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Technology, Empowerment and Economic Development

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Abstract: *This article is based on a research whose objective was to identify and analyze, in the current context of technological development related to new forms of production and organization of working times, the main impacts that are expected regarding the future of labor, the adequacy of resource qualification, and the challenges of society and economic activity.*

The research has shown that technological progress, being fundamental to the sustainability of business and economy, requires adjustments at the level of resources, society and companies' empowerment, the State's crucial role in supporting and creating the conditions through public policies for development and economic recovery.

Keywords: Technology, empowerment, economic development, public policy

I. Introduction

In the last 40 years the technological development that we have seen has had a fundamental influence on the economy and progress of an increasing number of countries.
The evolution of telecommunications, microelectronics, robotics, computing, optical technology, and the use of new materials, renewable energies, and biotechnology have all contributed to the innovation in the whole productive process in the most diverse fields and, consequently, to the development of innovative products and to the investment in new markets.
This means that if, over the years, national companies have mobilized themselves into initiatives in these new fields of knowledge, science and technology, multinationals have likewise heavily invested in this field, in which the rules of the markets, sustainability and competition, require public authorities to support innovation and to the transfer of new technologies as well as support measures for declining productive sectors susceptible to restructuring.
In effect, the profound technological transformations undertaken at a tremendous pace, with repercussions in business management and the ways in which work is organized, have an impact on the future of work, on society, as well as on business sustainability.
The purpose of this paper is to identify and analyze, in the current context of technological development associated with new forms of production and organization of working time, the major impacts that are expected with regard to the future of work, the adequacy of resource training, and the challenges of society and economic activity.
This paper is based on our bibliographic and documentary research.

II. The labor market in Portugal

II.I Latest Trends

The labor market in Portugal mirrors, year after year, the effects of technological evolution, market globalization and corporate internationalization, business competitiveness and sustainability, and also of course the evolution of workers' qualifications over the last few decades.
Chart 1 illustrates the evolution of the educational level of employees among 15- to 64-year-olds. Data show us that in 1992, 73.3% of TCOs had only basic education or no education at all, recovering this indicator to 39.8% in 2019,

which means a progress in workers' skills, while Germany recorded in the same years 15.9% and 13% respectively, keeping a low rate of workers with low qualifications. On the other hand, in the opposite direction, but also frankly positive, TCO with secondary and post-secondary non-tertiary education that in 1992 made up only 12.9%, in 2019 increased to 30.8% - Germany remained in this period with high values without significant change (from 56.8% to 58.5%). Regarding workers with higher education, Portugal also took a remarkable step forward, with 29.2% of the universe in 2019, compared to 13.8% in 1992, surpassing Germany during that period, which, although it had 19% in 1992, 28.3% of its workers had a higher education in 2019.

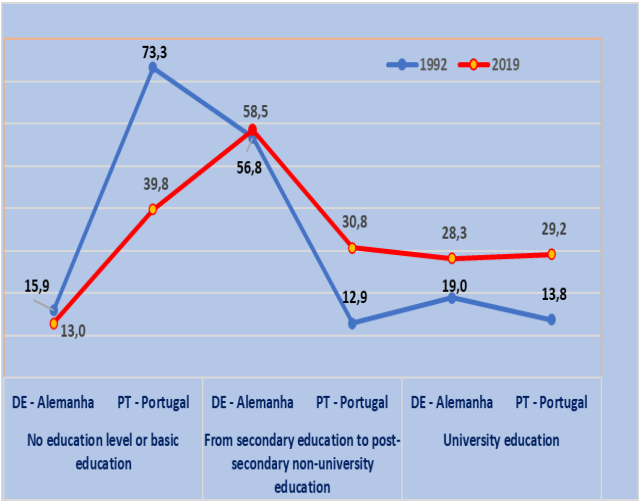

Chart 1 - Percentage of TCO, aged 15-64, with no education or with primary, secondary or higher education

Source: PORDATA – available at www.pordata.pt – accessed on 10-02-2021

Elaborated by the author

At the more specific level of acquired training, Portugal has seen an increase in the number of individuals with higher education qualifications in the areas of information and communication technologies with diplomas obtained in the country at public and private educational institutions. Public education which awarded 15090 diplomas in 1992, has reached a number of 68205 graduates in 2019. In its turn, private education comprised a total of 14988 new graduates in 2019, that compares to the 6359 in 1992.

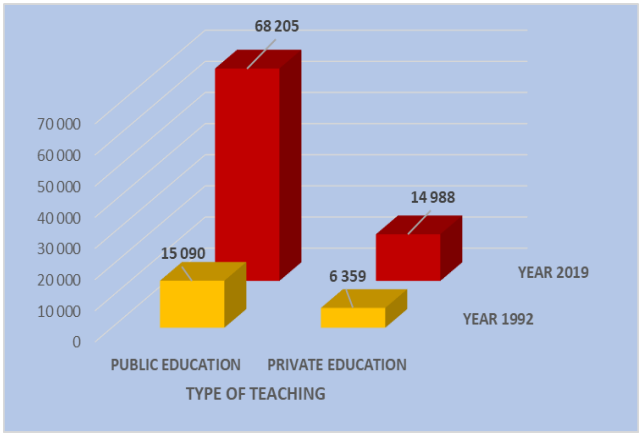

Chart 2 – Higher education graduates in information technology and communication by type of education

Source: PORDATA – available at www.pordata.pt – accessed on 04-07-2021

Elaborated by the author

Regarding the employment market, over the years, it has been seen that the available jobs are not fully filled (Chart 3). This is essentially due to the existence of a mismatch between the professional profiles required by the market (job supply) and the professional profiles available for work (job demand), also reflected in the levels of frictional unemployment in Portugal, in contrast to the objectives of the employment policies, according to which the policy in this area should contribute to "Improving the organization of the labour market, contributing to the quantitative and qualitative adjustment between employment supply and demand (…) [15]. This is in fact an enduring employment problem in Portugal, the reasons for which, as Moura states, must be sought in the education and training system [16]. Underemployment, likewise, is another torment in the domain of the employment market, and one cannot think that the guarantee of an income by providing better living conditions solves employment problems. In this regard, Moura states that it is not enough to grow the product in order to improve living conditions and well-being, even if a production of goods and services capable of satisfying certain basic needs is achieved, this does not guarantee that there will be adequate jobs for all. The qualitative dimension of employment is undoubtedly a key condition for the personal and professional fulfilment of citizens provided for in the applicable international instruments, namely

free choice, remunerative purpose, and the possibility of using their qualifications without any kind of discrimination.

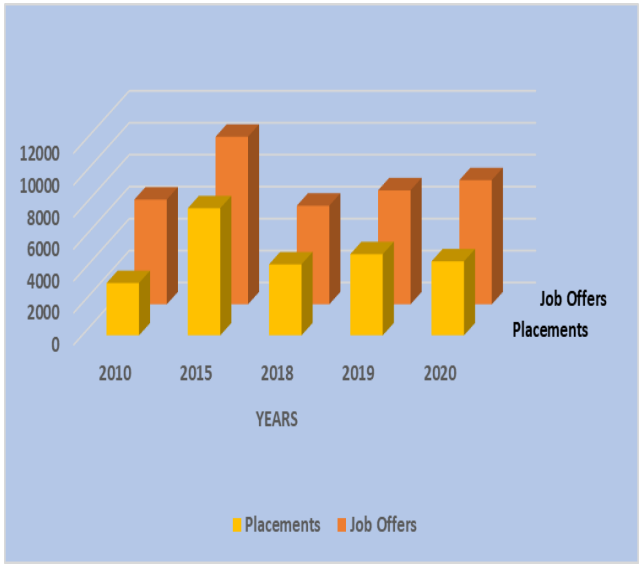

Chart 3 - Evolution of job offers and placements (movement throughout December)
Source: IEFP, IP, Monthly Employment Market Information - available at www.iefp.pt - accessed on 04-07-2021
Elaborated by the author

As a consequence, the percentage of placed individuals, after showing an upward trend in 2015, shows a reversal in 2020, with placed individuals representing 59.6% of the number of jobs offered.

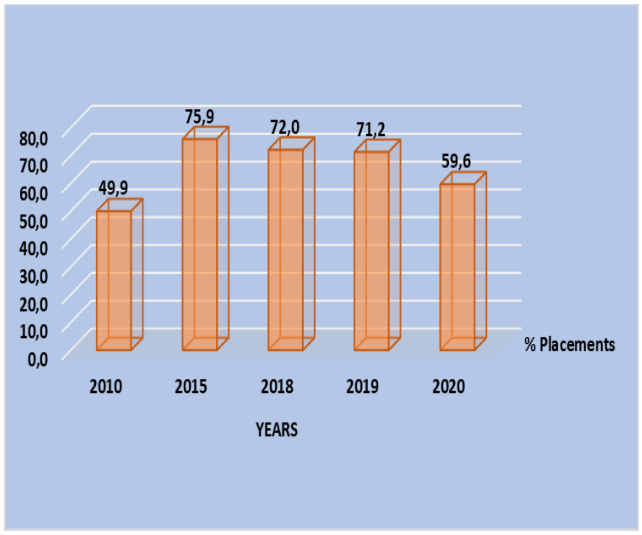

Chart 4 - Evolution of job offer fulfilment - % of placements (movement throughout the month of December)
Source: IEFP, IP, Monthly Employment Market Information - available at www.iefp.pt – accessed on 04-07-2021
Elaborated by the author

Therefore, for the adjustment of current and new professional profiles to the effective needs of companies in a global economy in which competitiveness is the key element for sustainability, Page [5] considers that, to this effect, it is urgent and required the improvement of skills and professional requalification, which are the decisive tools for success in the future labor market.

According to OECD, more than 40% of jobs in OECD countries are supported by consumers from foreign markets [7], as a result of globalization and the key role of technology in integrating global markets, increased outsourcing and global demand and competition for talent [8].

According to the available information, four out of ten new jobs in the OECD are in highly digitally intensive sectors, which demonstrates the introduction of digital into economies and the labour market [7].

II.II Most in-demand and emerging professional areas and profiles

As Ferreira describes [1], based on his consultation with Robert Walters, the technological area is one of the most sought after by employers. The author states that according to Paulo Ayres IT Manager software development from that recruiting specialized company "The IT area [information technology] is certainly one of the most requested in Portugal. (…). It is into the data areas, where data scientists, artificial intelligence engineers e business intelligence analysts, and programming, with special focus on full stack developers, mobile developers e devOps, that employers' attention is focused on".

However, according to Ayres, who is cited by Ferreira [1], the main obstacle is finding available professionals with the requirements demanded by employers. The scarcity of these profiles, in addition increasing the remuneration level of these professionals, "opens the door to the importation of talents.

"If in a finance or marketing area, job applications are plentiful, in IT, the consultant

most often has to directly approach candidates, often with no response," says Tatiana Silva, a senior consultant at Michael Page Information Technology, quoted by Ferreira [1].

According to François-Pierre Puech, senior manager at Robert Walters Portugal, Ferreira [1], the engineering job market is also booming, particularly in the automotive, food, and energy sectors. "The fields of quality, O&M [organization and methods], industrial organization and production are the ones that have been strengthened the most, because they have a direct implication on productivity and competitiveness in an increasingly global market." In this context, according to the same source, among the functions with the greatest interest are the following ones: “chief operations officer, automotive maintenance technicians, logistics specialists, quality assurance manager, manufacturing manager e shift coordinators”.

According to José Rosenbusch, manager sales & marketing at Robert Walters, as Ferreira [1] states in his paper, there is another area that has registered a growth in demand by employers - sales & marketing, especially with regard to the positions of sales director, export manager and key account manager, and these positions cut across all sectors of activity, although there is "(...) an increase in the FMCG [Fast-Moving Consumer Goods], technology and services".

As far as marketing is concerned, António Costa, senior manager sales & marketing, IT & technical sales at Robert Walters, as Ferreira [1] refers, "the paradigm changes a bit. The emergence of new roles impacting business leads to greater demand in the specific area of digital marketing and e-commerce. According to this human resources recruitment company, among the most sought-after positions are digital marketing manager, brand digital marketing and e-commerce specialist, all of which are also relevant for different business sectors.

Regarding emerging professions "the World Economic Forum has identified seven professional clusters that could mean 6.1 million new job opportunities in the next three years: data and artificial intelligence; care economy; green economy; engineering and cloud computing; people and culture; product development; and sales, marketing, and contents.

In any case, new segments and opportunities within the scope of digitalization tend to also create specialization profiles and potential job creation in niches provided by the evolution of specific technologies. For instance, a recent report from an industry company underlines that 73% of organizations are creating their first intellectual properties using next generation technologies such as machine learning, internet of things, blockchain, and mixed reality [8].

III. Digitalization - advantages, risks and challenges

The digital transition, regarded by many as the fourth industrial revolution, calls for the need to find ways to overcome challenges such as flexibility, supply customization, and adaptability [2]. This challenge, according to the author, is transversal to all companies, regardless of age, legal nature, size (micro-enterprises, small companies, small and medium-sized enterprises, and large companies) or even multinationals or start-ups.

Digitalization presupposes a change in organizational culture as well as a permanent effort to adapt the business models pursued, facing a set of changes, namely at the product, service, professional skills, commercial model, communication, channel, and customer levels. This means that the transformation of technology is a fundamental means for the competitiveness and sustainability of companies, yet the final purpose is still people [2].

Embracing the digital transformation is key to business competitiveness, with the European Court of Auditors in its 2020 report finding that EU companies are not capitalizing the advantages and benefits of technology for innovation [3], further noting "that the [European] Commission's strategy to support the digitization of European industry rests on a solid basis and is supported by Member States, yet lacks information on intended effects, result indicators and [expected] targets"[3].

In any case, the process of developing digitalization in the business context depends to a large extent on the financial strength and stability of the companies, so the path to be followed in this area will not run in all cases with the same speed.

According to the Liberty Seguros statement, "it is important to reinforce support for small and medium-sized companies, reminding us that it is the duty of all companies to help the sector in which they operate in the process of adapting to the current context, standing by their employees. It is important that we find tools for training, collaboration and support. At Liberty, the 150 people responsible for ensuring the digitalization of the company and the investment of 100 million euro will not be enough if our progress is not accompanied by those smaller companies that make a decisive contribution every day to keep economic activity going. The proximity and support of the people who are behind each SME and who contribute to maintaining employment is the real digital revolution that we will continue to promote [2].

More and more, whilst companies operate in an open system, they have to perceive and know how to interpret consumers' habits and preferences, as they are the reason for the company's existence. We can state that companies have several objectives, all of which are legitimate, but there is no doubt that the natural goal is to boost results - profit, and this is only possible by increasing the number of customers and sales, which presupposes, as Teixeira refers, that companies seek to meet society's needs for goods and services, increasing their well-being, even creating a climate favorable to the satisfaction of human needs, considered normal [4].

As the head of Sales and Distribution at Liberty Seguros Europe points out, it is necessary to train employees, promote business in digital environments, and develop functions that meet new consumer demands, bearing in mind the importance of using technology that is accessible and inclusive for everyone [2].

It becomes clear that technological evolution will contribute to some job replacements, particularly those based on more administrative, bureaucratic, and routine functions, but it is undeniable that the new technological tools will stimulate the creation of new jobs and the use of new labor models and practices to meet the new challenges faced by companies, workers, and society in general, yet this requires a collective effort, a focus on training, and no fear of change and the natural risks associated with it.

He also states that technological development within everyone's reach also provides economic benefits resulting from the reduction of time spent on routine tasks, admitting a benefit for the employee in the assumption that he will be able to invest more time in intellectually stimulating tasks.

From another perspective, Corinne Mills, professional coach, author and CEO of Personal Career Management, believes that the fast-paced evolution of technology, the increase in human life expectancy and the need to ensure our own financial sustainability will mobilize us to develop multiple careers, where lifelong learning or so-called Liquid Skills will be critical to enhance our employability.

"It is obvious that continuous learning and professional agility will be essential. Jobs are rapidly changing as technology begins to complement, redefine, and potentially replacing many existing jobs. Individuals must stay aware of potential career options and work proactively to develop the new skills and the required knowledge; ongoing proactive career management is likely to be essential for continued employability" [6].

In addition to digital, the overall demand for robots in OECD countries has also grown significantly in the last decade. Since these are average figures, it is important to take into account each country's characteristics, as is the case of Portugal, "which may be more subject to this type of transformation, due to the national productive structure, the nature of its activity sectors and its productive and qualification profile"[8].

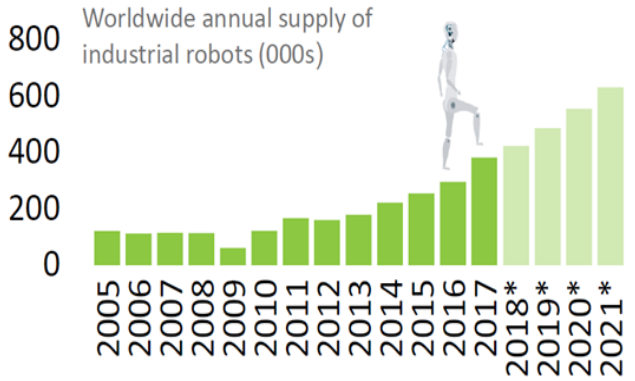

Chart 5 - Global robot supply (thousands)
Source: OCDE, Webinar Green Paper on the Future of Work, Portugal, 2020

The OCDE estimates that in the EU member states almost half of all jobs and occupations will undergo significant changes due to transformations in the world of work and production methods, such as automation: 14% of jobs in OECD countries and 17% of European jobs are likely to be fully automated, and another 32% in both the OECD and the EU, though not subject to obsolescence, but certainly to significant change [8].

IV. The progress of technology in Portugal and public policy as an increment to growth in this field

According to the Green Paper on the Future of Work [8], Portugal joined the "Digital Nations" (DN) in 2018, [10] also part of the "Coalition of the Willing" (COTW)[11] and was accepted, relatively recently, into D9+, the informal group of member states that brings together the top-ranked European countries in the EC's annual Digital Economy and Society Index (DESI) and includes two other countries besides Portugal that share identical ambitions for the Digital Single Market [12].

According to the same source, by 2020 Portugal ranked 19th among the 27 EU member states in the Digital Economy and Society Index, [13] maintaining its position in the global ranking relative to the previous year, although with a slight increase in the score achieved.

The authors mention [8] that in the last years leading up to the pandemic period, the country's score increased in line with the EU average, and the negative impact in this area is expected as a consequence of the crisis we are going through.

Overall, as far as DESI indicators are concerned, Portugal is at an advanced stage of capacity network deployment, standing above the EU average as far as the provision of digital public services is concerned, but still registering some delay in the assignment of the radio spectrum for 5G and a still poor performance in the indicators referring to digital skills.

Also, with regard to the performance of digital skills, according to the Green Paper, a boost in qualifications is required, despite some improvements in different dimensions over the last decades. In this context, the authors highlight the existence of significant inequality factors that need to be taken into account.

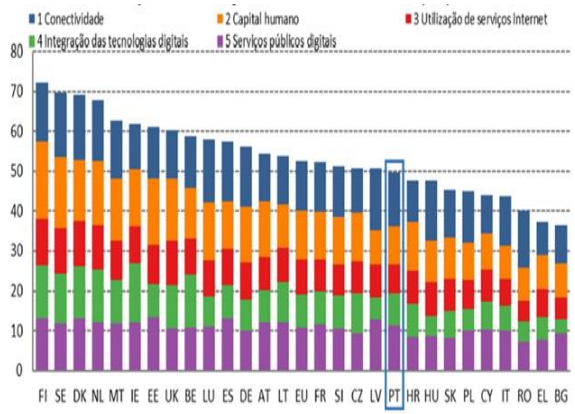

Chart 6 - Classifications of the Digital Economy and Society Index 2020
Source: DESI 2020

In October 2020 the OECD released the results of its first OECD Digital Index (DGI), which covers 29 OECD countries and four observer countries (Argentina, Brazil, Panama, and Paraguay). [8] In this context, Portugal ranked 10th in the overall DGI 2019 ranking, with 0.580 points, ranking above countries such as France (11th position), New Zealand (12th position) and Norway (13th position) and standing out from the OECD average (0.501 points, which corresponds to a position between 17th and 18th in the ranking) [8].

In Portugal, the government intends to encourage companies to follow the path of technological development by investing in digitalization, given that according to the 2019 EU data, Portugal is below the EU average in terms of digital technology adoption levels, as well as it is in the percentage of people with digital skills. The study developed by the EU

also demonstrates that, in Portugal, SMEs are less digitally active than their European counterparts [8].

Already in 2017, the Portuguese government began designing the Portugal 2030 Strategy, which, due to the pandemic that began in March 2020, was subject to revision in order to include short- and medium-term mitigating measures aimed at the recovery and resilience of the economy and society.

Therefore, in early 2021, the Portugal 2030 Strategy was approved, establishing a benchmark for the application of various policy instruments to be adopted in the near future, including the Multiannual Financial Framework (Portugal 2030) and the Next Generation EU, a temporary European instrument - where the national Recovery and Resilience Plans (RRP) are included [14].

Within this context, Digitalization, innovation and qualifications as drivers of development is one of the thematic agendas that comprise the Portugal 2030 Strategy, in the assumption that important structural efficiency gains will be achieved in this way, namely in terms of context costs for companies and people, a better preparation and adaptation of Portuguese skills to the new empowerment needs as citizens, for participation in a labor market marked by new production processes, new business organization modes and new products and services, resulting from the growing digitalization of economic activity [9],[14].

Therefore, Portugal 2030 Strategy would be incomplete if it didn't consider the digital transition and Industry 4.0, as well as the business dynamics in a post-COVID scenario, on a basis of greater autonomy and resilience [9],[14].

Of the objectives pursued in this Thematic Agenda, one can identify, namely: [9],[14]

- Increase total R&D expenditure to 3% of GDP by 2030;
- Ensure that 60% of 20-year-olds are in higher education by 2030;
- Strengthen the adult participation in lifelong learning;
- Achieve a European leadership level in digital skills by 2030;
- Increase exports up to a volume of 50% of GDP in the second half of this decade;
- Strengthening the financial resilience and digitalization of SMEs; and
- Strengthen the attraction of foreign direct investment.

V. Conclusion

In terms of conclusion of this paper's general lines, we note the evidence of technological progress on an international scale and the need for society and the business sector to adapt in order to face this ever-increasing challenge.

As for the economy and society's digitality index, in 2020 Portugal ranked 19th among the 27 EU member states, maintaining its position in the global ranking when compared to the previous year, and increasing its score in line with the EU average.

As far as the provision of digital public services is concerned, Portugal is above the EU average, yet it has some delays in the assignment of the radio spectrum for 5G and also a poor performance in the indicators referring to digital skills.

Regarding the employment market, the areas with the highest employment offers are: IT (information technology), data areas, especially these: data scientists, artificial intelligence engineers e business intelligence analysts, and programming, namely the full stack developers, mobile developers and devOps.

The areas of digital marketing and e-commerce were also identified as interesting for the market, as well as some emerging jobs, and therefore potential for employment creation: data and artificial intelligence, care economy, green economy, engineering and cloud computing, people and culture, product development, and sales, marketing and content.

The qualifications of the Portuguese have, in fact, improved significantly over the last decades, especially in terms of the educational level, although we still see a mismatch between the profiles required by the market (job supply) and the profiles available for work (job demand).

Businesses and companies competitiveness as well as their sustainability greatly depend on adherence to the digital transition and the change that this implies, on making the most of resources and opportunities, and on valuing people and companies. The

Portugal 2030 Strategy and, in particularly, the Recovery and Resilience Plan for the 2021-2027 period are fundamental support instruments for economic development and for improving the empowerment and quality of life of the Portuguese.

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[10] International group that gathers the world's most ambitious digital governments, with the common goal of using digital capabilities to improve businesses and citizens' lives

[11] Informal group, created on October 5, 2020, gathering those European countries considered leaders in digital transformation

[12] D9+ members include Denmark, Finland, Sweden, the Netherlands, Luxembourg, Belgium, the United Kingdom, Ireland, and Estonia, joined by the Czech Republic, Poland, and Portugal

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