

## **DIGITALIZATION PROGRESSES IN EUROPEAN CATCHING-UP COUNTRIES – THE CASE OF ROMANIA**

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### **Abstract**

Digitalization is a process that increasingly arouses interest both in the public and private sectors, given the benefits it brings in social and economic terms. The European Union has set as a strategic objective the development of the Digital Single Market, and this requires that Member States to improve progress in digitization. This will be possible through a proper measurement of the adoption and improvement of digitalization processes by analyzing the DESI composite indicator, the Delab report and other relevant sources that synthesize specific dimensions of this process. This approach is useful for understanding the current level and to identify measures to be taken in order to record progress in digitalization performance. Linked to the evolution of the internet and the development of IT technologies, digitalization has become a tool and a necessity for individuals as well as in the business sector, a drive for economic growth and a focus point at a European level. This article aims to realize an analysis of the evolution of digitization in EU Member States and in particular to provide an insight into the progress of catching-up countries as is the case of Romania.

### **Keywords**

digitalization, IT&C, DESI, Europe, Romania

### **JEL Classification**

O30, O38, O52

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### **Introduction**

Throughout human history, people have developed ways of storing and transmitting information. Starting from inscriptions on stone, to paper, which has been until recently used as primary tool for such activities, to the modern era of technology that brought new means for data storage. While in early times, information was scarce, hard to obtain and only few privileged would have had access to it, contemporaries see access to information as a normal, mandatory aspect of their daily personal or professional lives. Generally, there is a need for keeping knowledge safe and sharing it in a controlled manner in all domains, from medical, to economic, arts or technology. Furthermore, Generation Y's traits, such as the need to feel in control of their lives, to be involved in decisions that concern them

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(Procopie et al., 2015) and innovation processes require them to be connected to information whenever and wherever they need.

Digitalization can be defined as the use of internet-based technologies and devices in order to improve and to increase the interaction between market agents, state, citizens and other economic actors (Milkau and Bott, 2015).

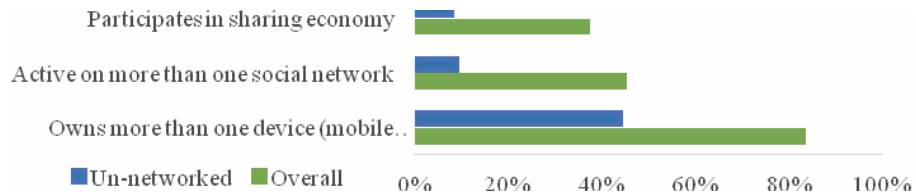
### **1. Short insight into the evolution of digitalization**

The progress of information technology has contributed to the status quo and two essential steps in it were the development of the personal computer in the early 90's and the evolution of the internet. The personal computer has also since evolved and the need for easy access to information has led to the development of smart, portable devices. Smartphones have generally become a daily used device, tablets and laptops can be transported conveniently, with all the data one needs and accessories have been developed for these to help increase storage capacities, add more functions to the device, bring more value to users. According to Miller (2014) and Ericsson Report (2015), laptops are expected to gain further popularity, at the expense of the traditional desktop, with lengthening life cycles, increased performances and the most important factor: portability (Euromonitor Report, 2016).

Digitalization has changed also the way of thinking and expectations regarding the interaction between market agents in the sense of improving communication standards, once with the evolution of emails, developing multilateral communication channels, represented by social media, the proliferation of mobile devices, internet based technologies and devices that increase the transparency of information about products and prices, simplifying payments methods and the emergence of new digital business models that offers free services and monetize the digital traces of their consumer behaviors (Milkau and Bott, 2015).

Another aspect related to the digitalized society is increased internet availability. In the past years, there has been an increase in internet access worldwide. While the European Union showed an internet penetration of 79.3% on Nov 15, 2015, the world average was 46.4% in the same year and the trend is expected to maintain ascending (Euromonitor Report, 2016).

Other studies (Miller, 2014; Ericsson Report 2015) show that the development of social networks have played a big part in the recent increase in popularity of the internet. These have brought changes in the consumer's lifestyles, shopping or communication preferences. A study conducted by Ericsson on more than 45,000 people in 24 countries, showed that almost half of the repliers - 46%, are active on more than one social network (Ericsson Report, 2015). Besides the obvious reason, that of socializing, they use these networks for gaining certain economic advantages, such as sharing accommodation, transportation means or even for financial activities and, as seen in Fig. no. 1, 34% of respondents have done so.



**Fig. no. 1 Differences between individuals connected and non-connected to a social network**  
*Source: Ericsson Report, 2015*

The main benefit of the social network use is that of communication and information exchange, as 38% of respondents generally prefer to rely on other users’ reviews when making a decision, buying a product for example, than on expert reviews. Another activity based on social networks, that developed along with Facebook is social online gaming. Over half of Facebook users reportedly played at least once such games, in 2012, and due to their viral character, this area is expected to further develop (Miller, 2014). All in all, diverse functions have evolved for social platforms, generating new business models, which over time will probably further contribute to the evolution of digitalization.

Generation Y was the first to benefit from internet and the following generation, generation Z brought along some changes in user traits. One of them is the growth in sharing video content online. While in 2011 around 30 hours of video content were uploaded to YouTube every minute, currently it is estimated that around 300 hours are uploaded every minute. Generation Z users mostly prefer streaming on mobile devices, 59% of their viewing time being spent on these (Ericsson Report, 2015). This highlights the increased need for portable devices among users. The ‘computer’ concept has progressed over years, from machines that occupied one room and performed only simple tasks to the current microprocessors which can transfer a terabit of data per second (Brodkin, 2012). In this context, another aspect highly debated is that of artificial intelligence. Since more and more everyday devices have become ‘smart’, a need for a general system that could manage and connect all these could arise. At the same time, consumers expect, for the future, an increase in technology implementation in even more aspects of daily life, from sensors around the house that can modify air temperature, humidity etc., to transportation customized to one’s schedule and preferences, to well - being or health areas. One attempt in this area has already been made, with Microsoft launching their first Artificial Intelligence bot early this year. The ‘chatbot’ was launched on social platform Twitter and the idea behind it was to learn to communicate through contact with users, developing his ‘knowledge’ from the other users’ tweets. After only 24 hours the bot’s tweets changed from positive to offensive, sexist or racist messages. This raised serious issues for developers in this area on how to get the artificial intelligence to distinguish between right and wrong and not just mimic the most common communication, which, as seen in this case, is mostly negative (Vincent, 2016). The future will probably bring challenges to the evolution of digitizing and new approaches to it. For example, museums already debate if they should digitize collections, medical representatives debate to which extent medical care and information should be digitized and so on.

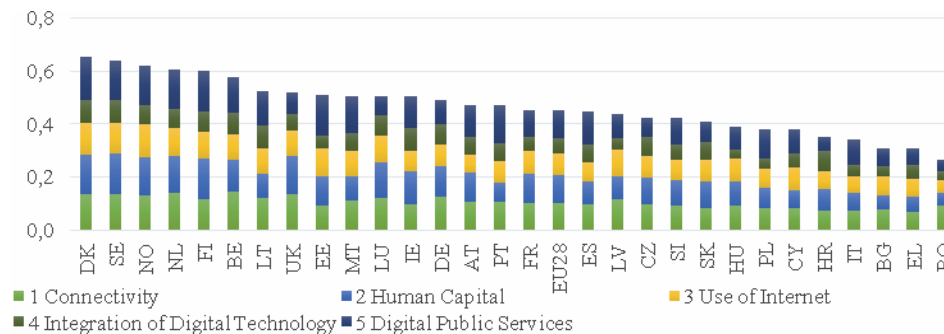
Furthermore, sharing information online is not without risks. Probably the first one that comes in mind is the risk of hacking. An organization can lose credibility and profit because of it. Two thirds of the Ericsson survey respondents see personal computers,

smartphones and social networks as highly exposed to the risks of hacking (Ericsson Report, 2015). But this not all, legal and ethical aspects also concern internet users, costs, (the costs of mobile data when traveling abroad for example), and socio-psychological risks can also affect them. These can be some of the challenges digitalization might have to face in the future.

The fast advance of technology made possible achieve (1) better services – in terms of increase in quality, more adapted to user’s needs, simplified and personalized; (2) faster services – increase of the efficiency of data processing, reducing time in process information and creating automation of services and (3) cheaper services – cost saving obtained through digitalization (Capgemini Report, 2015).

**2. The importance of digitalization in Europe**

Once with the evolution of IT&C technologies, with the increasing access to internet, to mobile phones and to electronic data in general, policymakers must ensure that individuals, business and governments use as well as possible the process of digitalization in their advantage. The article will continue with an assessment of the performance and importance given by EU countries to digitalization. A first approach is to analyze the composite index Digital Economy and Society Index (DESI index), which summarizes a number of key indicators on Europe’s digital performance. This index is constructed on the basis of five key dimensions (DESI Report, 2016): (1) connectivity - as the deployment and quality of the broadband infrastructure, (2) human capital - skills needed to interact online and to consume digital goods and services, (3) use of internet - activities performed online and consumption of online content, (4) integration of digital technology - refers to digitization of businesses and the use of online sales channel and (5) digital public services - better public services using instruments such as eGovernment.

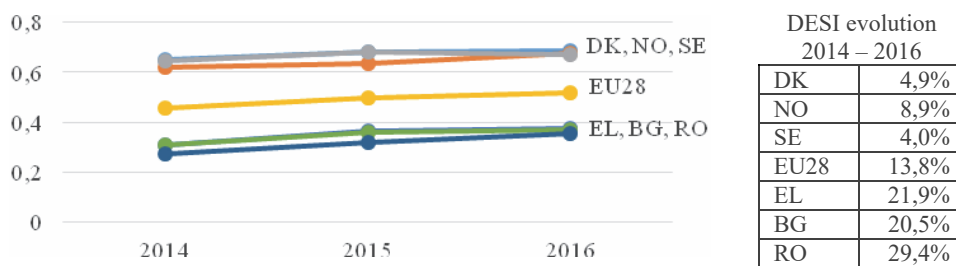


**Fig. no. 2 Digital Economy and Society Index (DESI index)**  
 Source: European Commission, Digital Scoreboard, 2016

The most important three main countries which have registered the greatest values of the DESI index are the Nordic countries - Denmark, Sweden and Norway, which have significant performances in all the five dimensions and their progress was remarkable especially in Digital Public Services (eGovernment users, Open Data, online service completion) and Integration of Digital Technology (Selling online, social media, cloud, e-procurement). At the opposite side there are the Balkan countries - Greece, Bulgaria and

Romania, which occupy the last positions according to DESI hierarchy, because of their low income, with less urbanized population having lower levels of digital skills and higher levels of corruption in the public sector (Capgemini, 2015). However it is important to note that these countries are making real efforts to improve digitization activities, aligning themselves with the common policy of the EU Member States and the Digital Single Market strategy which aims to remove barriers in the companies' approach to sell online their products and services. This is proved by the evolution of the last three years according to Fig. no. 3.

Countries that have reached a high degree of digitalization adoption, as the Nordic countries, have experienced an important and positive social and economic impact due to it and they have also succeeded in improving their operating mechanisms for the public sector both by increasing efficiency and transparency. Better regulation and digitalization are mandatory in order to improve the relation between public administration, citizens and economic actors (Natalini and Stolfi, 2012).

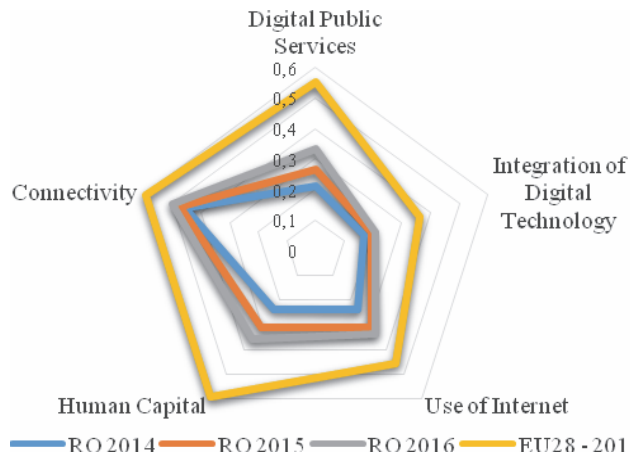


**Fig. no. 3. DESI index evolution in 2014-2016**

*Source: Own representation based on data provided by the European Commission, Digital Scoreboard 2016*

Thus, as seen in the previous figure, Romania, although positioned on the last place according to the DESI index, recorded the highest percentage growth in 2014 – 2016, 29.4%, well above the European average of 13.8% and with even a greater difference compared to countries which occupy top positions that have a growth rate between 5-9%. A more detail evaluation of Romania's performance in terms of its digital performance shows which are the main dimensions of DESI that have registered growth.

As seen in Fig. no. 4, Human Capital, Digital Public Services and Use of the Internet registered the biggest improvements over the three-year time period, these dimensions being those with the biggest gap compared to the European average.



**Fig. no. 4 Romania DESI index evolution 2014 - 2016 compared to EU28 average (2016)**

*Source: Own representation based on data provided by the European Commission, Digital Scoreboard 2016*

Among the main causes for Romania's position on the last place according to the DESI index, one can identify the low level of population's digital competences. 32% of the total population of Romania has not used the internet while the EU average is 16%, more than that only 26% of Romanians have basic levels of digital skills (DESI Romania - Country Profile, 2016). The low level of the DESI index in Romania is also due to the decrease of the number of graduates aged 20-29 years who finished Science, Technology, Engineering or Mathematics, the so-called STEAM Graduates indicator. Internet usage increased based on the increasing use of social networks (78%), but the low level of digital competences makes only 9.6% of Romanians to use online banking systems and only 18% to buy online, being the lowest level at the European level; moreover companies underuse benefits of social networks (6.5%), ERP type systems technology (22%), online shopping (only 7.4% of SMEs) and only 1.9% in other EU Member States (DESI Romania - Country Profile, 2016; Delab Report, 2016).

### 3. A view on the characteristics of digitalization in Romania

As on a worldwide level, digitalization in Romania can be linked to the development of the internet. If only 3.6% of Romania's population used the internet in 2000, over half of the population, meaning 56.3% of Romanians, accessed it in 2014, and the trend has been ascending, as seen in Table 1 (Internet World Stats, 2012). According to DESI index, connectivity is the area where Romania scored best, with 0.5 points in 2016, increasing with 0.03 compared to 2015 and ranking Romania 23rd among EU countries. Romania generally performs well when it comes to high speed internet access, within the EU. According to the DESI report, in 2016, Romanian networks were capable of ensuring internet speeds of over 30Mbps to 72% of Romanian households compared to 71% - the EU average; the Delab report also ranks Romania 2nd in the EU when it comes to the share of subscriptions to fast internet (Delab Report, 2016). Some aspects can still be improved, for example, when it comes to the coverage of fixed broadband networks, these reach 89% of households compared to 97%, the EU average; also, the number of fixed broadband

subscribers: 60% of households, compared to 72%, the EU average. The United Kingdom, for example, showed a 91% share of households having internet access in 2015, according to Statistics site [www.Statista.com](http://www.Statista.com), which is 19% more than the situation in Romania 72% (DESI Report, 2016). In addition to this, the subscription price for a household broadband subscription is significantly higher than the EU average, representing 2.7% of an individual's gross income compared to 1.3%, the EU average (DESI Report, 2016).

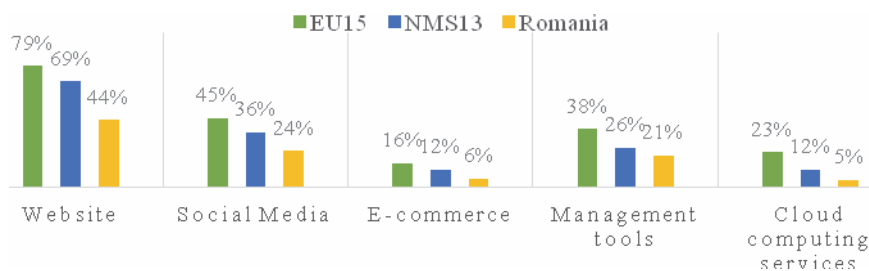
**Table no. 1 Evolution of internet access in Romania**

Year	Users	Population	% Pop.
2000	800.000	22.217.700	3,6%
2004	4.000.000	21.377.426	18,7%
2006	4.940.000	21.154.226	23,4%
2010	7.786.700	21.959.278	35,5%
2014	11.178.477	21.729.871	56,3%

*Source: Internet World Stats, 2014*

As seen in Table no. 1, more people in Romania have internet access one year compared to another, this trend being shown also by the DESI report, however, individuals have the lowest contact with public authorities, through the internet, in the whole European Union (DESI Romania – Country Report, 2016). This is one aspect that can and should be addressed in the future. Furthermore, Romanians seem to have the lowest faith in the security of online transactions, in the EU, with only 9.6% of individuals using online banking and 18% shopping online; this is one of the aspects limiting the development capacity for the digital economy. On the other hand, according to the Delab Report, less than half of Romanian small and medium enterprises (SMEs) have a website, while the average in the top 15 EU countries is 80%. Also, in the business sector, Romania can improve its use of internet tools, such as social-media, cloud based applications or e-commerce.

As seen in Fig. no. 5 and according to the data from the Delab Report, Romanian SMEs can and should focus more on using digital technologies to improve their activity, as most of these tools are valued at a significantly lower level than in the case of the top 15 European countries and even in comparison to the average of the 13 new EU members.



**Fig. no. 5 Romania SMEs using digital technologies compared to EU15 and NMS13 in 2015**

*Source: Delab Report, 2016*

The data provided by the Delab report shows that the top 15 EU countries have a 30% share of individuals with basic digital skills, which is almost double than Romania. Thus, the workforce in Romania is considerably less trained in using information technology than in general in EU, although in most working areas this is a necessary requirement. This can be linked to a need for a better education system and can equally affect a country's capacity for economic development. There is more need for trained specialists in the field of IT&C, a positive factor though being that the percentage of these in the total of employed individuals increased in 2014 compared to 2013, from 2.4% to 2.6%, according to the DESI Romania – Country Report.

In general, although improvements have been seen in this area in the past year, Romania is considered to be part of the 'catching up cluster' according to the DESI Report, as it is ranked overall 28th of the 28 EU countries and generally ranks lowest in most indicators in comparison to the top 15 EU countries and to the new 13 EU members, as mentioned in the Delab Report. The premises for development are nonetheless good, with access to one of the fastest internet speeds in the EU and some of the lowest internet subscription prices; so, future years might bring a significant improvement in this area.

### **Conclusions**

Nowadays, the world has become more connected than ever and thus interaction and the physical aspects of equipment have gained a digital dimension. At a European level, Nordic countries - Denmark, Sweden and Norway, recorded the best performance in digitalization as shown by the DESI index, and, on the opposite side, there are the Balkan countries - Greece, Bulgaria and Romania which have to make real efforts to improve digitization performances, to approach the average of EU28, aligning themselves with the common policy of the EU Member States and the Digital Single Market strategy.

Although positioned on the last place according to the DESI index, Romania recorded the highest percentage growth in the 2014 – 2016 period, 29.4%, well above the European average of 13.8% and even greater compared to the growth rate of top EU countries which have between 5-9% increases.

Romanians have access to a higher internet speed compared to the European average, however, the overall household internet access for Romanians is significantly below the EU average. Related to this, the percentage from an individual's gross income assigned to an internet subscription is higher, compared to the EU average, which could explain the difference in coverage. Also, Romanians have the least faith in internet transactions and the least contact with public authorities, through internet, in the whole European Union.

Furthermore, SMEs in Romania are the least digitalized in the EU and engage in a small percentage in e-commerce, using web sites as the main tool for their online activity; those that do, however, have the capacity to provide advanced services for their customers. Although there has been an increase recently in the percentage of IT&C specialists, these are still below the EU average and companies generally invest little in training their employees to gain computer skills. When it comes to digital skills, the indicators show Romanians to possess the lowest computer skills on all levels, from basic to proficient; although there has been an improvement in this area compared to previous years, more focus should be put on education overall.

Thus, companies' success is increasingly conditioned by their ability to adapt to the digital world, particularly through the adoption of software, advanced equipment and advanced knowledge to generate performance and to increase value. At the same time countries must



use as well as possible the process of digitalization in their advantage in order to increase their public services, efficiency and transparency.

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