THE IMPACT OF DIGITIZATION ON THE LABOR MARKET PATHS AND DEVELOPMENT OPPORTUNITIES

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Abstract
The digitization process of the Romanian society faces a series of essential problems. The gap of economic development at the level of the regions can be solved by digitizing the regional economies, the companies from the development regions and the institutions of education, health, public administration culture, the development of a precision agriculture and the digitized ecological economy. Therefore, this process will have a massive impact on the development of the labor market. In this article we aim to discuss issues related to the impact of digitization on the labor market, with the advantages and disadvantages of the digital revolution on the economy, society and first of all on human resources.

Keywords
Digitization of the economy, labor market, digital revolution.

JEL Classification
E2, O12

Introduction

The National Strategy on the Digital Agenda for Romania (2014) reflects the needs and also implicitly the vision of Romania regarding the development of the ICT sector. Mainly, there are 3 major areas of action: public administration and its modernization, the private sector and indirect support of its competitiveness, and the large population by ensuring access to ICT-type resources and digital inclusion.
A horizontal component regarding Romania's needs is on cyber security, which affects all areas of action equally. At the private sector level, Romania's vision is primarily aimed at developing the e-Commerce sector to ensure a retail sector that can be subsequently integrated into the single digital market. At the macro level of the population of Romania, the most

important need is to improve the degree of use of the broadband infrastructure, both regarding the total population and in the form of the urban-rural relationship (Bran et al., 2018). First field of action – *e-Governance, interoperability, security of computer networks and systems, cloud computing and social media.* Second field of action – *ICT in Education, Health and Culture.* Third field of action – *e-Commerce, ICT and research-development-innovation. The development of Romania's economy in line with global trends implies long-term development of the online commerce sector. The implementation of the actions in the third field of action generated in the period 2014-2020, an estimated impact on the Romanian economy of about 3% growth in the level of GDP and of 2% in terms of jobs.* The transition to a new paradigm, namely from the information society to the virtual society, has had a major impact on the way in which individuals carry out their activities, communicate and share their knowledge through collaboration (Rădulescu et al., 2018).

1. Evolution the access of Information Technology in Romania

Romania is growing in attractiveness on outsourcing, being behind Bulgaria, Poland and Lithuania. A.T. Kearney Global Services delivered a report regarding the attractiveness of outsourcing destinations and placed Romania 18th in the world in 2014 - up 7 positions compared to 2011 - Romania still outperformed in 2014 by states such as Bulgaria (9th place), Poland (2nd place) or Lithuania (15th place). According to the study Access of the population to information and communication technology in the years 2011 - 2014 the use of ICT products registered significant increases, in 2013. Regarding Romania as a representative project in the e-inclusion area was *"Access to the ICT and improvement of digital competencies"*. Population access to information and communication technology in 2014-2019, National Institute of Statistics, Romania. From a regional point of view, during 2010-2014 there is an obvious increase in the tendency of internet connection at the national level, from 38,9% in 2010 to 54,4 % in 2014. From a regional point of view, the highest percentage was in the households in the Bucharest – Ilfov region, almost 2 households out of 3 have internet access from home, increasing from 61,9 % in 2010 to 76,7 % in 2014, followed by the Western region increasing from 44,4 % in 2010 to 61,3 % in 2014. The lowest number of households with internet connection is in the following regions South West Oltenia -32 %, in 2010 and in 2014 with a value of 47.1%, South Muntenia 32, 9% in 2010 and reaching 33,1 % in 2010 and 46,1 % in 2014, staying on the last place, followed by the North-Eastern region 33,1 % in 2010 and 48,3 % in 2014 (Ciobanu, G., et al., 2015).

According to the methodological specifications for the study conducted by the National Institute of statistics, the source of data is the Statistical research on the population access to information and communication technologies which is conducted yearly, in argument with the Regulation of the European Council and Parliament no. 808/2004 related to the communitarian statistics on informatics society. Below we present, the Structure of households that have access to the Internet at home, according to the occupational status of the head of household, total house holding at national level and by development regions.

Table no. 1 The share of households that have access to a computer at home, by residence area, in total households in each residence area

Means of resident	Ani								
	2007	2008	2009	2010	2011	2012	2013	2015	2017
	%	%	%	%	%	%	%	%	%
Total	31,4	35	42,2	44,2	46,8	52	55,8	61,9	65,6
Urban	46	49,4	56,2	59,2	61,7	66,4	69,8	72,2	75,9
Rural	11,9	16,1	23	23,7	26,6	31,7	37,5	48,4	51,9

Source: www.insse.ro/

The Internet access has kept an increasing trend, the number of subscribers per thousand inhabitants reached 497.6 the increasing trend was also reflected in the number of Internet users per thousand inhabitants, thus, in 2013, there were about 173 users, compared to about 162 in 2012. The number of mobile phone subscribers has been increasing, which was visible from the point of view of complexity and quality of service.

Table no. 2 The share of households that have access to the Internet at home, by residence area, in total households from each residence area

Means of	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
resident	%	%	%	%	%	%	%	%	%	%	%	%	%
Total	20,5	27,3	35,1	38,9	43,3	49,3	52,9	54,4	61	65	68,6	72,4	75,7
Urban	33,6	42,5	50,8	54,3	59,3	64,6	68,3	68,3	71,9	74,5	77,5	81	82,5
Rural	3	7,6	13,5	17,8	21,8	27,7	32,8	36,3	46,6	52,3	56,9	61,5	66,7

Source: www.insse.ro/

In Chart 3 we present the *Proportion of the households with internet access at home, according to the occupational status of the head of household, on types of connections used and residence areas.*

Table no. 3 Types of Internet connections in households

Broadband connections	2014	90,9	91,5	91,2	93,2	90,5	83,8
	2015	96,4	97,3	93,5	100,0	94,9	99,6
	2016	96,8	97,7	92,5	98,4	96,0	98,3
	2017	97,3	97,3	96,9	97,0	97,4	97,3
	2018	97,5	98,5	93,6	97,8	96,9	95,5
	2019	97,9	98,6	97,6	99,3	96,4	99,4
Other narrowband connections	2014	9,1	8,5	8,8	6,8	9,5	16,2
	2015	11,6	11,8	14,6	4,4	10,1	13,1
	2016	11,8	10,8	11,8	*	9,4	7,5
	2017	9,4	11,1	7,2	9,3	6,8	11,0
	2018	12,5	13,5	14,2	*	9,4	19,2
	2019	9,7	10,8	7,9	*	8,5	10,8

Source: www.insse.ro/

From this table we observe that the level of internet access of the population by occupational status. Employee level in urban area is higher in 2019 60%, rural 44.1% Self-employed in urban areas is 3.5% in 2016, and 4% in 2019. In rural areas, it is 20.7% in 2016, with a slight increase to 21.4% in 2019.
The current economic conditions have made a high number of enterprise moves towards internet-based system to increase efficiency, reduce operating costs and support the capacity of operating in real – time between various platforms (Jianu et al., 2019). New products and services fully based on the internet have appeared and continued to evolve and they can complete with the existing ones.

2. Literature review

The author (Sümer, 2018) highlighted that new digital technologies are called over a wide area called Industry 4.0. The rise of digitalization, robotics and intelligent automation has a massive impact on market development, including a great impact also on the labor market (Burlacu et al., 2019). As new digital jobs are created, due to the impact of technological changes, many jobs are destroyed. Replacement of jobs by robots, intelligent machines, digitized and connected processes already have a great impact on the labor market, a phenomenon that leads to mass unemployment (Androniceanu et al., 2017). Therefore, in this article the author: *"It aims to highlight the potential changes in employment and job losses due to new technologies in Turkey."* The paper reviews the literature review on: *"the effect of new technologies on jobs, skills, tasks, occupations and employment. An analysis of the time, of the occupations in Turkey is carried out to highlight the occupations that could be replaced with Industry 4.0, and thus may lead to mass unemployment".* Therefore: *"in Turkey was established a framework for substitutable and complementary occupations. In the final remarks, it will be said that there will be considerable losses in some professional categories with routine tasks, both in manual and cognitive jobs*". In other jobs, new technologies have a complementary effect that could lead to job creation. It has been suggested that Turkey can better achieve the negative impact of Industry 4.0 by fully analyzing the problem, improving training and modernizing skills and promoting jobs in technology and creativity, new areas such as cultural and creative industries. In the author's opinion: *"Technological changes have always acted as job destroyers and job generators."* To cope with the tsunami of new technologies, Turkey urgently needs a comprehensive project for analysis, mapping and designing employment policies and occupations that Industry 4.0 could have both positive and negative effects. Sociological research can be done, at least in the leading sectors, regarding potential investments of technological capital, to see the effects that replace and complement new technologies (Burlacu, 2011).

3. Digitalization and Industry 5.0

Vocational education and training must be remodeled and modernized through the efforts of governmental and non-governmental stakeholders. Eder (2017) argues: *"from studying the phenomenon looking for the impact of automation on jobs has started the discussion on how to best define the target of automation"*. Should they be jobs, or should they be tasks, as the following authors have pointed out? Both methodologies illustrate part of the problem. Jobs are regarded as the sum of a set of tasks. Over time, the nature and number of tasks change, technology facilitates change. Over time, the nature of jobs changes just like tasks (Ioniţă et al., 2009). The state of technology has led to a new, more software-oriented direction: mechatronics. This description seems reasonable in a wide range of jobs. For example, the job of a car mechanic changed with the advancement of the job for a mechatronics did not exist years ago. Jobs will include more technological aspects. In the author's opinion: *"The definition and interpretation of jobs is likely to change."* Two authors presented difficult

conceptual obstacles to the designation of "safe jobs". “The report reaches a similar conclusion after reviewing a number of different studies on this topic. The study looked at the debate between tasks and jobs as being free. The study claims that jobs represent the sum of a set of tasks. These tasks change over time, changing the sphere of a work. The authors argue that: *“The future of work depends on several factors, on the long-term competitiveness and on demographic developments. One of the main factors of technological change in the foreseeable future is digitalization, and the center of this development is the production and use of digital logic”*. Circuits and its derivative technologies, including computer, smartphone and internet will evolve (Ionita and Burlacu, 2009). Smart automation will not cause general job losses, but can lead to considerable changes in the structure of employment. Considering the case of Germany, it is indicated that in the future it will be difficult to tackle structural problems of the labor market, such as skills shortages, persistent unemployment or inequality in terms of employment. Due to the increased demand for new tasks, skills gaps between the demands of the jobs and the skills of the workers, they can also appear to a greater extent. Premises for re-entry into the labor market they will probably be larger in the future. Lack of solid evidence, policy implications can only address general issues. The authors claim that: *“In the coming years, additional incentives must be examined or even obligations to enter the classic insurance system”*. Regarding new forms of work, such as group work, remuneration standards are another important issue. Instead of large and detailed regulations, platforms that allow for continuous customer assessment would be an option to establish a "fair" workplace. The strong tendency towards digitization-induced employment must be addressed by different means, such as professional infrastructure to support self-employed workers from the beginning. Social dialogue is an established means to accompany ongoing technological changes, as previous experience in Germany shows. The social partners have more opportunities to establish support measures. Possible areas of interest in this context are the establishment of a new culture of lifelong learning, the initiation of new ways to finance further training, to deal with conflicting interests regarding the regulation and management of working time, progress on humanizing work and ensuring adequate data protection for workers. In the opinion of the Heinrich (2018): *“As Industry 4.0 brings many changes to the workplace, workers will have to make these changes. This could mean that workers may be required to undergo further training or education”*. Moreover, one third or 35% of the skills that are considered important in today's workforce changed by 2020. The first jobs that will disappear will be repetitive jobs, both in the services sector and in the industry sector. Workers will have to develop or improve their skills that machines do not have (yet). Creativity will become one of the first three abilities, while critical thinking and complex problem solving are two others. Emotional intelligence will become one of the first ten abilities, while quality control will not even be in the first ten. It is obvious that some of the skills, which were considered less necessary, are rinsed on the first scale. With the increase of employment in the branch of architecture, computers, engineering and mathematics, it is obvious that skills that match those families of jobs will have a greater demand.

In the opinion of Schäfer (2018) the fourth industrial revolution is different from the previous three. This is because machines and artificial intelligence play a significant role in improving productivity and creating wealth, which directly changes and challenges the role of human beings. The fourth industrial revolution will also intensify globalization. Therefore, technology will become much more significant, because regions and societies that face positive the technological impact of the fourth industrial sector the revolution will have a better economic and social future. This article argues that the EU can play an important role in developing an environment suited to the fourth industrial revolution, an environment that is vibrant and open to new technologies.

The fourth industrial revolution is significantly different from its predecessors because of the combination of factors: (a) integrated circuits on microchips, (b) memory storage units, (c)

networks that help improve communication; (d) software applications that directly connect with consumer needs; and (e) the ability of the sensor that allows artificial intelligence to analyze most things that were previously accessible only to the human mind (Friedman, 2016). The article first describes the historical technological development and then provides a brief overview of the lessons that can be learned by countries with different policies. Finally, it offers concrete ideas for EU policies. Nahavandi (2018) supports the opinion that: ''*Staying on top is getting harder and harder because of the rapid growth and change of digital technologies and solutions based on artificial intelligence. The world of technology, mass customization, and advanced manufacturing face a rapid transformation. Robots are becoming more and more important as they can now be coupled to the human mind with the help of the brain-machine interface and advance in artificial intelligence. A strong need to increase productivity, without eliminating human workers in the manufacturing industry, imposes punishing challenges on the global economy."* To combat these challenges, this article introduces the concept of Industry 5.0, in which robots interconnect and interact with the human brain and work as a collaborator instead of a competitor. The authors outline a number of key features and concerns that each manufacturer may have regarding industry 5.0. It presents some evolutions made by researchers for use in industry 5.0 applications and environments. The impact of Industry 5.0 on the manufacturing industry and the general economy is discussed economically and on productivity level, where it is argued that Industry 5.0 will create more jobs than it will eliminate. In the study *„Skills for Smart Industrial Specialization and Digital Transformation"* (2018), it is shown the situation in the EU regarding the presence of policies, initiatives and strategies in support of smart industrial specialization and digital transformation at city, regional and national level, as well as those who fostering the development of high-tech skills and future professionals. The fourth industrial revolution brings major disruptions to the scale at which are currently taking place the improvement and retraining efforts and therefore, it is likely to expand these potential gaps. Our work contributes to the successful modeling of workforce transformation in the EU by developing a common vision of high-tech skills and future professionals and designing actions to encourage them. The breadth of the future professional reflects the individual's willingness and ability to collaborate across industries, sectors and disciplines. The depth of the future professional refers to the depth of industry skills and knowledge related to the industry and sectors that the individual has.

Conclusions

As the conclusion of this article we make a series of summarized ideas, by which we believe that we could manage to solve some important issues. We consider that jobs are the sum of a set of tasks, over time, the nature and number of tasks change, technological development is promoted.

Jobs are unlikely to remain within the scope of job descriptions for the current period. It is possible to change the impact on daily hierarchies and businesses. The technological departments of the companies will see increasing investments, which will become costly during potential mergers. The professional training of the employees may require large continuous investments and it will stimulate the outsourcing solution even more.

Some jobs with a high degree of uniqueness can be promoted with the help of new technologies and creativity that is widely used (in cultural and creative industries). The reforms, transformations with a change of attitude, caring for the people, with prudence and wisdom will represent key factors.

The decision makers need to be aware of these trends in order to handle them intelligently and efficiently. Education will need to be rethought and will require investments. An important emphasis is placed on the first quarter of a person's life, after which minor corrections will be filled with the professional activity or complementarities and it will mark

its future. Vocational training, webinars will become important even in technological skeptic countries. Education and lifelong learning create resistance. Countries in Europe and around the world will face increasing pressure and will have to respond with perspective and long term overview. The respective policies will focus on labor market reform, investments in infrastructure, education and competitiveness.

The case of Germany highlights four main areas of concern that need to be concentrated: the continuous development of skills, smart regulations for employment, policies to prevent the labor market biases, and complementary role of social dialogue.

Human resources within companies may be affected, as the rapid availability of external workforce can reduce incentives for firms to train their staff. The incentives for freelancers towards continuing vocational training could increase the employability and professional development.

There are no indications that digitalization can be a major threat to the labor market as a whole. The extent to which the workforce will be able and willing to cope with these fascinating new digital, nano-technological, ecological and eco-innovation technologies is very important.

Education will play a priority role for the future development of the industry and for the personal development of the population. Universities and other educational institutions must keep up with market trends and technology to meet market needs. On the contrary, people will slow down the development that can lead to rising unemployment and slowing the development of the economy.

The professional future refers to the depth of industry skills and knowledge related to the industry and the sectors that the individual has. Our conceptualization of high technology skills or hard skills is mainly focused on programs, learning projects that combine high technology skills with specific complementary skills.

References

Androniceanu, A., Burlacu, S., Drăgulănescu, I. V. and Nicolae, E. E., 2017. New trends of businesses digitalization in Romania and the behaviour young consumers. In *BASIQ International Conference on New Trends in Sustainable Business and Consumption*, Graz, Austria. Bucharest: ASE, pp.27-35.

Burlacu, S., 2011. Characteristics of Knowledge-Based Economy and New Technologies in Education. *Revista Administratie si Management Public (RAMP)*, 16, pp.114-119.

Burlacu, S., Alpopi, C., Mitrită, M. and Popescu, M. L., 2019. Sustainable e-Governance and Human Resource Development. *European Journal of Sustainable Development, 8*(5), pp.16-22.

Burlacu, S. and Jiroveanu, D.C., 2009. It Governance and Educational Ideal. *Administratie si Management Public*, 13, pp.73-82.

Ciobanu G., Ghinăraru, C., Cretu, A.S., Davidescu, A.M. and Chiriac, B., 2015. *Aspects of the digital economy development in Romania*. Bucharest: Universitara.

Eder, G., 2017. *Work 4.0 Automation and the European Labor Market.* [pdf] Available at: <http://liberalforum.eu/wp-content/uploads/2018/09/neoslab_work_final.pdf> [Accessed at 12 February 2020].

Ioniță, F. and Burlacu, S., 2009. Public Administration from Romania in the Knowledge Society and e-Learning. In *Proceedings of the Fifth Administration and Public Management" International Conference:" Public Institutions' Capacity to Implement the Administrative Reform Process.* Bucharest, June 23-24, 2009.

Jianu, I., Dobre, I., Bodislav, D.A., Rădulescu, C.V. and Burlacu, S., 2019. The Implications of Institutional Specificities on the Income Inequalities Drivers in European

Union. *Economic Computation and Economic Cybernetics Studies and Research*, *53*(2), pp.59-76.

Nahavandi, S., 2019. Industry 5.0-A Human-Centric Solution. *Sustainability*, 11, 4371.

Schäfer, M., 2018. The fourth industrial revolution: How the EU can lead it. *European View*, 17(1), pp.5-12.

Sumer, B., 2018. Impact of Industry 4.0 on Occupations and Employment in Turkey. *European Scientific Journal*, ESJ, 14(10), 1.