DIGITALIZATION AND AGRICULTURE - IMPACT ON HUMAN RESOURCES IN THE EUROPEAN UNION AND ROMANIA

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Abstract

The paper aims to identify the main aspects of digitalization in the EU and Romania at present, in general, and emphasizing on agriculture, because in this sector has a deep impact on infrastructure and work resources. The EU average for DESI index quantifying digital economy performance was compared with the index in the member states to show the differences in the performance of the digital economy. The aspects related to the impact of digitalization in agriculture from many points of view, but mainly on human resources have also been highlighted. Index scores differ from one country to another and reflect the performance result of the efforts that each member state has made to implement digital economy. The higher the index value, the higher the digital economy performance in that country. During the period 2017-2022, Finland, Denmark, the Netherlands and Sweden have maintained their top position in the EU, while Romania and Bulgaria are situated on the last places. Romania should be focused on the improvement of digital infrastructure, promotion of digital competences, innovation and entrepreneurship in order to increase its performance in digital economy. Major efforts should be done to improve connectivity, educational programmes in digital competences and to develop a favourable business environment for contributing to its digital transformation and integration into the EU digital unique market.

Key words: *digitalization, agriculture, human resource management, economy, European Union, Romania*

INTRODUCTION

The era of IR 4.0 digital transformation and of 4.0 industries, IoT and Artificial Intelligence/Machine Learning has a deep impact on decision making and personnel competences. The exponential growth of the information volume has led to changes in systems complexity, which have become automated and are called to offer predictions based on models, algorithms and structured data in a short period of time [22]. Business Intelligence has become a tool more and more used for making right decisions in order to attain the proposed objectives.

Artificial intelligence can have implications in business and digital economy and brings its contribution to the economic growth [4].
Other authors affirm that AI technologies will have also a deep impact on jobs which will become more automated, but the effect on employment is not obvious because it will depend on the nature of demand [3] and that automatization may affect the job market and the employees' adaptability to run new tasks [2], while [18] considers that digitalization could lead to jobs redistribution, the need for new competences and jobs.
The EU pays a special attention to digitalization in all the fields of activity,

agriculture and rural development being included.

The twin digital economy and green deal will accelerate the pace to change all the aspects of our lives and will have a deep impact on the future of work, job types, structure, labour market, personnel recruitment, productivity and income level [5].

The EU aims at digital economy to become a tool of "solidarity, prosperity and sustainability for empowering work force and businesses, ensuring the security and resilience of its digital ecosystems and supply chains" [11].

The NextGenerationEU (NGEU) is destined to offer "financial support for public and private investment to drive "a sustainable and resilient recovery", "repair the immediate damage caused by the COVID-19 pandemic" and "support the EU's green and digital priorities" [28].

The NGEU emphasizes the need of digitalization in order to ensure the sustainable economic development, job creation by means of research, innovation and development.

Digitalization can be a helpful tool to develop smart technologies, able to monitor resources, energy consumption, reduce waste, capture carbon, diminish greenhouse gas, reducing the impact of climate change, promoting sustainable development, good business models and practices, solutions to reduce poverty and eliminate social exclusion, improve medical system and health [12].

Intelligent agriculture is required to produce more and of higher quality food ensuring food security and safety [9, 10].

Mobile technologies, remote sensing services, robotized systems for assisting crop and animal growing, intelligent water delivery, chemicals control in smart agriculture, work platforms will increase production and efficiency across the product chain and will reduce the operational expenses.

However, agriculture, like many other economic fields, is facing challenges and difficulties in the implementation of the digitalization, regarding the work force recruitment, professional reconversion, data protection and cyber-security [17].

The key of success will depend on the implementation of the IoT infrastructure in agriculture in order to use Big data systems which can provide viable solutions for a sustainable agriculture [21].

In Romania, the National Programme for Recovery and Resilience aims to combine the objectives of the Green Deal with Digitalization, a sustainable economic development, social and territorial cohesion, health and institutional resilience, education and competences [29].

The quantification of digital economy performance in the EU is made by means of a composite index named DESI - Digital Economy and Society Index, which allows the comparison between the member states across five dimensions: Connectivity, Human capital use, Use of Internet, Integration of Digital technologies and Digital public services [8].

Index score as a whole and by each of its dimensions differs from a country to another and reflect the performance result of the efforts that each member state has made to implement digital economy. The higher the index value, the higher the digital economy performance is in that country.

In this context, the purpose of the paper is to identify the main aspects of digitalization in the EU and Romania at present, in general, and especially in agriculture, where the implementation of digital economy is a more complex process with a deep impact on human resources.

MATERIALS AND METHODS

This study is based on various information sources, documents from the European Union, data from Statista and National Institute of Statistics, and results mentioned in various published articles on the topic.

To characterize the performance of digital economy in the EU member states, the following specific indicator was used: Digital Economy and Society Index (DESI), with its five dimensions: (1) connectivity, (2) human capital, (3) use of Internet services, (4) integration of digital technology, (5) digital public services, which have been analysed

separately, pointing out the highest and the lowest scores among the EU member states.

(1) *connectivity* refers to: broad band coverage, the high scores reflecting opportunities for using digital skills, Internet services, digital technology and access to digital public services.

(2) *human capital score* indicates the Internet user skills and employment of the ICT specialists.

(3) *use of Internet services* refers to: the frequency of accessing the Internet for online activities and transactions.

(4) *integration of digital technology* refers to the impact of digital technology on business environment.

(5) *digital public services* characterize the efforts made by the Government to improve the communication with the public via online tools.

The EU average DESI score was used as a reference term for making comparisons with the scores obtained by the EU member states, pointing out the countries with the highest and lowest performance in digital economy.

The structured ideas and logical presentation belong to the authors' decision.

First, it was presented in brief a statistical situation at the EU level and then in different member states, and also separately in Romania.

The role of the digitalization was approached in general and also in particular, in agriculture. A special attention was given to challenges and thresholds facing digitalization in agriculture, opportunities for digitalization in agriculture and other fields, impact of digitalization on human resource management.

RESULTS AND DISCUSSIONS

Brief statistical view on digitalization in the EU and Romania's economy and society
DESI - the aggregate digital economy and society index score
In 2022, the EU average DESI - the aggregate digital economy and society index score was 11.4 for Human capital, 15 for Connectivity, 9 for Integration of digital technology and 16.8 for Digital public services.

For this index, in the period 2017-2022, Finland, Denmark, the Netherlands and Sweden have maintained their top positions.

Romania registered 7.73 for Human capital, 13.8 for Connectivity, 3.8 for Integration of digital technology and 5.3 for Digital public services, all these results being far away from the EU average [44].

Taking into account "Human capital", the EU average score of 11.4 was exceeded by the following countries, in descending order: Finland 17.8, the Netherlands 15.8, Ireland 15.7, Sweden 15.5, Denmark 14.8, Luxemburg 14.4, Malta 14.1, Estonia 13.5, Austria 12.7, France 12.5, Belgium 12.2 and Portugal 11.5.

The last positions were occupied by Bulgaria with 8.8 and Romania with 7.73 [52].

For "Connectivity", the EU average of 15 was surpassed, in the descending order, by: Denmark 19.3, the Netherlands 17.5, Spain 17.4, France 16, Ireland 15.4, Sweden 15.1.

On the last positions came Belgium with 10 and Poland with 11.6, while Romania and Bulgaria scored 13.8 and, respectively 12.7.

For "Integration of digital technologies", the EU average index score was 9 in 2022. A higher index score was achieved by: Finland 14.8, Denmark 14.5, Sweden 14.1, the Netherlands 13, Malta 12, Belgium 12, Ireland 10.8, Italy 10.2, Austria 10, Spain 9.6, Portugal 9.6, Lithuania 9.3, Croatia 9.2, Estonia 9.1.

At the opposite pole, there were Bulgaria and Romania with the lowest index: 3.9, and, respectively 3.8.

For "Digital public services", the EU average score was 16.8, this value being higher in case of: Estonia 22.8, Finland 21.8, Malta 21.5, the Netherlands 21, Ireland 20.9, Denmark 20.8, Luxembourg 20.8, Sweden 20.5, Lithuania 20.4, Latvia 19.2, Austria 18, Slovenia 17.4, Portugal 17.

The lowest values were scored by Romania 5.3 and Greece 9.8. Bulgaria and Slovakia had 13 each [44].

Access to Internet
In January 2023, the number of the world Internet users reached 5.9 billion, being by 8% higher than in 2022 and representing 64.4% of the globe population. Also, the

number of social media users accounted for 4.88 billion [45].

In the EU, the share of households with Internet access increased from 64.15% in 2009 to 92.44% in 2022. The access to Internet differs from a country to another.

The highest level belongs to the Netherlands 98.2%, Luxemburg 97.6%, Finland 97.5%, Spain 96%, Denmark 95.1%, Sweden 94.35, Belgium 94%.

Romania has 89.42% coming on the 6th position from the end of the list [47].

Digital skills of Internet users index score

This indicator is also different, the users being divided into two categories: above basic digital skills and at least basic digital skills.

Table 1. Digital skills of the Internet users in the EU by skill level in 2022

Country	Above basic digital skills	At least basic digital skills
EU-Average	10	27
Finland	18.2	39.6
Netherlands	19.6	39.5
Ireland	15	35.2
Denmark	14.2	34.3
Sweden	13.5	33.3
Spain	14.4	32.1
Luxemburg	12	31.9
Austria	12.7	31.7
Croatia	11.8	31.7
France	11.8	31.0
Malta	13.4	30.6
Czechia	9.1	29.8
Estonia	10.5	28.2
Portugal	10.8	27.7
Slovakia	7.9	27.6
Belgium	10	27.1
Greece	8.2	26.2
Latvia	9	25.4
Cyprus	7.9	25.1
Slovenia	7.5	24.8
Hungary	8.2	24.5
Germany	7.1	24.5
Lithuania	8.7	24.4
Italy	8.5	22.8
Poland	7.8	21.5
Bulgaria	3.0	15.6
Romania	3.3	13.9

Source: [48].

By member state, the situation of digital skills score in the EU in the year 2022 is shown in Table 1.

The data shows that the top position is occupied by Finland with 39.6 score and Romania is situated on the last position for 13.9.

Access to Internet in the urban and rural areas

The access to Internet as well as the digital skills are completely different in the rural area versus urban area.

In the cities, there is a higher percentage of households connected to the Internet and more population has digital skills, compared to the people living the communes and villages.

At the EU level, the average percentage of households having Internet at home increased from 2007 to 2022 as follows: in the cities, from 57.07% to 94.08%; in towns and suburbs from 56.5% to 92.9%; in the rural areas from 42.7% to 90.03% [49].

The share of daily Internet users

Also, the share of daily Internet users increased in the EU from 59.5% in 2013 to 84% in 2022 [50].

The share of ICT professionals in the EU total workforce

Concerning this indicator, the average in the EU is very small, just 4.55. But, a higher percentage of professionals is present in the following member states: Sweden, Finland, Luxemburg, Netherlands, Ireland, Estonia, Denmark, Belgium, Malta, Germany, Slovenia, Portugal, Czechia, France and Austria.

Below the EU average, there are: Romania with 2.6% on the penultimate position and Greece with 2.4% on the last place [51].

Comparative analysis between Romania and other EU Countries concerning the assessment of digital economy

Table 2 offers a comparative analysis of the EU member states regarding the performance of digital economy (DESI) 2022, whose level is given by Connectivity, Human capital, Integration of digital technologies and Digital public services.

The global competitiveness index 4.0 2019 measures the country competitiveness defined as the set of institutions, policies and factors which determine the productivity level based on innovation, technological development and business complexity.

According to DESI 2022 Report, Romania obtained a score of 30.58, reflecting the lowest level of the digital economy performance versus the other EU states [46]. Romania has still big problems regarding the DESI dimensions.

Table 2. Comparisons between the values of three index among the EU countries for the evaluation of the performance of the digital economy

EU member states	Digital Economy and Society Index (DESI) in 2022	Global competitiveness Index 4.0 in 2019	Easiness to make business in 2020
Austria	54.68	76.6	78.7
Belgium	50.31	76.4	75.0
Bulgaria	37.68	64.9	72.0
Croatia	47.55	61.9	73.6
Cyprus	48.35	66.4	73.4
Czechia	49.14	70.9	76.3
Denmark	69.33	81.2	85.3
Estonia	56.51	70.9	80.6
Finland	69.6	80.2	80.2
France	53.33	78.8	76.8
Germany	52.88	81.8	79.7
Greece	38.93	62.6	68.4
Hungary	43.76	65.1	73.4
Ireland	62.74	75.1	79.6
Italy	49.25	71.5	72.9
Latvia	49.71	67.0	80.3
Lithuania	52.71	68.4	81.6
Luxemburg	58.85	77.0	69.6
Malta	60.88	68.5	66.1
Netherlands	67.37	82.4	76.1
Poland	40.55	68.9	76.4
Portugal	50.76	70.4	76.5
Romania	**30.58**	**64.4**	**73.3**
Slovakia	43.45	66.8	75.6
Slovenia	53.37	70.2	76.5
Spain	60.77	75.3	77.9
Sweden	65.22	81.2	82.0

Source: [7, 46].

Regarding the Global Competitiveness Index 4.0 2019, Romania came on the 51st position of a number of 141 countries. On the top position was Singapore with 84.8 score and on the last position was Ciad, with 35.1 on a scale from 0 to 100.

Romania's position in this hierarchy suggests that it needs improvements in innovation and technological training at the national level.

From this Table, it is observed that Finland, Denmark, Netherlands, and Sweden have the best results in digital economy, DESI index having the highest levels and the global competitiveness index as well for these countries.

They developed a advanced digital infrastructure, high digital competences and favourable business environment.

As a member of the EU, Romania plays a significant role in the digital economy and has succeeded in achieving important progress in the last years.

Romania made significant investment in large-band infrastructure, which allowed a large-scale access of high-speed Internet. According to the data from National Institute of Statistics, starting from the year 2022, 82.1% of the households in Romania have access to Internet. In addition, Romania is among the top countries regarding the 4G cover and Internet speed, factors which contributed to the extent of the digital services, electronic commerce and digital innovation (Table 3).

Table 3. Internet penetration rate in Romania (%)

Year	%
2016	65.0
2017	68.6
2018	72.4
2019	75.7
2020	78.2
2021	80.8
2022	82.1
Difference 2022-2016	+17.1

Source: Own calculation based on the data from [31].

Electronic commerce market has considerably increased from Euro 2.8 Billion sales in 2017 to Euro 6.3 Billion in 2022 [20, 35].

Romania improved its innovation eco-system for enhancing the digital transformation and entrepreneurship. Numerous technological parks, innovation centers and startup accelerators were established to support innovative business (Techcelerator, Innovation Labs and Impact Hub Bucharest).

Also, important efforts were made for IT education, digital literacy, professional development as more and more citizens to get digital competences (Digital Education Strategy, Digital Skills and Job Coalition and Code Week). However, there are still discrepancies regarding the digital abilities in the urban and rural areas in Romania and between Romania and other member states.

Digital economy includes a large range of activities: e-commerce, digital services, software development, information and communication technologies which have a direct and indirect contribution to GDP, whose level in 2022 was 6% [20].

Role of digitalization in agriculture

Digitalization is a path and a tool to technologies and management change in agriculture, rural communities and people and by innovation it is called to strengthen and sustain this sector of activity in order to increase productivity, product quality, agricultural households profitability and economic efficiency [33].

Agriculture needs a smarter digital approach and also a green dimension to boost local production, to shorter food chain from farmers to consumers, to strengthen fair collaboration along the value chain and ensure food security and safety [23].

Digitalization is expected to change farmers' age structure, increasing the share of young farmers who will have not only high technological and economical knowledge and skills, but also digital skills called to enable them to apply a modern and efficient farm management based on a digital decision making process [24].

Prediction and production forecasts could be easier set up by means of modern IT, high precision and artificial intelligence tools, thus reducing the business risks. Automatized and computerized technologies are called to monitor crops along all the stages of production, transport, storage, processing, delivery, helping the farmers to perform the planned parameters regarding yield, production, product quality and economic efficiency per surface unit [26].

Digitalization will also bring a surplus of value and precision in land monitoring, planning the territory, registration of the cadastral data [40].

The negative impact of climate change on agriculture could be diminished by using drones and satellite information, whose images could be processed by computers and software, offering to farm managers precious data to improve technologies and increase production, and reduce material and financial losses caused by extreme weather phenomena, such as strong storms, huge rainfalls, long and severe droughts, heat waves, floods etc. [19, 34].

To achieve this goal, digitalization should have a deep impact in the field of education, where a new type of educational strategy and system, programmes and curricula have been established to help young people: scholars, students, graduates, and future professionals in a word to become more employable in the workforce market, where digital knowledge and skills are more and more required [24, 25].

Digitalisation will create new jobs in agriculture and rural areas, will change the life of the rural population and could be a source generating income and a better living standard [27].

Challenges and thresholds facing digitalization in agriculture

As many researchers affirmed, the EU agriculture is dominated by small family farms, mainly of subsistence and semi-subsistence farms, with a small average size of 17.4 ha, the smallest one being in Romania, 4.2 ha [36].

Most of farmers are old and many of them have no digital knowledge and skills [41,42,43].

Most of the farms have not a modern technical endowment and no financial resources for investments [37, 39].

However, the EU provides funding at present to strengthen the activity and efficiency of the family farms.

More than this, only the large agricultural households have financial resources from which a part to be invested in innovative tools. They are endowed with computers, software, drones and other tools of high precision.

But, in Romania, large agricultural holdings represent 1% of the total number of farms, but they work about 52% of arable land.

Most of the farms lack of modern endowment with a deep impact on productivity [38].

Therefore, digitalization is needed to modernize the farms helping them to monitor crops, animals, agricultural processes, and business transactions.

In agriculture and in the rural areas, it is a lack of IT professionals, because they are employed immediately in the cities where the request of highly qualifies specialists in IT is very high. Even the demand of IT professionals in the city is not yet covered by the offer [32].

The educational programmes and curricula do not provide enough knowledge in IT and they should be replaced by new programmes sustained by a teaching staff with high competence, computer rooms and other digital tools to improve the technical endowment in schools, vocational and high schools.

More than this, taking into consideration the fast development of the new digital technologies, continuous education is needed to update digital knowledge and skills.

Opportunities for digitalization in agriculture and other fields

The legal framework

First of all, the EU has created the legal framework which favours the expansion of digitalization in the rural areas and farms.

In this respect we could mention: Digital Strategy 2020-2025, Digital Services Act Package (15 Dec.2020), and Digital Markets Act (DMA), 2030 Digital Compass, the European way for digital decade [53, 13, 16].

Digital economy operates in a complex framework of regulations and policies, both at the global level and in the EU and in each country.

Governments, international bodies and regional bodies like EU and Europe Council have implemented measures for approaching the challenges and opportunities of the digital economy.

These regulations regard: data protection and confidentiality, digital market, cyber-security, digital infrastructure.

Recover and resilience strategy

After the Covid-19 pandemic, the EU has established a recover and resilience strategy according to which "the EU's long-term EU budget, also known as the multiannual financial framework, will boost digital technologies and aid in recovery from the pandemic".

Budget for digitalization and other destinations

The EU budget of the new MFF accounts for €1.21 trillion. Also, a new recovery instrument called Next Generation EU which worth €810.57 billion will run from 2021-2024 (Table 4).

This budget will finance 7 programmes as presented in Table 4.

In addition, ICT investments for over €20 billion will be destined for digital cohesion across the EU, the funds coming from European Regional Development Fund (ERDF) [14].

Table 4. The EU Digitalization programmes " Next Generation EU" for 2021-2024

Programme	Destination	Budget (Euro Billion)	%
Total funding	Next Generation EU	810.57	100.0
Digital Europe Programme	supercomputing, core artificial intelligence, cyber-security, digital skills, business digitalization	7.6	0.9
Connecting Europe Facility-Digital	trans-European networks and transportation infrastructure, telecommunication and energy	2.07	0.3
Horizon Europe for Digital, Industry, and Space	artificial intelligence, next generation Internet, high performance computing, big data, key digital technology, 6G	95.5	11.8
Invest EU	investments in public and private sectors	26.2	3.2
Creative Europe MEDIA	Film and other media	1.4	0.2
EU4Health	Hospitals endowment and digitalization	5.3	0.6
Recovery and Resilience Facility	investments and reforms to sustain the green and digital transition and the resilience of the national economies	672.5	83.0

Source: Own calculations based on the data from [14].

In the EU agriculture, digitalization will help the stakeholders to benefit of a more streamlined value chain, with closer collaboration and improved communication between producers, processors, distributors, and retailers.

Also, new ideas and fresh perspectives will help the innovative SMEs to emerge and thrive, bolstering the industry.

Horizon 2020 programme provided more than €200 million for Research and Innovation (R&I) in digital technologies for the agricultural sector for smart farming systems, precision agriculture, integrated digital technologies into entire agricultural value chain. All these objectives aim to increase productivity and competitiveness in agriculture, and to diminish the environmental impact.

Important results have been already obtained in the development of one Robotics Digital Innovation Hub (DIH), also in IoT and digital platforms and additional R&I projects [15].

In Romania, "the Strategy regarding education digitalization in Romania" - Smart-education aims to ensure the access to a modern and accessible schooling system, based on digital resources and technologies [30].

This strategy provides the development of digital knowledge and skills for scholars and students, for emergent professions, initial and continue digital education for teaching staff, a high performance digital environment in education (infrastructure and digital technological resources, connectivity, open educational resources, cyber-security, data protection, online security and IT ethics).

Impact of digitalization on human resource management

Human resource is the key capital of a company and which contributes to its business success and attainment of the proposed objectives.

Digitalization will change the department structure within a company, favouring the sectors where digitized operations bring the highest efficiency.

Automatization of the activities will lead to a reduction of personnel with a positive effect to lower expenses with wages and contributions to the state budget.

But, on the other hand, automatization of the activities that employees have to fulfil will eliminate the manual tasks, will reduce the time for carrying out those activities, stimulating the focus on complex problems and a more efficient use of the working time.

In a digitalized company, new key performance indicators (KPIs) will be introduced regarding the training level, competences, abilities, skills, communication skills, collaborative attitudes, good work relationships among the employees and among the leaders and the subordinates.

Stability, cohesion, and efficiency in a company depends on the reliability and communication speed, and digitalization will increase communication efficiency in decision

making by fast transmission of decisions to subordinates and by rapid collection of the information from the departments to leaders.

Digitalization is a solution for developing more efficient working teams [6].

Personnel recruitment will be improved and adapted to the requirements of the company regarding competences, abilities, skills emphasizing on digital skills, professional knowledge and work experience, fast and logical manner of thinking, abilities to run the competition for a vacancy using the pilot platform or to behaviour during an interview. All the received data will be stored, structured an objectively analyzed in order to select the best candidate who suits to the company's requirements.

The salary levels will be negotiated according to the tasks that need to be fulfilled in accordance with the digital job requirements.

After employment, the new employees will be periodically evaluated based on their achievements, will be encouraged and supported to improve their performance, to be motivated, and to develop their careers [1].

Digitalization will change the future potential employees in agriculture as well. They will have a new profile, new competences and will be for sure more employable.

The human resource management will be changed starting with the recruitment process, which will be based on solid knowledge and skills, not only in the field of technologies and economy, but also in digital competences [54].

This will change the personnel structure by work sectors, and also will change the promotion criteria, salary levels, labour productivity and work quality, management KPIs, involvement in the company life, attachment and fidelity.

More than this, the fast changes in the field of digital technologies will require a periodical training of the employees for updating their knowledge and skills for sustaining the productivity and competitiveness of the agricultural holding the business environment.

The use of artificial intelligence and high precision tools in agriculture will impose new competences to handle the new equipments and appliances, will create a more pleasant work environment, will reduce the working time and physical effort, will ensure comfort, develop a new way of approaching problem solving and way of thinking and acting. The employees will become more conscious of their role in the success of the company.

The media tools will facilitate a better and more effective communication between employees and between the company managers and subordinates.

The fast implementation of digitalization in a company depends not only on the financial resources allotted for innovation and digitalization, but also on managers' desire to implement it quickly and efficiently to sustain the company competitiveness in the business environment.

Therefore, the labour market requirements concerning the potential candidates for job vacancies will be more and more oriented to the ones who have strong digital skills, high training level, professionalism, competences and work experience.

Besides these requirements, the new employees will have to be flexible persons, easy adaptable to high time pressure work to sustain the competitiveness and economic and financial stability of the agricultural company. All these aspects reflect the need for employers to look for new methods in human resource management and implement the most effective ones.

Therefore, digitalization will contribute to the development of a new "digital culture" without which none could be employed in the future in any field of activity, agriculture being included.

CONCLUSIONS

The comparison between Romania and the EU average and also versus other member states for various indicators reflecting the performance in digital economy allowed to observe the huge discrepancies which exist at present and shows what Romania has to do to diminish these gaps.

By analysing the results in digital education, e-commerce, digital innovation, digital competences and Government initiatives, it is

easy to have an idea on Romania's position in the digital landscape.

Romania is facing major challenges regarding digital transformation and competitiveness.

Romania should be focused on the improvement of digital infrastructure, promotion of digital competences, innovation and entrepreneurship in order to improve its performance in digital economy. It must make efforts in the field of connectivity, educational programmes in digital competences and to develop a favourable business environment for contributing to its digital transformation and integration into the EU digital unique market.

Digital infrastructure and human resource management for having high professional and digital skilled employees are very important for a successful future, in all the fields of activity.

Digitalization in agriculture has to take into consideration its specificity regarding farm size, producers age, education level, financial resources, the importance of communication between farmers and their customers, to strengthen the food value chain, the need to develop a modern ICT infrastructure, to enable the employees to get digital skills, to improve the actual strategy to become more effective and develop services and digital applications according to the legislation in force in the EU.

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