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INCREASING USE OF DIGITAL TECHNOLOGIES IN FUNCTION OF ECONOMIC GROWTH IN EUROPEAN COUNTRIES

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Abstract:
Impact of the Information and Communication Technologies (ICT) on economic growth, recently attracted high research interest. Thus, it has been found that in the case of developed European economies the considered impact is significant. In general, ICT diffusion has significant impact on the economic growth in high-income countries while smaller effect is observed in middle-income and low income countries.
In the present work we study multiple aspects of the impact of ICT as a factor of the economic growth of European countries, both EU-28 and candidate countries.
The internet usage across the regions is discussed in details. Social networking, online banking, e-government and e-commerce aspects are considered separately. Values for EU-28 are compared with these for Republic of North Macedonia, Montenegro, Serbia, Albania and Turkey. Digital gap between the elderly persons urban and rural areas is also studied. Rather low presence of online banking in some countries outside of EU-28 has been found.
Based on analyses following recommendations are made: to create policies to shape the digital single market; to improve the digital infrastructure in North Macedonia, Montenegro, Serbia, Albania and Turkey; to bridge the digital divide between urban and rural areas.

Keywords: e-Business and Competitive Strategy, Information and communication technologies

JEL classification: L86, 014, O33

INTRODUCTION

Impact of the Information and Communication Technologies (ICT) on economic growth has been a subject of different studies (Vu et al. 2020; Wibowo et al., 2020; Nair et al., 2020). It has been found in (Fernández-Portillo 2020) that in the case of developed European economies the considered impact is significant. In general, ICT diffusion has significant impact on the economic growth in high-income countries, while less significant effect is observed in middle-income countries (Cheng et al. 2020). However, it is found that the effect of ICT spread on economic development is

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definitively positive for lower middle income and low income countries (Bhattacharya and Ghosh, 2020).

Part of the economic development connected with ICT is the internet usage in online purchases of goods and services. The case of the online purchases in South East European countries in comparison with EU-28 countries has been studied in a previous work (Novkovska and Dumicic 2019).

Concerning the internet use, it is observed that among the elder persons there are substantial undesirable effects, such as greater anxiety following online discussions (Hunsaker et al., 2020). Substantial concerns about the engagement of childred in online social activities have been raised (Symons et al. 2020). In view of these undesirable effects, the ICT indicators (described further in this work) are defined for individuals aged 16 to 74.

In the present work we study multiple aspects of the impact of ICT as a factor of the economic growth of European countries, both EU-28 and candidate countries, further reffered as the region.

The internet usage across the regions is discussed in details. Social networking, online banking, e-government and e-commerce aspects are considered separately. Values for EU-28 are compared with these for the countries from the region. Digital gap between the elderly persons urban and rural areas is also studied. Rather low presence of online banking in some countries outside of EU-28 has been found.

Finally, European policies for shaping of the unique digital market have been discussed in the light of above listed analyses.

1. RESULTS AND DISCUSSION

1.1. Comparison of countries from the region with Euro area

First, in this section we compare main indicators relevant for this study between Euro area and countries from the region: North Macedonia, Montenegro, Serbia, Albania nad Turkey. Indicators for the economic development level and ICT use are presented and discussed.

As the main indicator for the economic development level is used the GDP per capita in PPS, which is the volume index of GDP per capita in Purchasing Power Standards (PPS) as expressed in relation to the European Union average set to equal 100 (EU27_2020 = 100). This indicator is intended for the use in comparison between the countries and not for temporal variations. Below we use it in order to compare the development level of countries from the region to the Euro area – 19 counties (2015), (https://ec.europa.eu/eurostat/databrowser/view/tec00114/default/table?lang=en)

For the ICT use several indicators are selected:

a) (Internet use) Percentage of individuals frequently using the internet (% of individuals aged 16 to 74; Frequent use: every day or almost every day on average within the last three 96months before the survey. Use includes all locations and methods of access and any purpose (private or work/business related)). (https://ec.europa.eu/eurostat/databrowser/view/tin00092/default/table?lang=en).

b) (Social networks) Individuals who used the internet for participation in social networking (% of individuals aged 16 to 74).
(https://ec.europa.eu/eurostat/databrowser/view/tin00127/default/table?lang=en).

c) (Online banking) Individuals using the internet for internet banking (% of individuals aged 16 to 74).
(https://ec.europa.eu/eurostat/databrowser/view/tin00099/default/table?lang=en).

d) (E-government) Individuals using the internet for interaction with public authorities (% of individuals aged 16 to 74).
(https://ec.europa.eu/eurostat/databrowser/view/tin00012/default/table?lang=en).

e) (E- commerce) Individuals using the internet for ordering goods or services (% of individuals aged 16 to 74).
(https://ec.europa.eu/eurostat/databrowser/view/tin00096/default/table?lang=en).

The values of all above listed indicators are displayed in the Table 1.

Table 1. Main indicators related to economic growth and ICT use for the year 2019

GEO/TIME	GDP per capita in PPS*	Internet use	Social networks	Online banking	E-goverment	E-commerce
Euro area	106	77 %	82 %	55 %	53 %	89 %
North Macedonia	38	73 %	68 %	15 %	25 %	29 %
Montenegro	60	71 %	62 %	3 %	23 %	16 %
Serbia	49	75 %	55 %	18 %	29 %	44 %
Albania	40	54 %	48 %	2 %	13 %	5 %
Turkey	68	78 %	60 %	35 %	51 %	41 %

Source: Eurostat database (https://ec.europa.eu/eurostat/data/database)
Note: *Index (EU27_2020 = 100)

Substantial differences between the Euro area and listed countires are observed for all of the considered indicators. For the GDP per capita in PPS, Republic of North Macedonia and Albania perform the worst (index 38 and 40, almost a third of the value for Euro area). The best from the region perform Serbia and Turkey (indices 60 and 68 respectively).

For the case of internet use, the differences shown in Table 1 are much smaller than in the case of GDP per capita in PPS. Again, the lowest performance is observed for Albania (54 %), while Republic of North Macedonia exhibits high value (73 %), comparable to this for the Euro area (77 %); the value for Turkey is even higher (78 %) and for Serbia close to the value for Euro area (75 %). However, the elvated values of the indicator for internet use (Percentage of individuals frequently using the internet) is not correspondingly reflected in other ICT indiactors. Thus, only the percentages for participation in social networking (Social networks) are comparable to the value for Euro area (82 %), with the lowest value observed for Albania (48 %) and the highest for Republic of North Macedonia (68 %). Values for internet banking and e-government are low even for the Euro area (55 % and 53 %, respectively). Rather low values are observed in the case of internet banking. For Montgenegro and Albania (3 % and 2 %, respectively), while the highest one from the region, for Turkey (35 %) is still substantially lower than this for Euro area. For e-government Turkey permorms as

good as Euro area (51 %), while other countries from the region show much lower values, with the lowest one fo Albania (30 %).

Differences are very high in the case of e-commerce. The percentage of the individuals using the internet for ordering goods or services in Euro area is very high (89 %), while for the countries from the region it is markedy lower: from 44 % for Serbia and 41 % for Turkey, down to 16 % for Montenegro and only 5 % for Albania.

Particularly interesting is the case of Republic of North Macedonia; while the indicator for the economic development level is one of the lowest in the region, the ICT indicators are in the middle between these for the countries from the region and the social networking is the highest one (68 %). Above finding indicates that the potential for economic growth reying on the ICT use in Republic of North Macedonia is fairly high and has to be considered as an asset for accelerated growth in the next period.

1.2 Digital gap between urban and rural areas

This section examines the digital divide between urban and rural areas. We compare the main indicators relevant to this study on aspects of the use of information and communication technology in urban and rural areas between the Euro area and the countries of the region. Indicators of the level of economic development and use of ICT are presented and discussed.

Euro area countries are intensifying investment in improving information and communication infrastructure. Internet access in urban areas is at a much higher level than in peripheral cities and rural areas.

In EU-27 countries, the percentage of adults who use the Internet on a daily basis is relatively high in urban areas, while generally lower in remote regions. This disparity is particularly noticeable in Eastern Europe. The analysis shows that in 2019, 81 % of adults aged 16-74 in cities in the EU-27 used the Internet on a daily basis, 77 % in the suburbs and 70 % in rural areas. This analysis shows that the share of daily Internet users living in the cities of the EU member states is higher. In North Macedonia in 2019 77 % of the adult population living in urban areas use the Internet on a daily basis, 72 % in small towns and 68 % in rural areas. The disparity in the daily use of the Internet among adults living in urban and rural areas is relatively small in most EU Member States, which have been characterized by a relatively high overall use of the Internet, which means that there is widespread Internet access. In contrast, the difference is usually much larger in the Member States, characterized by lower overall levels of Internet use.

The values of all above listed indicators are displayed in the Table 2.

Table 2: Daily internet users during the three months preceding the survey, 2009 and 2019 (% of people aged 16-74 years,by degree of urbanisation)

	Cities		Towns and suburbs		Rural areas		Total	
	2009	2019	2009	2019	2009	2019	2009	2019
EU-27	52	81	47	77	36	70	46	77
North Macedonia		77		72		68	37	73

Source: Eurostat database (https://ec.europa.eu/eurostat/data/database)
Note: *Index (EU27_2020 = 100)

Advances in technology contribute to the digital empowerment of the individual, regardless of age, access and use required (Sirotin and Arkhipova, 2018). The relatively high value of using the Internet in the urban regions is due to the high-quality infrastructure that enables faster connection, the relatively young age of the population by structure or the larger number of passengers.

In figure 1 are displayed the daily internet users (% of individuals aged 16 to 74) during three months preceding the survey, for 2009 and for 2019, by country, for the cities. It is seen that the indicator rapidly rases towards the maximum possible value of 100 % for all contries considered and the differences between the countries substantially diminish simultaneously.

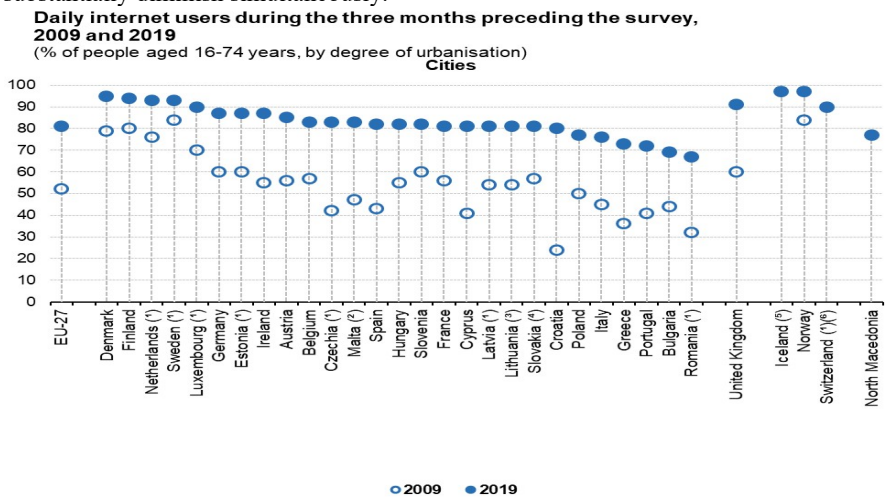

Figure 1. Daily internet users during three months preceding the survey, 2009 and 2019, by country, for the cities.
Source: Eurostat

1.3 Participation in social networking

Social networks play an important role in today's Internet. They contain huge amounts of data and are challenging (Rehman and Asghar, 2020). Social networks are an excellent source of information that reflects the real life of people in the digital space (Kalinin et al., 2020). They make it possible to discover various aspects of the socio-economic behavior of the user (Kalinin et al., 2020). The use of social networks, primarily Facebook, Instagram, TikTok or Twitter, is closely related to the user's age. These digital tools are mostly used by the younger population who embrace new applications and services because they are looking for alternative ways to exchange text, pictures, sound, video and other information.

Table 3. People participating in social networks during the three months preceding the survey, 2019 (% of people aged 16-74 years, by NUTS 2 regions)

	Lowest region	National average	Highest region	min	mid	max
EU-27	30	54	82	0,0	30,0	52,0
Denmark	77	81	82	0,0	77,0	5,0
Belgium	73	76	82	0,0	73,0	9,0
North Macedonia		68		0,0	68,0	0,0
Montenegro		62		0,0	62,0	0,0
Turkey	43	60	73	0,0	43,0	30,0
Serbia	52	55	59	0,0	52,0	7,0
Albania		48		0,0	48,0	0,0

Source: Eurostat (online data codes: isoc_r_iuse_i and isoc_ci_ac_i)

According to the analyzed indicators in 2019, 54 % of the adult population of EU-27 used social networks. The use of social networks differs significantly between age groups. Approximately 9 out of 10 people aged 16-24 used social networks, compared to less than one in five people aged 65-74. At least half of the adult population used social networks, 138 out of 197, NUTS level 2 regions in 2019. The share of adults who participated in social networks reached 82 %, or three quarters, in 15 regions in the EU. The lowest level of use was observed in the regions of France (34 %) and Italy (40 %). Compared to the EU countries, in the countries of the Southwestern Balkans, Turkey has the highest level of use of social networks with 73% of the population, while R. N. Macedonia is second with 68 % of the population. The lowest level of use of social networks is observed in Albania with 48 %.

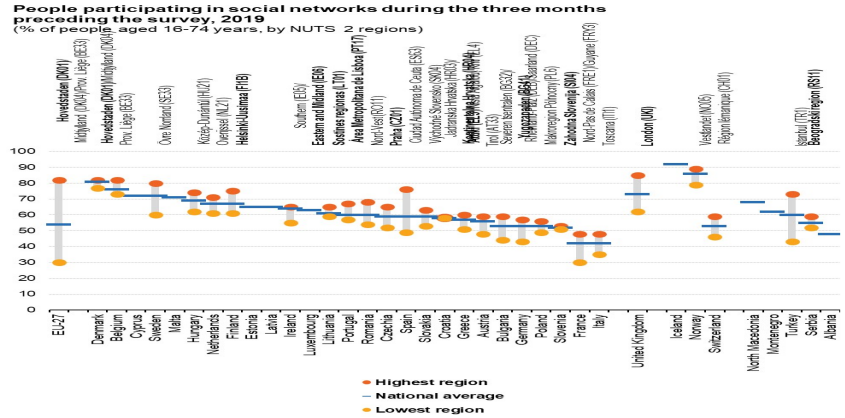

Figure 2. People participating in the social networking during three months preceding the survey, 2009 and 2019, by country, for lowest, highest and average regions.
Note: ranked on national average. Regions listed above the figure are those with the highest ratio. *Note*: Capital regions are indicated by a bold typeface. Germany, Greece, Poland, the United Kingdom and Turkey: NUTS 1 regions. Albania: national data. Ciudad Autónoma de Ceuta (ES63), Corse (FRM0) and Mellersta Norrland (SE32): low reliability. Albania: 2018.
Source: Eurostat

In Figure 2 are displayed people participating in the social networking (% of individuals aged 16 to 74) during three months preceding the survey, for 2009 and for 2019, by country, for lowest, highest and average regions.

This situation indicates the digital divide that is evidently large between the EU member states and the countries of the region as a result of the insufficient focus of government policies on investing in technological innovation and educating the population on the use of digital tools.

1.4 Online Banking

The use of online banking, to some extent, reflects the availability of the Internet. An individual's choice of whether or not to use the Internet for banking often comes down to trust. ICT helps organizations adapt and improve their quality of service (Sembiring, 2015). There is a noticeable variation of the population (aged 16-74) in the EU-27 in terms of internet use 81 % and internet banking 55 % in 2019. Of these, 72 % used online banking by people aged 25 to 34, while less than a third of the population aged 65-74 used internet banking.

Table 4. People making use of the internet for banking during the three months preceding the survey, 2019 (% of people aged 16-74 years, by NUTS 2 regions)

	Lowest region	National average	Highest region	min	Mid	max
EU-27	4	55	95	0,0	4,0	91,0
Netherlands	85	91	95	0,0	85,0	10,0
Finland	88	91	94	0,0	88,0	6,0
Sweden	78	84	95	0,0	78,0	17,0
Turkey	17	35	49	0,0	17,0	32,0
Serbia	12	18	30	0,0	12,0	18,0
North Macedonia		15		0,0	15,0	0,0
Montenegro		3		0,0	3,0	0,0
Albania		2		0,0	2,0	0,0

Note: ranked on national average.
Source: Eurostat (online data codes: isoc_r_iuse_i and isoc_ci_ac_i)

In all NUTS Level 2 regions, more than four-fifths of adults used Internet banking in 2019. The highest level of use is observed in the Netherlands and Sweden 95 %. In other regions of the EU, less than four-fifths of the adult population used online banking. Approximately one third of all regions in the EU, i.e. less than 50 % of the adult population used the Internet for online banking in 2019. Generally lower in rural and remote regions and higher in urban regions. This share did not rise above 15 % in any of the other regions in these two EU member states. Unlike EU countries, the value of using e-banking in the region countries is much lower. The highest level of application of 35 % is in Turkey, and the lowest in Albania 2 %. In R. N. Macedonia 15 % of the population in 2019 used e-banking, which is a low percentage compared to EU member states.

1.5 Interaction with public authorities

The area of analysis and interpretation in this study is the digital interaction of citizens with the public authority to improve service delivery. In many EU Member States, individuals engage in a wide range of online interactions with public authorities.
The analysis notes approximately the same value in the use of the Internet for communication with public authorities 53 %, and the use of e-banking 50 % of the adult population in the EU-27. Although 81 % of the population uses the Internet, the value of using the Internet with public authorities and e-banking is low. There are significant differences between EU member states in terms of the participation of people communicating with public authorities online. In one-fifth of NUTS level 2 regions in the EU, 75 % of the adult population used the Internet to communicate with public authorities in 2019. The highest percentage of Internet use for communication with public authorities is observed in the Nordic member states 94 %, the lowest in Romania 10%. The situation in the countries of the region is unsatisfactory compared to EU countries. Turkey has the highest level of 51 % of citizens' communication with public authorities, while Albania has the lowest level of 13 %. R. N. Macedonia participates in that segment with 25 % of the citizens, which is unsatisfactory compared to the EU countries.

Table 5. People interacting with public authorities over the internet during the 12 months preceding the survey, 2019 (% of people aged 16-74 years, by NUTS 2 regions)

	Lowest region	National average	Highest region	Min	mid	max
EU-27	8	53	94	0,0	8,0	86,0
Denmark	89	92	94	0,0	89,0	5,0
Finland	84	87	93	0,0	84,0	9,0
Sweden	81	86	94	0,0	81,0	13,0
Turkey	31	51	67	0,0	31,0	36,0
Serbia	19	29	46	0,0	19,0	27,0
North Macedonia		25		0,0	25,0	0,0
Montenegro		23		0,0	23,0	0,0
Albania		13		0,0	13,0	0,0

Source: Eurostat (online data codes: isoc_r_gov_i and isoc_ciegi_ac)
Note: ranked on national average.

1.6. Ordering goods and services online

E-commerce is significantly present as a potential that configures the geography of consumption by expanding consumer choice and reducing remote pricing in EU regions. This is especially true in social networking, where people in the community show a similar interest in the trend in the community, for example, buying the same products in network marketing (Narantsatsralt end Cang, 2017). As with internet banking, an individual's choice of whether or not to use e-commerce may be partly related to trust.

Table 6. People buying/ordering goods or services over the internet for private use during the 12 months preceding the survey, 2019 (% of people aged 16-74 years, by NUTS 2 regions)

NUTS	Region name	Value	Flag	Class
NL31	Utrecht	89		5
NL32	Noord-Holland	84		5
NL33	Zuid-Holland	82		5
ME00	Montenegro	16		1
MK00	North Macedonia	29		1
AL	Albania	5	National	1
RS11	Beogradski region	44		2
RS12	Region Vojvodine	37		2
RS21	Region Šumadije i Zapadne Srbije	29		1
RS22	Region Južne i Istočne Srbije	31		2
TR1	Istanbul	41	NUTS 1	2

Source: Eurostat (online data codes: isoc_r_blt12_i and isoc_ec_ibuy)

E-commerce values in 2019 in the EU-27 are relatively high. 60 % of the population aged 16-74 bought or ordered goods or services online. The use of e-commerce is closely related to age. The population aged 25-34 were almost three times more likely to use the internet to buy or order goods or services – 79 %, compared to people aged 65-74, 28 %. The values indicate that there is a relatively balanced distribution around the EU-27 average when analyzing the propensity to use e-commerce at the regional level: 99 NUTS level 2 regions are above the EU-27 average, while 97 regions are below the average. Regarding the countries of the region, the highest percentage of 44 % of the population using e-commerce in Serbia, the lowest percentage is observed in Albania of 5 %. In North Macedonia 29 % of residents use the Internet for e-commerce, which is a significantly low level of Internet use for that purpose. The indicators indicate low values of the region in the use of e-commerce compared to the EU-27 countries.

CONCLUSIONS

This study examines several aspects of the impact of ICT as a factor in the economic growth of the EU-28 and the countries of the region.

The impact of information and communication technologies (ICT) is significant for economic growth in high-income countries, while less significant effect is observed in iddle-income countries. It is also noticeable that the impact of ICT on economic development is positive for low to middle income and low income countries. The main indicator of the level of economic development is the GDP per capita in PPS, which is an index of the volume of GDP per capita in the Purchasing Power Standards (PPS), expressed in relation to the European Union average set at 100 (EU27_2020 = 100).

Internet use across regions in terms of social networking, Internet banking, e-government and e-commerce are considered separately. The values for the EU-28 are compared with those for the countries from the region. The digital division between older people in urban and rural areas has also been studied.

Regarding the use of the Internet, it is noted that in the older population there are significant side effects. Substantial concerns about engaging children in social activities on the Internet have been raised.

Finally, European policies for shaping the digital single market are discussed according to the indicators of the analysis.

For all the considered indicators, significant discrepancies are noticed between the euro area and the countries in the region. For GDP per capita in PPP, the North Macedonia has the weakest results (index 38 and 40, almost a third of the value for the euro area).

In the case of Internet use, the differences are much smaller than in the case of GDP per capita in PPP. The North Macedonia has a high value (73 %), comparable to this for the Euro area (77 %). Other countries in the region are also show high values. However, the high values of the Internet usage indicator (percentage of people who frequently use the Internet) do not correspond to other ICT indicators.

Thus, only the percentages for participation in social networking are comparable to the value for the Euro area (82 %), North Macedonia (68 %). Internet banking and e-government values are low even for the euro area (55 % and 53 %, respectively). Low values are also observed in the case of internet banking.

The differences are very large in the case of e-commerce. The percentage of individuals who use the Internet to order goods or services in the euro area is very high (89 %), while for countries in the region it is significantly lower.

The case of the North Macedonia is especially interesting; While the indicator of the level of economic development is one of the lowest in the region, the ICT indicators are in the middle of these for the countries in the region and social networking is the highest (68 %). The above finding indicates that the potential for economic growth dependent on the use of ICT in the North Macedonia is quite high and should be considered as a benefit for accelerated power in the next period.

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