Breaking Barriers: Social, Cultural and Organisational Factors Affecting Women's Participation in Renewable Energy Careers

Manuel S. Araújo [1 *], Dora Martins [2], Teresa A. Nogueira [3], Paula Carvalho [1] and Pedro M. Silva [1]

[1]CEOS P.P; ISCAP; Polytechnic of Porto (P.PORTO), Porto, Portugal
[2] *inED and* CEOS.PP, ISCAP, Polytechnic of Porto, *Portugal and* GOVCOPP, University of Aveiro, Aveiro, Portugal
[3]CIETI; ISEP; Polytechnic of Porto (P.PORTO), Porto, Portugal

Email: manuelsalvador@iscap.ipp.pt (M.S.A.); doramartins@iscap.ipp.pt mailto:(D.M.); tan@isep.ipp.pt (T.A.N.); paulacarvalho@iscap.ipp.pt (P.C.); psilva@iscap.ipp.pt (P.M.S)
[*]Corresponding author

***Abstract* - The transition to renewable energy represents a major socio-economic transformation, yet significant gender disparities persist in STEM fields and the energy sector. This article aims to analyse the main social, cultural, and organisational barriers to women's participation in STEM and renewable energy careers, drawing on a comprehensive literature review. Stemming from the Literature Review carried out within the scope of the Erasmus+ European Policy Experimentations project "STAR Girls - Supporting Talent & Ambition in Renewable Energy Sector for Girls, through mentoring and role models" (GAP 101196009, co-funded by the European Union), and adopting a multilevel perspective, this article examines how the literature explores the under-representation of women in STEM, particularly in the renewable energy sector, the barriers that shape career choices and reinforce gender inequalities, and, consequently, the implications of the gender gap for innovation in these sectors. More specifically, it looks at how individual perceptions (micro level), social influences such as family and education (meso level), and broader organisational and cultural structures (macro level) interact to shape career choices and reinforce gender inequalities. The conclusions drawn reveal that a combination of internalised stereotypes, unequal distribution of care responsibilities, lack of female role models, and structural barriers within education systems and labour markets drives the gender gap. These factors operate simultaneously and reinforce each other, limiting women's access to technical roles and leadership positions. Furthermore, this research highlights that the energy transition, while creating new opportunities, does not automatically promote gender equity without targeted and inclusive policies. Building on this analysis, we formulate three research propositions that link the three levels of influence and provide a basis for future empirical research. The results underscore the need for integrated strategies that address both individual and structural dimensions, including inclusive education, gender-sensitive policies, and organisational transformation. Ultimately, promoting gender inclusion is not only a matter of social justice but also a key driver of innovation, sustainability, and the effectiveness of the energy transition.**

***Keywords* - Renewable energy careers, Gender gap in STEM, Women's participation, Social and organisational barriers, Education, Research propositions.**

I. INTRODUCTION

The transition to renewable energy constitutes one of the most significant socio-economic transformations of the 21st century [1]. The energy transition is crucial for combating climate change and fostering sustainable development; however, it is a complex and uneven process that encompasses environmental, economic, and social aspects. These challenges require coordinated policies and strong international collaboration [2]. Moreover, the energy transition extends beyond technological change, involving profound social and labour market implications. As such, it necessitates substantial investment in skills development, education, and inclusivity to ensure a just and effective transformation [3]. For example, the IRENA report (2025) shows that despite the sector's growth, women remain underrepresented (around 32%), mainly concentrated in administrative roles, with less presence in STEM fields and leadership positions [4]. This gender gap is not only an issue of equity but also of efficiency and innovation, as diverse teams enhance problem-solving and organisational performance [5]; however, persistent disparities point to deeply rooted barriers that limit women's participation and progression in STEM and energy-related careers [6;7]. Existing literature highlights that these barriers are multifaceted, encompassing diverse dimensions [4; 8].

Against this background, this paper aims to analyse, based on existing literature, the main social, cultural, and organisational barriers that limit women's participation in renewable energy and STEM careers. Furthermore, this research aims to advance a theoretical discussion and formulate research propositions by integrating these dimensions into a structured critical approach. This approach seeks to provide a comprehensive understanding of the factors influencing young women's career choices. In doing so, this paper contributes to the development of theoretical insights and offers a foundation for future research on educational and policy strategies to promote gender inclusion in the energy transition.

II. METHODOLOGY

This paper adopts a structured literature review approach. The review was conducted using the Scopus and Web of Science databases, complemented by reports from international organisations (e.g., IEA and IRENA). Searches were performed using combinations of keywords including "women in STEM", "gender gap", "renewable

https://doi.org/10.34630/cip.vi.7653

energy", "energy transition", "female participation", "career choice", and "gender barriers". Only peer-reviewed journal articles and institutional reports published primarily between 2017 and 2026, written in English, were considered. Articles not directly addressing gender issues in STEM or renewable energy were excluded. The selected literature was analysed thematically and organised according to three analytical levels (micro, meso and macro), which formed the basis of the conceptual framework and research propositions.

III. Gender Gap in STEM and Renewable Energy

Gender inequality in STEM fields and the renewable energy sector remains a persistent challenge, reflecting the interplay of educational, organisational, and structural factors. Despite the growth of the green sector, female participation remains limited, especially in technical areas and leadership positions, demonstrating that the energy transition, by itself, does not guarantee greater equity [9]. The literature suggests that there is a "cultural resistance" to the presence of women in traditionally conservative sectors, including STEM and renewable energy [10]. This culturally more conservative mindset represents an implicit barrier to the inclusion of women in technical careers within these sectors [10]. As a result, there is a shortage of skills and qualified labour [11], which poses challenges for organisations operating in these sectors, particularly the difficulty of finding specialists in emerging fields such as renewable energy. This scenario is aggravated by organisational dynamics and power structures that favour male profiles, hindering women's access to career advancement opportunities [12].

In the educational context, the type of training plays a determining role. More diverse curricula tend to favour female participation, while highly specialised programs may reinforce the distancing of women from STEM careers [6]. Furthermore, factors such as self-efficacy and professional perceptions significantly influence commitment to STEM careers, being shaped differently between genders [13].

In the renewable energy sector, female underrepresentation is also associated with broader structural barriers, including occupational segregation, unequal access to resources, and reduced participation in decision-making processes [7]. Additionally, the energy transition may reproduce or even exacerbate existing inequalities if specific inclusion policies are not implemented [8]. Despite these challenges, literature shows that gender equality is a strategic factor for the sector's development, contributing to greater innovation, economic performance, and sustainability [14]. Consequently, a fundamental shift in attitudes towards the inclusion of women in the energy and STEM sectors is essential for the sector's transformation [10]. Thus, reducing the gender gap in STEM and renewable energies requires an integrated approach that articulates education, public policies, and organisational transformation.

IV. Gender Barriers in the Renewable Energy Sector

Social, cultural and organisational barriers play a central role in perpetuating gender inequalities in the energy sector and STEM fields. These barriers reflect deeply ingrained social norms that shape expectations, behaviours, and opportunities, limiting female participation in traditionally male-dominated sectors [11; 15; 16; 17].

Gender stereotypes continue to strongly influence women's career choices and participation in STEM fields. The association of these areas with traditionally masculine characteristics, such as technical rationality and competitiveness, contributes to the symbolic exclusion of women [15, 18]. These stereotypes are reinforced by organisational and educational environments that value technical skills in an exclusionary way, functioning as implicit barriers to female entry as well as their premature departure from both training and professional activity. [17].

Family influence is another relevant factor, especially regarding the division of domestic labour and caregiving responsibilities [15]. Women continue to bear a disproportionate burden of family tasks, which limits their availability for demanding careers such as STEM or the energy sector [19]. On the other hand, there are also low family expectations or pressures negatively influenced by social representations about women's vocational choices in STEM fields. This contextual reality does not favour either women's choices in these vocational areas or their retention once the choice has been made, highlighting the need to raise awareness within significant social contexts, such as family or the immediate community, about the appropriateness of these professional choices [26]. This reality is exacerbated by the lack of support infrastructure, such as childcare centres, and the persistence of social norms that assign women primary responsibility for family care.

The scarcity of female role models in leadership positions and technical fields reinforces the perception that these sectors are inaccessible to women. The lack of female role models limits professional aspirations and reduces the visibility of successful female career paths [20]. This phenomenon contributes to the reproduction of inequalities, hindering women's entry and retention in the energy sector.

Organisational barriers are one of the main factors explaining the persistence of the gender gap in STEM fields and renewable energy. These barriers manifest themselves at different levels, from the education system to organisational practices and public policies [11; 21; 22].

Educational curricula play a decisive role in shaping career paths. Highly specialised programs can discourage female participation, while more diverse approaches tend to promote greater inclusion [6]. The absence of gender perspectives in STEM education contributes to the reproduction of inequalities and limits the development of inclusive skills [23].

School and career guidance plays a crucial role in defining career choices. A lack of adequate information, coupled with implicit biases, can steer women towards traditionally female fields, distancing them from STEM [13]. Furthermore, the absence of structured mentoring programs limits access to networks and opportunities, reinforcing existing inequalities [20].

Structural inequalities in technical education are reflected in occupational segregation and the underrepresentation of women in strategic areas of the energy sector. These inequalities are reinforced by insufficient policies, lack of funding, and the absence of gender-disaggregated data, hindering the implementation of effective measures [24]. Additionally, territorial factors, such as limited access to education and mobility, condition female participation, especially in more vulnerable contexts [25].

V. Discussion and Suggestion of Research Propositions

Based on the literature reviewed, a multilevel conceptual model is proposed to explain the gender gap in STEM fields and the renewable energy sector through the interaction between individual, social, and organisational factors. This model is structured into three interdependent levels – micro, meso, and macro –, allowing for an understanding of the systemic nature of gender inequalities.

At the micro level, the model focuses on individual perceptions, including factors such as self-efficacy, career aspirations, and perceptions of competence. Literature demonstrates that commitment to STEM careers is strongly influenced by academic experiences and perceptions of sector suitability, which tend to differ between men and women [13]. Internalised stereotypes and a lack of confidence in technical skills contribute to women's self-exclusion from these fields. Thus, this level represents the starting point of inequalities, where social norms are internalised and influence individual choices.

The meso level encompasses immediate social contexts, namely family, school, and social networks. Family influence manifests itself through the division of domestic labour and gender expectations, which condition women's availability and professional choices [19]. Simultaneously, the educational system plays a central role in reproducing or mitigating inequalities through curricula, vocational guidance, and the presence (or absence) of female role models [6; 20]. This level highlights how social factors shape educational and professional trajectories, acting as mediators between the individual and the system.

At the macro level, the model incorporates structural factors, including public policies, organisational practices, and cultural norms. Literature shows that inequalities persist due to organisational structures that favour male profiles, the absence of equality policies, and exclusionary organisational cultures [7; 12]. Furthermore, cultural norms and gender stereotypes continue to influence female participation and the distribution of opportunities in the energy sector [8]. This level represents a structured critical approach. That conditions the micro and meso levels, being decisive for the reproduction or transformation of inequalities.

Table 1 synthesises the key dimensions and factors identified in the literature, highlighting the multilevel and interconnected nature of gender inequalities in STEM and renewable energy careers. It illustrates how individual perceptions are shaped by social environments and, in turn, influenced by broader organisational and cultural structures.

Table 1. Gender Gap in STEM and renewable energy careers

Dimensions	Factors to consider
Micro level – Individual perceptions	▪ Self-efficacy in STEM; ▪ Career aspirations; ▪ Perceived competence in technical fields; ▪ Internalised gender stereotypes; ▪ Motivation and interest in green careers; ▪ Risk perception and career confidence; ▪ Awareness of opportunities in renewable energy
Meso level – Family & school influence	▪ Family expectations and gender roles; ▪ Division of care responsibilities; ▪ School guidance and career orientation; ▪ Exposure to STEM education; ▪ Access to female role models; ▪ Teacher bias and encouragement; ▪ Peer influence; ▪ Mentoring and support networks.
Macro level – organisational & cultural norms	▪ Gender norms and cultural expectations; ▪ Education system structure (STEM pathways); ▪ Labour market inequalities; ▪ Organisational culture (male-dominated sectors ▪ Public policies on gender equality; ▪ Access to funding and resources; ▪ Gender mainstreaming in energy policies; ▪ Leadership representation.

Source: Authors' elaboration

While most studies consistently identify stereotypes as a key determinant of women's career choices, the evidence regarding the relative importance of organisational versus family-related barriers remains less conclusive. Some authors emphasise educational interventions as the primary mechanism for change, whereas others argue that structural organisational reforms are necessary before educational gains can translate into labour market participation.

VI. Propositions for Future Research

The integrative perspective presented in the previous point reinforces the idea that the gender gap cannot be explained by isolated factors but rather emerges from the interactions across micro, meso, and macro levels. Consequently, addressing these disparities requires coordinated interventions that simultaneously target individual empowerment, social support systems, and structural transformation. By organising the main determinants across these levels, the table provides a structured basis for developing research propositions and supports future empirical studies aimed at identifying effective strategies to promote gender inclusion in the energy transition.

Proposition 1 (Micro level – Individual perceptions)

P1: Higher levels of self-efficacy, perceived competence, and awareness of opportunities in renewable energy are positively associated with young women's intentions to pursue STEM and renewable energy careers, while internalised gender stereotypes are negatively associated with these intentions.

Proposition 2 (Meso level – Social influences)

P2: Supportive family environments, exposure to inclusive school guidance, and the presence of female role models positively influence young women's engagement with STEM and renewable energy pathways, whereas traditional gender roles and unequal care responsibilities negatively affect their participation.

Proposition 3 (Macro level – Organisational and structural factors)

P3: Gender-inclusive organisational frameworks (such as diversified educational curricula, equitable labour market conditions, and gender-sensitive public policies) positively moderate the relationship between individual and social factors and young women's participation in STEM and renewable energy careers.

These propositions provide a structured basis for future research by linking individual, social, and organisational dimensions of the gender gap in STEM and renewable energy. They highlight the need to examine not only direct effects but also the interactions between different levels of influence. By doing so, they offer a foundation for testing how multilevel factors jointly shape young women's career choices and for identifying the most effective intervention points to promote gender inclusion in the energy transition.

VII. Conclusion

This literature review explores the gender gap in STEM and the renewable energy sectors from a multilevel perspective. It highlights how individual, social, and organisational factors interact. The findings confirm that gender inequalities do not arise from isolated factors; instead, they emerge from a complex system of interactions influenced by deeply rooted social norms, educational pathways, and structural conditions. Although the energy transition is becoming increasingly important, it is not enough on its own to achieve gender equity. Without targeted interventions, existing disparities are likely to persist or even worsen.

The analysis underscores the critical role of social and cultural barriers, such as gender stereotypes, family responsibilities, and the lack of female role models, in shaping young women's career aspirations and limiting their participation in STEM-related fields. At the same time, organisational barriers (including rigid educational curricula, biased career guidance, and structural inequalities in technical education) continue to restrict access to opportunities and reinforce occupational segregation. These findings reinforce the need for a holistic and coordinated approach that addresses inequalities across multiple levels simultaneously. By proposing research propositions grounded in a multilevel analytical framework, this paper advances theoretical understanding and provides a foundation for future empirical research. These propositions highlight key mechanisms that produce and sustain gender disparities, offering potential pathways for testing and refining policy interventions.

From a practical perspective, promoting gender inclusion in the energy transition requires integrating gender-sensitive policies across education systems, labour markets, and organisational practices. Efforts should focus on fostering inclusive learning environments, expanding access to female role models and mentoring opportunities, and implementing organisational reforms that challenge persistent, gendered power structures. Ultimately, achieving a just and effective energy transition depends not only on technological innovation but also on ensuring equal opportunities and meaningful participation for women throughout the education-to-employment pipeline. Addressing the gender gap in STEM and renewable energy is therefore not only a matter of social justice but also a strategic imperative for fostering innovation, resilience, and long-term sustainability. Building on these practical implications, this paper also offers a distinct theoretical contribution. Unlike previous literature reviews, which have typically examined educational, organisational, or policy-related barriers in isolation, this study integrates these dimensions into a multilevel conceptual framework linking micro, meso, and macro-level determinants. Moreover, rather than simply synthesising existing evidence, it develops theory-driven research propositions that provide a structured agenda for future empirical research on women's participation in renewable energy careers. By explicitly connecting individual perceptions, social influences, and broader structural conditions, this integrated perspective advances the existing literature on gender and STEM while offering a more comprehensive understanding of the mechanisms shaping women's participation in the context of the energy transition.

Conflict of Interest

The authors declare no conflict of interest.

Author Contributions

M.S.A: Conceptualisation, literature review, writing-review and editing, supervision. D.M: Literature review, methodology, writing-original draft. TAN: Validation, writing-review. P.C.: Writing-review and editing. P.M.S.: Literature review, methodology, writing-original draft. All authors have read and agreed to the published version of the manuscript.

Funding

The authors disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: This work was supported by CEOS.PP – Center for Organizational and. Social Studies [UIDB/05422/2020].

Acknowledgment

The authors would like to thank the scientific support of CEOS.PP – The Center for Organisational and Social Studies of the Polytechnic University of Porto.

References

[1] Q. Hassan, P. Viktor, T. J. Al-Musawi, B. M. Ali, S. Algburi, H. M. Alzoubi, A. K. Al-Jiboory, A. Z. Sameen, H. M. Salman, and M. Jaszczur. (2024). The renewable energy role in the global energy transformations, *Renewable Energy Focus*, [Online]. 48, pp. 100545. Available: https://doi.org/10.1016/j.ref.2024.100545

[2] B. Ramasubramanian, and S. Ramakrishna. (2023). What's next for the Sustainable Development Goals? Synergy and trade-offs in affordable and clean energy (SDG 7). *Sustainable Earth Reviews*, [Online]. 6(17), pp. 1-16. Available: https://doi.org/10.1186/s42055-023-00069-0

[3] International Energy Agency. (2022). Skills development and inclusivity for clean energy transitions. IEA. [Online]. Pp. 1-62. Available: https://www.iea.org/reports/skills-development-and-inclusivity-for-clean-energy-transitions

[4] IRENA. (2025), Renewable energy: A Gender perspective; Second edition, *International Renewable Energy Agency*, Abu Dhabi.

[5] L. Xie, J. Zhou, Q. Zong, and Q. Lu. (2020). Gender diversity in R&D teams and innovation efficiency: Role of the innovation context. *Research Policy*, [Online]. 49(1), 103885. Available: https://doi.org/10.1016/j.respol.2019.103885

[6] A. Meoli, E. Piva, and H. Righi. (2024). Missing women in STEM occupations: The impact of university education on the gender gap in

graduates' transition to work. *Research Policy*, [Online]. 53(8), 105072. Available: https://doi.org/10.1016/j.respol.2024.105072
[7] R. Santero-Sánchez, B. Castro Núñez, V. Martín Barros and M. I. Martínez Martín. (2025). Gender challenges in just energy transition: The labour market perspective. *Energy Research & Social Science*, [Online]. 127, 104303. Available: https://doi.org/10.1016/j.erss.2025.104303
[8] M. A. Caretta, and D. Vela-Almeida. (2025). Just energy transition and gender: A systematic review for feminist research. *Energy Research & Social Science*, [Online]. 126, 104138. Available: https://doi.org/10.1016/j.erss.2025.104138
[9] K. Arias, D. López, S. Camino-Mogro, M. Weiss, D. Walsh, L. Gouvea Gomes, and M. C. M. Hallack. (2023). Green transition and gender bias: An analysis of renewable energy generation companies in Latin America. *Energy Research & Social Science*, [Online]. 101, 103151. Available: https://doi.org/10.1016/j.erss.2023.103151
[10] M. O. Shehu, R. Almeida, and K. Mahapatra. (2025) Opportunities for digital tracking technologies in the precast concrete sector in Sweden. *Front. Built Environ.* 11:1566784. doi: 10.3389/fbuil.2025.1566784
[11] S. R. Akhter, and S. Ceustermans. (2026). Circular economy practices and barriers within European SMEs in the construction sector. *European Journal of Sustainable Development*, [Online]. 15(1), pp. 53-74. Available: https://doi.org/10.14207/ejsd.2026.v15n1p53
[12] X. Ren, and A.. Clarke. (2025). Shifting currents of power: Navigating gender inequalities, internal networks, and diversity and inclusion policy effectiveness in an energy sector workplace. *Gender, Work & Organization*, [Online]. 32(5), pp. 2252–2272. Available: https://doi.org/10.1111/gwao.70007
[13] C. Guo, W. Wu, T. Hu, Y. Zhang, X. Li, and Z. Liu. (2025). Unequal access, equal outcomes? Gender differences in the relationship between university-led STEM program factors and undergraduates' career commitment in STEM. *International Journal of STEM Education*, [Online]. 12(46), pp. 1-21. Available: https://doi.org/10.1186/s40594-025-00569-9
[14] L. Volodzkienė, and T. Baleţentis. (2025). Gender equality as a driver of inclusive green transitions: Evidence from EU panel. *Sustainable Development*, [Online]. pp. 1–13. https://doi.org/10.1002/sd.70523
[15] S. Prenner, F. Part, S. Jung-Waclik, A. Bordes, R. Leonhardt, et al. (2024). Barriers and framework conditions for the market entry of second-life lithium-ion batteries from electric vehicles. *Heliyon*, [online], 10 (18), pp. e37423. Available: https://hal.science/hal-04698957v1
[16] D. Bottino-Leone, A. E. Stawinoga, J. Adami, A. Troi, D. Herrera-Avellanosa, D. (2024). Social Acceptance of Integrated Photovoltaic Systems in Italian Heritage and Landscape Contexts. *Buildings*, [Online] 14, 3948. Available: https://doi.org/10.3390/
[17] M. Vogel, C. Kacperski, M. Bielig, and F. Kutzner. (2024). Doing gender in energy communities: A gendered perspective on barriers and motivators. *Environmental Innovation and Societal Transitions*, [Online]. 53, 100902. Available: https://doi.org/10.1016/j.eist.2024.100902
[18] M. Marshall, D. Ockwell, and R. Byrne (2017). Sustainable energy for all or sustainable energy for men? Gender and the construction of identity within climate technology entrepreneurship in Kenya. *Progress in Development Studies*, [online], 17(2), pp. 148-172. https://doi.org/10.1177/1464993416688830
[19] W. Hermawati, K. R. Ririh, L. Ariyani, R. L. Helmi, and I. Rosaira. (2026). Exploring gender equality in renewable energy R&D: Evidence from Indonesian public research centers. *Public Organization Review*. [Online]. Pp 1-20 Available: https://doi.org/10.1007/s11115-026-00996-4
[20] D. Lazoroska, J. Palm, and A-R. Kojonsaari. (2024). Gender-based opportunity structure in the energy sector: A literature review on women's networking and mentoring. *Energy, Sustainability and Society*, [Online]. 14(67), pp. 1-13. Available: https://doi.org/10.1186/s13705-024-00494-9
[21] T. M. Joseph, H. Shajidha, S. Beheiry, and M. M. Mortula. (2026). Perceptions of lean construction for waste management in the UAE building sector: a partial least squares structural equation modeling approach. *Frontiers in Sustainable Cities*, [Online], 8:1698448. Available: https://doi.org/10.3389/frsc.2026.1698448
[22] M. Kołodziej-Hajdo, A. Machno, J. Nesterak, M. Kowalski (2025). Application of Management Controlling in the Energy and Heating Sector: Diagnosis of Implementation Level and Identification of Development Barriers in the Context of Other Economic Sectors. *Energies*, [Online], 18, 4458. Available: https://doi.org/10.3390/en18174458
[23] M. Cellini, M., S. Loos, C. Mirenda, L. Pisacane, C. Striebing, and S. Tagliacozzo.(2025). Exploring the nexus of gender and energy transitions: A systematic literature review. *Energy Research & Social Science*, [Online]. 119, 103887. Available: https://doi.org/10.1016/j.erss.2024.103887
[24] D. Owusu-Manu, D. M. Sackey, D. Osei-Asibey, D. Kyerewah, R. Agyapong, and D. J. Edwards. (2022). Improving women's energy access, rights and equitable sustainable development: A Ghanaian perspective. *Ecofeminism and Climate Change***,** [Online]. **3**(1), pp. 23–40. Available: https://doi.org/10.1108/EFCC-05-2021-0009
[25] C. Mayen Huerta, C. Ivanescu, B. Herfort, P. Badowski, and D. Gontariu. (2025). Leveraging geospatial data to evaluate women's employment opportunities in the renewable energy sector. *Energy Research & Social Science*, [Online]. *120*, 103917. Available: https://doi.org/10.1016/j.erss.2024.103917
[26] M.N. Şahin, Y Rumeli, and N. Sakallı (2025). An application of the theory of planned behavior to women's feminist and protective action in Türkiye. *Currents Psychology* 44, [Online]. 14368–14382 https://doi.org/10.1007/s12144-025-08179-y.

AUTHORS' INFORMATION

Manuel S. Araújo, holds a PhD and a master's degree in Health Psychology. He is full Professor at Porto Accounting and Business School, Polytechnic University of Porto, Portugal. Currently are coordinator of the Social Science Department and the main research interest is in leadership and quality of working life. He is currently a researcher at CEOS.PP, Executive Coach, Training, Mentor and Consulting Professional in Porto Executive Academy, and member of the Anti-Bullying Committee of Porto Polytechnic.

Dora Martins, is a Full Professor with a PhD in Business Sciences, specialising in Organisation and Human Resources from the School of Economics and Management of University of Porto (2011). She teaches Human Resources management in both undergraduate and master's degrees at Porto Accounting and Business School from the Polytechnic Institute of Porto (ISCAP-P.Porto). She has been a faculty member at P.Porto since 2000 and at Porto Business School since 2009. She has been a research member at GOVCOPP (University of Aveiro) since 2010, at CEOS.PP (Centre for Organisational and Social Studies of Polytechnic of Porto) since 2017 and at inED (Centre for Research and Innovation in Education of Polytechnic of Porto) since 2026.

Teresa A. Nogueira, holds a PhD and a Master's degree in Electrical Engineering and Computer Science. She has been a professor at the Polytechnic University of Porto, School of Engineering (ISEP), since 1994. Additionally, she has been a researcher at the Centre for Innovation in Engineering and Industrial Technology (CIETI) since 2015.
Her scientific publications focus on power systems, energy markets, renewables, and energy quality.
She is currently coordinating the European project SHOREWINNER - Southern European Community for Offshore Wind Energy.

Paula Carvalho is an Invited Assistant Professor at ISCAP–P.Porto, where she teaches translation and English language and culture. She was an invited lecturer at the same institution from 2009 to 2021. Her research focuses on automated translation, text analysis, summarisation, and simplification using generative artificial intelligence and corpus-based approaches. She holds a Master's Degree in Multimedia, and in 2021, she was awarded the Professional Qualification of Specialist with the work "*Considerations on the Ever-Increasing Relevance of Technical Competences in Translation: The Localization of Digital Content*." She is currently pursuing a PhD in Language Sciences at the University of Minho. In addition to her academic role, Paula Carvalho has been a project manager at ISCAP–P.Porto since 2010, overseeing the administrative and financial management of approximately 90 national and international projects funded under programmes such as Horizon Europe, ERASMUS+, LLP, Youth in Action, and ESF. She has successfully coordinated project audits and contributed to the development and translation of outputs in several international initiatives.

Pedro M. Silva holds a Bachelor's degree in International Trade and a Master's in Entrepreneurship and Internationalization from ISCAP. He earned his Ph.D. in Economic and Business Sciences, specialising in Management, from the University of Aveiro, and was awarded the title of Specialist in Management and Business Sciences under Decree-Law 206/2009. He completed a postdoctoral fellowship in Management at the University of Beira Interior. He is currently a researcher at CEOS.PP and a Professor at ISCAP, Polytechnic University of Porto, where he directs the Master's in Digital Marketing and an executive postgraduate program in Sales Management. He has authored several books and scientific articles and serves as a reviewer for international journals.

Copyright © 2026 by the authors. This is an open access article distributed under the Creative Commons Attribution License which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited (CC BY 4.0).