

## Gendered Competence Perceptions in Graduate Employability Assessment: Unpacking Implicit Bias in Early Career Evaluation

Sonia Martin Gomez<sup>1\*</sup>, Angel Bartolome Muñoz de Luna<sup>2</sup>

<sup>1</sup> Department of Business Management, Universidad San Pablo-CEU, CEU Universities, Madrid, Spain

<sup>2</sup> Audiovisual Communication and Advertising Department, Universidad San Pablo-CEU, CEU Universities, Madrid, Spain

\*Corresponding Author: [margom@ceu.es](mailto:margom@ceu.es)

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### ABSTRACT

Despite growing attention to gender equity in higher education and employment, subtle and systemic biases continue to shape perceptions of graduate competence. This paper examines how gender stereotypes influence the evaluation of transversal competencies during the transition from university to the labor market. Drawing on quantitative data from 440 employer assessments of graduates from a Spanish university, we identify both the persistence of stereotypical associations (e.g., men with technical performance, women with interpersonal traits) and their impact on competence evaluation. Although most univariate analyses revealed no significant differences, multivariate analyses (MANOVA) and non-parametric tests indicated a statistically significant gender gap in perceived action and performance at work. These findings suggest that even in contexts with apparently neutral evaluation systems, implicit gender norms can influence the interpretation of soft skills and professional behaviors. Our study contributes to the literature on employability, human capital assessment, and gender in the workplace by providing evidence of how bias may persist in subtle forms during the early career phase. We argue that addressing these forms of bias is crucial for building equitable talent pipelines and propose specific HR practices—such as structured evaluations, blind reviews, and bias awareness training—to mitigate their effects. These insights are particularly relevant for HR professionals and policymakers committed to fostering inclusive organizational cultures.

**Keywords:** Gender stereotypes, graduate employability, competence assessment, bias, labour market.

**JEL Codes:** J16; J22; I24

### INTRODUCTION

In the current economic context, employability has become a key indicator of social and professional development. For Schwab (2016), those who are capable of innovating and adapting will benefit from this transformation, as the fourth industrial revolution will require and focus on workers' ability to continually adapt and learn new skills and approaches within a variety of contexts.

An individual's ability to enter and remain in the labor market depends not only on their academic training but also on the acquisition of relevant skills that align with the demands of the sector. In the new social and technological scenarios, individuals will need to develop new skills, particularly those who will work professionally. In addition to the knowledge associated with their discipline, they will need to develop other skills to function in the modern world.

The evolution of the concept of employability has made competencies crucial for career design and access to the labor market, as they encompass knowledge, skills, and attitudes that must be developed throughout one's

working life (González, 2011). Employability is fundamental to education, and core competencies are highlighted as essential for addressing social vulnerability and achieving full employment (Llinares- Insa et al., 2020).

Personal and interpersonal skills are especially influential for successful entry into the labor market. According to Moreno and Morales (2017), the incorporation of work- personal skills into the educational and labor market is necessary to emphasize not only candidates' knowledge, but also their ability to understand their colleagues and contribute to a positive work environment.

It is evident that labor demand is constantly changing due to technological advances and changing economic dynamics (Rojas and Mogollón, 2022). In this sense, the relationship between digital natives, known as Generation Z, and the labor market poses a challenge to current educational relevance, derived from the characteristic of this group that "wants to enjoy things, but does not want to have them," according to Vilanova and Ortega (2017).

However, a discrepancy has been observed between the skills acquired during university education and the specific demands of the labor market (Oblitas and Plaza, 2020). This has led to a debate about the relevance of curricula and the need to foster greater collaboration between educational institutions and businesses to address the gap between academic training and business needs. The university must no longer only respond to the demands of the current labor market, but must be proactive, anticipating the new demands of existing jobs and emerging sources of employment, and even more so in the present future of the 4.0 Revolution (Pages Serra and Ripani, 2017).

However, despite the growing importance of meritocracy. Certain stereotypes about women's and men's work prevail, particularly in selection and promotion processes and in corporate culture, such that gender stereotypes continue to play an influential role in shaping job opportunities. These stereotypes, which assign predetermined roles and behaviors to men and women, can hinder the equitable assessment of skills, as well as decision-making in selection and hiring processes.

Academic literature has documented how gender biases affect the perception of skills and competencies in various workplaces. According to Eagly and Karau (2002), these biases can influence not only how individuals are perceived, but also how they perceive themselves, affecting their performance and career aspirations.

Women, often associated with less competitive work environments, may face prejudices that limit their access to leadership positions and traditionally male-dominated sectors, while men may be discouraged from participating in professions considered "feminine." Gender stereotypes also have a significant impact on competency-based employability, often hindering women's career advancement. These stereotypes manifest themselves through biases in hiring practices, performance evaluations, and workplace dynamics.

Then, it is very important to discuss the connotation and mechanisms of gender stereotype formation, analyze their adverse effects on women in the workplace, and study how to better them. This article follows this research idea, hoping to contribute to a better understanding of the causes of gender discrimination against women in the workplace and propose corresponding solutions. In conclusion, given the relevance of these dynamics in a constantly evolving world of work, it is imperative to investigate how gender stereotypes impact skills assessment and employability.

Therefore, the primary objective of this research is to explore the implications of these stereotypes in the selection and hiring processes. In analyzing this issue, the secondary objectives are also to provide a conceptual framework that contributes to understanding the barriers many people face in their job search and to support the creation of more inclusive work environments that value competencies without the interference of gender bias.

To conduct this study, were collected, of 440 recruiters from a database of 6,524 companies, the competency training scores from graduates of a Spanish university in 2024. After analyzing and cleaning this sample, the statistical software SPSS was used to obtain the study's results and conclusions.

## **THEORETICAL FRAMEWORK**

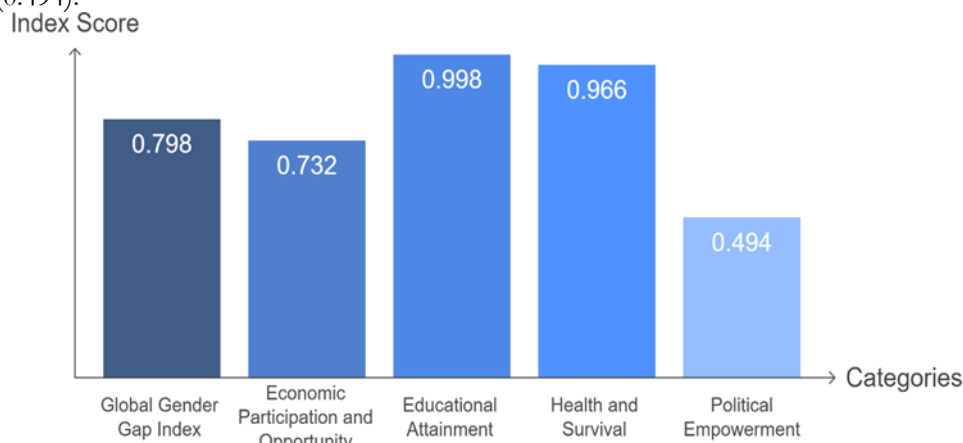
The World Economic Forum's Global Gender Gap Index (World Economic Forum, 2023), was first introduced in 2006 to measure the magnitude of the gender gap in health, education, economic, and political indicators. It is used to understand the extent to which resources and opportunities are distributed equitably between men and women in the 146 countries it analyzes, and thus to compare them.

Specifically, the Gender Gap Index analyzes the following areas: economic participation and opportunity: wages, participation, and highly skilled employment; education: access to basic and higher levels of education; political participation: representation in decision- making structures; and health and survival: life expectancy and male-female ratio.

According to this Report, women have (re)entered the workforce at a slightly faster rate than men, leading to a modest recovery from last year's low. Between the 2022 and 2023 editions, parity in the labor force participation rate increased from 63% to 64%. However, the recovery in women's labor force participation remains incomplete, as parity remains at its second lowest point since the first edition of the index in 2006 and significantly below its

2009 peak of 69%. Compounding these patterns, women continue to face higher unemployment rates than men, with the global unemployment rate at around 4.5% for women and 4.3% for men.

The data of this index reveal, as shown in figure 1, that in the specific case of Spain the differential is 0.798, with the lowest indices being those relating to economic participation and opportunity (0.732) and political participation (0.494).

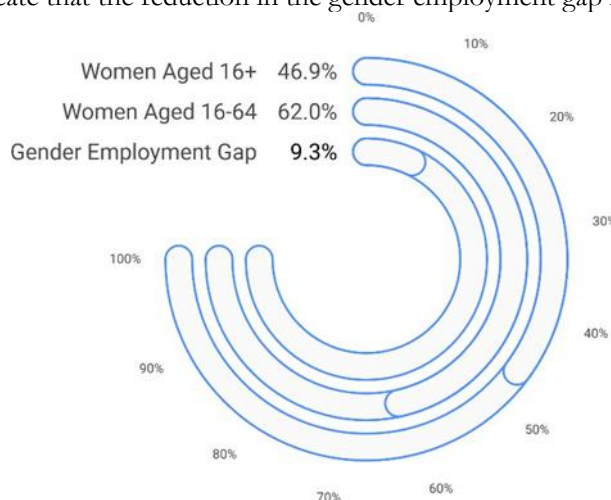


**Figure 1.** Global Gender Gap Index 2024 and Sub-Indices for Spain

Source: World Economic Forum, 2024

Along these lines, the Ministry of Labor and Social Economy (Ministerio de Trabajo y Economía Social, 2024) confirms that the employment level of women aged 16 and over has increased to 9,782,300 employed women in 2023, 3.8% more than in 2022. The employment rate reaches 46.9% among women aged 16 and over, and 62.0% among those aged 16 to 64.

These figures represent increases of 1% and 1.5%, respectively, compared to 2022. The difference between male and female employment rates for the population aged 16 to 64 is 9.3% in 2023, 0.7% less than in 2022. These data, shown in Figure 2, indicate that the reduction in the gender employment gap is decreasing, but very slowly.



**Figure 2.** Employment and occupation rates of women

Source: Ministry of Labor and Social Economy, 2024

Regarding skills training, despite the wide variety of online learning options available, offering the advantages of great flexibility, accessibility, and customization, women and men currently do not have equal opportunities and access to these online platforms, as a result of the digital divide. Even when they do use these platforms, gender gaps in training exist, especially in skills that are expected to grow in importance and demand.

Coursera's global data from the 2023 Global Gender Gap Report suggests that, as of 2022, with the exception of teaching and mentoring courses, enrollment disparities exist across all skill categories. Regarding enrollment in technology skills such as technology literacy (43.7% parity) and AI and big data (33.7%), which are among the top 10 skills projected to grow, parity is below 50%, and progress has been slow. In all skill categories, gender gaps tend to widen as proficiency levels increase. However, when women enroll, they tend to reach most proficiency levels in all skill categories studied in less time compared to men.

There is extensive research arguing and demonstrating the pervasive effects of stereotypes in organizations (Biernat and Sesko, 2018; Koch et al., 2015), but a comprehensive analysis of gender stereotypes in the workplace

is lacking in the scientific literature. While considerable research has been conducted on the topic, a systematic review that captures evolution and trends over time is lacking (Raj et al., 2023).

One proposed explanation for gender bias in the workplace is a role congruence theory (Eagly & Karau, 2002), which explains bias in terms of the congruence between stereotypes held about job requirements and stereotypes held about gender groups. The greater the incongruence between stereotypical gender traits and the generic stereotype of a job, the greater the gender bias. These gender biases in employability skills have been studied by various authors (Boyd & Crawford, 2012; Hong, 2016) who associate men

with "hard" technical skills, while women are commonly associated with "soft" skills or more linked to socio-emotional traits.

More recent research, such as that conducted by Segbenya et al (2023) or Papyrina et al (2021), also attributes a higher level of personal and social skills to women, while men report higher levels of technical skills, such as computer skills or specialized knowledge for skilled jobs. On the other hand, other authors such as Aeon et al, (2021) discovered that women also excelled in skills related to time management.

However, there is also a group of researchers who report that they have not found significant differences between genders (McNatt, 2020; Capella-Peris et al, 2021; Herrera et al, 2023). According to this systematic approach, there is no scientific consensus on gender bias at the competency level. Therefore, this study aims to advance scientific knowledge related to this line of research by investigating whether recruiters currently engage in gender stereotypes when selecting personnel based on competencies.

## RESEARCH DESIGN AND METHODOLOGY

This study uses a descriptive, comparative, and inferential approach to analyze key variables such as the soft skills required for women's employability and professional development, considering potential gender stereotypes among employers.

The main objective of the research is to determine the perception that employers have about the skills training graduates from a University of Madrid, to analyze possible gender biases. This objective has been addressed from a quantitative methodological perspective, through computer-assisted online interviews (Computer Assisted Web Interview (CAWI)).

Specifically, a total of 440 interviews were conducted from a database of 6,524 companies that have hired graduates from the various degrees offered by a Madrid university, either as interns or employees. This represents a sampling error of  $\pm 4.65\%$  for a 95.5% confidence level,  $2\sigma$ . The response rate was 6.6%. The sample is well balanced, with 221 women and 219 men, providing a solid basis for comparison.

The candidate pool consists of companies (managers, CEOs, HR directors, etc.). The field phase took place in April and May 2024.

As for the characterization of these companies, they are distributed evenly according to their size: 38% are large companies, with those with more than 500 employees standing out (31%); 34% are SMEs, and the remaining (28%) are micro-SMEs.

In terms of capital ownership, six out of ten companies are privately held and operate in a wide variety of sectors.

Regarding the scope of their activity, 61% are national in scope, although as the size of the company increases, its international scope increases.

The research also includes a prior analysis of the competencies to be assessed, referenced by recruiters and in line with those stated by the World Economic Forum in its latest Report (2025):

1. Critical thinking and analysis
2. Troubleshooting
3. Self-management
4. Active learning
5. Resilience, stress tolerance and flexibility
6. Creativity, originality and initiative
7. Leadership and social influence
8. Use, monitoring and control of technology
9. Technological design and programming
10. Teamwork and collaboration
11. Relationship with your skills

In this study, the skills to be assessed by recruiters are the following:

1. Planning and Organization: refers to the ability to set goals, develop strategies, and coordinate resources to efficiently achieve those goals.

2. Action and Performance at Work: refers to the ability to execute tasks and fulfill job responsibilities effectively and efficiently.
3. Involvement, Commitment, and Responsibility: as a competency, it refers to the dedication and seriousness with which a person assumes their work tasks and obligations.
4. Problem-solving: A key competency for facing challenges and overcoming obstacles in the workplace; it involves the ability to effectively identify, analyze, and solve problems.
5. Teamwork: understood as support in the pursuit of a common goal, subordinating personal interests to team objectives.
6. Dynamism: as a competency it refers to the ability to be energetic, proactive and adaptable in the work environment.
7. Communication: interpersonal communication skills and communication skills with various types of interlocutors, in different academic, professional and social contexts.
8. People management/Leadership: Effective coordination and organization of a team of people, finding a suitable work environment, and knowing how to guide and direct to achieve set goals and objectives.
9. Focus: refers to the ability to understand and meet the needs and expectations of customers. A key aspect of this skill is empathy, effective communication,
10. Stress Tolerance: The ability to handle and function effectively under pressure, related to resilience and self-control.
11. Learning and innovation: As a competency, it refers to the ability to acquire new knowledge and apply creative ideas to improve processes and products.

These competencies are linked to those of the World Economic Forum as shown in Figure 3.



**Figure 3.** Relationships between the study's competencies and those of the World Economic Forum  
 Source: Prepared by the authors based on data from the World Economic Forum, 2025

The questionnaire assessed each competency using a quantitative Likert scale of 1 to 10, from lowest to highest importance. Employers were asked to rate the perceived level of each competency that graduates demonstrated in the competency training for their companies.

Statistical analysis was performed using SPSS Statistics 25.

The survey data were subjected to a reliability study using Cronbach's alpha, resulting in 0,9624, indicating excellent internal consistency between the questionnaire items.

## RESEARCH RESULTS

To investigate employers' perceptions of the relationship between gender and soft skills, various statistical techniques can be used. In this study, a descriptive analysis was first used to gain an overview of the distribution of skill ratings, including measures of central tendency (mean) and dispersion (standard deviation):

**Table 1:** Descriptive statistics by Gender

Gender		Planning and	Action and Performance	Involvement, Commitment and Responsibility	Problem Solving	Teamwork	Dynamism	Communication.	Customer Orientation	People Management	Stress Tolerance	Learning Innovation
1 WOMEN	Average	6.16	6.19	5.71	6.05	6.17	5.86	5.93	6.3	6.2	6.27	5.95
	N	221	221	221	221	221	221	221	221	221	221	221
	Standard dev.	2,194	2,123	1,959	2,313	2,200	2,159	2,293	2,418	2,166	2,487	2,353
	Variance	4,816	4,506	3,836	5,352	4,840	4,661	5,258	5,847	4,690	6,187	5,538
	Kurtosis	-0.585	-0.702	-0.036	-0.75	-0.45	-0.534	-0.907	-0.733	-0.535	-0.866	-0.88
	Asymmetry	-0.188	0.045	-0.457	0.18	-0.04	0.063	0.304	-0.144	-0.162	0.049	-0.005
2 MEN	Average	5.84	5.82	5.51	6.03	6.17	5.8	5.93	6.18	6.05	6.46	5.94
	N	219	219	219	219	219	219	219	219	219	219	219
	Standard dev.	2,292	2,348	2,104	2,385	2,235	2,316	2,332	2,608	2,250	2,574	2,423
	Variance	5,254	5,514	4,425	5,687	4,994	5,363	5,440	6,801	5,061	6,626	5,873
	Kurtosis	-0.245	-0.775	-0.621	-0.706	-0.24	-0.568	-0.891	-0.871	-0.55	-0.786	-0.738
	Asymmetry	-0.208	0.315	-0.411	-0.047	-0.17	0.005	0.129	-0.241	-0.084	-0.194	0.129
Total	Average	6	6	5.61	6.04	6.17	5.83	5.93	6.24	6.13	6.36	5.95
	N	440	440	440	440	440	440	440	440	440	440	440
	Standard dev.	2,247	2,243	2,032	2,347	2,215	2,236	2,310	2,512	2,207	2,530	2,386
	Variance	5,048	5,030	4,129	5,506	4,906	5,000	5,337	6,311	4,869	6,400	5,692
	Kurtosis	-0.395	-0.771	-0.359	-0.728	-0.35	-0.547	-0.902	-0.797	-0.55	-0.842	-0.808
	Asymmetry	-0.206	0.173	-0.44	0.061	-0.11	0.029	0.214	-0.203	-0.124	-0.074	0.064

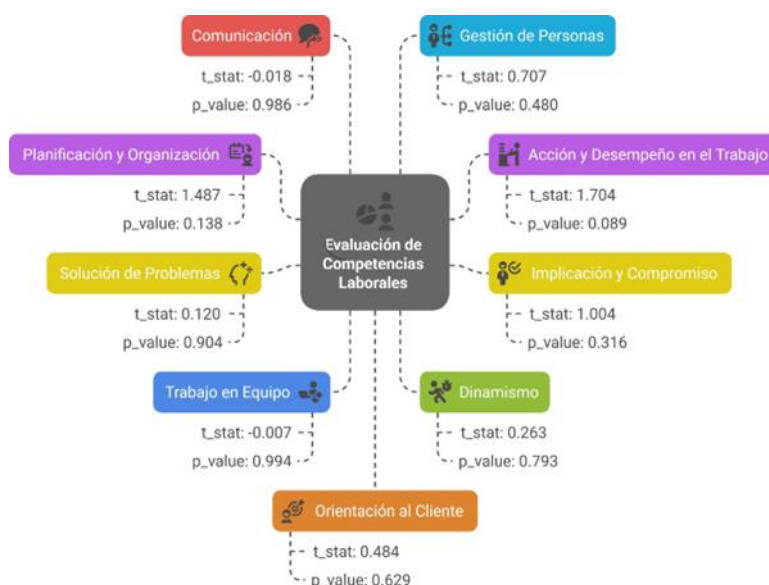
Source: Prepared by the authors using SPSS

Table 1 presents the descriptive statistics of the work competencies, differentiated by gender (women and men) and allows us to observe that women tend to have slightly higher averages in several competencies, such as planning and organization, action and performance, and problem solving, while men have a higher average in learning and innovation.

On the other hand, the standard deviations are similar between both genders, indicating comparable variability in scores.

Secondly, a comparison of means (T-test) was performed, which allows comparing the means of the competencies between genders to determine whether there are significant differences. In this case, as can be seen in Figure 4, none of the p-values is less than 0.05, which suggests that there are no significant differences between the competencies of genders 1 (female) and 2 (male).

Although the t-test can only be used when the data are not normal if the sample size is large in this study it would be viable since the sample has a considerable size, more than 400 data.



**Figure 4.** Competency assessment  
Source: Prepared by the authors using SPSS

An ANOVA test was subsequently performed (Table 2), which again confirmed that none of the competencies showed a significant difference between genders, since all p values were greater than 0.05.

**Table 2.** ANOVA Test

Competence	F - statistic	P- value
Planning and Organization	2.212	0.138
Action and Performance at Work	2.904	0.089
Involvement, Commitment and Responsibility	1.007	0.316
Troubleshooting	0.014	0.904
Teamwork	0	0.994
Dynamism	0.069	0.793
Communication	0	0.986
People Management	0.5	0.48

Source: Prepared by the authors using SPSS

The correlation analysis (Pearson Correlation), which allows to evaluate the linear relationship between gender and competencies, indicating the strength and direction of the relationship between two variables, concludes, as shown in Table 3, that all competencies show a weak correlation with gender, and none of the correlations are significant, since all p values are greater than 0.05, since values close to 1 or -1 indicate a strong relationship, while a value close to 0 indicates a weak relationship.

In the case of the P- value, a p-value less than 0.05 indicates that the correlation is significant, and there were no such cases in this study.

**Table 3.** Correlation Coefficient

Competence	Correlation Coefficient	P- value
Planning and Organization	-0.071	0.138
Action and Performance at Work	-0.081	0.089
Involvement, Commitment and Responsibility	-0.048	0.316
Troubleshooting	-0.006	0.904
Teamwork	0	0.994

Dynamism	-0.013	0.793
Communication	0.001	0.986
People Management	-0.034	0.48
Customer Orientation	-0.023	0.629
Stress Tolerance	0.038	0.421
Learning and Innovation	-0.002	0.966

Source: Prepared by the authors using SPSS

After applying a linear regression and obtaining regression coefficients, a weak relationship between gender and skills is also shown, confirming again that none of the relationships were significant, since all p values are greater than 0.05, as shown in Table 4.

**Table 4.** Regression Coefficient

Competence	Regression Coefficient	P- value
Planning and Organization	-0.071	0.138
Action and Performance at Work	-0.081	0.089
Involvement, Commitment and Responsibility	-0.048	0.316
Troubleshooting	-0.006	0.904
Teamwork	0	0.994
Dynamism	-0.013	0.793
Communication	0.001	0.986
People Management	-0.034	0.48
Customer Orientation	-0.023	0.629
Stress Tolerance	0.038	0.421
Learning and Innovation	-0.002	0.966

Source: Prepared by the authors using SPSS

However, it should be noted that the Shapiro-Wilk Normality Test indicates that the distributions of scores in all competencies are not normal, since a low p- value (less than 0.05) indicates that the null hypothesis of normality is rejected.

As can be seen in Table 5, in all cases, the p-values are below the conventional threshold of 0.05, leading to a rejection of the null hypothesis of normality. These results confirm that none of the competence scores follow a normal distribution.

As a result, the application of non-parametric statistical methods (such as the Mann- Whitney U test and Kruskal-Wallis test), as well as multivariate analyses (MANOVA), is justified in the study.

**Table 5.** Test Kruskal-Wallis

Competence	W-statistic	p-value
Stress Tolerance	0.9335	$4.31 \times 10^{-13}$
Communication	0.9476	$2.33 \times 10^{-11}$
Involvement, Commitment and Responsibility	0.9502	$5.11 \times 10^{-11}$
Customer Orientation	0.9521	$9.55 \times 10^{-11}$
Problem Solving	0.954	$1.80 \times 10^{-10}$
Action and Performance at Work	0.9546	$2.16 \times 10^{-10}$
Learning and Innovation	0.9552	$2.63 \times 10^{-10}$
Teamwork	0.9617	$2.68 \times 10^{-9}$

Planning and Organization	0.9646	$8.19 \times 10^{-9}$
Dynamism	0.9647	$8.60 \times 10^{-9}$
People Management	0.9682	$3.52 \times 10^{-8}$

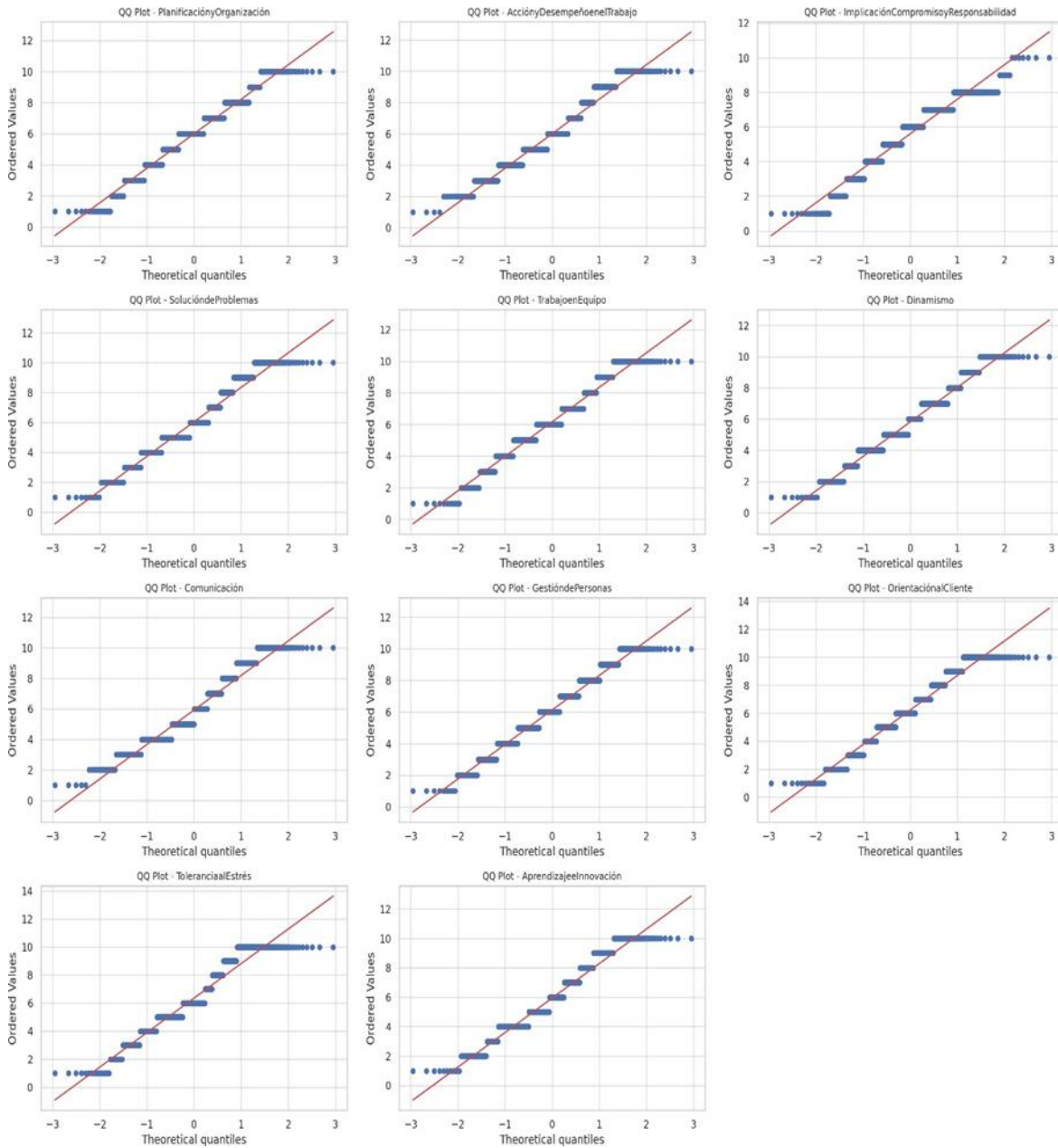
Source: Prepared by the authors using SPSS

To visually assess the normality of each competency distribution, Quantile-Quantile (QQ) plots were generated. These plots compare the quantiles of the observed data with the quantiles of a standard normal distribution. If the data follow a normal distribution, the points should align closely along the reference diagonal line.

As shown in the figure below (figure 5), most competencies exhibit noticeable deviations from the diagonal, especially at the tails. This visual pattern suggests the presence of skewness or heavier/lighter tails than a normal distribution, which is consistent with the results of the Shapiro-Wilk tests.

The QQ plots reveal that:

- Competencies such as Stress Tolerance, Communication, and Involvement show significant deviations in both tails, indicating strong departures from normality.
- Even competencies with relatively higher *W*-statistics (e.g., People Management) demonstrate curvature or outliers, reinforcing the need to use non-parametric statistical tests in the analysis.
- The observed patterns confirm that parametric assumptions are violated, thus justifying the methodological choices made for the inferential analysis.



**Figure 5.** QQ Plots by competition  
Source: Prepared by the authors

It will also assess whether there are statistical differences in the mean scores of work competencies between women and men by applying a bootstrap analysis to estimate the uncertainty of the difference in means without assuming normality or equal variances.

As shown in Table 6, all confidence intervals include the value 0, indicating that the observed differences can be attributed to random sampling. In addition, the null hypothesis of equality of means in any competition is not rejected and the magnitudes of the differences are small (absolute values < 0.4), reinforcing the conclusion of similarity in performance between genders.

This allows us to demonstrate that, in this sample, there are no significant gender differences in the 11 competencies evaluated and suggests an equalization in the work capabilities of men and women within the analyzed dataset.

**Table 6.** Bootstrap analysis

Competence	Mean Difference (Women – Men)	95% CI	Statistically Significant?
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Planning and Organization	-0.32	[-0.74, 0.10]	No
Action and Job Performance	-0.36	[-0.77, 0.05]	No
Commitment and Responsibility	-0.19	[-0.57, 0.18]	No
Problem Solving	-0.03	[-0.46, 0.40]	No
Teamwork	≈ 0.00	[-0.41, 0.41]	No
Dynamism	-0.06	[-0.47, 0.35]	No
Communication	≈ 0.00	[-0.43, 0.43]	No
People Management	-0.15	[-0.57, 0.26]	No
Customer Orientation	-0.11	[-0.58, 0.37]	No
Stress Tolerance	0.19	[-0.28, 0.66]	No
Learning and Innovation	-0.01	[-0.46, 0.44]	No

Source: Source: Prepared by the authors using SPSS

The Table 6 shows, for each of the 11 competencies evaluated, the mean difference (Women – Men) estimated by bootstrap together with its 95% confidence interval.

It also shows that all confidence intervals include the value zero. Therefore, there is no statistical evidence of significant gender differences in any competence. The estimated mean differences are very small (all lower in absolute value of ±0.4), which reinforces the conclusion that, in this sample, women and men perform similarly in the skills analysed.

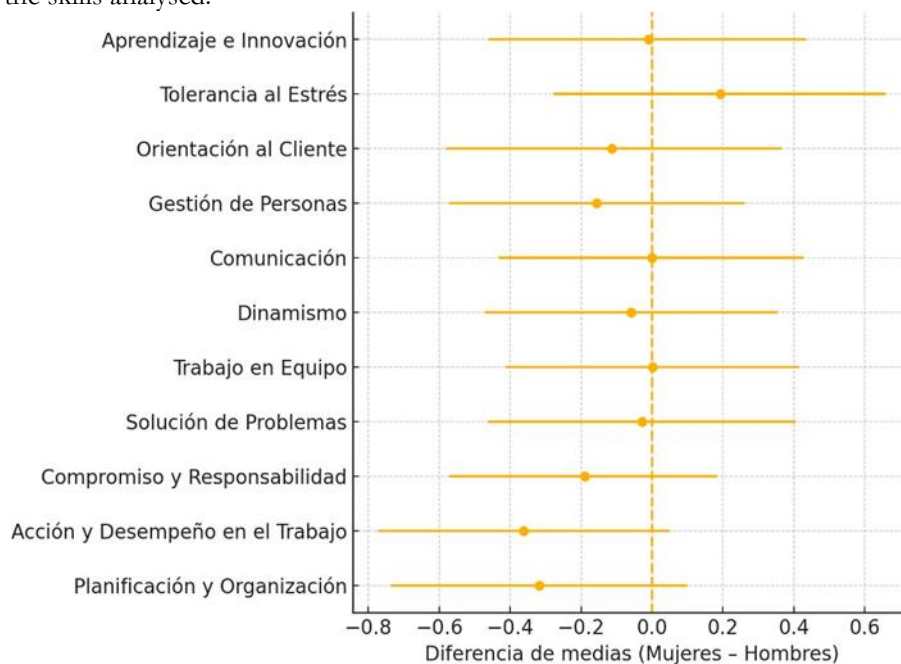


Figure 6. 95% Bootstrap confidence intervals for mean difference (Women – Men).

Source: Prepared by the authors

Given the lack of normality, despite verifying the Central Limit Theorem (CLT) due to the high sample size, it is decided to use MANOVA (Multivariate Analysis of Variance), which allows evaluating differences in multiple variables and thus determine if there are significant differences between groups in several dependent variables at the same time, obtaining the results in Table 7, which allow us to answer the question: Are there multivariate differences in the competence profile (for all competences together) between men and women?

Table 7. MANOVA Analysis

Test Statistic	Value	F Value	P- value
Wilks' Lambda	0.4295	4,06	0,0004
Pillai's Trace	0.5705	4,06	0,0004
Hotelling's Trace	1.3285	4,06	0,0004

Roy's Largest Root	1.3285	4,06	0,0004
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Source: Prepared by the authors using SPSS

The multivariate test reveals a statistically significant effect of gender on the combined set of competency scores ( $p < .001$  across all test statistics).

Each test is explained in detail:

1. Wilks' Lambda: proportion of the total variance in the dependent variables that is not explained by the independent factor (gender).

Observed value: 0.4295

Interpretation: The closer to 0, the greater the effect of the genre. Here, a value of 0.4295 indicates that about 57% of the combined variance in competencies is explained by gender.

Significance:  $p = 0.0004 \rightarrow$  significant.

2. Pillai's Trace: sum of the effects explained by the group (genus) as a function of the total variance of the dependent variables.

Observed value: 0.5705

Interpretation: This value indicates that 57.05% of the combined variance in competencies can be attributed to gender. It is a measure considered robust even when the assumptions of MANOVA are not perfectly fulfilled.

Significance:  $p = 0.0004 \rightarrow$  significant.

3. Hotelling's Trace: sum of the ratios of explained variance between groups and variance within groups.

Observed value: 1.3285

Interpretation: It also reflects a substantial effect of gender on skills. The higher the value, the greater the difference between groups.

Significance:  $p = 0.0004 \rightarrow$  significant.

4. Roy's Largest Root: maximum effect of the group on some linear combination of the dependent variables.

Observed value: 1.3285

Interpretation: This test focuses on the dimension where the difference between genders is most pronounced. Although it is sensitive to extreme values, here too it indicates a significant effect.

Significance:  $p = 0.0004 \rightarrow$  significant.

In conclusion, all the tests converge on the fact that gender has a statistically significant effect on the set of competencies evaluated. This suggests differences in the competence profiles between men and women, although to know in which specific competences there are differences, we need to carry out individual ANOVAs.

**Table 8.** Univariate ANOVA Results for Competency Scores by Gender

Competence	F Value	p-value
Action and Job Performance	2,90	0.089
Planning and Organization	2.21	0.138
Commitment and Responsibility	1.01	0.316
Stress Tolerance	0.65	0.421
People Management	0.50	0.480
Customer Orientation	0.23	0.629
Dynamism	0.07	0.793
Problem Solving	0.01	0.904
Learning and Innovation	0.00	0.966
Communication	0.00	0.986
Teamwork	0.00	0.994

Source: Prepared by the authors using SPSS

Table 8 indicates that none individual competence presents statistically significant differences between genders at a conventional level of significance ( $p < 0.05$ ).

However, the "Action and Job Performance" competition shows a marginal trend ( $p = 0.089$ ), which could indicate a potentially relevant difference that deserves a deeper analysis or a larger sample.

Although the MANOVA indicates significant differences in the overall set of competencies by gender, no significant differences are detected at the individual level in the competencies separately, probably due to sample size or intercorrelations between variables.

To confirm this conclusion, in the Table 9, the test Tukey's HSD (Honest Significant Difference) will be used only for the variable with  $p$  close to the threshold (Action and Job Performance,  $p = 0.089$ ), but it would be treated as an exploratory, not confirmatory, analysis.

**Table 9.** Tukey HSD Post Hoc Test – Action and Job Performance

Group1	Group2	Mean Diff	p-adj	Lower	Upper	Reject
1	2	-1.227	0.089	-2.626	0.172	FALSE

Source: Prepared by the authors using SPSS

The mean difference between the genders is -1.227 points, with a  $p$ -adjusted of 0.089, which is not statistically significant at a level of  $\alpha = 0.05$ . The Reject = False column confirms that the null hypothesis of equality of means is not rejected.

This result is consistent with ANOVA: it suggests a possible trend, but not a conclusive difference.

After obtaining this result, non-parametric methods will be applied to analyze the differences between groups when the data are not normal, including the Mann-Whitney U Test, whose objective is to compare two independent groups when the data are not normal, and the sample size is small.

In this case, the scores of men and women in a specific competition will be compared, obtaining the results in Table 10.

**Table 10.** Mann-Whitney U test

Mann-Whitney U test	Statistics	p -value
Planning and Organization	2, 6108	0.1484
<b>Action and Performance at Work</b>	26,830	0.0465
<b>Involvement, Commitment and Responsibility</b>	25,139	0.476
<b>Troubleshooting</b>	24,092	0.9357
<b>Teamwork</b>	23,960	0.8565
<b>Dynamism</b>	24,565	0.7817
<b>Communication</b>	24,123	0.9544
<b>People Management</b>	25,201	0.4489
<b>Customer Orientation</b>	24,608	0.7577
<b>Stress Tolerance</b>	22,861	0.3106
<b>Learning and Innovation</b>	24,308	0.8914

Source: Prepared by the authors using SPSS

The Mann-Whitney U test shows significant gender differences in Action and Performance at Work competency ( $p$ -value  $< 0.05$ ). No significant differences were found for the other competencies.

If we use another non-parametric model, such as the Kruskal-Wallis test, which allows comparing more than two independent groups, and is useful when the data are not normal, the following results are obtained (Table 11).

**Table 11.** Kruskal-Wallis Test

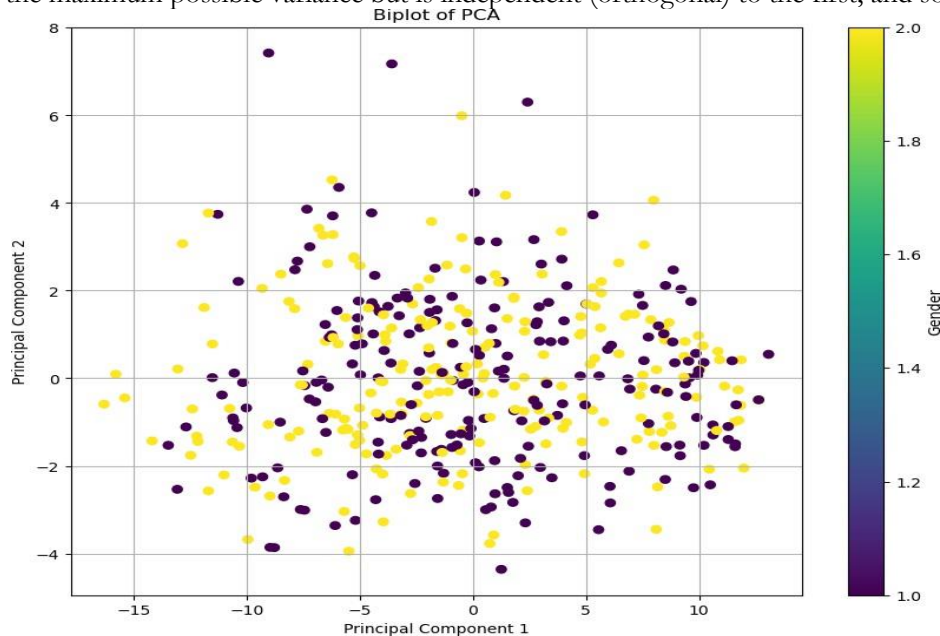
Kruskal-Wallis test	Statistics	p -value
Planning and Organization	2, 0894	0.1483
<b>Action and Performance at Work</b>	<b>3, 9652</b>	<b>0.0464</b>
Involvement, Commitment and Responsibility	0.5085	0.4758
Troubleshooting	0.0066	0.9354
Teamwork	0.0328	0.8562
Dynamism	0.077	0.7814

Communication	0.0033	0.9541
People Management	0.5739	0.4487
Customer Orientation	0.0954	0.7574
Stress Tolerance	1,029	0.3104
Learning and Innovation	0.0187	0.8911

Source: Prepared by the authors using SPSS

The Kruskal-Wallis test also shows significant gender differences in competency Action and Performance at Work ( $p$ -value  $< 0.05$ ). No significant differences were found for the other competencies. Therefore, we can highlight that there are no gender differences in most of the competencies assessed, with the only notable case being the Action and Performance at Work competency.

Finally, a PCA (Principal Component Analysis) is performed which is mainly used to reduce the dimensionality of a dataset. The PCA transforms the original variables into a smaller number of new variables called principal components. These components capture most of the variability (information) in the original data. To do this, the PCA, as shown in Figure 7, looks for linear combinations of the original variables that explain most of the total variability. The first principal component (PC1) explains the maximum possible variance. The second component (PC2) explains the maximum possible variance but is independent (orthogonal) to the first, and so on.



**Figure 7.** Biplot de PCA

Source: Prepared by the authors using SPSS

Figure 7 shows that:

- X-Axis (PC1): Represents the first principal component, which captures the most variance in the data. In this case, PC1 explains 73.41% of the variability.
- Y-Axis (PC2): Represents the second principal component, which captures the next highest variance. PC2 explains 5.74% of the variability.
- Each Point: Represents an observation (or row) from the original dataset, projected into the space of the first two principal components.
- Colors: The points are colored according to the gender, allowing to visualize how the observations group based on this variable.

Some improvement strategies based on the results of the first two principal components (PC1 and PC2) of the Principal Component Analysis (PCA) would be the following:

- PC1-Based Improvement Strategies

PC1 captures 73.41% of the variability in the data. This component represents a linear combination of the original features that maximizes variance.

The characteristics that contribute the most to PC1 are the most important in explaining the differences between the observations.

The strategies to be taken into account are:

1. Focus on Key Skills:
  1. Specific Training: Develop training programs focused on the skills and characteristics that contribute most to PC1. For example, if "Planning and Organizing" and "Action and Performance at Work" are important, offer specific workshops in these areas.
  2. Personalized Assessments: Conduct personalized assessments for each employee based on the key characteristics identified by PC1.
2. Development of Strengths:
  1. Identifying Strengths: Use PC1 results to identify each employee's strengths and develop customized development plans to enhance these strengths.
  2. Recognition and Rewards: Implement recognition and reward systems to motivate employees to improve in the key areas identified by PC1.

- **PC2-Based Improvement Strategies**

PC2 captures 5.74% of the variability in the data. This component represents a linear combination of the original features that maximizes the variance remaining after PC1.

The features that contribute the most to PC2 provide an additional dimension to understanding the differences between the observations.

The strategies to take into account are:

1. Address specific variations:
  1. Individualized Development Programs: Develop individualized development programs that address the specific variations identified by PC2. For example, if "Teamwork" and "Communication" are important to PC2, offer specific training in these areas.
  - Monitoring and Follow-up: Implement monitoring and follow-up systems to assess progress in areas identified by PC2.
2. Continuous Improvement:
  1. Periodic Evaluations: Conduct periodic evaluations to identify areas for continuous improvement in the key characteristics identified by PC2.
  2. Constant Feedback: Provide constant feedback to employees on their performance in key areas of PC2 and adjust development strategies accordingly.

Some competencies may be more susceptible to gender differences due to cultural, social, or biological factors. According to the study, Action and Performance at Work is one of the competencies where gender differences are most pronounced. This may be due to several factors that influence the perception and evaluation of job performance.

**Different expectations:** Gender stereotypes can lead to different expectations about job performance for men and women. Men may be expected to be more competitive and results-oriented, while women are expected to be more collaborative and relationship-oriented.

**Biased evaluation:** Evaluators may have unconscious biases that influence performance evaluation, favoring men in action- and performance-related competencies.

**Task distribution:** In some work environments, tasks and responsibilities may be assigned differently based on gender, which can affect perceptions of performance.

**Promotion and development opportunities:** Men may have more opportunities to participate in high-profile projects that improve their perceived performance.

**Organizational culture:** can influence how the performance of men and women is perceived and valued.

**Differences in self-assessment:** Women may be more critical of their own performance and less likely to highlight their achievements.

**Confidence and assertiveness:** Men can be more assertive and confident when communicating their achievements and abilities.

To mitigate these gender biases, it is essential to implement equality policies, train employees in diversity and inclusion, and promote human resources practices that ensure equity. Furthermore, it is imperative to have leadership committed to diversity and act as a role model.

## CONCLUSIONS AND DISCUSSION

Companies that have hired graduates from this university indicate in their evaluations that they meet all the competencies analyzed, at least to a notable degree.

This suggests that the training received by graduates is adequate to meet the demands of the current labor market, which is important since the relationship between university and the workplace is increasingly critical as employers seek specific competencies that align with their needs. Research indicates that there is a significant gap between the skills acquired through higher education and those required by employers, which calls for a re-evaluation of educational programs to improve the employability of graduates (Teshome & Oumar, 2023).

The skills graduates excel in are teamwork, values, communication, and social commitment. These skills are essential for effective integration into the workplace and for creating a collaborative and positive work environment.

Leadership is the competency with the lowest level of achievement, according to companies. This finding indicates the need to strengthen leadership skills in educational programs to better prepare graduates for management and leadership roles.

A gender bias was identified in the "Action and Performance at Work" competency. This bias may result from a combination of gender stereotypes, traditional roles, organizational culture, and differences in self-assessment and confidence. Gender stereotypes can lead to different expectations about work performance between men and women, influence performance evaluations, and affect the distribution of tasks and promotion opportunities.

Organizations must recognize and address these biases to foster a more equitable and fair work environment, as proper diversity and inclusion education can help create a more conscious and respectful corporate culture.

It can be concluded that there is a minimum of gender bias in employment based on job skills, with this study showing no significant differences in performance ratings between genders, but Research on other aspects of bias highlights systemic problems that disadvantage women in various work environments.

Thus, women often face cultural stereotypes that question their competence, leading to higher performance standards and greater scrutiny (Wynn & Correll, 2018). They also remain underrepresented in senior positions, perpetuating bias and limiting advancement opportunities (Karakaplan, 2018). Özer, 2023).

It must not be forgotten that the exclusion of women from equal opportunities translates into opportunity costs for companies and, therefore, society. Promoting work-life balance and educating about inclusion can help reduce bias and improve women's representation in all aspects of the labor market.

The main limitation of the research is its focus on a single university in Madrid, as there are significant variations in gender bias across world regions. The Southern Hemisphere shows the highest levels of bias, which correlates with lower social indices of gender equality (Mandal et al., 2023).

Therefore, this study should be expanded not only to other Spanish universities but also to universities around the world. However, this limitation is compounded by the broad scope of the recruiting firms surveyed. Six out of ten companies interviewed are national in scope, while the remaining 40% are international.

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The author(s) declare(s) that they have no conflict of interest in relation to the research, authorship or publication of this work.

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