

DEVELOPMENT THE DIGITAL ECONOMY AND INDUSTRY 4.0 IN ROMANIA AND NEW OPPORTUNITIES FOR THE LABOR MARKET IN ROMANIA

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ABSTRACT

In this article we discuss the theoretical aspects of the formation and development of the digital economy in the countries of the European Union and the special aspects in Romania in the modern conditions of the global competition. We present the concept of "Industry 4.0" and the possibilities of implementation in the industry. Particular attention is paid to the issues and prospects of developing innovative activities of economic systems and economic entities, issues related to efficient business and digital management of digitization, and training for the digital economy that cannot be done without human resources well prepared. We are therefore reviewing the correlation between the development of the digital economy and the 4.0 industry with the labor market and the prospects for the Romanian labor market in terms of the development of the European digital economy.

KEYWORDS: *digital economy, industry 4.0, human resources, labor market*

1. INTRODUCTION: THE KNOWLEDGE SOCIETY AND THE DEVELOPMENT OF THE CREATIVE ECONOMY

Taking into account the objectives of the Europe 2020 Strategy, they are translated into three mutually supportive priorities, namely: Smart growth; Sustainable growth; Inclusive growth. Achieving the Europe 2020 goals requires the development of new skills and new jobs, capable of modernizing the labor market and providing citizens with more autonomy through the development of lifelong skills, thus increasing labor market participation rates, a better correlation of labor supply and demand, the basis of the industrial society's activity - it gives information - based on the information society (Burlacu, 2010)). The creative potential of personality, its ability to generate new knowledge are fundamental to the development of the information economy and the information society (Costache et. al., 2015).

2. THE DIGITAL AGENDA FOR ROMANIA

Within the 2020 European Strategy context, the definition of the National Strategy for the Digital Agenda for Romania, adapted to Romania's current social and economic situation plays a priority

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part in the development of digitization in various fields and areas of activity. The principle underlying the National Strategy is the creation of a competitive environment, which should encourage and attract tax-paying citizens and companies, which in their turn would ensure a long-term sustainable development (Bran, 2010).

The globalization of commerce and production influences the economic activity to be conducted in the places where it is most profitable. In order to stand competition on a globalized market, organizations focus on a relatively small number of central competences and cooperate extensively with other organizations in order to keep up with the technological development or to improve their efficiency to obtain small costs. The virtual organization of work is the cooperation between the organizations of a subject in the dynamic network. While forging the partnership, the tasks and responsibilities of each of the partners, as well as the cooperation mechanisms are expressed in detail and allocated. The relationship between the partners within the virtual organization is formalized. The cooperation format produces an operation in which different organization jointly develop, produce and sell products and services on the market.

Ghilic-Micu, in his article *Business in digital economy* 29 expresses his opinion that: "The key feature of the digital economy organization will be the replacement of the traditional pyramid hierarchy with a horizontal hierarchy." At the management level, there will be more decisions taken by optimizing the employees' creativity, innovative capacity and intellectual training. This means that team work, cooperation and collaboration among employees will be a key feature of the future organization, which will probably lead, in many places, to the change of generations at management level"(Ghilic-Micu & Stoica, 2004).

The study „Building a Digital Economy: The Importance of Saving Jobs in the EU's Creative Industries ” 36 has as its objectives the production and distribution of the creative industry works, including movies, music, TV shows and software, acknowledged as having a positive influence on economic growth and creation of jobs. Over the last decade, digital piracy (breaking the mass media digital copyrights) has increasingly threatened the economic performance of the industries producing these creation works, Because of this it results that the increasing wave of digital piracy should be a priority in the current agenda of the European Union's decision makers.

In the article "Philosophers of the World Unite! Theorizing Digital Labor and Virtual Work—Definitions, Dimensions, and Forms" Christian Fuchs, Jernej A. Prodnik, Sebastian Seignani, Thomas Allmer (2014), 31 the authors aim for a rather ambitious study, starting from the Marxist theory. In 1845, Karl Marx (1845, 571) formulated the Feuerbach thesis: "The philosophers have interpreted the world in different ways: the idea is to change it. "Today the interpretation of the world has become an important form of work, which is also expressed by means of the digital mass-media. In this context, it has become commonplace to speak about digital and virtual work. However, the changes brought to the labor world by digital, social and mobile mass media have been slightly theoretically interpreted so far. In order to change the information society, digital work should be first defined, by means of a critical theoretical approach. The world's social theoreticians from different interdisciplinary and transdisciplinary areas and subjects have to come together for this joint philosophical task. This triple C special question (Communication, Capitalism and Critique) aims to make a contribution to the building of a theoretical framework for the critical analysis of the digital and virtual workforce, and concepts related to the fact that they can trigger additional debates, inform empirical studies, and social inspiration, struggles related to work and beyond digital capitalism. This special triple is: Communication, Capitalism and Critique and it aims to make a contribution to the building of a theoretical framework for the critical analysis of the digital and virtual workforce.

In the study *Converting the virtual economy into development potential* The uptake of the information and communication technologies (ITC) on a large scale in the day-to-day life and

commerce has generated new digital issues and challenges. Although the information provided through networks is abundant, the human attention necessary to process it is limited. Although the digital resources are in principal, unlimited, many online platforms have shortcomings in artificial constructions, as part of their design. In the last decade, the developing and the developed countries have rapidly adopted ITC and in certain areas, such as mobile payments, they have even exceeded it. Nevertheless, the development of the countries' part in digital economy has, to a large extent limited to being technology users and consumers. The creation of new digital services and technologies on the world market requires advanced abilities and developed infrastructure and continues to reach most of the entrepreneurs for developing the country.

3. JOBS IN THE DIGITAL ENVIRONMENT

The digital labor force is a concept that has become an essential basis for the discussions in the area of the political economy of the internet (Fuchs et al., 2014). The fundamental argument is the fact that the dominant model of the accumulation of capital, of contemporary cooperative internet platform is based on exploiting the unpaid work of the users, who get involved in creating the content and using the blogs, social networking sites, wiki, micro-blogs, sharing sites for entertainment content and in these activities, value is created, which lies at the center of generating profit. The workers in the area are highly educated and/or extremely clever. On-line social media The revolution of the on-line socializing media platforms is continually developing and spreads among the mass of users. The impact that on-line socializing media have on the objectives and social life covers all activities. Integrated data, web and social activities can provide a complete image of the institutional and community materials and activities, opening a range of services and facilitating the adaptation of their answers to the users' requirements. E-education. According to a European Commission's press release published on the 19th November 2012, which evaluates a report drawn by the Eurydice network, at the Commission's request, on 38 national units in 34 countries (EU member states, Croatia, Switzerland, Iceland, Liechtenstein, Norway, Serbia and Turkey), it plays an important part in training the youth for the current labor market, in terms training of IT, entrepreneurial and citizenship competences.

Table 1. Index of Economic and Social Digitalization

	2014	2015	2016	2017
1a 1 Fixed broadband access % of households <i>Fixed BB Coverage</i>	90%	90%	89 %	88 %
1a2 Use of fixed broadband services % of households <i>1a2 Fixed BB Take – up</i>	55%	54%	63 %	67 %
1B2 Use of mobile broadband services <i>1b2 Spectrum</i>			71	82
1bc Use of mobile broadband services% of households (subscriptions for 100 people) <i>1bc Spectrum</i>	69%	69%	72 %	45 %

1c1 High Speed Broadband Access (NGA) % of households covered by VDSL, FTTP or Docsis 3.0 NGA Coverage	66%	66%	72%	74%	
1C2 Using high-speed broadband services % of households with a subscription of > = 100 Mbit/s	54 %	59%	44 %	53%	
1d1 Broadband High Speed Service	1.6%	1.8%	-	73 %	
1d2 Using high-speed broadband services % of households with a subscription of > = 100 Mbit/s			31,9%	43,8 %	
1E1 Broadband Price Index Rating (0-100)			85	87	

DESI <https://ec.europa.eu/digital-single-market/en/desi>

Table 2. Percentage of individuals

GEO/TIME	2011	2012	2013	2014	2015	2016	2017
European Union (current composition)	20	25	23	28	31	26	32
European Union (before the accession of Croatia)	20	25	23	29	31	27	32
European Union (25 countries)	:	:	:	:	:	:	:
European Union (15 countries)	21	28	25	30	32	28	33
Euro area (EA11-2000, EA12-2006, EA13-2007, EA15-2008, EA16-2010, EA17-2013, EA18-2014, EA19)	19	22	23	27	29	25	31
Romania	5	5	6	14	20	14	21

Source: <https://ec.europa.eu/eurostat/statistics-explained/>

A conceptual document on digitization, employability and inclusiveness, the role of communications networks in Europe, in the last year or so, there have been many expressions of digitization care, especially robots and artificial intelligence, will replace jobs and increase inequality. These concerns come from the research community, technologists and trade unions and are widely reported in the media. As a result, according to the latest Eurobarometer survey¹, while 75% of Europeans think that digitization has a positive effect on the economy, 74% also think that digitization replaces more jobs than it creates. As digitization is a major vector of change in European societies, it is important that the European Union takes the fears expressed seriously, even if they may be partly unfounded and rely more on perceptions than on evidence.

Regarding the ecological component of sustainability and digitization, "smart" cities are noted in the literature. Urban intellectual initiatives are becoming more common and include the adoption of

functions such as automation, automated learning and the Internet, which is needed to support urban functions, to reduce consumption and to improve the quality of life of the inhabitants. Intelligent urban solutions facilitate a green transition, including intelligent public transport systems to reduce carbon dioxide emissions, smart grid solutions for more efficient power systems and waste and water management.

The "smart city" concept, which includes rural areas through the concept of "smart villages", has been developed. This concept was adopted by the European Commission in 2016 to focus on overcoming the digital divide between rural and urban areas and for the development of the potential offered by connectivity and digitization of rural areas (European Commission 2016). This paper aims to recognize that innovation and digitization are equally important for sustainable rural areas, with particular emphasis on circular and bio-economic development and on the creation of high-quality jobs in the agricultural sector. Digital technologies and rural innovations can support the quality of life, greater public services for citizens (such as transport and mobile solutions), efficient use of resources, low environmental impact and contributing to the development of new opportunities for rural value chains by supporting both residents and entrepreneurs (European Commission 2016a). In the context of regional development, digitization can help reduce two complementary efforts that many regions face - First of all, the lack of jobs and sustainable business activity and, second, inadequate and declining services (ENRD 2017). However, "this potential will only be achieved if rural communities' benefit from all the benefits of digitization and connectivity" (European Commission 2017).

It is necessary to ensure that digital conversations go beyond the "smart city", recognizing, as well as problems in rural, peripheral and sparsely populated areas, for example, solutions for mobility and access to digital public services. Digital processing also contributes to a green transition through the rapid expansion of business models which promotes sustainable consumption through the "exchange" of goods and services through digital platforms.

In the author's opinion of author B. Pelinescu, in the study "New Economy and Information Society and IT Evolution in Romania" Human society is now in a new stage, an industrial post, as Drucker (1993) characterized by the strength of the new microeconomic and informational technologies that open up was the new knowledge-based society. The real-time spread of knowledge and information through the Internet is an in-depth change in the knowledge-based society and produces widespread mutations in all areas of economic and social life. More and more talk about "the new economy", the "digital economy", "cyber-space", "virtual markets", "ecomer", "e-business", "e-market" many others. The new economy is, in fact, more than a digital economy, because it involves both globalization and regionalization, and accelerating innovation, as well as fundamental changes in production systems and in the functioning of markets, management, attitude to risk and uncertainty. In fact, the new economy has at its center the change as a dominant motor of development, based on the broad dissemination of information and scientific knowledge.

4. DEVELOPMENT THE INDUSTRY CONCEPT 4.0

Banadic D. in the article "The Fourth Industrial Revolution Began. Romania is ready to face the challenges of this new revolution? (Industry 4.0 is ready for the challenges of this new revolution?) "Is of the opinion that" manufacturing technologies have undergone a cyclical development, from personalized (individualized) craft production to mass production (product-oriented) then to personalized meal (targeting consumer groups) and returning to personalized production (individual consumer oriented), " and familiarizes us with the Industry 4.0 concept that is included in the strategic development programs of some developed countries in Europe, America and Asia. The author comes

with the example of Germany, which included in its strategic research program, with 2025 perspective, Industry 4.0. This is one of 10 future projects for the period. Germany has set up a platform within the Federal Ministry of Education and Research. Industry Platform 4.0 already has over 250 participants from over 100 organizations (businesses, research institutes and universities). Within this platform, a working group was set up to draw up a report containing a set of regulations on the implementation of Industry Strategy 4.0.

The advanced technologies specific to the fourth industrial revolution are: the Internet of Things (IoT), data security, data processing and new „cloud” parts manufacturing, material addition processing, augmented reality, Big Data, autonomous robots, process simulation, vertically and horizontally integrating systems.

The evolution of Embedded Systems to the Internet of Things was achieved through Embedded Systems Relay and Cyber-Physical Systems. For an easier understanding of the difference between the process chain structures in a classical manufacturing system and a specific one for Industry 4.0, [9]. In the classic system, the production process takes place in a well-defined fabrication process, between independent work cells, In the new Industry 4.0 concept there is a flow of both products and data integrated between them. Several features specific to the new manufacturing concept are: Integrated communication across the entire work cycle (1); a high degree of automation, which will lead to the replacement of operators performing low-skilled work with robots (2); increasing the number of highly qualified people for the monitoring and management of the manufacturing flow (3); a high degree of communication between machines (Machine to Machine M2M) between the car and the human (Machine to Human-M2H) (4); optimizing the entire process chain by using artificial intelligence programs in every structure of the technology chain.

What are the main expectations of this industry? According to the same author, the main expectations of the industry as a result of its transition to the fourth stage of development (Industry 4.0) are: (1) more flexibility and adaptability; (2) transforming rigid structures into network structures; (3) the vertical integration of flexible and reconfigurable production systems; (4) modularization and autonomy of production systems; (5) the use of fractal structure production systems; (6) optimizing resources by connecting equipment to the network; (7) the use of artificial intelligence in the command of production systems, in order to make quick and optimal decisions; (8) the development and use of new business models; (9) the use of app-store and cloud applications as new concepts in knowledge management. All of this will lead to an increase in manufacturing efficiency by reducing the length of the process, reducing the process chain, greater adaptability to customer needs, increased product quality and, ultimately, to reduce the cost of manufactured products and the waiting times for the final consumer. This huge impact expected through the transition to the new stage of the industry by digitizing the entire process chain, manufacturing a product, justifies Europe's budget effort to implement the Industry 4.0 agenda. Romania must be active in this qualitative leap of European industry.

5. CONCLUSIONS

As we can see from the analysis, the development of the digital economy still does not have the results we expect. We believe that Romania has a sufficiently well-trained intellectual potential in those areas that can contribute to the development of the digital economy at the national level, but also contribute to the development of the digital economy and in other countries, support through partnerships, the organization of joint competitiveness poles and capitalizing on the full potential both in the urban environment, and as a priority the entry and development of the regions, especially those currently disadvantaged, and in rural areas.

We propose to create an Industry 4.0 platform in collaboration with government institutions, potential economic agents pillar of industry development 4.0 and active participation of educational institutions, both Universities and Colleges and High Schools in various industrial fields and creativity.

Creating a Functional Model of the activity of the industry 4.0 having as a priority the development of the economy and the knowledge society.

Create a working group to develop the implementation of the 4.0 Strategy

How can we develop this industry in Romania? Creating digital networks, adaptable to existing old structures, but transforming them into network structures; Vertical integration of production systems into networks;

Using fractal structures production systems; Connecting equipment will optimize resources; Application of Artificial Intelligence in Managing Activities and Production Systems.

Developing new business models for a broad segment of users, regardless of economic activity and profits.

Continuous learning of both private and government specialists, familiarization with new technologies and digital management, analysis and forecasting systems and other diverse activities that will radically change the activity and behavior of human resources in a new labor market with a new a development paradigm that will need to be gradually adapted to all branches of the economy and society.

Identify strengths and weaknesses at each stage of technological and socio-human implementation to anticipate and avoid undesirable developments in order to avoid unexpected losses, risks and identify new opportunities in this area.

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