On the occasion of International Women's Day in Engineering, 23 June

Gender Pay Gap in STEM occupations: evolution over the last decade

Amélia Bastos, João Cruz and Sara Falcão Casaca

The proportion of workers in STEM[i] occupations in Portugal increased between 2010 and 2023 (Table 1). However, their share of the total workforce still remains very small, at 5.62% (2023). Engineers formed a significant part of the total number of STEM occupations in 2010; however, by 2023, the weight of ICT occupations was already quite evident.

Table 1 – STEM workers and total workers

2010				
Occupation	Number	% in STEM	% of total workers	% Women
STEM (All)	**74 785**	**100%**	**3.28%**	**25.12%**
ICT	23 167	30.98%	1.02%	19.43%
Engineers	38 699	51.75%	1.70%	22.14%
Other STEM	12 919	17.27%	0.57%	44.24%
Total workers (all occupations)	2 282 291		100%	45.70%

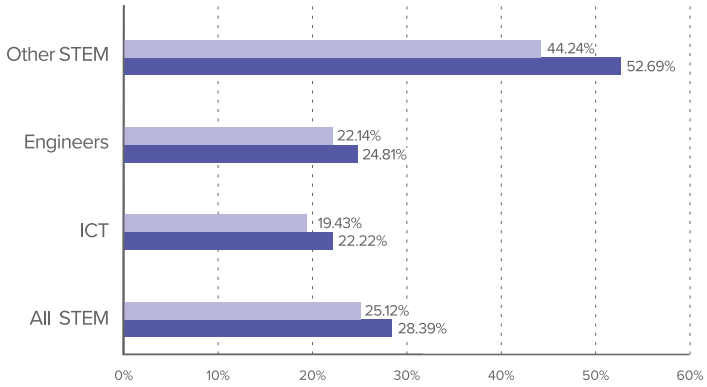
2023				
Occupation	Number	% in STEM	% of total workers	% Women
STEM (All)	**154 395**	**100%**	**5.62%**	**28.39%**
ICT	75 221	48.72%	2.74%	22.22%
Engineers	52 387	33.93%	1.91%	24.81%
Other STEM	26 787	17.35%	0.98%	52.69%
Total workers (all occupations)	2 744 980		100%	46.57%

Source: Based on *Quadros de Pessoal* 2010 and 2023.[ii]

It should be noted that, during this period, the distribution of women across these two occupational areas remains relatively low (less than a quarter of the total), while, in contrast, there has been an increase in the feminisation of scientific occupations in general (52.69% in 2023) – *Other STEM* (Figure 1).

Finally, attention is drawn to the low proportion of women among STEM workers as a whole – which is less than a third of the total in the last year of analysis. STEM fields still remain predominantly male.

Figure 1 – Proportion of Women in Total Number of Workers, STEM occupations



Source: Based on *Quadros de Pessoal* 2010 and 2023.

The basic GPG indicator – simple GPG[iii] – shows that, in 2010, STEM occupations had a pay gap (14.15%) that was less penalising for women than the one relating to the entire population (20.28%). It should be noted that this scenario was reversed to some extent in 2023: the simple GPG rose by 1.71 p.p. compared to 2010, while for most occupations there was an overall improvement (14.74% in 2023) (Table 2).

[i] The classification follows the 2010 - ISCO-08. STEM occupations (the acronym for Science, Technology, Engineering and Mathematics) include specialists in physical sciences, mathematics, engineering and related techniques (ISCO 08, code 21) and information and communication specialists (ISCO 08, code 25). The areas have been broken down: (a) ICT, (the acronym for Information and Communication Technologies, which includes information and communication specialists; (b) Engineering, referring to the occupations included in ISCO 08, codes 214 and 215; and (c) Other STEM occupations, the remaining area that includes physicists, chemists and related specialists (ISCO 08, code 211), mathematicians, actuaries, statisticians and demographers (ISCO 08, code 212), (ISCO 08, code 213), architects, urban planners, surveyors and designers (ISCO 08, code 216), generically referred to in this document as scientific occupations.

[ii] Data from *Quadros de Pessoal* (QP – Employment Records) are used. This is statistical information resulting from an annual administrative procedure relating to all employers in mainland Portugal, provided by the Strategy and Planning Office (GEP) of the Ministry of Labour, Solidarity and Social Security (MTSSS). For the central regional and local administration and public institutes, the information collected refers only to individuals with individual contracts. This database includes detailed information on basic pay and earnings (including bonuses, overtime pay and other regular benefits) on a monthly basis, and the corresponding working hours. In addition, the QPs also include data on the characteristics of employers and socio-demographic information on their employees.

[iii] Two techniques are used to analyse the pay gap between men and women, referred to in Anglo-Saxon literature as the *Gender Pay Gap* (GPG): (i) the basic indicator that assesses the earnings gap between women and men in relation to men's earnings, referred to as the simple GPG; (ii) the indicator that takes into account individual characteristics, namely age, seniority, education and working time regime, resulting from the application of an econometric procedure referred to as the adjusted GPG.

The simple GPG is more penalising for women working in *Engineering* and shows a worsening trend: it rose from 11.20% in 2010 to 16.34% in 2023.

Scientific occupations – *Other STEM* – have the lowest simple GPG, with a slight decrease being recorded between 2010 (7.74%) and 2023 (6.60%).

Finally, it should be noted that while, in 2010, *ICT* occupations had a simple GPG favourable to women (-5.02%), this situation was not repeated in 2023, when this gap (8.81%) followed the trend of the other values recorded for this indicator. In short, in these STEM areas, women are penalised in terms of pay differentials.

The adjusted GPG values are more accurate, as they allow the pay gap between women and men to be measured while controlling for the effect of individual characteristics. The pay gap penalises women, although it is less pronounced in *STEM* occupations than in occupations as a whole. In *STEM* occupations, in 2023, women earned around 16% less than men with the same characteristics, a gap that has widened by around 6 p.p. since 2010.

Engineering is the field with the most penalising pay gap for women – in 2023, women working in this occupation earned around 14% less than men with the same characteristics.

It is also worth noting the significant increase that occurred in the adjusted GPG in the *ICT* field during the period analysed, with women earning around 10% less than men with the same characteristics.

Finally, mention should be made of the reduced pay gap in scientific occupations – *Other STEM* occupations – where women earn around 3% less than men.

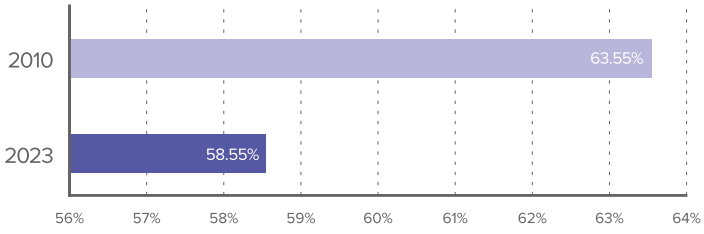
Table 2 – Simple GPG and Adjusted GPG

	Simple GPG		Adjusted GPG	
Occupation	2010	2023	2010	2023
STEM	**14.15%**	**15.86%**	**10.51%**	**16.05%**
ICT	-5.02%	8.81%	2.35%	10.16%
Engineers	11.20%	16.34%	8.25%	14.10%
Other STEM	7.74%	6.60%	3.17%	2.72%
Total workers (all occupations)	20.28%	14.74%	22.78%	17.55%

Source: Based on *Quadros de Pessoal* 2010 and 2023.

In the context of *STEM* occupations, the share of the unexplained component of the GPG[iv] decreased from 63.55% in 2010 to 58.55% in 2023 (Figure 2).

Figure 2 – Percentage of the unexplained component of the GPG - Total *STEM* occupations

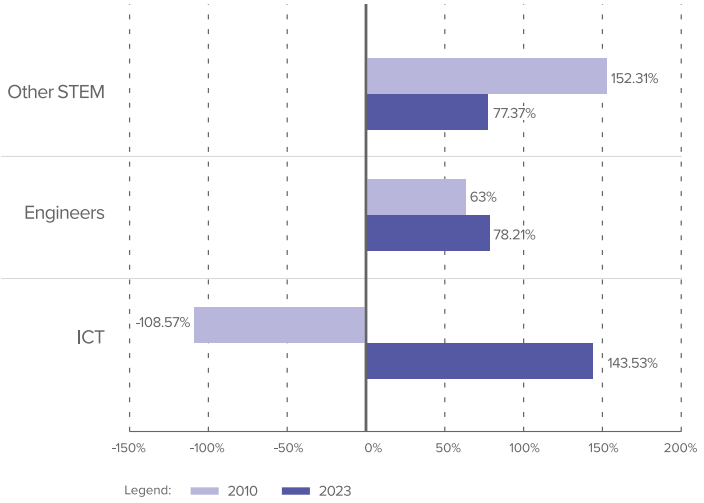


Source: Based on *Quadros de Pessoal* 2010 and 2023.

The analysis of the GPG broken down into the three STEM areas (Figure 3) shows:

- A substantial increase in the unexplained component of the GPG in the area of *ICT* occupations (reaching 143.53% in 2023), suggesting attention should be paid to possible gender discrimination;
- An increase that, although it is less significant, also occurs in engineering-related occupations (standing at 78.21% in 2023), decreasing considerably in other *STEM* occupations – where it nonetheless still remains very high (77.37% in the last year analysed).

Figure 3 – Percentage of the unexplained component of the GPG - Three STEM areas



Source: Based on *Quadros de Pessoal* 2010 and 2023.

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[iv] In this case, the Blinder-Oaxaca decomposition of the wage gap between men and women was used, which also results from an econometric procedure designed to break down the wage differentiation index between men and women into two parts: one part that is explained by individual attributes (age, contractual relationship, working hours, education, type of contract, occupation, sector of activity, company size, region and level of qualification); and one part that is not explained by these characteristics and which may therefore suggest gender-based pay discrimination.