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LIFELONG LEARNING IN CONTEXT OF INDUSTRY 4.0

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Abstract: *In recent years in the research field, but especially in industrial and business sectors, the objectives of the Industry 4.0 have been implemented, which has led to the increase of automation and robotization of production processes. The directions imposed by the Industry 4.0 outline a new era in which millions of human operators and companies in Europe and even around the world must align. The analysis of some statistical data presented in this article aims to make a retrospective of the current situation of lifelong learning and the labor market, capturing relevant aspects of the ability of human resources to adapt to new career development opportunities.*
Key words: *Industry 4.0, Lifelong learning, Future jobs, Labor market.*

1. INTRODUCTION

Today, the Industry 4.0 revolution and all its connected and emerging technologies (e. g. Big Data, Internet of Thing, Artificial Intelligence, Cloud Computing, Machine Learning, Augmented Reality etc.) are quickly and deeply impacting on the companies' organization and technical capability. It is obvious that in recent years when technology and social environment change rapidly, it is no longer sufficient to graduate a form of study and be a good employee. To create a good career is needed to learn all the time, to have the possibility to adapt to changing job conditions, career and business market [1; 2].

In the research field and especially in the industrial area, the focus is to implement the Industry 4.0 goals, and to create a manufacturing process that is based on the advancement robotics and automations. The industrial revolution that happens in this days has now been replaced by the information revolution and the knowledge economy. Therefore, in the future the jobs challenges, but mainly the opportunities will arise. Jobs will be less repetitive, centered on the IT technology and innovation, more creative and more challenging and rewarding [3].

The question that appear after thus affirmations is: How easy is to an employee that have a certain age and an experience to prepare to thus changes? One of the answer is lifelong learning, which continues over the course of a person's entire career. Keeping up with professional and technology trends will help light the way towards the learning that is most important in the new economy.

Acquire all the most important skills to participate in a rapidly growing knowledge economy [4].

A university degree at the start of a working career does not answer the need for the continuous acquisition of new skills, especially as career spans are lengthening. Vocational training is good at giving people job-specific skills, but those, too, will need to be updated repeatedly during a career lasting decade [5] (Figure 1).

Fig. 1. Lifelong learning stages [5]

2. WHAT IS LIFELONG LEARNING?

The Oxford English Dictionary (OED) defines lifelong learning thus: "Lifelong learning n. a form of or approach to education which promotes the continuation of learning throughout adult life, esp. by making educational material and instruction available through libraries, colleges, or information technology" [3].

The Oxford English Dictionary provide a good definition, but it is a general one. Starting from this point, the idea or concept of lifelong learning can be traced to the ancient Greeks.

The European Commission issued "A Memorandum of Lifelong Learning" in 2000, in which it recognized that the transition to a knowledge economy requires a rethinking of patterns of learning, living and working in Europe.

The definition of lifelong learning used is: "All purposeful learning activity, undertaken on an ongoing basis whit the aim of improving knowledge, skills, and competence and all learning activity undertaken throughout life, whit the aim of improving knowledge, skills, and competences within a personal, civic, social and/or employment related perspective" [6; 7; 8]. The Memorandum launched a Europe-wide debate on strategies for implementing lifelong learning at individual and instructional levels, and in all spheres of public and private life. [3; 6]. The key points of this document are the need to [6; 7; 8; 9]:

1. Guarantee universal and continuing access to learning for gaining and renewing the skills needed for sustained participation in the knowledge society;
2. Visibly raise levels of investment in human resource to place priority on Europe's most important asset - its people;
3. Develop effective teaching and learning methods and contexts for the continuum of lifelong and life wide learning;
4. Significantly improve the ways in which learning participation and outcomes are understood and appreciated, particularly those in nonformal and informal learning;
5. Ensure that everyone can easily access good quality information and advice about learning opportunities throughout Europe and throughout their lives;
6. Provide lifelong learning opportunities as close learners as possible, in their own communities and supported through Information and Communications Technology Network, based facilities wherever appropriate.

3. THE FUTURE OF JOBS

The emerging contours of the new world of work in the Industry 4.0 are rapidly becoming a lived reality for millions of workers and companies around the world [12]. The inherent opportunities for economic prosperity, societal progress and individual flourishing in this new world of work are enormous yet depend crucially on the ability of all concerned stakeholders to instigate reform in education and training systems, labor market policies, business approaches to developing skills, employment arrangements and existing social contracts [9]. Catalyzing positive results and the best knowledge that will acquire from this evolution, will require fearless leadership and an entrepreneurial spirit form the businesses and governments, as well as an agile mindset of lifelong learning knowledge, form the employees [12].

A focus of this paper is a good understanding of the potential for new technology, including how automation and algorithms help to create new high-quality jobs and vastly improve quality, and productivity for existing human workers and how these workers will be affected [8] From the economic history, we can observe that for increasing the existing jobs through technology is expected to create entirely new tasks, from remote programming machine tools to integrated product tracking to virtual reality, opening up new opportunities for an entire range of human workers. At the same time, the Industry 4.0 movement of technological advancement is set to reduce the number of human workers that required for a task. Those new technologies lead to a difficult transition for millions of human workers and the need for investment in developing a new wave of agile learners and skilled talent globally [12].

3.1 Workforce trends for the Industry 4.0

To capitalize on the transformative potential of Industry 4.0, business leaders across all industries and regions will increasingly be required to formulate a comprehensive workforce strategy ready to meet the challenges of this new era [7; 8; 9]. Governments, educations institutes, labor unions and individual workers also have a lot to win from a correct understanding of the new labor market and they must have a proactive preparation for the changes underway [12]. Key factors include:

- An understanding of the scale of occupational change and documenting emerging and declining job types;
- Highlighting opportunities to use new technologies to improve human work and upgrade job quality;
- Tracking the job-relevant skills evolution;
- Documenting the business case for investment in retraining, up-skilling and workforce transformation.

3.2 The 2022 jobs landscape

Recent projections of the extent of structural change in the global labor market depend significantly on the time horizon taken into consideration [12]. In addition to the rate of technological advancement, a range of other considerations must be considered -such as ease of commercialization, public adoption of new technologies and existing labor laws-influence the rate at which these developments accelerate workforce transformation [7, 12]. From the companies' side of view, they estimate for implementing in the entire labor market, worldwide, the time limit needed for this transformation is about five years.

Emergent roles groups will gain significantly in importance over the coming years, while other groups of job profiles are set to become increasingly redundant (Figure 2). Across all industries, by 2022, the emerging professions groups is set to increase its share of employment from 16% to 27% of the total employee base, whereas the employment share of declining roles is set to decrease from currently 31% to 21% (Figure 2).

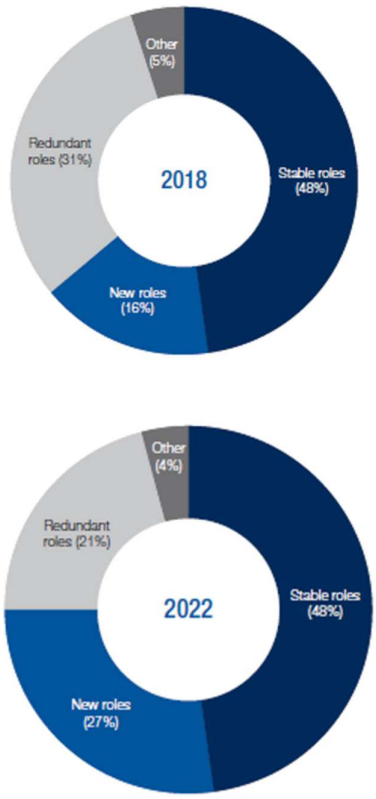

Fig. 2. New redundant role 2018 vs 2020 [12]

Therefore, in purely quantitative terms, the expectation emerging from the estimates of employers surveyed is that, by 2022, the structural decline of certain types of jobs (10% decline) will be fully counterbalanced by job creation and the emergence of new professions (11% growth). About half of today's core jobs-making up the bulk of employment across industries-will remain somewhat stable in the period up to 2022 [12].

4 LIFELONG LEARNING IN THE EUROPEAN UNION (A SECONDARY DATA ANALYSIS)

During the course of a person working life it is increasingly necessary to develop existing and learn new skills that are relevant to a specific job or which provide opportunities for new career paths [11]. Continuously refreshing the skills and knowledge of the labor force by means of lifelong learning has frequently been highlights in Europe Union policies. In the "Education and training 2010" programmer and in the European employment strategy is reflected the highlights

of lifelong learning which put the accent on the need for strategies to keep human workers in a continuously adaptable [10]. Adult learning can be measured in the Labor Force Survey by specific questions on participation in education or training activities during the four weeks preceding the survey. The target group for this study concern from the human workers between 25-64 age from all education or vocational training, whether relevant to participants current or future employment [10].

Figure 3 shows participation in education and training in 2010 and present a national profile by countries [10]. From the Figure 3 can observe that in regions like Denmark, the Netherlands, Slovenia, Finland, Sweden and the United Kingdom and but also in Iceland, Norway and Switzerland the highest rate of participation in education and training.

Later in 2019 (Figure 4) there have been observed that within countries, the highest rates of participation in education and training are often found around the largest cities, which are usually also the regions with the highest levels of educational attainment and where the range of education and training offered is widest and continuing vocational training activities are most frequent (e. g. in large enterprises) [10; 11]. On the other hand, the EU Member States on the border of the continent, such as Greece, Hungary, Malta, Poland, Portugal, Romania, Slovakia Croatia and Turkey generally have low participation rates in education and training for the 25-64 age group [10].

For 2020 the target for lifelong learning is to increase adult participation to a least 15% [6]. In Europe Union states, in 2018 one of nine people (11.1%) from the adult population is in education and training activity, this makes an insignificant increase with 0.2% besides preview year [11]. The target for adult participation rate in the learning of 15% is reached in 8 EU Member States and even exceeded in the Nordic Member States like Denmark (23.5 %), Finland (28.5 %) and Sweden (29.2 %). The adult participation in the learning rate was high that the target put by the EU in every region of Denmark the Netherlands, Finland, and Sweden and closer the target in Estonia and Luxemburg [11].

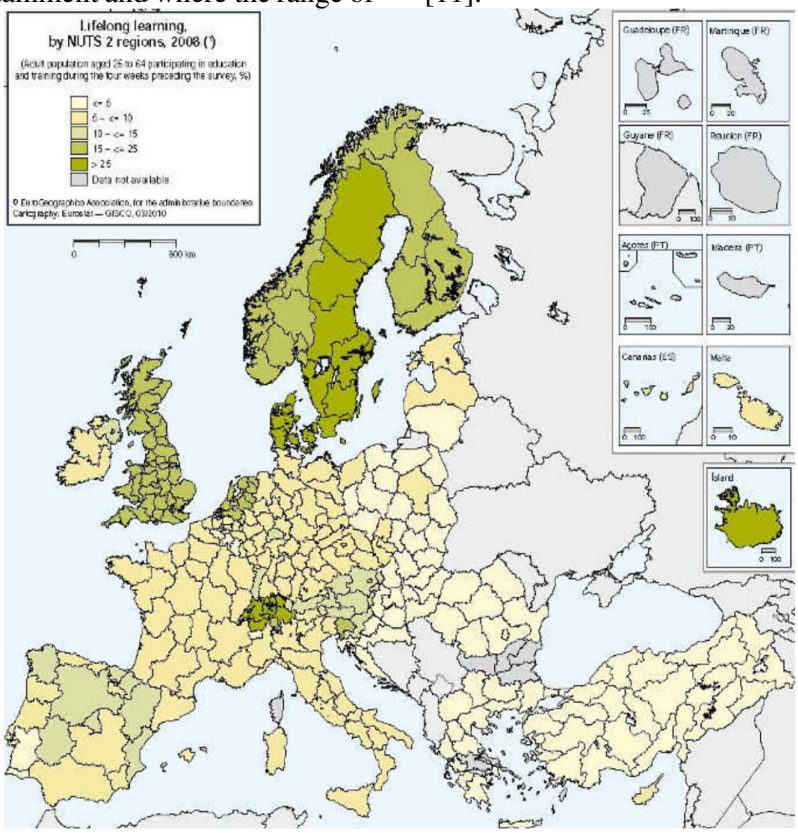

Fig. 3. Lifelong learning 2010 [10, p. 160]

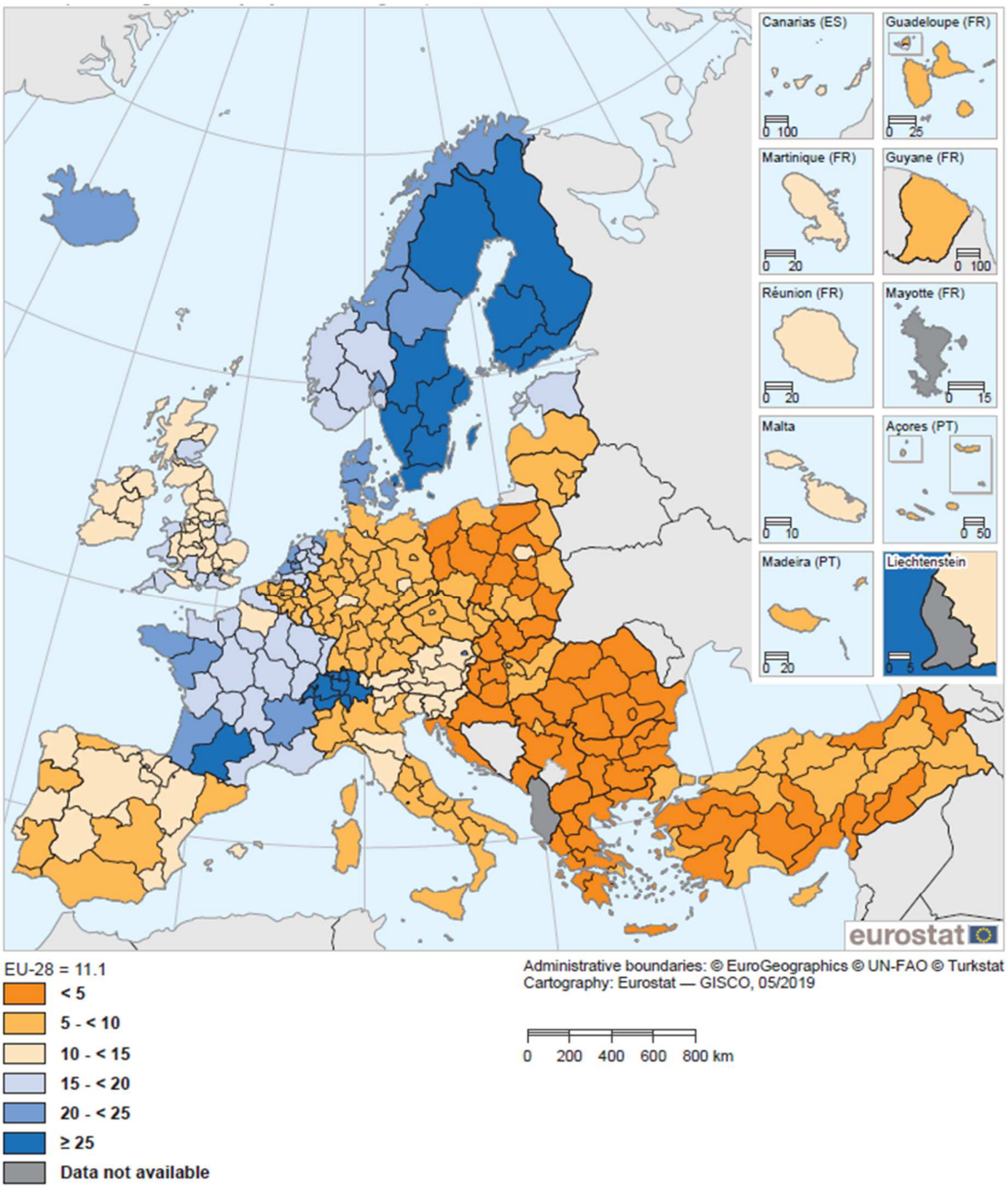

Fig. 4. Lifelong learning 2019 [11]

By contrast, the adult participation rate in the learning was below 5% in the EU Member States like Greece, Slovakia, Croatia, Bulgaria, Romania, the last of these have the negative record of lowest participation rate of only at 0.9%.

4.1 Regional employment

There were 232 million people employed in 2016 in the EU Member States, the statistical classification of economic activities in the European Community can be used to identify literally hundreds of different economic activities, however, these have been aggregated into just six different groups (Figure 5).

The total number of persons employed in the EU is divided as follows [9]:

- Agriculture, forestry, and fishing (10.4 million people employed; 4.5 % of the EU total);
- Industry (35.6 million; 15.3 %) and Construction (14.7 million; 6.3 %);
- Wholesale and retail trade; transport; accommodation and food service activities; information and communication (64.4 million; 27.7 %);
- Financial and insurance; real estate; professional, scientific and technical; administrative and support service activities (38.1 million; 16.4 %);
- Public administration (defense; social security; education; health and social work) arts, entertainment, and recreation; others (69.1 million; 29.7 %).

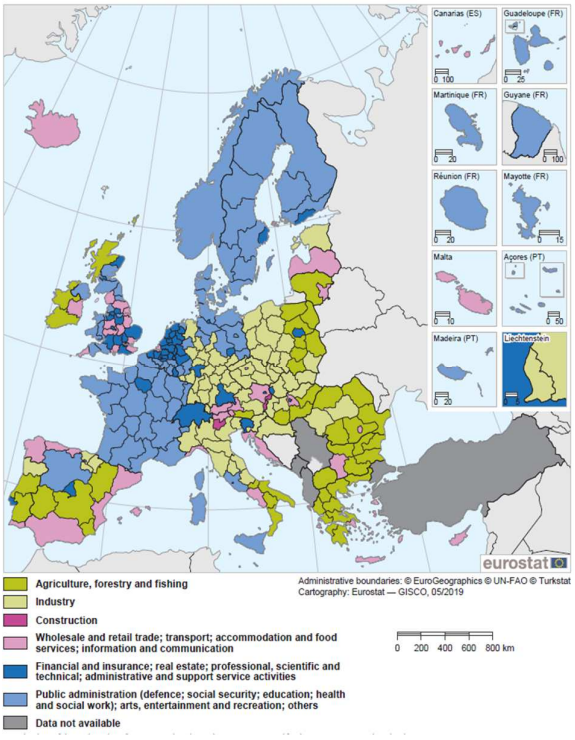

Fig. 5. Employment specialization in 2016 [11] (Eurostat online data codes: nama_10r_3empers and nama_10_a10_e)

5. CONCLUSION

A particular focus of this paper is to reach a better understanding of the potential of implementing new technologies to create as well as disrupt jobs and to improve the quality and productivity of the existing work of human employees. Another focus was to point out the necessity of lifelong learning in concordance whit the implementation of Industry 4.0.

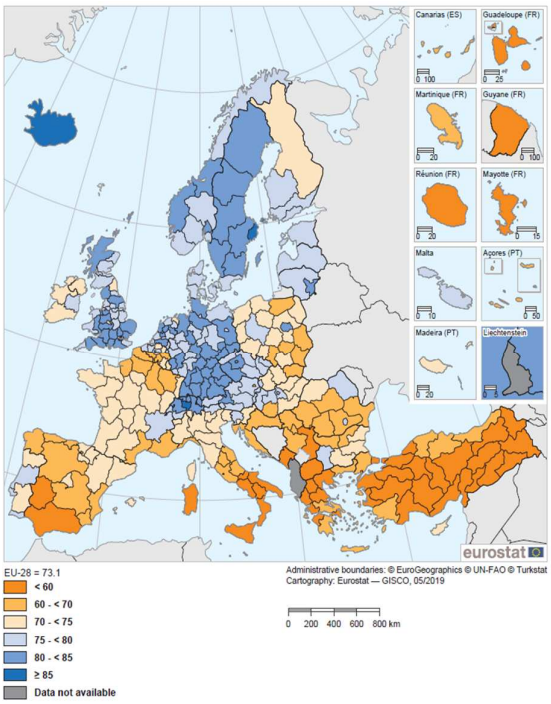

Fig. 6. Employment rate, 2018 [11] (Eurostat online data code: edat_lfse_33)

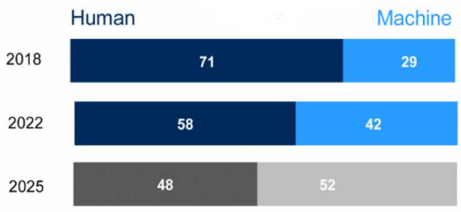

Fig. 7. Automation machinery rate in industry [12]

The data analyzed in this paper represent the current understanding of human resources in terms of lifelong learning and in the new opportunities for growing up in the career or to choose a new path. From the data analyzed in the paper, it is easily observed that in the States Members located in Est of Europe like Greece, Slovakia, Croatia, Bulgaria, Romania the life learning rate is very low, that can be correlated with the observation (Figure 6) that in the same area is the lowers rate of employment.

While the rate of employment in the state that reaches the target (15%) of lifelong learning like Denmark, Finland, Sweden, Netherland, Estonia, and Luxemburg is very highs, and whit a sphere of activity that requests a high knowledge and educations, and whit a consistent revenue.

The number of employees in the European Union States is considerable with a variety of domains. Industrial activity is one of the main domains where lifelong learning is expecting to have a major role, even more because of the implementation of Industry 4.0, but after the analysis, we can observe that the rate of learning is not so higher.

By implementing Industry 4.0 the rate of automation machinery will be increasing with approximate 20% by 2025, this aspect will lead in the industrial field to have the ability to acquire new skills like analytical thinking and innovation, emotional intelligence, complex problem-solving, system analysis and evaluation. For acquiring those skills, the World Economic Forum estimates that everyone in the industry needs an extra 101 days of learning (Figure 7) [12].

One of the essential conclusions of this paper is to pull an alarm signal to the academic and business side to look more closely at the labor market, to create new training programs, to support the worker to have an understanding about lifelong learning. It is obvious that future manufacturing process and product service systems design will need innovation and integrated engineering collaboration skills [13].

Future works will be focused on creating new training programs for future jobs and to understanding the need among workers of lifelong learning and his benefits.

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Învățarea pe întreaga durată a vieții în contextul Industriei 4.0

Rezumat: În ultimii ani în cercetare, dar în special în sectorul industrial, au fost implementate obiectivele Revoluției Industriale 4.0 ceea ce a tras după sine creșterea automatizării și robotizării producție. Direcțiile impuse de Revoluția Industrială 4.0 conturează o noua eră la care milioane de operatori umani și companii din Europa și chiar din întreaga lume trebuie să se alinieze. Analiza unor date statistice prezentată în acest articol are drept obiectiv realizarea unei retrospective a situației actuale a educației pe tot parcursul vieții și a pieței forței de muncă, surprinzând aspecte relevante privind capacitatea de adaptare a resursei umane la noile oportunități de dezvoltare a carierelor.

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