer activity in the digital world conscious and secure. This system is not based on traditional fields but separates pre- and post-purchase layers. It focusses not only on business transparency and traceability but also on having the right information, and it pays close attention to data security. In addition to the framework, evaluation areas (Nyikes, 2017a) and levels had to be defined, depending on the level of the given digital world player (EU, 2015), using the services of the digital world as a basic, "home" or professional user. The issue is not only related to the use of computers but also has serious economic implications. For example, countries where those entering the labour market have at least basic digital competences have lower unemployment rates. Based on their performance in this field, EU Member States are divided into three clusters: groups of underdeveloped, developing, and developed countries. The biggest difference between these groups is in the number of skilled people. Developed countries are characterised by the so-called "reverse pyramid of competence". This means that as the level of competence increases so does the number of those who have the appropriate competences (Csordás & Füzesi, 2019).

The Digital Economy and Society Index, the so-called DESI index, shows Europe's digital performance and examines Member States' progress in digital competitiveness. The components of the index are the level of network connections, human capital, internet use, and the integration of digital technologies and digital public services.

The 2020 reports are based on 2019 data and even reflect pre-pandemic conditions. This fact is also important because the COVID pandemic is, has been, and will be affecting the lives of citizens, with a particular focus on digital competence. During the COVID pandemic, the states in the EU also tried to fight digital epidemics with epidemic management. For example, the rise of online forms of education, the wider provision of digital public services, the expansion of teleworking opportunities, the strengthening of the security of online shopping, and so on. They all contribute to a more successful fight against the pandemic. For the Member States examined, the DESI index based on the 2020 reports developed as follows (Figure 1):

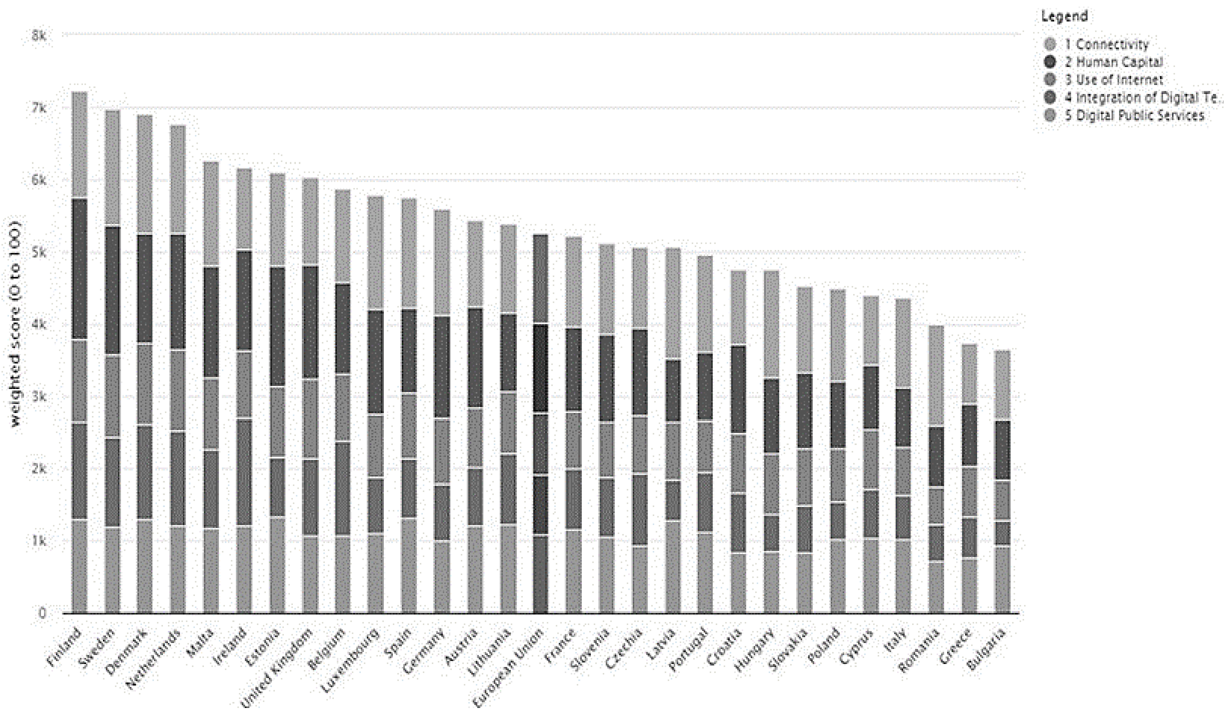

Figure 1. DESI Scores 2020

Source: European Commission, Digital Scoreboard 2020.

It can be clearly seen in the Figure 1 that the highest index values were achieved by the Scandinavian countries as well as the Netherlands while the lowest were achieved by Bulgaria, Greece, and Romania. In the following the authors write only briefly about the components of the index and its development by the member states.

The connectivity dimension encompasses the demand and supply opportunities of fixed and mobile broadband. These include general and ultra-fast broadband, fast broadband availability, large fixed high-capacity networks, 4G mobile broadband coverage, and more. In terms of this dimension, Scandinavian states (Denmark, Sweden, Finland) are at the forefront, but in terms of mobile broadband coverage, for example, Hungary is also among the leading states while Bulgaria and Cyprus reached the lowest values in terms of connectivity.

A study of human capital also revealed that, in 2019, 85% of EU citizens used the internet but only 58% had at least basic digital skills. In 2020, only 33% of EU citizens boasted higher basic digital skills, compared to 3.9% as ICT specialists. Among other things, the ratios on this issue varied from one age to another. For example, while 82% of 16-24-year-olds had at least a basic digital ability, this proportion was only 35% for people aged 55 to 74. In the two sub-dimensions of human capital (internet users' ability, advanced ability, and development), Finland finished in first place, followed by Sweden, Estonia, and the Netherlands. The lagging countries on this issue were Romania and Bulgaria.

The use of Internet was positively affected by the COVID pandemic. In 2019 85% of people living in the EU used the internet. While according to 2018 data, another 13% of the population had never used this device, by 2020 this number had already dropped to 9%. It is most common in Bulgaria, Greece, and Portugal that more than one in five people have never come close to the internet. 71% of people have already purchased online, 66% have banked with it, and 81% have used the opportunities offered by the internet for music, video, and gaming. The variations in service provided by the Internet were highest in Finland, Sweden, the Netherlands, and least in Italy, Bulgaria, and Romania. Ireland, Finland, Belgium, the Netherlands, and the leaders (Hungary, Bulgaria, and Romania) are in the cutting edge of integrating digital technologies. Table 1 summarises the frequency of indicators describing a given dimension (Table 1):

Table 1. Integration of digital technologies indicators in DESI

Indicators	DESI 2020
Electronic information sharing (% enterprises)	34%
Social media (%enterprises)	25%
Big data (% enterprises)	12%
Cloud (% enterprises)	18%
SMEs selling online (% SMEs)	18%
e-Commerce turnover (%SME turnover)	11%
Selling online cross-border (% SMEs)	8%

Source: EU Commission DESI 2020.

The table clearly shows that cross-border online sales were relatively modest before the epidemic, with only 7% of businesses having web sales to shoppers in other EU countries. The situation was similar before COVID regarding e-commerce traffic, as only one in five companies traded online in this respect.

Finally, in terms of digital public service, Estonia, Spain, Denmark, and Finland took the lead, while the last in line were Romania, Greece, Slovakia, and Hungary. In the case of e-government, for example, more than 90% of internet users (aged 16-74) choose this solution for dealing with official matters in Finland, Estonia, and Denmark, while this proportion was less than 40% for Italian citizens.

The DESI 2020 index is therefore based on 2019 data. One consequence of the epidemic is that DESI index values are likely to change significantly and positively, as the strengthening of the digital economy and digital societal development have been induced by COVID. Even if, out of sheer necessity, countries are quick to respond to the economic crisis caused by the epidemic, they will be able to respond more quickly and effectively to the digital challenges that already exist and will be able to implement digital economic and social solutions in addition to traditional economic instruments.

Data and method

In the second half of last year, the authors launched an empirical study using Eurostat statistics, which looked at statistics that could be linked to the digital competences in 13 EU countries. The EU's digital, economic, and social statistics tables were used in the analysis. Here, basically, Internet accessibility, computer use, and Internet use were examined by researchers between the ages of 16 and 74, who provide an accurate description of the variables in the results section. The countries were: Bulgaria, Czech Republic, Estonia, Greece, Croatia, Lithuania, Latvia, Hungary, Austria, Poland. Romania, Slovenia, and Slovakia, i.e., typically the countries of the Middle East and Southern European Union, were included in the sample, along with the former Soviet bloc, Austria, and Greece.

The study period was typically between 2010 and 2019. During the research, the researchers were basically interested in the use of the internet and computers, in which areas of life they appear in the studied countries, and what correlations can be identified between the development of digital competence and the usability of specific digital service areas. To this end, the authors selected factors related to digital competencies in the DESI composite index. These were divided into three groups. Individual characteristics included the frequency of internet use and the degree of digital skills variables. The second group included infrastructure variables, computers availability, and household internet access level. The third group (internet use) included the most common activities that we encounter most often in everyday life (e.g., purchasing, social media). The initial assumption was that infrastructure provision determines the frequency of Internet use, and this is the level of digital competencies. The authors used SPSS Statistics and SPSS AMOS for the research analysis. The authors first examined the correlations between each variable. A Structural Equation Model (SEM) was constructed using significant correlations. Partial correlations between variables were also examined and used to improve the model. The structural equation model was created using SPSS AMOS 24 software.

Research results

Table 2 contains the descriptive statistics of the sample. Total of nine-time series from thirteen countries were used for the analysis, all related to Internet use. The nine-time series are listed in the "Variable" column of Table 2. The database covered the period from 2010 to 2019 and the data were projected per capita for comparability; then, we worked with these intensity ratios later. This meant that the absolute numbers for each country were divided by the total population for that year, thus including the variables in the model. The number of items in the sample is given by the product of the countries reporting data from the given year and the number of years containing the data. In the case of 'frequency_of_internet', all thirteen countries reported a complete ten-year data set, so here the item number is 130. In the case of 'above_basic_skills', all thirteen countries reported data only in the last five years examined, so the number of items in this variable was 65. The theoretical maximum of the total number of observations (for 10 years) was 130 for each variable, but due to the nature of the model, the missing values were replaced by the mean. (Table 2, 3 Figure 2)

Table 2. Descriptive statistics of variables used in SEM model

Variable	Sample	Min	Max	Average	St. dev.
Individuals: frequency of internet use (frequency_of_internet)	130	0.341	1.006	0.692	0.146
Individuals who have above basic overall digital skills (above_basic_skills)	65	0.082	0.456	0.248	0.092
Households: level of internet access (internet_access)	130	0.288	1.053	0.733	0.151
Households: availability of computers (availbility_computers)	104	0.306	0.985	0.725	0.147
Internet use: participating in social networks (social_networks)	117	0.247	0.668	0.471	0.098
Internet use: Internet banking (internet_banking)	130	0.017	0.745	0.350	0.209
Internet use: seeking health information (seeking_health)	130	0.114	0.644	0.419	0.123
Internet use: telephoning or video calls (tel_video_calls)	120	0.096	0.575	0.344	0.100
Last online purchase: in the last 3 months (last_online_purchase_3M)	130	0.020	0.632	0.254	0.143

Source: Authors' results.

Table 3. Interactions of variables

Effect	Esti-mated	St. Error	St. Esti-mated	Cri-tical Ratio.	p
above_basic_skills<---frequency_of_internet	0.473	0.040	0.778	11.836	<0.001
frequency_of_internet<---internet_access	0.920	0.026	0.952	35.165	<0.001
internet_access<---availbility_computers	1.003	0.016	0.987	62.656	<0.001
internet_banking<---internet_access	-1.620	0.272	-1.173	-5.952	<0.001
internet_banking<---frequency_of_internet	2.495	0.282	1.746	8.860	<0.001
last_online_purchase_3M<---internet_banking	0.125	0.022	0.184	5.668	<0.001
last_online_purchase_3M<---internet_access	0.382	0.046	0.405	8.344	<0.001
last_online_purchase_3M<---social_networks	0.149	0.056	0.106	2.650	0.008
last_online_purchase_3M<---above_basic_skills	0.682	0.072	0.425	9.500	<0.001
seeking_health<---frequency_of_internet	0.331	0.066	0.392	5.027	<0.001
seeking_health<---social_networks	0.206	0.070	0.170	2.931	0.003
seeking_health<---above_basic_skills	0.614	0.094	0.443	6.535	<0.001
social_networks<---frequency_of_internet	0.513	0.043	0.736	11.878	<0.001
tel_video_calls<---internet_access	-0.514	0.153	-0.753	-3.362	<0.001
tel_video_calls<---frequency_of_internet	0.453	0.167	0.642	2.714	0.007
tel_video_calls<---social_networks	0.692	0.105	0.683	6.604	<0.001

Source: Authors' results.

Three of the fit statistics of the model (Figure 2) show a very good fit, while the other three show a weaker fit (NFI = 0.942; RFI = 0.869; IFI = 0.954; TLI = 0.895; CFI = 0.953; RMSEA = 0.167). However, all relationships in the model are significant, so the results can be interpreted overall (Table 3). Each indicator has been normalized to population for comparability, so it should be interpreted on a per-capita basis. In Figure 2, the number in the upper right corner of the rectangles shows the explanation of that variable (R2), and the numbers in the arrows show the strength and direction of the direct effect (D.E.) between the variables (the arrow points to cause).

The main goal of the study of digital competences is to explore and possibly expand their areas of use. The basic condition for practical use is for the person to have an Internet device, which is typically a computer, possibly a smartphone, which we have summarised in the model as a computer. In their model, this is the only variable that appears only as an explanatory variable. If you have such a device, you also need internet access. The existence of Internet access is almost entirely (R^2 = 0.97) explained by this model. Internet access at home also determines the frequency of individual Internet use (R^2=0.91). Individual internet use is a central factor in the model, along with internet access, it determines the evolution of almost all other variables. It has the strongest direct effect (D.E. = 1.75) on NetBank use, which is also significantly but negatively affected by the level of internet access (D.E. = -1.17). A possible explanation for the latter fact is that better internet access (broadband, optical cable) can be used for many other purposes so such users will not primarily mark net banking as the main digital activity in the questionnaire.

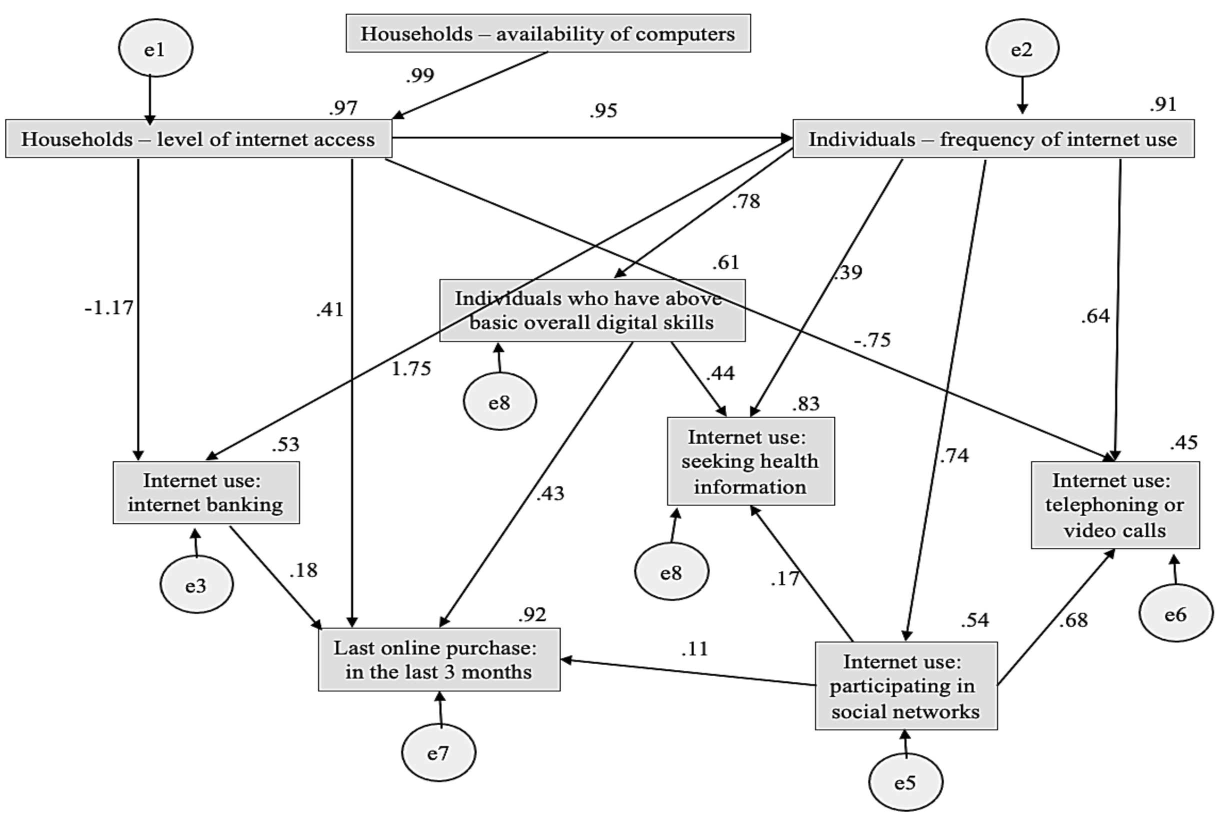

Figure 2. SEM model of digital variables

Source: Authors' results based on European Commission, Digital Scoreboard 2020.

The same two variables (level of internet access and frequency of internet use) together determine the frequency of internet phone and video calls, their effect is similar: more frequent internet use is accompanied by more frequent voice or video calls, while the level of internet access has a negative effect on the same. They use the reason given for using NetBank as an explanation. Another difference between NetBank use and telephony / video calling is that the former is only affected by direct effects while the latter is not only directly affected by the frequency of internet use, but also indirectly by social networks. In the same way, it also has an indirect effect on online shopping and the frequency with which health information is searched.

On the other hand, higher quality (faster, broadband) home internet access has a positive effect on the frequency of online purchases. Increased internet use does not directly affect them, but it does have an indirect effect through the use of social networking sites and the number of people with more knowledge than basic skills, and through the use of NetBank. Internet shopping is one of the clearly explained variables in the model, with telephone calling and video conferencing being the other, but the latter is less explained by the model ($R^2 = 0.45$), while the explanation for shopping is 92% ($R^2 = 0.92$). Another difference between the two variables explained is that each factor influencing online shopping (influenced by four factors according to our model: NetBank use, number of internet accesses, frequency of use of social networks / social sites and number of people with more knowledge than basic knowledge) is positive , while the number of telephone and video calls, at least among marked responses, is negatively affected by the number of Internet accesses and positively by the frequency of Internet and social network use (Figure 3).

The third explained variable is the search for health information ($R^2 = 0.83$), which is positively influenced by the frequency of Internet use, the frequency of use of social networks, and the share of those with knowledge above basic knowledge in the population. The frequency of using social networks ($R^2 = 0.54$) depends directly on one thing, and that is the frequency of using the Internet.

We also draw attention to a context that would be logically obvious: higher levels of digital skills have an impact on NetBank use. The model has not confirmed this correlation because neither direct nor indirect effects could be detected between the two variables. The other issue is between individual internet use and the level of digital skills. It was originally thought that higher skill levels would lead to more frequent internet use. However, based on the model, the relationship is reversed. That is, the more someone uses the internet, the more their digital skills develop. The result suggests that in addition to learning, practical activity is also important in developing skills. This relationship was termed the PMP effect. The name was compiled from the initials of the English equivalent of the proverb “practice makes perfect”.

Although not the aim of the study, statistical analysis has also yielded a remarkable result: the average of the time series of the nine indices they used showed that, out of the thirteen countries examined, Austria performed best overall. However, the fact that even the basic skills of Austrian respondents do not reach the theoretical average (0.5) worsens the overall picture somewhat. At the same time, Austrians do not use this performance advantage primarily for Facebook-sharing, it is more typical for Slovak and Hungarian respondents. Meanwhile, Baltic states are at the forefront of NetBank and video calling (Figure 3).

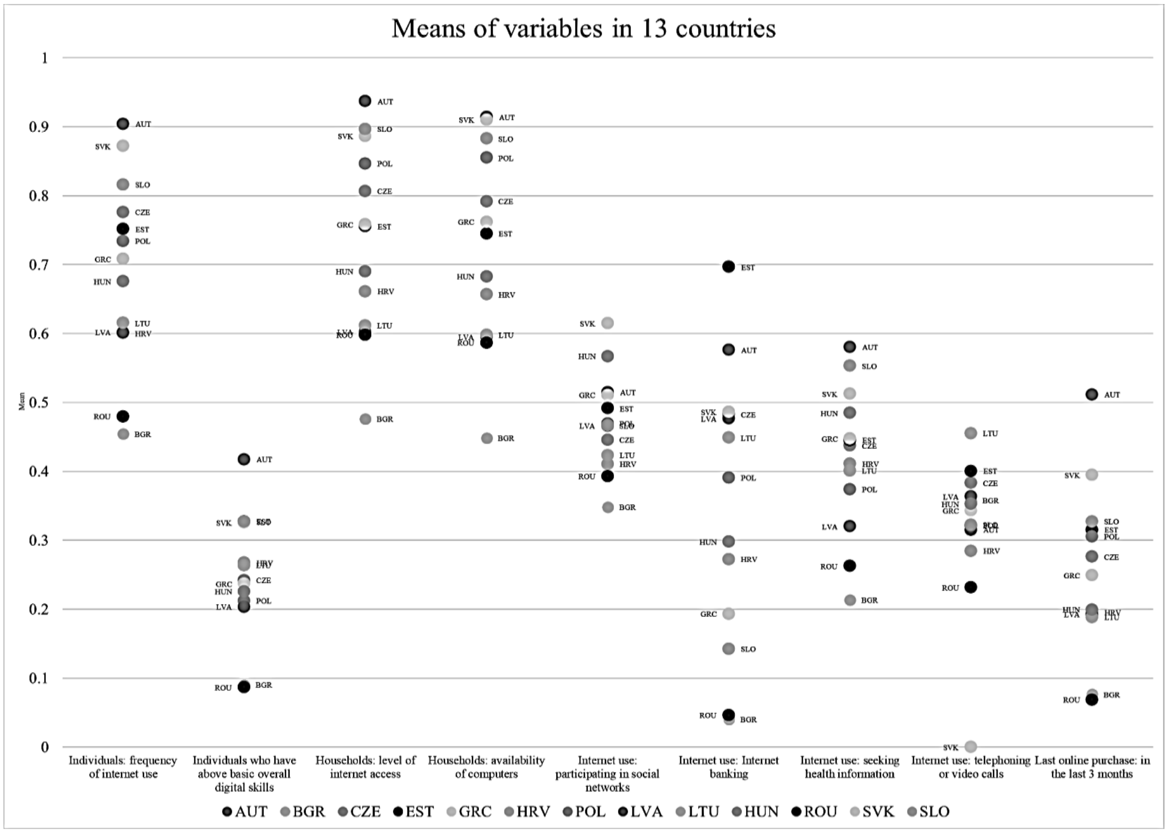

Figure 3. Digital performance of 13 countries

Source: European Commission, Digital Scoreboard 2020 – edited by Authors.

Conclusion

In the study, the authors analysed digital competence statistics from 13 EU countries. The question on the areas of life in which digital competence is used in the countries included in the study and what is the relationship between the development of digital literacy and the usability of service areas was raised. Author's model starts from data on infrastructural background. Of the two explanatory variables, only one proved to be a real explanatory variable, household's computer availability. However, the level of internet access is also determined by the extent to which households are equipped with computer equipment. The authors' assumption that the IT equipment of households and the stable broadband connection at home determine the extent of individual internet usage proved to be correct (R^2 = 0.91). Once you have the latter, the world opens: online shopping, social networking sites, video and conference calling become available. Without broadband only the necessary activities take place on the internet, e.g., NetBank and customer gateway activity. At the same time, broadband not only enhances internet use but also improves digital skills through learning and practice (PMP effect). No correlation was found between digital skills and NetBank use, *viz*., NetBanking, probably out of compulsion, is also learned by those less familiar with the internet.

From a workforce aspect, the possible explanation of our result – the PMP effect – can be traced back to individual career goals and the targeted, consciously structured educational activities of companies. The individual career goal of a workforce can be found on the one hand to keep your job or to find the best possible job for yourself. A prerequisite for this can be digital competence, which can be learned and developed both in organized and individual ways. On the other hand, the basic goal of companies is to employ a workforce with the right knowledge and skills. To this end, educational programmes that can equip the employee to perform a given job digitally are developed. All this can motivate employees to achieve their individual ambitions, i.e., individual development.

For examining workforce expectations in terms of digital competence, it is also important to analyse industry specificity and differences in firm size. Changes caused by the Digitalisation / Industry 4.0 transformation affect companies differently, whether in terms of industry or size. Companies face different challenges in the banking sector, energy, or retail, but there are also differences for SMEs or large corporations.

Given that the digital transformation affects all areas of life, digital competence cannot be reduced to a single sector, job, or geographical location, so if its analysis is desirable to be carried out from a labour market perspective, it is worth examining the expectations of each job and industry against workers. There are several possible aspects of job testing, according to which there are jobs / professions that, in addition to other competences and basic digital competences, also build on a high level of digital competence. The latter is defined in the Digital Workforce Program (2018) as "digital workforce", who must have digital competence above the basic level or above the level of one required to work in an average IT user (e.g., office) environment. They work in jobs that require an IT solution, IT expertise, or IT engineering knowledge. In these jobs, the existence of digital competences is no longer a source of competitive advantage but a qualification criterion, i.e., without it, the employee cannot acquire / perform the given job.

However, there are also jobs where employees only use digitisation tools to perform their duties. In the latter case, it is relevant to examine the use of the internet and IT tools, on which this research has also focused.

Changes in the business environment, the use of advanced technologies are inducing new jobs and changing labour market needs. One element of this is the level of digital competence of the employee. Based on the theoretical overview, it can be stated that digital competence is a complex concept that is very difficult to define, therefore its uniform examination is limited. Ferrari (2012) also points out that digital competence is a multifaceted concept that is not limited to technical skills (e.g., device use, internet) but is just one of other aspects of digital competence.

This research focused on the issue of internet use. It was based on Eurostat databases, focusing on the DESI index. The article examined digital competences with the aim of exploring and possibly expanding them. The authors used the path model method; based on their fit statistics, they found a good fit for three factors and a weaker fit for three. The explanatory variable in the model was the 'Internet-enabled devices' (computer, mobile phone). As a result of their empirical study, they were able to compile a road model the explanatory variables of which are 'Internet access' and 'Internet use'. With these, 98 percent were able to explain trends in online shopping, 83 percent used the internet to search for health information, and 45 percent used Internet phone and video conversations. Of course, the abundance of available data may indicate several additional new areas of research: the emergence of individual internet use skills in Industry 4.0 competences, or digital skills influencing the growth engine of developed economies, human resources, and its development.

The practical benefit of our work is primarily to draw attention to the areas that require the involvement of the state (digital infrastructure), companies (training), and the individual (self-education, practical use) in digital development.

The limitations of the research can be summarised as follows. It focusses on an area of digital competence, i.e., device use, and internet activity, it does not differentiate between jobs, usually it does not examine in an industry-specific manner, nor does it consider company sizes. Hence, the study yields result only for digital core competences, which are only used in those jobs or appear as an expectation by the employer in those workplaces where the task is solved using digital tools (tools and programmes are used at the user level); however, IT / analytical tasks are not carried out.

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