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## Digitising European Industry, Risks and Challenges for both Policy Makers and Individuals: The Case of Romania

Mihaela BUICA<sup>a</sup>

<sup>a</sup> Ph.D. Student, Academy of Economic Studies, Faculty of International Economic Relations, Bucharest, Romania, [mihaelabuica2002@yahoo.com](mailto:mihaelabuica2002@yahoo.com)

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### ABSTRACT

The initiative on Digitising European Industry, or the Fourth Industrial Revolution as it has been classified by the experts in the field, adopted by the Commission on 19 April 2016, represents one of the most important measures taken at European level for economic growth. According to relevant studies, its importance consists not only in the potential exponential growth of the economy but also in its socio-political implications having regard that society has known three other industrial revolutions with significant impact upon our way of thinking and our way of life.

Taking into consideration these aspects, this paper intends to make a parallel view of the risks and challenges the new industrial revolution involves, including the latest global trends and global risks, and current position of Romania, in terms of objectives and results achieved so far, related to the digitisation process and competitiveness.

This comparison intends to provide a clear picture of the Romanian's position in the field of digitisation in order to respond to the secondary objective of the paper - increasing the awareness of public decision makers and individuals on this topic.

However, the last places that Romania has constantly occupied both in the European digitisation and competitiveness rankings, as well as in European social progress ranking, should represent a big concern for Romanian authorities and its public policies. The gaps between objectives and results related to digitisation process and competitiveness are very high and impose rapid and determined policy measures. The same big concern is relevant for citizens too, in their double position: as the beneficiaries of these public policies and as the managers of their own lives.

As a conclusion, taking into consideration that digitalisation is undoubtedly a reality all over the world with a high degree of dynamism, deep impact and implications, all stakeholders have to pay special attention for this ongoing process and adopt adequate and rapid measures to exclude or minimize the risks involved by it.

### Introduction

For many people when they hear the words 'The Fourth Industrial revolution' it might not mean anything, one reason being the lack of interest in the history of industrial revolution. But when we talk about digitisation phenomena, everybody thinks immediately at smart phones, various gadgets, robots and something's like these. Almost everybody who use

the Internet every day likes and enjoys new inventions which make their job easier or help create a relaxing atmosphere (European Commission, 2017a).

But this phenomena of digitisation is more complex and profound in many aspects. Having regard this, lately, experts in the field offer various analyses which, on the one hand, emphasize the huge benefits of digitisation and, on the other hand, expose and warn about the various implications. Some of these experts have developed valuable initiatives of research in the area, such as: World Economic Forum 'Shaping the Future of Digital Economy and Society', McKinsey Global Institute 'Digital Disruption -Understanding how technology is transforming industries and how leaders and organizations can respond', 'Employment and Growth -How to drive economic growth and create jobs', Manpower Group 'World of Work-The skills revolution', Boston Consulting Group 'Mastering the Digital Imperative', Empirical 'skills & Work', European Parliament Think Tank (European Parliamentary Research Service) and so on. At the same time, we have to mention here the research developed by important international institution such as UNESCO, UNICEF, and OECD.

Among the authors which recently approached the subject of the Fourth Industrial Revolution, the future of jobs and professions we can mention: Klaus Schwab (2016), Eric Schmidt and Jared Cohen (2013), Chris Anderson (2013), Franco Mosconi (2015), Alec Ross (2016), Kevin Kelly (2016), Erik Brynjolfsson and Andrew McAfee (2014), Richard Susskind and Daniel Susskind (2015).

About the changes that the new industrial revolution is supposed to bring, Klaus Schwab in his article 'The Fourth Industrial Revolution: What It Means and How to Respond' (Schwab, 2015, p.3) notes "We stand on the brink of a technological revolution that will fundamentally alter the way we live, work, and relate to one another. In its scale, scope, and complexity, the transformation will be unlike anything humankind has experienced before".

For managers, experts in the management field offered for these new challenges various solutions, strategies, models and ideas of new management, leadership, innovation and creativity.

Some of the ideas for new managerial strategies adapted for the new challenges are presented below.

The recommendation offered by Schwab (Schwab, 2015, p. 9) to decision-makers is to embrace "... 'Agile' governance, just as the private sector ..."

The same solution, but for both the private and public sectors, is agreed by Isaksen and Tidd (Isaksen and Tidd, 2006, Preface) "Under these conditions, managers must learn how to become more flexible and agile in order to respond successfully". In their opinion "successful organizational transformation and managing change demand both leadership and management as well as creativity and innovation".

Roland Bel in his work 'Leadership and Innovation: Learning from the Best' (Bel, 2010, p.47) proposes as a new managerial strategies, learning from the experience of some of the most innovative companies. In the same time, Bel highlights the importance of having good leaders "And without great innovation leaders, there is no innovation".

In the opinion of the McKinsey Global Institute (Manyika et al., 2017, p.112) there are two broad categories of issues for policy-makers to consider. First, increasing the productivity by accelerating development and deployment of automation and second, managing the redeployment to other productive activities of workers whose activities are automated.

"Ultimately, the ability of government systems and public authorities to adapt will determine their survival. If they prove capable of embracing a world of disruptive change, subjecting their structures to the levels of transparency and efficiency that will enable them to maintain their competitive edge, they will endure. If they cannot evolve, they will face increasing trouble" (Schwab, 2015, p. 8).

Nowadays "The European social partners have recognized that digitisation is not just a technological issue, but it has wider social, work and economic implications. It is also a question of economic development and social cohesion" (European Commission, 2016a, p14).

Talking about the challenges that digitisation will bring, besides "...many potential benefits for industrial development...", "There will be winners and losers, and adjustments to make" (Smit et al., 2016, p 72).

But the challenges of the new revolution are not just addressed to managers "... the response to it must be integrated and comprehensive, involving all stakeholders of the global

polity, from the public and private sectors to academia and civil society” (Schwab, 2015, p. 8).

Taking into consideration these aspects and the fact that the research intends to highlight the Romanian case, the paper has two main parts, as a parallel view.

First part is dedicated to exposing the risks and challenges of the new industrial revolution as they are presented in the experts’ studies, followed by global trends, global risks and new global challenges in the digitisation area.

The second part is dedicated to the Romanian framework. It will focus on the main strategies related to the digitisation process and competitiveness in terms of objectives and results achieved so far.

## 1. Digitising European Industry –an ongoing process

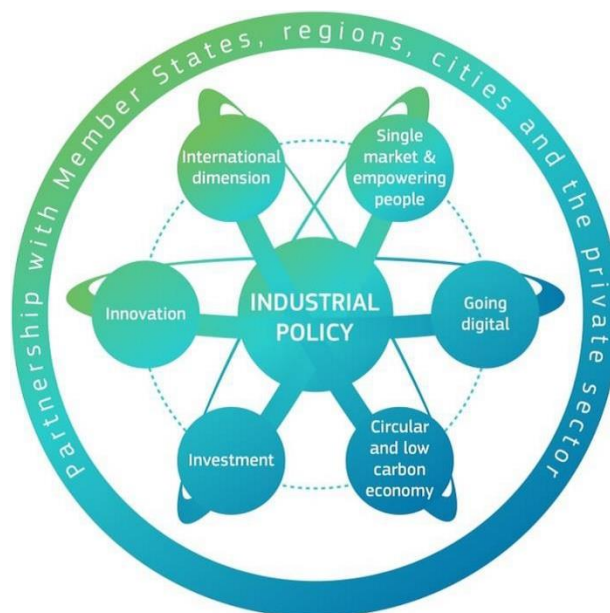
Since 2010, with the adoption of the ‘Europe 2020’ strategy (European Commission, 2010a), Europe has entered a new era, an era with ambitious plans for changing. This plan is sustained by seven flagships initiatives: ‘Innovation Union’, ‘A Digital Agenda for Europe’, ‘An industrial policy for the globalization era’, ‘New Skills for New Jobs’, ‘Youth on the move’, ‘Resource efficient Europe’ and ‘European platform against poverty’.

The flagship initiative ‘An Industrial Policy for the Globalization Era’ (European Commission, 2010b) focuses on the central objective of this policy, namely promoting the competitiveness of European industry.

Since April 2016, European industry strategists have become even more daring in approaching the future in the competitiveness field and started an official process of digitisation of industry as “...a unique opportunity for attracting further investments into innovative and high growth digital and digitised industries in Europe” (European Commission, 2016a, p. 6). The decision has come due to the spectacular development of digital technologies and after less than a year, when a “strategy for a Digital Single Market proposed transformational actions for the European economy and society” (European Commission, 2016a, p. 15).

In September 2017, European Commission was launched a renewed EU industrial policy strategy (European Commission, 2017b) (Figure 1) that “brings together all existing and new horizontal and sector-specific initiatives into a comprehensive industrial strategy”.

**Figure 1: A renewed EU Industrial Policy Strategy**



Source: European Commission, 2017b, p. 6

“The implementation of this strategy will require a joint commitment and systematic efforts on part of the industry as well as all relevant EU, national and regional stakeholders” (European Commission, 2017b, p. 6).

This process of digitising industry is known as the new industrial revolution or The Fourth Industrial Revolution or for short Industry 4.0. This new industrial revolution had been particularly triggered by the spectacular development of digital technologies that represent an opportunity in increasing the economic competitiveness.

“The First Industrial Revolution used water and steam power to mechanize production. The Second used electronic power to create mass production. The Third used electronics and information technology to automate production. Now a Fourth Industrial Revolution is building on the Third, the digital revolution that has been occurring since the middle of the last century”. (Schwab, 2015, p. 3).

### 1.1 Risks and challenges

In order to have a clear image of the risks and challenges, I will take in consideration the most recent and relevant studies about this subject. Thus, first of all, I will analyze the main strengths, weaknesses, opportunities and threats (SWOT) of the Industry 4.0. Then, the image will be completed with the global trends and global risks. This chapter closes with new global challenges in the digitisation field.

#### A. SWOT of the Industry 4.0

The strategic analysis of the main strengths, weaknesses, opportunities and threats of the Industry 4.0 is presenting in Figure 2 (Smit et al., 2016, “Industry 4.0”, p. 72).

**Figure 2: Industry 4.0 – SWOT analysis**

<b>STRENGTHS</b>	<b>WEAKNESSES</b>
<ul style="list-style-type: none"> <li>• Increased productivity, (resource) efficiency, (global)competitiveness, revenue</li> <li>• Growth in high-skilled and wellpaid jobs</li> <li>• Improved customer satisfaction –new markets: increased product customisation and product variety</li> <li>• Production flexibility and control</li> </ul>	<ul style="list-style-type: none"> <li>•High dependence on resilience of technology and networks: small disruptions can have major impacts</li> <li>•Dependence on a range of success factors including standards, coherent framework, labour supply with appropriate skills, investment and R&amp;D</li> <li>•Costs of development and implementation</li> <li>•Potential loss of control over enterprise</li> <li>•Semi-skilled unemployment</li> <li>•Need to import skilled labour and integrate immigrant communities</li> </ul>
<b>OPPORTUNITIES</b>	<b>THREATS</b>
<ul style="list-style-type: none"> <li>• Strengthen Europe’s position as a global leader in manufacturing (and other industries)</li> <li>• Develop new lead markets for products and services</li> <li>• Counteracting negative EU demographics</li> <li>• Lower entry barriers for some SMEs to participate in new markets, links to new supply chains</li> </ul>	<ul style="list-style-type: none"> <li>• Cybersecurity, intellectual property, data privacy</li> <li>• Workers, SMEs, industries, and national economies lacking the awareness and/or means to adapt to Industry 4.0 and who will consequently fall behind</li> <li>• Vulnerability to and volatility of global value chains</li> <li>• Adoption of Industry 4.0 by foreign competitors neutralising EU initiatives</li> </ul>

Source: Smit et al., 2016, “Industry 4.0”, p. 72

## B. Global trends

In Table 1 there is a parallel view between 'Global trends to 2030' (ESPAS, 2016) and its updated and extended version namely 'Global trends to 2035' (EPRS, 2017a).

**Table 1: Parallel view between Global trends to 2030 (ESPAS, 2016) and Global trends to 2035 (EPRS, 2017a)**

<b>Global Trends to 2030 ESPAS (2016)</b>	<b>Global Trends to 2035 (EPRS, 2017)</b>
<ul style="list-style-type: none"> <li>-Widening inequalities</li> <li>-Vulnerability of the sustained development of the world economy in front of challenges and weaknesses in the globalisation process</li> <li>-Revolution in technologies involving digitisation</li> <li>-Managing scarcity of resources</li> <li>-The interdependence of countries and global governance.</li> </ul>	<ul style="list-style-type: none"> <li>-An ageing global population</li> <li>-Fragile globalisation in a multipolar world</li> <li>-Industrial and technological revolution</li> <li>-Climate change and resource competition</li> <li>-Changing power in the international system</li> <li>-New arenas of state competition</li> <li>-Politics of the Information Age</li> <li>-Ecological threats</li> </ul>

*Source:* Author own representation based on data from ESPAS (2016) and (EPRS, 2017a)

## C. Global risks

According to 'The Global Risks Report 2017' (World Economic Forum, 2017a) published by the World Economic Forum, there are five categories of global risks: Economic, Environmental, Geopolitical, Societal and Technological. There are presented two tops risks, one Top 10 risks in terms of likelihood and second Top 10 risks in terms of impact (Table 2).

**Table 2: Global risks 2017**

<b>Top 10 risks in terms of Likelihood</b>	<b>Top 10 risks in terms of Impact</b>
<ol style="list-style-type: none"> <li>1. Extreme weather events</li> <li>2. Large-scale involuntary migration</li> <li>3. Natural disaster</li> <li>4. Terrorists attacks</li> <li>5. Data fraud or theft</li> <li>6. Cyberattacks</li> <li>7. Illicit trade</li> <li>8. Man-made environmental disaster</li> <li>9. Interstate conflict</li> <li>10. Failure of national governance</li> </ol>	<ol style="list-style-type: none"> <li>1. Weapons of mass destruction</li> <li>2. Extreme weather events</li> <li>3. Water crises</li> <li>4. Natural disaster</li> <li>5. Failure of climate-change mitigation and adaptation</li> <li>6. Large-scale involuntary migration</li> <li>7. Food crises</li> <li>8. Terrorists attacks</li> <li>9. Interstate conflict</li> <li>10. Unemployment and underemployment</li> </ol>

*Source:* Author own representation based on data from World Economic Forum -The Global Risks Report 2017

Also in this chapter "Global risks" can be highlighted 'Top 5 Trends that Determine Global Developments' and 'Most Important Risks' Interconnections' (Figure 3) (World Economic Forum, 2017a, Part 1, pg. 11-12).

Top 5 Trends that Determine Global Developments are:

1. Rising Income and wealth disparity
2. Changing climate
3. Increasing polarization of societies



4. Rising cyber dependency
5. Ageing population

**Figure 3: Most Important Risks' Interconnections**

<b>1</b>	Unemployment and underemployment
	Profound social instability
<b>2</b>	Large-scale involuntary migration
	State collapse or crisis
<b>3</b>	Failure of climate-change mitigation and adaption
	Water crises
<b>4</b>	Failure of national governance
	Profound social instability
<b>5</b>	Interstate conflict with regional consequences
	Large-scale involuntary migration

Source: World Economic Forum -The Global Risks Report 2017a, Part 1, pg. 12

#### D. New challenges

- European gigabit society. According to EPRS (EPRS, 2017b): As part of its digital single market strategy, in September 2016, the Commission put forward new strategic connectivity objectives for 2025 in order to prepare Europe for the roll-out of the next generation of broadband infrastructure with gigabit speeds, including both fixed and mobile internet access (5G).

Given its importance for EU competitiveness, the Commission is speeding up 5G by cofinancing research and development. The 5G-PPP public-private partnership is the largest initiative of its kind in the world, with €700 million in EU funding, to be topped up with private funding to reach a total budget of €3.5 billion by 2025.

- Developing supercomputers in Europe. According to EPRS (EPRS, 2017c): As part of its European cloud strategy, the European Commission has launched a target plan to acquire and develop European high-performance computers that would rank among the world's top three by 2022.

In addition, the Commission has an ambitious €1 billion flagship initiative on quantum technology in place, which will also contribute to the development of quantum supercomputers in the longer term. Expected to surpass traditional supercomputers, the new ones could dramatically improve the technology used in communication, computing and sensing, as well as and in other areas.

## **2. The industrial digitisation process in Romania: results so far and perspectives through the main strategies**

Because of the political situation in Romania before 1989 and the slow transition process after, the transformation of economy and society was delayed. The main tool which effectively 'forced' Romania, and all European countries, to initiate measures in the direction of increasing competitiveness was the 'Lisbon' strategy and since 2010 the 'Europa 2020' strategy.

Since 2007, the year when Romania became officially an EU member state, the monitoring of the progress achieved in reaching the Europe 2020' objectives was presented in the National Reform Program (NRP), a framework platform for defining structural reforms and development priorities that should guide the evolution of Romania by 2020.

## 2.1. Relevant results achieved so far by Romania on the competitiveness and digitisation process

For the current analysis, I selected four areas whose results are offering a relevant image about competitiveness and digitisation process in Romania, respectively: A -Digital Agenda; B- Education and Professional Training; C- Research, Development and Innovation; D- Competitiveness.

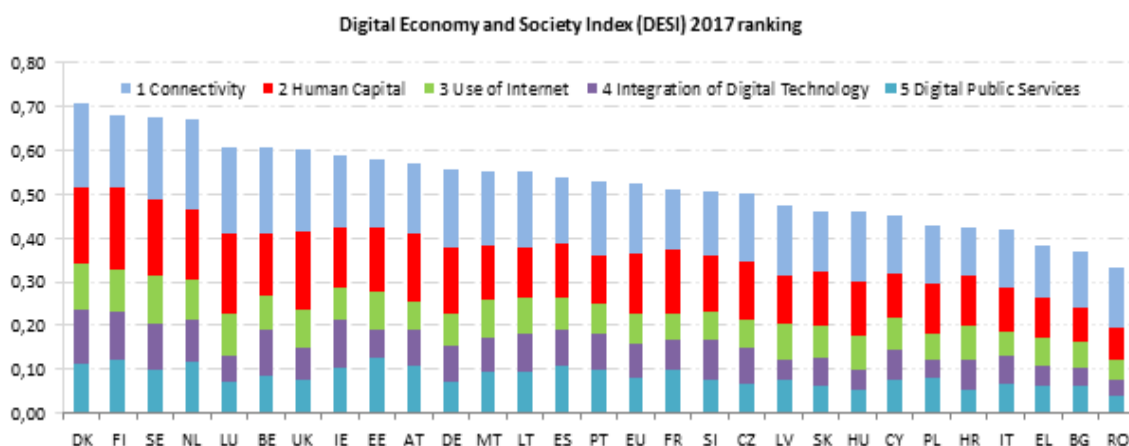
### A. Digital Agenda area

At the European level, the evolution of the Member States in digital competitiveness is measured and tracked by The Digital Economy and Society Index (DESI) and the results are annually made public in the Europe's Digital Progress Report (EDPR).

According to the definitions of DESI from the Digital Agenda website, it is an overall index, calculated as the weighted average of the five main DESI dimensions: 'Connectivity', 'Human Capital', 'Use of Internet', 'Integration of Digital Technology' and 'Digital Public Services'. Each one of the five main DESI dimensions is calculated as the weighted average of the DESI Sub-dimensions which in turn are calculated as the weighted average of the DESI Individual Indicators.

The Europe's Digital Progress Report provides a very clear image of the efficiency of public policies regarding digitisation process in Europe. Figure 4 presents the 2017 Digital Economy and Society Index ranking, included in the 2017 EDPR (European Commission, 2016b).

**Figure 4: Digital Economy and Society Index (DESI) 2017 ranking**

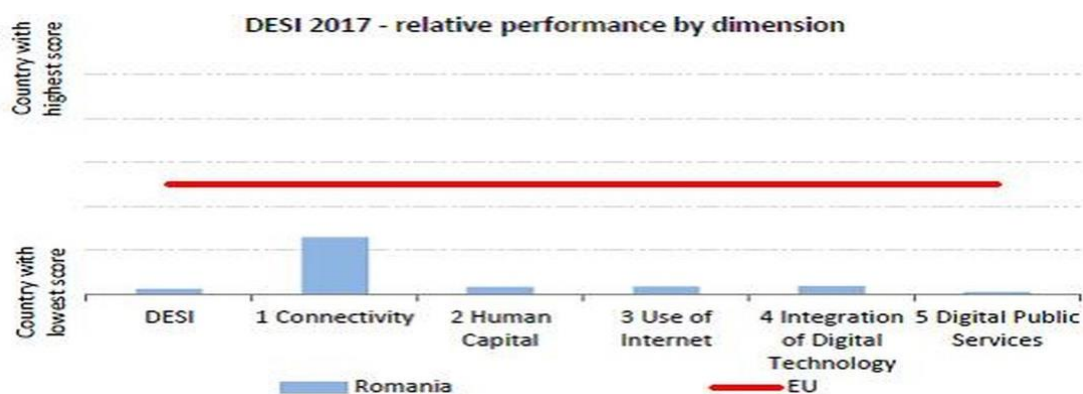


Source: <https://ec.europa.eu/digital-single-market/en/desi>

As can be seen, Romania is on the last position in the European ranking according to DESI 2017, a result of the last places in many monitored aspects, like human capital, use of internet, integration of digital technologies and digital public services.

Romania's place in the European rankings on digitisation by dimensions is presented as follow (Figure 5):

**Figure 5. DESI 2017 –relative performance of Romania by dimension**



Source: <https://ec.europa.eu/digital-single-market/en/scoreboard/romania>

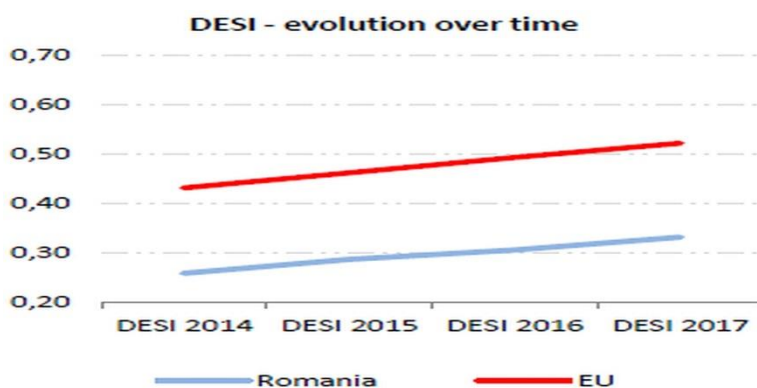
'Connectivity' is the only dimension for which Romania has the best ranking among all five, occupying the 22<sup>nd</sup> place in the EU. This position is due to Romanian consumer preference for high-speed broadband, mobile and fixed point connections. Despite this position, the coverage of fixed and mobile (4G) broadband networks remains one of the lowest in the EU: coverage 45%, rank 28. For all other four dimensions Romania occupies the last place, 28.

An essential factor that has a major influence on the third dimension 'Use of internet' can be identified in the second dimension 'Human capital' and is referring at the level of preparedness of human capital with digital skills. This aspect can be verified at the digital-agenda-data.eu/charts. Thus, after the analysis of the digital skills indicator (all individuals) and compare countries, the results for Romania, in percentages, are: 40.5% 'No digital skills', 31.8% 'Low digital skills', 19.1% 'Basic digital skills', and only 8.59% 'Above basic digital skills'. These percentages are based on 2016 data. The indicator 'No digital skills' is 40.5% for Romania, compared to EU average of 18, 9%. Romanian citizens use the Internet in general for 'News', 'Music, videos and games' and 'Social networks'.

In the 'Digital Public Services' dimension, Romania continues to occupy the last place in the ranking for this indicator and even more worrying is the fact that internet users' percent decreased by 2 p.p. in 2016 compared with 2015 (from 8% to 6%).

Despite the achieved progress in connectivity area, Romania is among the low performing countries in Europe, as can be seen in Figure 6.

**Figure 6: DESI 2017 –evolution over time in Romania in comparison with the EU**



Source: <https://ec.europa.eu/digital-single-market/en/scoreboard/romania>

B. Education and Professional Training area

The second dimension 'Human capital' from the 2017 Europe's Digital Progress Report highlights the main Romanian weakness in approaching the process of digitisation, namely the low level of preparedness of the human capital with digital skills.

The very low level in preparedness of human capital is corroborated with the data about the education and training system in Romania (European Commission, 2016c) (Table 3).

**Table 3: Education and training Monitor 2016 -Key indicators Romania**

ET 2020 benchmarks		Romania		EU average	
		2012	2015	2012	2015
Early leavers from education and training (age 18-24)		17.8 %	19.1 %	12.7 %	11.0 %
Tertiary education attainment (age 30-34)		21.7 %	25.6 %	36.0 %	38.7 %
Early childhood education and care (ECEC) (from age 4 to starting age of compulsory education) Data refer to 2011 and 2014		86.4 %	86.4 %	93.2 %	94.3 %
Proportion of 15 year-olds with underachievement in:	Reading	37.3 %	38.7 %	17.8 %	19.7 %
	Maths	40.8 %	39.9 %	22.1 %	22.2 %
	Science	37.3 %	38.5 %	16.6 %	20.6 %
Employment rate of recent graduates by education attainment (age 20-34 having left education 1-3 years before reference year)		70.2 %	68.1 %	75.1 %	76.9 %
Adult participation in lifelong learning (age 25-64)		1.4%	1.3%	9.2%	10.7 %

Source: Own representation based on dates from European Commission, 2016c

The OECD 'Programme for International Student Assessment' (PISA) (OECD, 2016) is reflecting the same serious weakness in the quality of education. The PISA is testing the skills and knowledge of 15 year-old students, measuring their reading, math and science literacy. The highest performance in PISA tests was obtained by Romania in 2012 with 445 score in Maths, 439 in Science and 438 in Reading. The scores obtained in 2015 are: 444 (Maths), 435 (Science) and 434 (Reading). Romania has been participating in PISA tests since 2006. The OECD 2015 averages are: 490 (Maths), 493 (Science) and 493 (Reading).

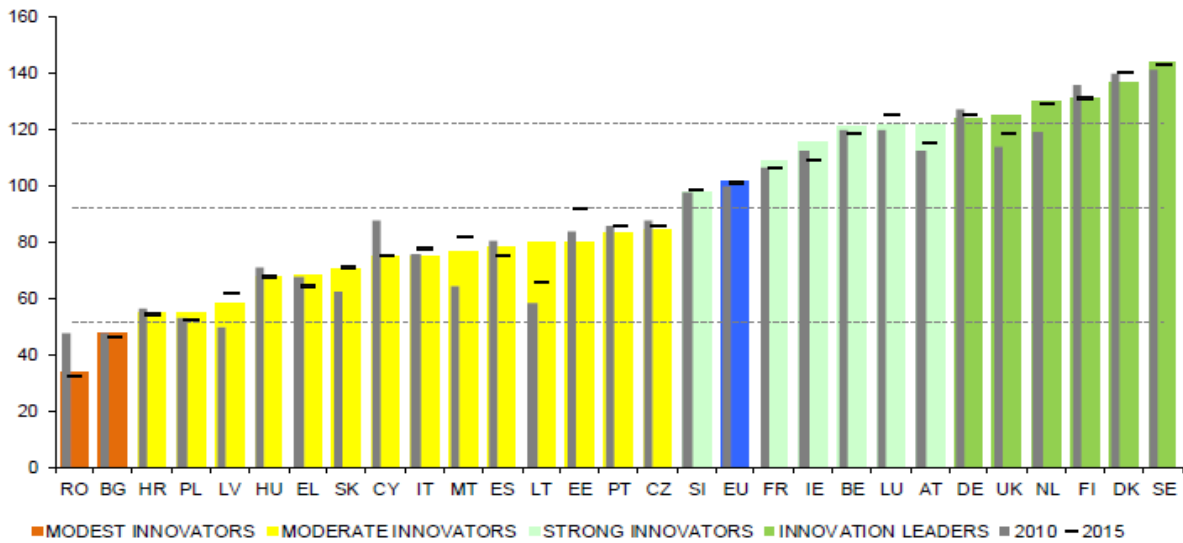
The Global Human Capital Report 2017 (World Economic Forum, 2017b, pg. 13) specified that "Most countries in the region are close to having achieved near universal basic education enrolment. Some, however, such as Moldova (62) and Romania (42), still lag behind".

### C. Research, Development and Innovation area

The research and innovation performance of Romania can be seen in the annual 'European Innovation Scoreboard' (EIS), which provides a comparative assessment of the research and innovation performance of the EU Member States.

In the 'EIS 2017' (European Commission, 2017c), Romania and Bulgaria are included in the 'Modest Innovators' cluster, that gathers EU Member States with an innovation performance level well below the EU average, i.e. less than 50% of the EU average (Figure 7). More than this, according to the Executive summary of the 'EIS 2017' report, "Compared to 2010, the innovation performance of the EU has increased by 2 percentage points. At the level of individual Member States, results differ with an increase in performance in 15 countries and a decrease in performance in 13 countries. Performance has increased most in Lithuania, Malta, the Netherlands, and the United Kingdom, and decreased most in Cyprus and Romania" (European Commission, 2017c, pg. 3).

**Figure 7: Performance of EU Member States' innovation systems**



Source: European Commission (2017c), European Innovation Scoreboard 2017

#### D. Competitiveness area

In order to monitor and help countries to evaluate their regional performance in competitiveness, at the European level, a Regional Competitiveness Index (RCI) was launched in 2010. It is published every three years and allows the regions to monitor and assess their development over time and in comparison with other EU regions.

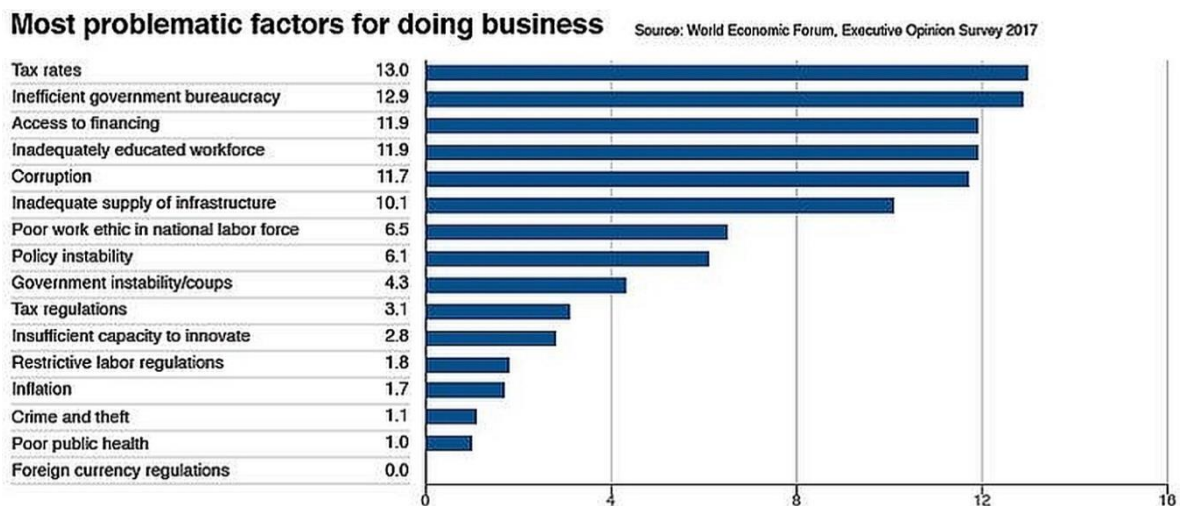
The RCI consists of 11 pillars describing the various aspects of competitiveness, divided into three groups: elementary, efficiency and innovation. Pillars that represent the key elemental drivers of all types of economy are represented by: 1 -institutions; 2 - macroeconomic stability; 3-Infrastructure; 4-health; and 5-Basic education. All these five pillars are grouped in the elementary.

According to the strategy, at the time when it was elaborated, Romania's development regions occupy the last place both in terms of RCI and in almost all the rankings of indicators forming this composite index. The 'RCI 2016', Annex Time comparison (European Commission, 2017d) reveals no improvement for Romania since 2010.

The Global Competitiveness Index 2017-2018 Rankings (World Economic Forum, 2017c), which covers 137 economies and measures national competitiveness—defined as the set of institutions, policies and factors that determine the level of productivity, positioned Romania at 68<sup>th</sup>. The Global Competitiveness Index 2016-2017 Rankings positioned Romania at 62<sup>th</sup>.

Between most problematic factors for doing business can be observed 'Inefficient government bureaucracy', 'Access to finance' and 'inadequately educated workforce' (Figure 8).

**Figure 8: Most problematic factors for doing business in Romania**



Source: World Economic Forum, 2017c

## 2.2. Digitisation process of the industry in Romania: perspectives through the main strategies

As a development perspectives, in correspondence with the areas presented above I can mention here four relevant Romanian strategies and their main objectives for increasing competitiveness and digitisation process of industry, respectively:

- *National Strategy on the Digital Agenda for Romania (NSDAR) 2020* approved by Government Decision no. 245/ 2015 (Guvernul Romaniei, 2016). The aim of the strategy is to ensure Romania's information and communication technology (ICT) development at the level of the countries in the region and to establish the prerequisites of Romania's integration into the digital single market of Europe.

- *Strategy of Education and Professional Training in Romania (SEPTR) for the period 2016-2020* approved by Government Decision no. 317/2016 (Guvernul Romaniei, 2015a). The overall objective of the strategy is to develop a system of education and training adapted to the requirements of the labor market and the needs of the direct beneficiaries.

- *National Strategy for Research, Development and Innovation (NSRDI) 2014-2020* approved by Government Decision no. 929/ 2014 (Guvernul Romaniei, 2014). The strategy's goal is for Romania to become competitive by 2020 at a regional and global level, through innovation-driven R & D, generating wealth for citizens.

- *The National Strategy for Competitiveness (NSC) 2015 -2020* approved by Government Decision no. 775/2015 (Guvernul Romaniei, 2015b). The vision of this strategy is to develop a competitive business ecosystem based on a stable regulatory environment centered on entrepreneurship, innovation and creativity, focusing on trust, efficiency and excellence and placing Romania in the top 10 European economies.

## 3. Comments of results

This paper presents a parallel view of the risks and challenges of the process of digitisation combined with the relevant global risks and trends on one hand, and, on the other hand, the official measures taken by Romania through public policies. The summary of these measures was completed with the corresponding results of each of the four strategies selected for this analysis.

The first part reveals to us that the world is changing fast through the digitisation process plus other global trends and, in this regard, Europe is preoccupied with preparing and adopting adequate strategies in order to minimize the risks and to remain in the first line of global competitors. This process and new technologies have been scientifically proven to have the power to change the world, reshaping economic, social, cultural, and human environments (Schwab, 2015). This reshaping involves besides benefits also a lot of risks and challenges both for policy makers and individuals and create the need for adequate strategies and new type of managers. "Governments, businesses, and individuals are experiencing high

levels of uncertainty as technology and geopolitical forces reshape the economic and political order that has underpinned international relations and economic policy for the past 25 years” (World Economic Forum, 2017, Preface).

In the second part, we can see the Romanian position in this process of transformation. The 22th place occupied by Romania for Connectivity dimension on the 2017 DESI Index concludes that Romania has a good base for digital development, but this is not enough to compensate the gaps for the others four dimensions. More than this, as can we see, Europe is already prepared to implement the latest trend in digitisation, namely gigabit society and supercomputers.

The other three areas analysed, namely education, innovation and competitiveness, revealed that the Romanian weaknesses were not properly countered, more than this in some aspects Romania decreased in ranking (see Research, Development and Innovation area) or had no improvements since 2010 (see competitiveness case).

Overall, the current results revealed to us a country that is significant unprepared to change. One of the most important aspects in this process, besides financial and institutional aspects, is represented by education. Education as can be seen through industrial history is playing a central role and the adequate skills are the “pathway to employability and prosperity” (European Commission, 2016d, Introduction). Also education is an important component of the Foundations of Wellbeing (Figure 9) (European Commission, 2016e, pg 2) and in this period of digitisation “Educational reforms will be critical, as automation will put a premium on the integrated technical, business, and services skills that will be required to drive new business growth in technology and services sectors” (EPRS, 2017a, section 5, pg 100). For Romania this fact requires urgent actions because, as could we see in the analysis of preparedness of Romanian human capital with digital skills, the indicator ‘No digital skills’ is 40.5% compared to EU average of 18, 9%.

**Figure 9: EU-SPI framework**



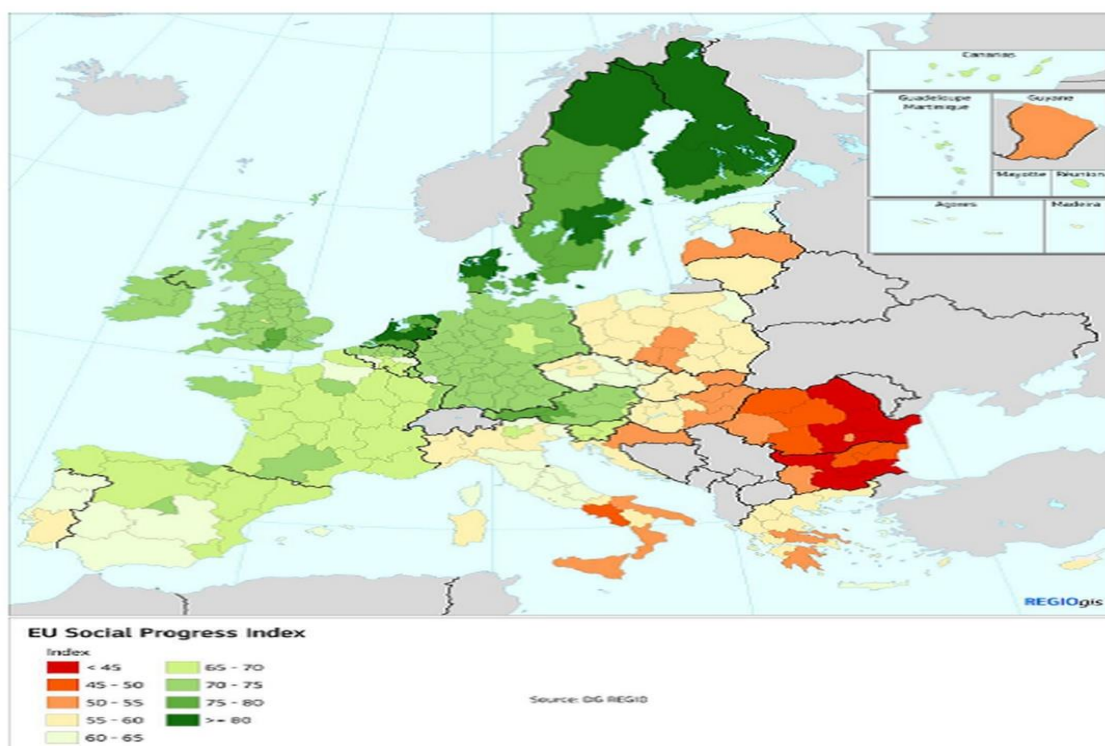
Source: European Commission, 2016e, pg 2

According to the ‘Methodological paper: the EU regional SPI’ (European Commission, 2016e, pg. 2) “The Social Progress Imperative defines ‘social progress’ as the capacity of a society to meet the basic human needs of its citizens, establish the building blocks that allow citizens and communities to enhance and sustain the quality of their lives, and create the conditions for all individuals to reach their full potential”.

EU regional Social Progress Index 2016 (European Commission, 2016e, pg 4) reveals to us that the lowest social progress in EU is in Romanian and Bulgarian regions (Figure 10).



**Figure 10: EU regional Social Progress Index**



Source: European Commission, 2016e, pg. 4

In *The Global trends to 2035* (EPRS, 2017a, pg. 33), European Commission estimates that new technology will boost Europe's GDP by 110 billion euros annually over the next five years but in the same time warns the poorer EU Member States about the possibility to face severe drastic job losses because they have higher concentrations of low-skill jobs.

Experts in the field (Zahidi, 2017) estimate that an average one-third of the skillsets required to perform today's jobs will be wholly new by 2020 and suggest that 65% of children currently entering primary school will have jobs that do not yet exist and for which their education will fail to prepare them.

Talking about the impact on people of The Fourth Industrial Revolution, Klaus Schwab (Schwab, 2015, pg. 9), and notes:

"The Fourth Industrial Revolution finally, will change not only what we do but also who we are. It will affect our identity and all the issues associated with it: our sense of privacy, our notions of ownership, our consumption patterns, the time we devote to work and leisure, and how we develop our careers, cultivate our skills, meet people, and nurture relationships. It is already changing our health and leading to a "quantified" self, and sooner than we think it may lead to human augmentation. The list is endless because it is bound only by our imagination".

## Conclusions

"The Fourth Industrial Revolution represents a fundamental change in the way we live, work and relate to one another. It is a new chapter in human development" (World Economic Forum, Top Link).

Digitisation is a reality. Digitisation can be a way to top or to bottom, both as a country and as an individual.

Regarding Romania, the presented results revealed a fragile approach in terms of management and strategies. It also revealed the potential for addressing these challenges. A strong public-private collaboration in managing this situation is vital. An important role belongs to the public sector and it consists in the education and preparedness of the human capital for these new and difficult challenges, as long as it is in its responsibility "Ensuring



future economic growth will require solutions that are more creative than any we have seen so far” World Economic Forum, 2017c, Preface).

As an individual, the preoccupation for both initial and continuing training must become a priority, in the context of the fact that the Romanian education system presents real deficiencies. These new challenges are not only for a part of our society, these new challenges involve and affect each individual.

This paper can be extended with research in many areas of Romanian economy and society, with predominance in the social area, in the public-private partnership, in the research and innovation area. Any scientific contribution can increase the chances of evolving both as a country and as an individual through new ideas, new solutions and practical applications.

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