

TRANSFORMING ROMANIA INTO A KNOWLEDGE ECONOMY THROUGH ICT - CURRENT DEVELOPMENTS

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Abstract: *In a society dependent on information, knowledge seems to be the only power that guarantees socio-economic development and progress. The knowledge is considered to be the driving force of economic growth and a resource that can provide sustainable competitive advantage and for this reason generates a great interest in understanding knowledge, information, technology, learning and their role in social economic life.*

In this society in which knowledge occupies an important place, information and communication technology represents an important pillar because without it the transmission of knowledge cannot be achieved. From this perspective, this paper tries to present the current stage of development of the ICT sector in Romania and to propose some solutions to improve it.

Keywords: Knowledge economy, digitalization, Romania, information and communications technologies

1. Introduction

Information and communications technologies represent a pillar of the knowledge-based economy, because without it, knowledge transmission cannot be achieved. At the same time, the knowledge-based economy cannot be conceived even without content products that digitize knowledge itself [1].

A number of emerging trends in the global ICT sector are drivers of growth, innovation, changing business models and even the disruption of various economic sectors. Among the important trends we can mention [2]:

Connectivity: Electronic communications networks are gradually becoming channels

for mass consumption of multimedia content (music, movies, live broadcasts), for the widespread use of a large number of diversified applications and services (social networks, payment applications and e-commerce) and even for the remote control of various types of devices (sensors, video cameras, etc.).

Ubiquitous internet access: fixed (point) internet solutions are an already established method for connecting to the internet of many households and businesses worldwide.

Business digitalisation increases business productivity and contributes to increasing consumer satisfaction, with a positive effect on turnover [3]. The full realization of the

5G benefits at global level is expected by 2035, when the annual production of "5G enabled" products and services is forecast at USD 12.3 trillion [4].

The Internet of Things (IoT) represents, in terms of connectivity, an important innovation from economic and social point of view. Through IoT, it can be realized a network between objects and people through Internet. IoT can create intelligent ecosystems that perceive the environment, analyse and adapt in order to make our lives more safe and efficient. The significant increase in the number of IoT-connected objects at average annual rates of over 20% by 2022 [5] will be fuelled by an increasingly diverse range of usage scenarios and lower prices of connected devices / things.

Cyber security, trust and data sovereignty: the proliferation of IoT and the serving of more and more industries with personalized services mean that an increasing volume of private information, sometimes with high commercial sensitivity, is transported through communications networks. Due to the heterogeneous possibilities of network access, combined with advanced data processing techniques and the extraction of knowledge from them, data loss or their illegitimate use can have severe consequences. Thus, securing communications infrastructures must be accompanied by securing services from their design, through a user-centered approach.

2. ICT in Romania

In recent decades the Central and Eastern Europe countries have had a remarkable development. Between 2004 and 2019, the GDP per capita in the Central and Eastern Europe countries had an increasing of 115%. This success of the CEE countries has been largely due to consolidation of the The present ITC sector performance is not very favourable for Romania because

economy, lower labour costs, increasing exports and foreign investment, the efficient utilization of the European Union funding. This growth trajectory can be maintained through digitization. Central and Eastern Europe countries can obtain economic benefits from digitization, mainly due to possible productivity increases [6].

In 2017-2019, the digital economy in CEE countries grew by approximately 8% per year and the growth rate was superior to the growth rate of the "Big 5" - France, Germany, Italy, Spain and the United Kingdom. Between January and May 2020, the digital economy in the CEE countries had an impressive growth, reaching in the first 5 months of 2020 78% of the growth recorded in 2019 [6].

Due to recent developments, we can say that in the near future the world will be more digitalized. The current pandemic has shown how important digitalisation is for national economies, allowing work and economic activities to continue in many sectors of activity, the exchange of information on the spread and treatment of Sars Cov2 infection, the acceleration of the medicines and vaccines search.

Romania is an important regional centre for software developers, several cities being associated with the IT sector. Among them is not only Bucharest, but also Cluj, being often mentioned as "Silicon Valley of Europe", Timisoara, Iasi or Brasov. Statistics show that Romania has a higher number of software developers per capita than in the United States, China or Russia. IT&C specialists in Romania are especially famous for software development, web pages or fintech. Regarding the number of employees in the ITC sector, Romania has a high level, having almost 200 thousand specialists and being close to the level of the Czech Republic [7].

according to the DESI 2020 report Romania occupied the 26th rank from the of 28 EU member states.

The digital performance of Romania has not changed in the case of four out of five dimensions measured by DESI. Romania has achieved the best results in terms of

connectivity due to the use of very high speed broadband services (at least 100 Mbps) in 49% of homes in Romania [8]. However, Romania's performance is the lowest among EU Member States in terms of digital public services and the use of internet services.

Table 1 Romania's position in DESI 2020

DESI dimensions	Romania Score	EU Score	Maximum score	Romania's rank
Connectivity	14	12.5	16.5 (Denmark)	11
Digital competences	8.29	12.3	19.6 (Finland)	27
Use of internet services	5.38	8.7	11.5 (Finland)	28
Integration of digital technology	6.51	8.27	14.9 (Ireland)	27
Digital public services	7.26	10.8	13.4 (Estonia)	28

Source: Data processed by author based on European Commission DESI 2020 report.

In terms of connectivity Romania ranks 11th among EU member states. Romania has very good results in the indicators fixed very high capacity networks (VHCNs) and the use of broadband services of at least 100 Mbps (68% and 49%, respectively). In terms of the use of broadband services of at

least 100 Mbps, Romania still exceeds the EU average (49% compared to 26% in EU) but lagged behind in terms of 4G coverage (85%, ranking well below the EU average of 96%). Regarding the degree of readiness for the 5G use, Romania has a score of 21%, similar to the EU average.

Table 2 Connectivity dimension in Romania and EU

Connectivity indicator	Romania	UE
Overall fixed broadband take-up (% households)	66%	78%
At least 100 Mbps fixed broadband take-up (% households)	49%	26%
Fast broadband (NGA) coverage (% households)	82%	86%
Fixed Very High Capacity Network (VHCN) coverage(% households)	68%	44%
4G coverage(% households)	85%	96%
Mobile broadband take-up Subscriptions per 100 people	86	100
5G readiness	21%	21%
Assigned spectrum as a % of total harmonised 5G spectrum		
Broadband price index Score (0-100)	92	64

Source: Data processed by author based on European Commission DESI 2020 report

From the human capital point of view, Romania ranks 27th out of the 28 EU countries. Romania registers a higher value than the EU average in the case of ITC graduates, with 5.6% of all graduates (compared to the EU average of 3.6%).

The levels of at least basic digital skills and at least basic software skills are far below the EU average. Compared with the EU average of 58%, 31% of Romanians have at least basic digital skills. In the same time occupies also a weak position in terms of

basic software skills, 35% of Romanians having basic software skills (compared to EU average of 61%). Only 10% of people have above basic digital skills and for this reason Romania occupies the last position

in EU. Romania's unfavourable is consolidated by the percentage of ICT specialists, they representing only 2.2% of the workforce, while in EU the average being 3.9%.

Table 3 Human capital dimension in Romania and EU

Human capital indicator	Romania	EU
At least basic digital skills(% individuals)	31%	58%
Above basic digital skills(% individuals)	10%	33%
At least basic software skills(%individuals)	35%	61%
ICT specialists (% total employment)	2,2%	3,9%
Female ICT specialists (% female employment)	1,2%	1,4%
ICT graduates(%graduates)	5,6%	3,6%

Source: Source: Data processed by author based on European Commission DESI 2020 report

Romania's weak position is sustained by the lowest level of Internet services use. 18% of people aged 16 to 74 have never used the internet (EU average: 9%). However, there are two online activities in which Romania ranks 6th in the EU. These are the use of social networks (82%, compared to an EU average of 65%) and video calls (67%; EU average: 60%). In contrast, the use of online banking (11%), shopping (29%), reading news (55%), as well as the consumption of music, videos and online games (63%) are the lowest among EU Member States. [8]. The low level of online banking services use is due to the fact that more than two out of five Romanian adults (42%) do not have a bank account [9].

Compared with the EU average, the utilization of digital technology by companies in Romania is much lower, 23% of Romanian companies exchanging information electronically, 8% using social communication platforms (EU average: 25%) and 11% make online sales (EU average of 18%).

Also, in the last three years the utilization of the digital public services puts Romania in the last position in EU. In contrast, Romania ranks 8th in terms of users of e-government services, with 82% of Internet

users, compared with the EU average of 67%.

In order to deal with the crisis caused by the COVID-19 pandemic Romania has taken several specific measures in the information technology field. Among these measures we can mention:

- the application of the Ministry of Health used to centralize the data regarding the number of infected people;
- creation of a website for the electronic transmission of the necessary documentation for granting technical unemployment (<https://aici.gov.ro>);
- creating information websites for citizens to provide clear and concise information about the Sars Cov2 virus and to combat misinformation (<https://stirioficiala.ro>, <https://datelazi.ro>, <https://fiipregatit.ro>)
- the adoption of a Government Decision on May 7, 2020, by which the budget of the Ministry of Education for 2020 was supplemented with the amount of RON 150 million (approximately EUR 24 million), for the purchase of laptops for 250,000 children. The aim was to ensure access to distance learning activities for students from disadvantaged areas enrolled in pre-university education units.

3. Conclusions

The results of the analysis show the improvement of ITC sector development in Romania. But nevertheless, Romania is on the penultimate place in Europe in terms of digital competitiveness. Although we are proud of both our cheap and fast internet services and an IT industry, in fact, these achievements hide the fact that we are lagging behind with the essential infrastructure and skills that would allow us to adapt to the economy of the 21st century. Although it may seem only a passing fad in the world of corporations, digitalization is an indispensable element for the recovery and development of the Romanian economy. In this context, the EU is committed to supporting economic recovery in view of the transition to climate neutrality and resilient digital transformation. For this reason, the development of the population digital skills, the organizations and public administration digitalization are essential for a solid recovery.

A solution for the Romania's digitalization and the development of the ICT sector is

the efficient use of the non-reimbursable funds allocated by the EU for the financing of various projects. Thus, a financing facility is represented by the continuation of the European Interconnection Mechanism [10], an initiative of the European Commission in collaboration with the European Investment Bank for the development of cross-border transport, communications and energy networks, and in the period 2021-2027, with the aim to support investments in cross-border transport infrastructure (including smart and autonomous transport), energy and digital transport [11]. Too these will be added funding available through the Digital Europe Program in five directions: supercomputers, artificial intelligence, cyber security, advanced digital skills and the widespread use of digital technologies. In addition, the new Invest EU Program will provide funding in particular to the private sector for projects that support the development of high-capacity digital networks and the development and operationalization of digital services and technologies.

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