Challenges of Women's Digital Inclusion in the Portuguese Context

Isabel Fonseca, Barbara Barreiros and Cecília Pires
University of Minho, Braga, Portugal

ifonseca@direito.uminho.pt
barbarabarreiros.nedal@gmail.com
ceciliapires@gmail.com

Abstract: The gender barrier in the technological area represents a significant challenge for the members States of European Union. Also, in Portugal the participation of men and women in ICT is still uneven. This position is the result of the historical evolution of the position of women in the Portuguese society. This article aims to review the digitally index of women and the level of representation of women specialists in Information and Communications Technology (ICT) in Portugal comparing with the position occupied by men and the rank occupied by women in other members States of the European Union. It also intended to know the policies that have been implemented in Portugal with the aim of improving the digital inclusion of women. To achieve our goals, we supported our study in statistics data and we recapitulate Portuguese policies adopted to strengthen female representation in the digitally and ICT market. Furthermore, we looked at the 2020 European Commission report on this subject (which presents pre-pandemic COVID-19 data, 2021 (which represents data during the period of the pandemics and the period of the emergence State in Portugal) and the 2022 report (which represents post-pandemic data to understand the evolution and impact of female digital inclusion caused by the COVID-19 period. The research technique adopted is document analysis based on the systematization of statistical data from the years 2019, 2020 and 2021, reading articles, academic books on the subject and the political programs implemented in Portugal to meet the digital challenges of women. we conclude that Portugal is on the right path, however, it is still too early to assess the success of the measures implemented.

Keywords: Information and Communications Technology (ICT), Women, Digitally index, Public policies, Portugal, Asymmetry

1. Introduction

For the asymmetry between man and women in the access, learning and use of ICT and for the use of internet, historical, social, cultural, and political factors contribute to it.

According to Castells (2016), society cannot determine technology but uses it. The uses of technology can slow down or accelerate social development, with the State having an essential role in this movement. As stated by the author, technology alone cannot determine the historical evolution of society, but the capacity to dominate technology can influence the realization of essential social changes. As a result, all sectors and social groups must participate in the technological revolution. This model is the way to ensure that society will evolve positively and inclusively.

According to Saavedra et al. (2011), the dualism that associated science with man and nature with women was established in the 17th century with Francis Bacon, and since then this association of values has accompanied us throughout history, continuing to influence the choice of professions, despite being known examples of renowned women in the field of mathematics and physics.

In Portugal, schools and textbooks have only very recently implemented the alteration of this stereotype that has haunted us for years. Many families also followed this dualism, eventually influencing the choice of Portuguese young women regarding the educational path to follow and, consequently, as to the profession to be performed in the future. Thus, even today there is a strong number of women dedicated to the areas of education, health and social protection, the arts and humanities, the social sciences and law; and a more reduced number of women dedicated to the study of science, mathematics and informatics, as well as in the field of engineering and manufacturing (SAAVEDRA, 2011).

The reasons responsible for maintaining this stereotype may be related to some historical factors. It should be recalled that in Portugal, just over 40 years ago, the difference between men and women was still very marked due to the political dictatorship in which we lived. Consequently, the limitations imposed on women were several and this reality was not really changed until after April 25th, 1974. Although the Revolution of April 25th (commonly known as the *"Cravos"* Revolution) overthrew the fascist regime, the emancipation of Portuguese women was not immediate. Women's emancipation was sedimenting step by step and began to truly impose itself in the 1980s and more sharply in the 1990s. According to Irene Pimentel, it was not until the 1980s that the operative concept of gender emerged in Portugal (CARDOSO, 2016). That is why the path of equality between men and women in Portugal began slightly later than in the other Member States of the European Union where the rate of feminisation in the digital world is higher.

Making a brief synthesis of the evolution on the education and integration of women at the professional and social level in Portugal since the twentieth century, with interest for our study, in order to better understand the position of women in Portuguese society today, it is worth highlighting the following facts.

During the First Portuguese Republic that took place between 1911-1926, about 80% of women in Portugal were illiterate. Only from then on was the path to compulsory education opened from 7 to 11 years for boys and girls. However, in practice, there were not enough schools for this right to be exercised by all; and only from then on were women able to start working in the civil service. However, the First Republic was short-termed and the politicians of the time, with the aim of breaking with the ideals of the monarchy, were eventually lost in heated debates whose primary objective was to end monarchical ideals. Therefore, the achievements have been few, especially with regard to the position of women. In 1914, with the First Great War, women had an intervening role in society, however, this social intervention was summarized to education and hospital organizations from the rear, thus maintaining the role of caregiver (ALVES, 2015).

However, in Portugal there was a setback in the position and right of women in society with the installation of the dictatorial political regime, called the *Estado Novo*, preceded by the Military Dictatorship installed since 1926. The Constitution of the Portuguese Republic of 1933 provided in Article 5 that citizens were equal before the law, but provided for the exception: "*the differences resulting from their nature and the good of the family are saved as far as women are concerned*." The 1933 National Labour Statute also limited the possibility for women to work outside the home, and in cases where they could work the wage gap paid for the same work performed by a man was considerable. In addition, the Civil Code of the 1867 Portuguese remained in force in which several norms were foreseen within the family with the supremacy of male power (CARDOSO, 2016).

Portuguese women lived, therefore, in a condition of legal inequality *vis-à-vis* man, inequality in status within the family and the couple, but also in terms of political, social, labour and cultural rights. Only with the revolution of April 25th, 1974 Portugal starts living in a climate of freedom. Thus, on April 2nd, 1976, the Constitution of the Portuguese Republic was adopted, declaring the principle of equal choice of profession, access to work and pay without gender discrimination; and in the area of the family ensured equal rights and conjugal duties. It is indispensable to review the various Portuguese legal codes, such as labour legislation and the civil code. More specifically with regard to higher education, there began to be a renewal of the teaching taught in universities, the influence of the Annals' school and the "new history" of anthropological orientation, directed to the studies of private and daily life, as well as changes in Portuguese society itself, more specifically, the massive entry of women into higher education (NUNES, 1961-1986). Before the revolution of April 25th, 1974, very few women were studying in higher education (LOUSADA,2013). However, to this day, despite existing legislation and a change in the social mind-set, the family remains a singular feminine noun. (MACEDO, 2022). Thus, even during the 21st century and, nevertheless, the Portuguese constitutional framework, which is very rich in norms that enshrine equal rights between men and women, as well as the varied legislation that has been published in defence of gender equality, in fact, the majority of Portuguese women continue to have the burden of domestic management and family management, with the education of children. That is, the family remains a burden more of women than men and of course this social factor has a strong impact on the choice of the professional area of studies (MACEDO, 2022).

In addition, a political factor also contributes to the problem. Thus, in 2015 the measures that were being implemented with the aim of increasing the digital index in Portugal left out the development of human capital and the private sector, prioritizing investment in the digitization of public administration. With the proposal to update the Portugal Digital agenda, Portugal has approved the *Resolução de Conselho de Ministros 22/2015, de 16 de abril*. Consequently, initiatives aimed at the development of human capital in the digital area are beginning to be implemented.

2. Literature Review

In the literature existing, Isabel Fonseca, co-author of this paper and principal researcher of the Smart Cities and Law, E.Governance and Rights: Contributing to the definition and implementation of a Global Strategy for Smart Cities (NORTE-01-0145-FEDER-000063) left an important contribute to this subject in Portugal with "Smart Cities and Law, E.Governance and Rights: (retomando) o diálogo com a Benedita", in Liber Amicorum Benedita Mac Crorie, Escola de Direito da Universidade do Minho, vol. I, Braga: UMinho Editora, 2022, pp. 509 a 527. This section focuses on the related research efforts in light of this research.

Also Eva Macedo presents us with a important bibliographic collection in this area, having been highlighted with Rosmaninho prize – a important distinction in women and human rights.

3. Methodology

In methodological terms, this article fits into two research paradigms: quantitative and qualitative and involves inductive and deductive reasoning. We aim to quantify and qualify the process by identifying the reasons behind the measure phenomenon. The research techniques adopted are the document analysis from the systematization of statistical data for the years 2019, 2020 and 2021, articles and European Union reports.

It is important to note that the technological areas consist of several sections. However, we will focus on the digital competences of the women and the ICT field because it is an area that lacks qualified human resources and has been impacted by the public health crisis of COVID-19.

The active participation of historically excluded groups will have the capacity to impact society's destiny, enforcing the creation of an inclusive and modern legal framework in the digital era. In this context, it is fundamental that women, as a socially excluded group of different and essential stages of history, take part in this "*accelerated process of technological modernization* (…)" (translated by the authors from the original language – Spanish. Castells, 2016, p.8).

We also recognize that factors such as limitation, devaluation, disqualification, and exclusion affect women at different levels depending on factors such as race, ethnicity, nationality, and sexual orientation, among others. However, we comprehend that an intersectional approach goes beyond the mere sum of identities and the "(*…) simples reconhecimento da multiplicidade dos sistemas de opressão (…)*"(Bielgi *cit in* Pires, 2009, p. 190)- that means the simple recognition of the multiplicity of systems of oppression – but demands that multiple aspects besides political, social, economic and cultural contexts be deepened. To avoid adopting a simple idea of intersectionality, we will focus our analysis without delving into the reasons for specific situations.

4. Objectives

Therefore, this article aims to review the digitally index of women and the level of representation of women specialists in Information and Communications Technology (ICT) in Portugal comparing with the position occupied by men and the rank occupied by women in other members States of the European Union. It also intended to know the policies that have been implemented in Portugal with the aim of improving the digital inclusion of women.

To achieve our goals, we supported our study in statistics data and we recapitulate Portuguese policies adopted to strengthen female representation in the digitally and ICT market. Furthermore, we looked at the 2020 European Commission report on this subject (which presents pre-pandemic COVID-19 data, 2021 (which represents data during the period of the pandemics and the period of the emergence State in Portugal) and the 2022 report (which represents post-pandemic data to understand the evolution and impact of female digital inclusion caused by the COVID-19 period. The research technique adopted is document analysis based on the systematization of statistical data from the years 2019, 2020 and 2021, reading articles, academic books on the subject and the political programs implemented in Portugal to meet the digital challenges of women. The next step will be to recapitulate Portuguese policies adopted to strengthen female representation in the digitally and ICT market.

According to our objectives we systematized this study as follows.

- The importance of ICT training and the women's challenges in the digital field
- Women's digital Competences and their position in the ICT Sector in Portugal
- The COVID-19 pandemic impact on digital skills indicators
- *Policies for the development of human capital in the digital area specially for digital inclusion of women in Portugal*
- *General conclusions*

5. The Importance of ICT Training and the Women's Challenges in the Digital Field

Several processes are leading to an accelerated change in the productive sector that impacts the global labour market, among them the advance of new technologies and the social and economic political choices being made. However, it is not our purpose to scrutinize the reasons for the changes in the productive sector but only to illustrate the need for human resources training in the technology sector.

The technology sector has been experiencing gradual growth. Nonetheless, the COVID-19 crisis, the war in Ukraine and the economic consequences it generated, rising inflation, and the climate and energy crises,

accelerated the sector's expansion. On the authority of the person in charge of the Software Development Department, Beltrão Coelho, "*TI é um mercado de pleno emprego, onde a procura de talentos na área continuará a ter forte predominância*."(Bandeira, 2002, p. 7) – that means IT is a full-employment market, where the hunt for talent in the area will continue to have a strong predominance.

In addition, the European Union (EU) has also invested significant resources in Member States to support digital transformation. Thus, a total of EUR 127 billion was devoted to digital sector-related reforms and investments in national recovery and resilience plans. In turn, Member States have devoted, on average, 26% of their Recovery and Resilience Facility (RRF) allocation to digital transformation, staying above the mandatory 20% threshold. These financings are an unprecedented opportunity to accelerate digitalization, increase the UE's resilience and reduce external dependence.

Considering Portugal's circumstances, it is necessary to accelerate its digitalization rates. On the report of Robert Walters consultancy (2022), the ICT sector is one of the fastest growing in the country. The transformation processes to the business fabric and Public Administration will increase the demand for qualified professionals in the ICT sector even more. Nevertheless, this is an area that suffers from a lack of specialists. There are vacancies for around 15,000 IT professionals in Portugal. Data from IDC Portugal show that by 2025, 90% of organizations will lack ICT resources. More specifically, there will be a lack of more than 1.15 million professionals in Western Europe. There will be a lack of more than 10,000 professionals by 2025.

One of the challenges faced in Portugal to fill vacancies in the ICT area, although not the only one, is related to training. The number of technicians specialized in ICT areas in Portugal is below the European average. However, we point out that the low value of wages practiced also contribute to qualified professionals leaving the country. Carapuça (2022, p. 23) verifies the need for an increase "in the number of graduates in ICT and the number of specialists in general, graduated or not.". Another factor that must be considered is the phenomenon of the "informational city" and the Smart Cities that bring together the use of ICT in the urban environment to solve the most diverse problems faced in cities.

For these reasons, the ICT market is promising and requires more qualified workers. A country that invests in skilled labour training in ICT also invests in innovation and is closer to developing solutions that guarantee its digital sovereignty. The expansion of the ICT trade and the emergence of labour in the area can be an essential chance for women to have the opportunity to be recognized for their abilities, mainly from a collective and social point of view. This movement can impulse change to the space women occupy in society.

According to Piscitelli (2002), subordination experienced by women varies concerning the historical period, and the place examined. Despite the particularities, it is a universal phenomenon that occurs in all parts of the world and all historical periods. As claimed by feminist currents, the occurrence is structured based on the social construction that is made of women and can be modified. Such subordination also reflects on the division of labour and exclusionary processes based on gender. Regarding some of the barriers faced by women in accessing the labour market, we highlight those exposed by Diogo and Coutinho:

> *"(…) Dificuldade de inclusão; sua força de trabalho é social e culturalmente desvalorizada; recebem os menores salários; possuem baixa qualificação profissional, sendo conduzidas aos setores de trabalho intensivo, onde predomina a exploração do trabalho manual e repetitivo; freqüentemente são obrigadas a pautar suas possibilidades de inserção laboral nas suas responsabilidades domésticas e familiares, acumulando trabalhos dentro e fora de casa." (Coutinho e Diogo, 2006 p. 122-123) – that means the difficulty of inclusion; social and cultural devaluation of the workforce; lower wages; low professional qualification led to the intensive work sectors, where the exploration of manual and repetitive work predominates; accumulating jobs inside and outside home.*

As a first conclusion: even with the emergence of careers related to ICT and the lack of labour in the area, women continue to face barriers to their insertion in the labour market, as we will appreciate in the following topic.

6. Women's Digital Competences and Their Position in the ICT Sector in Portugal

The European Commission annually publishes the economy and society digitally index (ESDI). It summarizes the indicators of Europe's digital performance and monitors the progress made in the EU Member States regarding digital competitiveness in human capital domains (available in the European Commission website - https://ec.europa.eu/commission). The most recent index version of ESDI is from 2022 and it presents data for 2021.

How we can observe above on the graphic (Source: 2022 ESDI Report), Portugal ranks 15th.

However, in the Human capital dimension, Portugal ranks 14th of the 27 EU countries.

As we can observe bellow, data from 2021 indicates that 55% of the Portuguese population has at least basic digital skills and 29% of it has above basic digital skills, exceeding the European average.

Level of digital skills	PORTUGAL	EUROPEAN UNION AVERAGE
At least basic digital skills	55%	54%
Above basic digital skills	29%	26%

About ICT specialists in Portugal, the average of employed in Portugal corresponds to the EU average and the average of ICT female specialists (21%) in Portugal surpassing the EU average (19%).. However, the level of ICT graduates (2,6%) is lower than the European average (3.9%).

ICT	PORTUGAL	EUROPEAN UNION AVERAGE
ICT specialists	4,7%	4,5%
ICT graduates	2,6%	3,9%
ICT female specialists	21%	19%

The level of experts across Europe is still very low too. As far as Portugal is concerned, in addition to the number of specialists still very low for the needs faced with digitization of services and companies, the number of women specialists is insignificant. This is a problem that originates in education. Considering education levels, the area related to ICT is the one with the lowest number of graduates in Portugal. Thus, in 2020, around 7,000 students graduated in a universe of 86,000 graduates. The proportion of women exclusively ICT specialists in Portugal is 21 %, exceeding the EU average of only 19 %. Which means that not even a fourth of ICT specialists in Portugal are women. In addition, there has been a positive trend in the last 10 years in the growth in the number of women with ICT degrees, women accounted for only 20.1% last year while men accounted for 79.9% of graduates. Consequently, also with regard to employment in these areas, in the last 10 years only one woman in five people working in the ICT sector. It is also verified that men are more represented in areas related to research and business while women are more represented in the state sector. There is, therefore, a notorious gender asymmetry in the employment of women in companies, where the feminisation rate is only 27.7%. Men are more focused on engineering and technology and women are more represented in medical sciences and health.

But the problem isn't just around this. In addition to the lack of ITC specialists, we see that the percentage of women with basic digital skills is still far from the desirable. The position held by Portuguese women in the digital field, calculated on the basis of internet use, digital skills and ICT work, ranks 14th, and is below Finland, Ireland, the Netherlands, Sweden, Denmark, Luxembourg, France, Spain, Estonia, Malta, Austria, Belgium and Slovenia. According to the data obtained in the 2021 report on the use of the internet by women, 79% of Portuguese women habitually use the internet, 17% of women have never used the internet and 58% of women use the internet to relate to public administration. When we compared this data with the European Union with regard to women's use of the internet, we found that 87% of women use the internet, only 8% of women have never used the internet and 65% of women use the internet to relate to public administration.

In summary, in Portugal the digital and digital knowledge index is similar between men and women, but with regard to higher education and the exercise of ICT-related professional activities, women are in a large minority. Given the growing need for skilled ICT labour, increasing women's participation in ICT is a challenge to address. In addition, there is also a need to increase women's basic digital skills.

7. The COVID-19 Pandemic Impact on Digital Skills Indicators

We remember that in Portugal, the emergence State has been decreed in March of 2020 and it was remained, between advances and setbacks, until June 2021. Thus, the last report of ESDI (2022) exposes the data obtained after the pandemic. So, to understand the impact we will also use the 2019 and 2020 data (before the pandemic and during the pandemic). The intention is to offer an overview of the consequences of the COVID-19 pandemic on the progress of the female digital skills. Sometimes we compare the Portuguese square in DESI with the European Square for a better understanding.

How we can observe below, before COVID-19 pandemic (according to data from 2019) Portugal ranks 19th in the 27 members States, during the pandemic (according to data from 2020) Portugal has climbing three steps up and after the pandemic Portugal has climbing one step more, ranking 15th.

Table 1: Portuguese's rank and square on the Digital Index Before, During and After COVID-19 (Women and man)

IDES	Portugal		European Union
	Rank	Square	Square
2022 – data from 2021	15	50,8	52,3
2021 – data from 2020	16	49,8	50,7
2020 – data from 2019	19	49,6	52,6

However it not represents an increase on digital skills as we can observe on the table above.

Table 2: Portuguese Average of Digital Skills Before, During and After Pandemics COVID-19

Digital Skills	Before pandemics EDSI 2020	During pandemics EDSI 2021	After pandemics EDSI 2022
At least basic digital skills	52%	52%	55%
Above basic digital skills	32%	32%	29%

The impact of COVID-19 on the digital skills level of the Portuguese population is not significant. We saw an increase of 52% up to 55% of the population who has at least basic digital skills. About ICT, Portugal marks a significant increase in the proportion of ICT specialists from 3.6% to approximately 4,7%. The share of female ICT specialists has increased considerably from 18% to 22%, but after pandemics this average is lower (21%) as we can observe bellow.

Table 3: ICT Average Before, During and After Pandemics COVID-19

ICT	Before pandemics	During pandemics	After pandemics
ICT specialists	3,6%	4%	4,7%
ICT female specialists	18%	22%	21%
ICT graduate	2,2%	2,3%	2,6%

The COVID-19 crisis had an important impact on key societal indicators, relating to the use of internet services by citizens because to deal with the COVID-19 crisis, Portugal has taken many targeted measures in digital. Because that, after the COVID-19 crisis, Portugal is advanced promoting digital services, but has already a weak performance in the digital skills indicators. Portugal ranks 19th in the EDSI index and on the human capital dimension, Portugal ranks 21st out of 28 EU countries.

8. Policies for the Development of Human Capital in the Digital Area Specially for Digital Inclusion of Women in Portugal

As we have seen above, when we present the exhibition on the statistical data of women's participation in the digital world, the Portuguese State is currently facing two major challenges with regard to the inclusion of women in the digital world: on the one hand, almost half of its population, which also includes women, does not have basic digital skills; on the other hand, only 1/4 of ICT specialists are women and only 1/5 of all ICT workers are women. These facts therefore call for a solution and a strategy. What strategies have been adopted by the Portuguese to address this problem?

Under the motto "*No one can be left behind*", the 2030 Agenda is deeply transformative and provides a roadmap for the removal of all structural obstacles to equality between women and men, in the national territory and in terms of development cooperation. Accordingly, on April 21st 2020, the Portuguese government approved a strategy and action plan for the digital transition identifying the empowerment and digital inclusion of people

as one of the national priorities, in line with the Recovery and Resilience Plan with a total allocation of more than EUR 16 million and which should be implemented by 2026. The digital dimension concentrates 22.1 % of the overall amount of the Portuguese PRR, i.e. higher than the amount used by most Member States. The most prominent digital measures included in the plan are education and training in digital skills.

Thus, Portugal has promoted digital skills through various initiatives and programs: in schools the Digital School Program for teachers, an initiative of Digital Teacher Training to train workers; the Employment Digital initiative; the Youth Digital Program for unemployed young people; the UPSKILL Program to requalify unemployed people, converting them into IT specialists; the "Adult Boost Program" to update the skills of adults of active age; as well as the Technological Academies Programme. The digital inclusion of the population has been addressed through the "I AM Digital" Program, through the "MUDA" (Movement for Active Digital Use). All of these initiatives include men and women, so contributing to increase the level of basic skills of the general population.

More focused on a gender perspective, we highlight the INCoDe.2030 Roadmap – Digital Empowerment initiative, which is a national initiative that promotes digital skills among the general public, providing studies, measures and platforms to boost digital inclusion and literacy, training, qualification and gender convergence programs. INCoDe.2030 includes initiatives to monitor gender balance, collect disaggregated data and boost women's participation.

In addition to this program that aims to boost digital literacy, within the National Strategy for Equality and Non-Discrimination 2018-2030, Portugal has launched The Program "Engineers for a Day" that has promoted the option for engineering and technologies among primary and secondary school students, with about ten thousand participants since 2017. She has also promoted the "Promote – Gender Equality Opportunities in Senior Management" Project that aims to develop female talents and foster their promotion to top management functions of companies.

9. Conclusions

The paper started by providing a historical context about the different circumstances that influence women's professional choices and the context of inequality between men and women in other spheres of life. We supported our study with statistics data to review the digital index of women's representation as specialists in ICT. We recapitulated Portuguese policies adopted to strengthen the female model in the digital ICT market.

In that regard, it is possible to pronounce that the level of representation of women specialists in Information and Communications Technology (ICT) in Portugal is still deficient as well as the average of internet use by women. These are two different problems to be solved. On the one hand, the labour market is increasingly offering jobs in the digital area, so it is an opportunity that should also be used by women; and, on the other hand, daily life increasingly calls for the use of digital media. The COVID-19 period highlighted the importance of women having greater digital skills and the choice of women for ICT-related professions to be well represented in this field.

The Portuguese State has actively contributed to the digital inclusion of women and strongly encouraged their choice of engineering and ICT but in fact the concern with the development of human capital in the digital area in Portugal only started in 2016 (just over 5 years ago). The initiatives for the inclusion of women that the Portuguese State has taught seem promising. However, it is necessary to check whether such programs are sufficient and inclusive in practice to ensure that no one is left behind. Portugal still lags significantly behind the Member States with the best performance. Therefore, studying the digital policies applied in other Member States may be interesting to understand what Portugal can do to improve in the digital.

As for the need to increase the number of women specialists in ICT, the incentive program carried out among girls in primary and secondary education is a commendable example. Only through education will it be possible to create awareness of the importance of learning ICT and demonstrate the immensity of the labour market. Nevertheless, the programs must continue for the long term. On the other hand, it is also necessary that the other factors that also influence women's distance from the labour market, and which we do not intend to delve into here, are also addressed: social and cultural appreciation of the female workforce; increased and equalization of female and male wages; promotion of supports to make possible that women do not have to give up their professional life in the name of domestic and family life. Only from an holistic approach will it be possible for the inclusion of women in the ICT market to correspond to an advance capable of repositioning them in society.

In any case, it seems that Portugal is on the right track. This is a subject that deserves further study, and our intention is to raise some topics contributing to this reflection that is not exhausted here.

Acknowledgements

Smart Cities and Law, E.Governance and Rights: Contributing to the definition and implementation of a Global Strategy for Smart Cities (NORTE-01-0145-FEDER-000063).

References

Alves, L.A (2015), Primeira República: Espaço para a Mulher no Ensino Técnico em Portugal, Em Tempos de História, 25, p. 35 a 57.

Atlantic Hub (2022), "Escassez de mão de obra em Portugal", [online], https://www.atlantichub.com/2022/09/15/escassez-de-mao-de-obra-em-portugal/.

Bandeira, M. (2022), "O software ainda está a devorar o mundo", Jornal Económico, [online], https://leitor.jornaleconomico.pt/download?token=c1cc6a3cdb004e85692025180e225ff3&file=Quem_%C3%A9_quem_nas_TIC5.pdf

Campos, L.M. (2019), O Sector das TIC em Portugal, Gabinete de Estratégia e Estudos, [online], https://www.gee.gov.pt/pt/documentos/estudos-e-seminarios/temas-economicos/8749-te75-o-setor-tic-em-portugal-seculo-xxi/file

Cardoso, SIS (2016), A Mulher e a Censura no Estado Novo – O coro das Novas Cartas Portuguesas [online], https://www.academia.edu/32841956/A_mulher_e_a_censura_no_Estado_Novo_O_coro_das_Novas_Cartas_Portuguesas

Castells, M. (2016), A era da informação: economia, sociedade e cultura. 5ª edição. Fundação Calouste Gulbenkian.

Costa, JS. (2022), "Rogério Carapuça: há que estar entre os primeiros, não ser o primeiro dos últimos", Jornal Económico, p. 20-23, [online], https://leitor.jornaleconomico.pt/download?token=c1cc6a3cdb004e85692025180e225ff3&file=Quem_%C3%A9_quem_nas_TIC5.pdf .

Coutinho, J. (2012), Mulheres Pioneiras na Engenharia. Faces de Eva: Estudos sobre a Mulher, p. 27.

European Commission, Communication "2030 Digital Compass: the European way for the Digital Decade", March 2021

European Commission, Digital Economy and Society Index 2021: overall progress in digital transition but need for new EU-wide efforts, [online], https://ec.europa.eu/commission/presscorner/detail/pt/IP_21_5481 .

Fonseca, Isabel, Smart Cities and Law, E.Governance and Rights: (retomando) o diálogo com a Benedita", in Liber Amicorum Benedita Mac Crorie, Escola de Direito da Universidade do Minho, vol. I, Braga: UMinho Editora, 2022, pp. 509 a 527.

Gabinete de Estratégia de Estudos, Posição Portuguesa – Rankings Internacionais – Digital Economy and Society Index 2021, Janeiro de 2022.

Lousada, I. (2013), Elos de Progresso Social e Científico: Contributo para a História das Mulheres Cientistas em Portugal, in I. Lousada & M.J. Gonçalves Editores, Women, Science and Globalization: Whats up? P. 57-85, Lisboa, Amonet.

Macedo, Eva (2022), "Os mecanismos de paridade no setor público local português" in Políticas Públicas de Género no contexto da gesto local – enfrentamento da COVID-19, CNM, Brasília, p. 33-44.

Melo, N. (2022), "Talento de TI nas empresas: o que fazemos quando não temos a faca e o queijo na mão?", Diário de Notícias, [online], https://www.dn.pt/opiniao/talento-de-ti-nas-empresas-o-que-fazemos-quando-nao-temos-a-faca-e-o-queijo-na-mao-15041233.html.

Nunes, J.L. (1961-1986), "As Primeiras Mulheres Assistentes e Doutoradas na Secção de Ciências Matemáticas da Universidade de Coimbra" Boletim da Sociedade Portuguesa de Matemática, 72, p. 53-74.

OECD (2021), OECD Economic Surveys: Portugal 2021, OECD Publishing, Paris

Pires, T. (2019) "Prática e Teoria: direito à cidade e interseccionalidade: pistas para a ação e para a pesquisa" In: Belo, E and Keller, RJ (Ed.) Curso de direito à cidade. Rio de Janeiro, Lumen Juris, p. 187-199.

Piscitelli, M (2002), "Re-criando a (categoria) mulher", A prática feminista e conceito de gênero, nº 48, Textos didáticos, Campinas, p. 7-42.

Robert Walter Salary Survey (2022), [online], https://www.robertwalters.pt/pesquisasalarialglobal.html (accessed 19 January 2023).

Saavedra, Luísa et al.,(2011) '(A)Simetrias de Género no Acesso às Engenharias e Ciências no Ensino Superior', Ex Aequo, n.º 23, Associação Portuguesa de Estudos sobre as Mulheres (APEM) p. 163 a 177, https://hdl.handle.net/1822/14564