Women in the Computing Job Market: a Case of Study in WillDom Latam

Verena M. Ojeda [1], Gabriela L. Gaona [2,3] and Vanessa J. Cañete [1,3]

[1] *Willdom Paraguay, Asunción, Paraguay*
[2] *Universidad Nacional de Asunción, Asunción, Paraguay*
[3] *Girls Code, Asunción, Paraguay*

Abstract

In Latin America, women perform less than 30% of people employed in the technology sector. In some countries of the region, women software developers represent only 10% of the staff in companies.

The current job market is increasingly driven by STEM areas, so it is essential to understand barriers that women are facing in the field of software development and propose recommendations to encourage them.

In this article we present a data analysis of women in technology area in the *WillDom* Latam network, a company focused on connecting software developers with companies abroad, especially in the US. The network includes candidates from: Paraguay, Argentina, Bolivia, El Salvador and Ecuador collected in a platform since 2014. All candidates went through validation and interview processes to work on software projects. The analysis includes the gender perspective in terms of English level, academic training, technologies, rejections in interviews and salary differences with respect to men.

Keywords

STEM, Women in Computer Science, Gender Gap, Payment Gap.

1. Introduction

The current labor market is increasingly driven by the STEM areas (science, technology, engineering and mathematics for its acronym in English) and the trend indicates that the opportunities in these areas will continue to grow in the future as mentioned by the Economic Forum World, which predicts that up to 75% of jobs in this decade are related to STEM [1].

In Latin America, women make up less than 30% of people employed in the technology sector. In some countries of the region, they represent only 10% of those dedicated to programming [2]. These numbers are part of a general context of lower female participation in the labor force: barely 52% of adult women in the region belong to the labor market, 24% less than men.

Likewise, according to [1], "if the current trends in the gender gap in the industry persist, and the transformation of the labor market, with its new and emerging roles in the fields related to information technology, technology and engineering, continues to outpace the current access rate of women to these jobs, women could risk missing out on the best job opportunities of the future, aggravating companies' hiring processes due to fewer applicants for the positions and it would reduce diversity within the company." Therefore, it is essential that women take advantage of these opportunities to improve the competitiveness of countries, in addition to eliminating the obstacles they

[1] LAWCC 2022 - XIV LATIN AMERICAN WOMEN IN COMPUTING, October 17–21, 2022, Armenia, Colombia
EMAIL: verena.ojeda@willdom.com (V. Ojeda); gaby.lorely@pol.una.py (G. Gaona); vanessa@girlscode.com.py (V. Cañete)
ORCID: 0000-0003-1482-6252 (V. Ojeda); 0000-0001-6840-9652 (G. Gaona); 0000-0002-2254-256X (V. Cañete)

still face. The article presents statistical data on talent related to software development present in the WillDom network, a group of companies based in several Latin American countries including Paraguay that seeks to connect foreign job opportunities with local talent. The data presented analyzes the number of female versus male talent in the network, the levels of English and academic training, the technologies used by women, acceptances and rejections in jobs and the salary differences that exist by gender.

With the analysis of these data from the private sector, an attempt will be made to make known what are the obstacles that women face when it comes to positioning themselves in the technology area to take measures and thus promote diversity in software companies.

Section 2 describes the methodology used, the population studied, and the recruitment platform as a data source. Section 3 analyzes the distribution of the population and its characteristics, presenting the results and comparisons.

Section 4 proposes a series of recommendations based on the study carried out and finally, Section 5 describes the conclusions of the work as well as future work to be carried out.

2. Methodology

This section provides a synthesis of the methodology used to collect data on the current situation of women within the WillDom network in Latin America [11].

The WillDom network constitutes a group of talent management companies specialized in software development in Paraguay, Argentina, Bolivia, Ecuador and El Salvador through a web platform known as Wave, centralizes collaboration and communications with the talents of these countries.

WAVE by WillDom is a platform that allows the organization to optimize all areas and processes of the company. In essence, it is the mechanism by which any country can share and find opportunities and developers with WillDom.

The recruitment of developers begins with the search for them without distinction of nationality, race, skin color, gender, language, origin, religion, political or other opinion, social or economic level. The search or sourcing sources are various: Linkedin, Github/Gitlab, Meetups, the referral program (developers who recommend other developers), Universities, etc. Wave has talent as its center, therefore, when a software developer enters the talent pool, it implies that the company has collected personal data, academic data, level of English, work history, current seniority, desired compensation, and has labeled the developer with all his technical skills. In addition to all this data, Wave functions as a repository of the facts of the relationship you have with that person and a history of information collected to ensure the candidate is presented with the best possible future projects.

2.1. The Resources and Interviews Platform

The data presented in this research was obtained from the talent recruitment platform called Wave. Talents are evaluated by a team of Talent Specialists who contact people. During the interview process, data is collected on salary expectations, interests, level of English, technological skills and soft skills such as: communication, teamwork, flexibility, initiative, results orientation and leadership.

In addition to the interviews, the talents are introduced to job positions for the USA, where a certain level of experience in their area and an advanced level of English are required. Profiled talents with very little professional experience or difficulty communicating fluently in English are not considered. Once the talent is accepted for a position, the information of the profile with which they were hired, and the salary assigned for that profile are available.

2.2. Pool de Candidatos y Pool de Talentos

The difference between the Candidate Pool and the Talent Pool is that the candidate pool corresponds to all those interviewed by the WillDom talent team without considering those who were rejected after the first interview. The Talent Pool corresponds to candidates who were approved and for whom all the profile data is available.

To approve the interview with Willdom's talent team, the following considerations must be taken:

1. The candidate must be aligned with the work model offered by WillDom.
2. The candidate must speak and write in English. In the case of Paraguay, English is not always a reason for rejection because there are also projects that do not require a language.
3. The candidate has focused his area of expertise with at least 6 months of work in the same technology.
4. The candidate is interested in working for WillDom and has good deals (soft skills).

The data presented in this research corresponds only to candidates who were approved and therefore are part of Willdom's talent pool. There is no data on rejected candidates from the pool of candidates.

From when a person is first interviewed by talent specialists, until he finally gets the job and is assigned to a project, there are several instances:

- Sourcing: it is the stage in which the talent team contacts the candidate to coordinate an interview with the aim of revealing the skills that the professional has and her interests.
- Evaluation (Candidate Pool): it is carried out through a competency-based interview, focused on the person's experience and the technical skills (skills) that they claim to have acquired professionally or academically.
- Approved (Talent Pool or Talent Pool): All interviewed candidates who pass the initial evaluation become part of the Talent Pool and can be contacted by talent specialists when there are vacancies that match their profile.
- Matched: in WillDom, just as there is a database of pre-evaluated candidates, there is also a database of job opportunities or vacancies. The talent team's main objective is to match opportunities and candidates, present these opportunities to candidates, and if there is interest, coordinate the introduction to the client.
- Submitted: At this stage, the talent team introduces the developer to apply for a certain vacancy. The candidate's resume is submitted to an internal peer review to verify the correct match with the vacancy and is subsequently presented to the final client, who decides whether to start the selection process or reject it.
- Assigned: If the candidate is selected by the end client to fill the vacancy, the contracts are signed, and the candidate is assigned to the client's project.
- Taking this process into account, candidates indicate their salary expectations. During the presentation stage, a salary is agreed with the candidate before presenting them to the vacancy. If selected, a project is assigned, and a contract is signed with the agreed salary.

3. Observations in the talent pool of the WillDom network

The database has a total of 5,988 profiles in the technology area that went through interview processes from August 2014 to May 2022 to learn about each of their profiles and job interests. The candidates for the talent pool come from Paraguay (WillDom PY), Argentina - Buenos Aires (WillDom AR-BA), Argentina - Santa Fe (WillDom AR-SF), El Salvador (WillDom SV), Ecuador (Willdom EC) and Bolivia. (WillDom BO) that constitute the network of WillDom companies.

Figure 1. Talent *Pool* candidates by sex.

As can be seen in Figure 1, the low representation of women in all the countries of the network is a constant, where the highest percentage is in Paraguay, with 15.1% of women in the talent pool.

Of the total number of candidates in the network, only 10.3% (558 in total) are women. This group of female candidates constitutes the main focus of this research.

3.1. Level of English and Academic Training

According to [4], 68% of international companies worldwide (including some based in Brazil and Mexico) indicated that English is the language that the company's workforce must know to expand into foreign markets. At the same time, they indicated that it is not easy to find workers with the necessary knowledge of English [12].

WillDom is mainly focused on the North American market, for this reason the evaluation of the English level of the candidates is key. The talent team performs an evaluation of the level of English during the first interview, the result can range from a basic level to native English.

The vast majority of vacancies at WillDom require intermediate to advanced levels of English, with this we want to highlight that if women do not have this ability, they are not suitable to be presented to the vast majority of vacant positions.

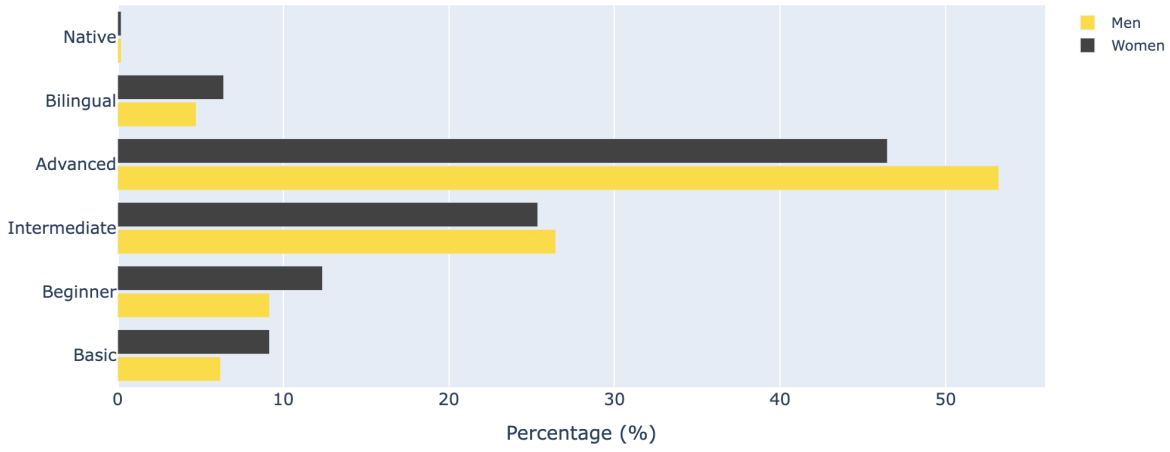

Figure 2: English levels. Proportion of the different levels of English for men and women according to their population in the Talent Pool.

As can be seen in Figure 2, if only the levels of English that qualify a candidate to fill a vacancy at WillDom are taken into account, it is evident that men are generally more prepared with intermediate or advanced levels of English. Based on these data, it is possible to notice that the level of English is also an impediment for women to be competent, since men are more prepared than women in terms of

the required level of English. In addition, it should be noted that the data analyzed for the study does not indicate how many women were excluded from the talent pool due to their level of English.

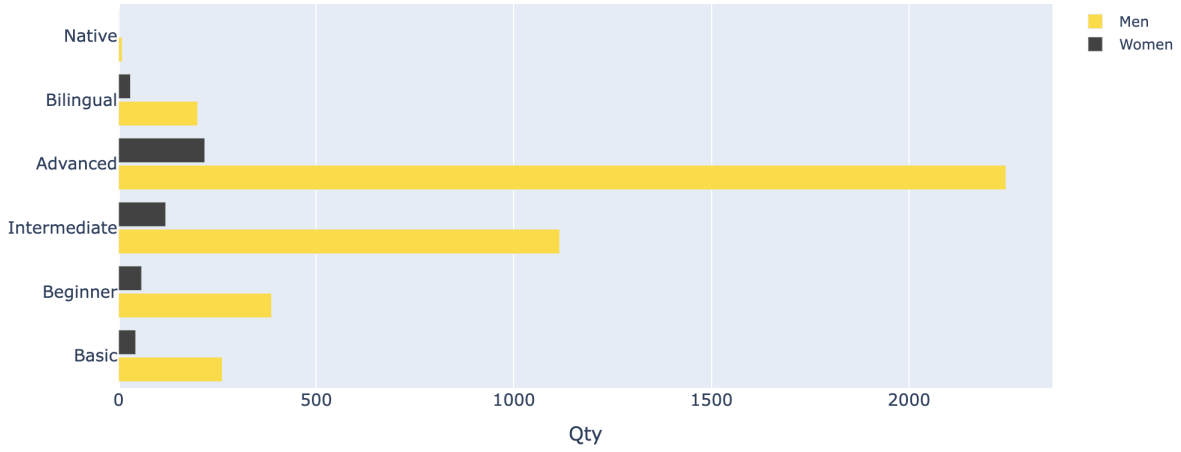

Figure 3: English levels. Number of people in the Talent Pool by level of English for men and women.

However, looking at Figure 3, if we compare the number of men at the intermediate, advanced, and bilingual levels, we can see that it is much higher than for women. Therefore, no matter how competent the few women who reach the talent pool are, the probability that a vacancy will be filled by a woman is very low, due to the small number of women.

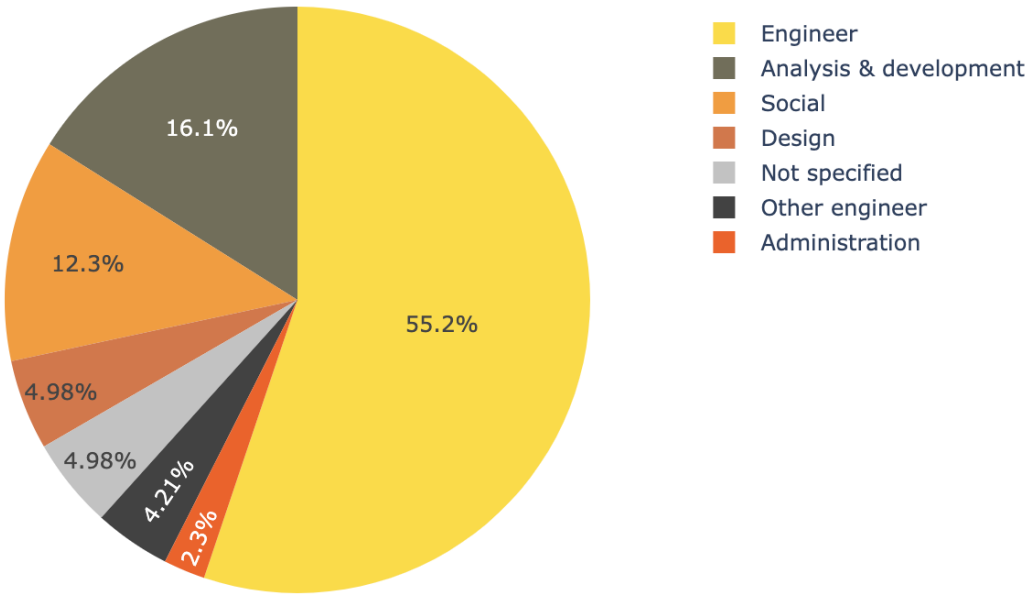

Figure 4: Academic studies of women in the Talent *Pool*.

Regarding the academic training of the women who are in the Willdom talent pool, it is possible to note that more than 55% studied a career in the Computer Science area, and only 20% (social, administration, does not specify) He does not have studies related to ICT careers.

This indicates that Willdom's talent pool is very well oriented towards vacancies in the software industry since the search for these profiles is intentional. However, since only 10.3% of Willdom's talent

pool are women, to know the trends in ICT training for women, more representative samples must be studied, such as those observed by the OEI in its study "The state of science 2020" [9], where they indicate that despite the fact that 55% of university students are women, only 21% are in ICT careers.

3.2. Technologies and Talent

According to a study carried out by HackerRank in 2020, talent search specialists agree that full-stack developers are the most in-demand on the market. Followed by: Back-end developers, Data Scientists, Frontend Devs, DevOps and QA Engineers [5].

Although the qualities that define a "full-stack developer" are up for debate, most agree that they should have an understanding of all layers of technology and should be able to produce a software product with minimal requirements on their own. alone. That is why they are especially important in small organizations or startups. Coincidentally, the tech startup environment is one of the main focuses for WillDom clients. Analyzing the network data, as shown in Figure 5, among the women in the talent pool, only 2.2% correspond to candidates in full-stack positions.

In the sample used for this research, the majority role among women is that of Project Management with 21.3%. According to [6] in the coming years this role will be more in contact with the needs and demands of organizations. 74% of the companies surveyed have answered that, in the future, Project Management skills will be more important than today.

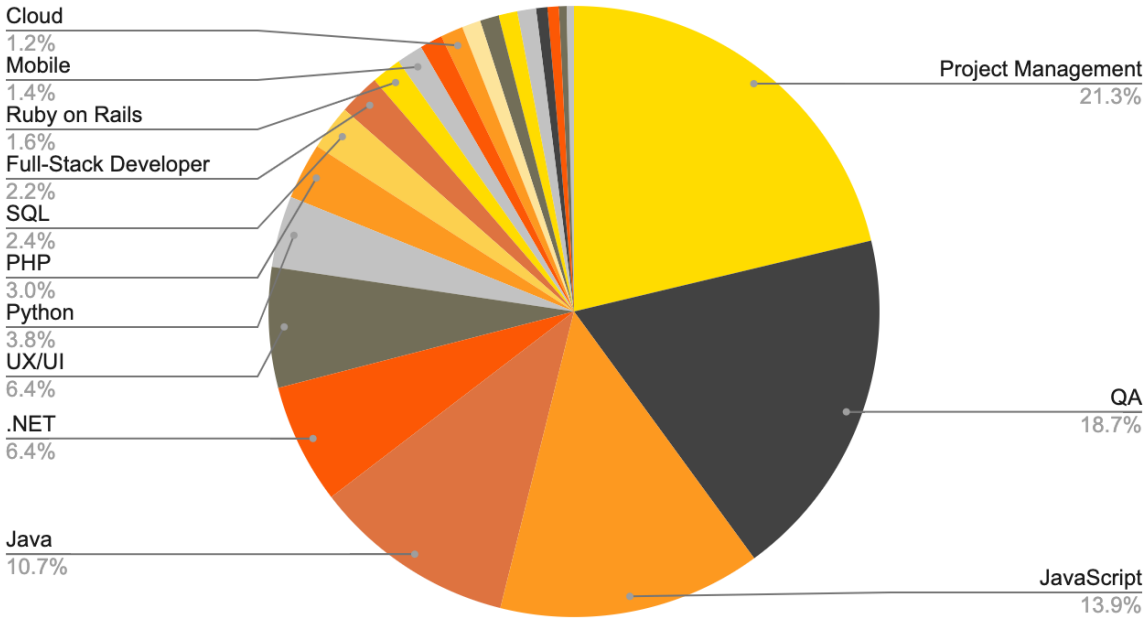

Figure 5. Technologies and positions of women in WillDom.

Analyzing knowledge in the most in-demand programming languages worldwide, JavaScript is the most popular programming language when looking for a candidate. Followed by Python, Java and C# [5]. In the case of the WillDom women's pool, JavaScript (13.9%), Java (10.7%) and .NET (6.4%) are the languages with the most representation.

However, according to [5], not all vacancies establish a specific programming language as the main priority. In the Americas region, 21% of vacancies are independent of any programming language.

Professionals who have programming knowledge but are not tied to any specific language are called “language agnostic” or “language agnostics”.

3.3. Submissions and Rejections

Talent specialists have access to view the list of open vacancies (approximately 70 vacancies are active per week), and through the Wave platform they filter the profiles taking as the main criteria the required technical skills and command of the English language. Subsequently, they contact the candidates shortlisted by Wave to introduce them to job opportunities, and if they are interested, introduce them to the client.

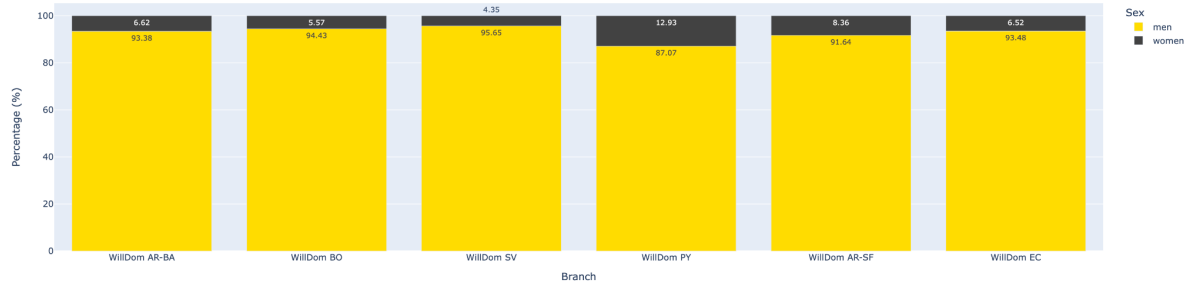

Figure 6. Women and men candidates introduction to clients.

Considering all the presentations made at WillDom (in the last 10 years), we can see that the number of women applying for vacancies responds perfectly to the percentage of women in the talent pool of each branch, as shown in Figure 6. However, if we look at Figure 7, we can see that the rejection rate of women is only 10% to 15% higher than that of men. This implies that female candidates who apply for vacant positions are accepted in a lower proportion than male candidates, but that the difference is not significant, that what is really affecting the number of women assigned to projects in the network is the lack of women in the talent pool.

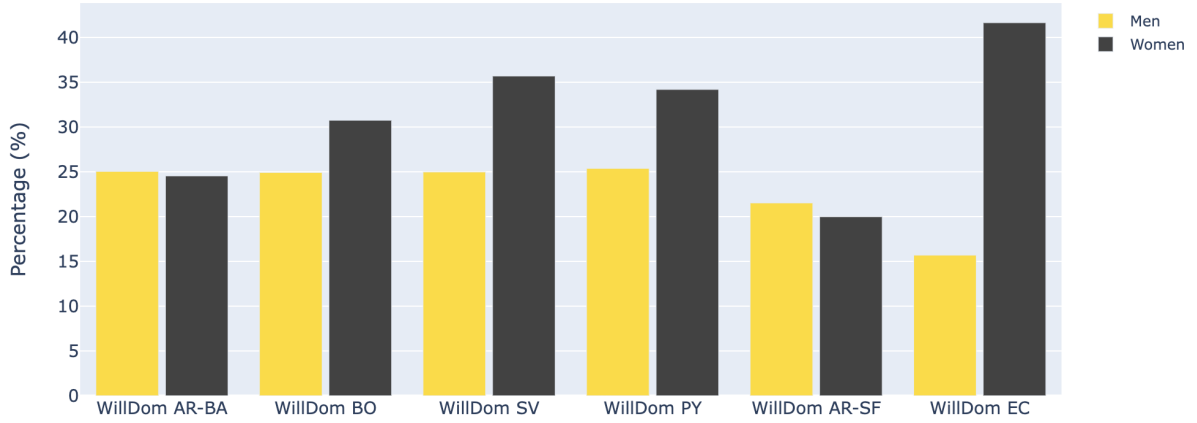

Figure 7. Women and men candidates reject percentage comparison.

3.4. Salary Differences

According to [8], about 78% of large organizations admitted to having a gender pay gap in the technology sector. Globally, it was found that men earn more than women. Only 8% do not have any gender pay gap. Women earn up to 28% less than their male colleagues in the same tech roles.

Furthermore, it has been found that the gender pay gap in technology is found more in small companies, ranging between 19% and 20% [8]. There is an obvious gender disparity in jobs belonging to areas where there are usually higher incomes. For example, in the information and communication technology (ICT) sector, only one in four professionals is a woman and one in five works in technical positions in the world. Likewise, science, technology and computing professionals represent on average less than 30% of the total [7].

The WillDom data also confirms this salary gap, in Figure 8 in most of the countries in the network, men earn more than women. In WillDom Argentina the greatest difference is observed, with men earning an average of USD 32.5 per hour and women USD 19.7. On the contrary, in Paraguay (WillDom PY) and Ecuador (WillDom EC) it can be observed that women earn more on average, but it is also known that these countries have two situations:

There is very little participation of women, and those who are have managerial or "Senior" level positions. There are many "Junior" level male profiles with low salaries that make the average vary considerably.

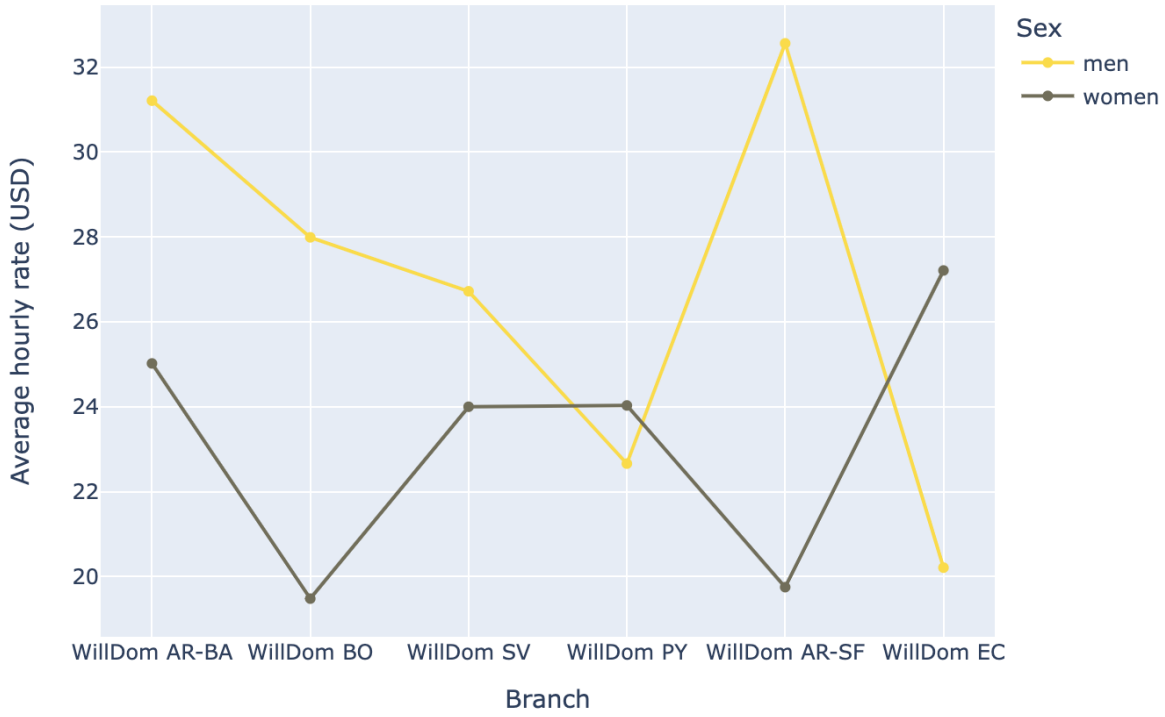

Figure 8. Average hourly rate paid to WillDom contract developers by branch and by gender.

There are several factors that could affect the gender pay gap in technology, such as working in different management positions, skills and previous experience, as well as the level of English of the candidates.

To mitigate the variation by hierarchical positions in Figures 9, 10, 11 and 12, a breakdown of average salaries by profiles was made, where we have:

"Senior" profiles: talent with extensive knowledge of the requirements of the required profile, generally with more than 5 years of experience.

"Semi Senior" profiles: talent with extensive knowledge of the requirements of the required profile, with less than 5 years of experience.

"Mid-Level" profiles: talent with knowledge of some requirements of the required profile, with between 1 and 3 years of experience.

"Junior" profiles: talent with little or no knowledge of the required profile requirements and no experience.

Even with the division by profiles, it can be identified that the trend continues to be that of higher salaries for men.

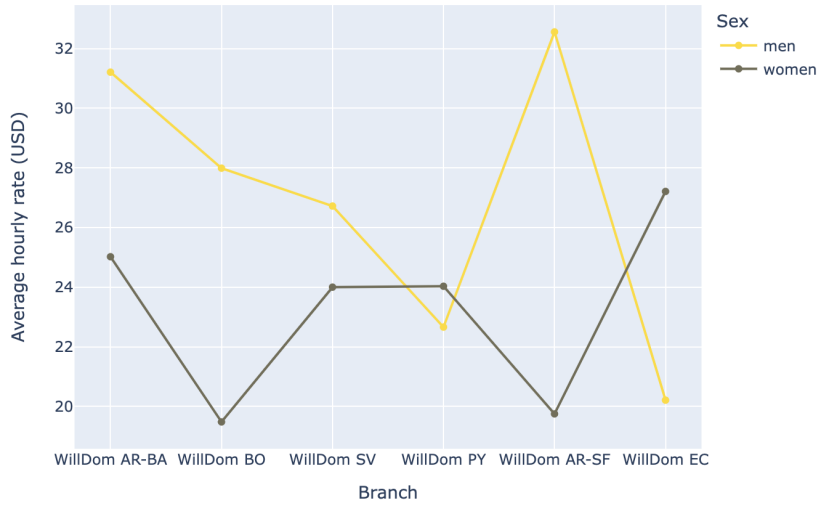

Figure 9. Women and men salary comparison for "Senior" level.

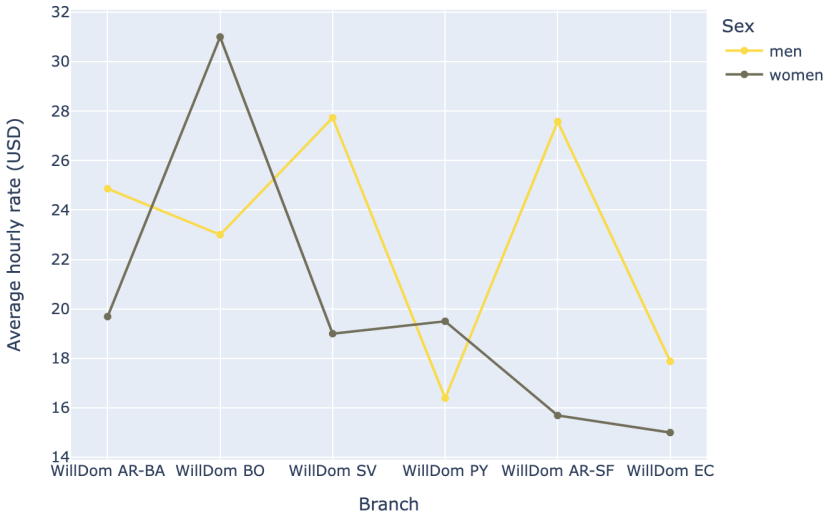

Figure 10. Women and men salary comparison for "Semi Senior" level.

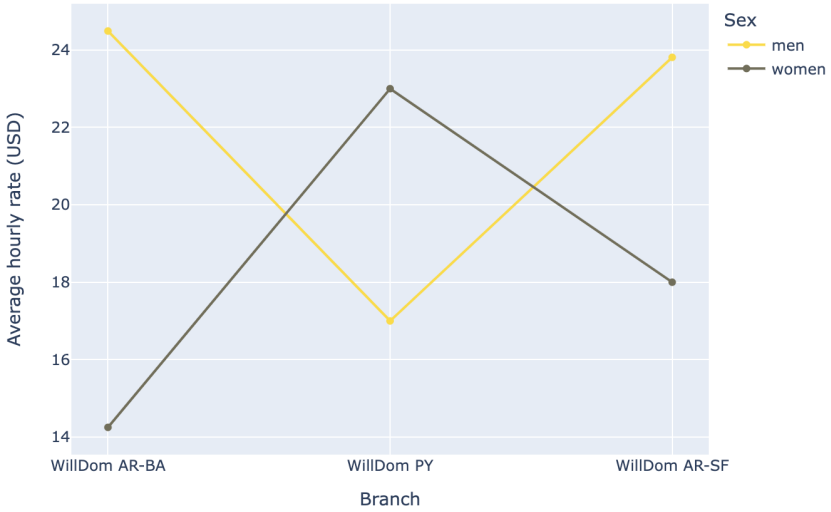

Figure 11. Women and men salary comparison for "*Mid Level*".

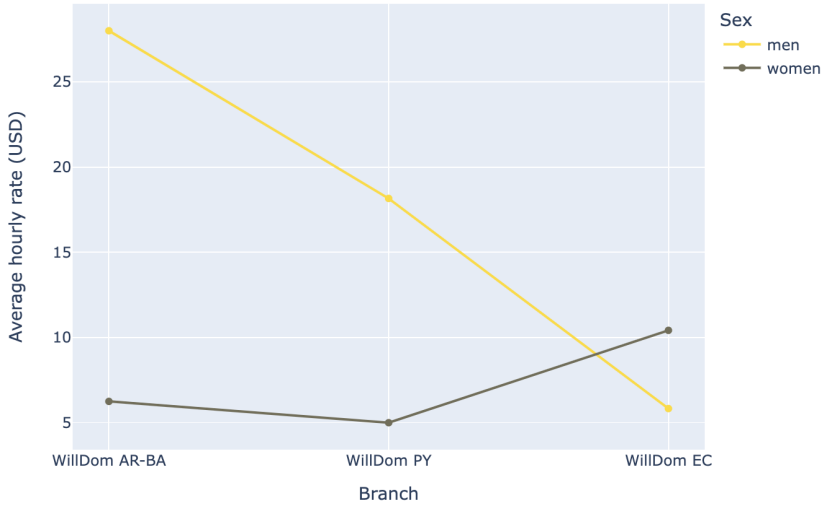

Figure 12. Women and men salary comparison for "*Junior*" level.

4. Recommendations

If the analysis of the data has shown anything, it is that companies are facing difficulties in recruiting women, and that due to the demand, this mission is crucial for the satisfaction of their clients.

Recruitment companies can intensify the following actions:

- Expand the talent pool: Talent specialists should look to broaden the scope and diversity of the IT talent search. In this sense, remote work has already managed to geographically expand diversity, however, it has not improved gender diversity ratios, at least not in a representative way.
- Recruit low-visibility segments of workers: Recruitment companies could begin to investigate how to attract women returning to work or transitioning from other industries, or those women with gaps in their resumes due to child or elder care responsibilities. These women may need an upskilling process or acquisition of new skills. This process is much faster and cheaper than waiting for new college students or recruiting senior talent from the competition.
- Speed up the English language learning process: An alternative may be to incorporate English language learning as part of the in-house job training program; This strategy was implemented by the Paraguay branch, in a permanent training program for all company employees through weekly English classes throughout the year. Cases have been observed in which, in less than

three years, developers went from a basic level to an advanced level, which allows them to compete in vacancies related to the international market.

Some of the success stories in the region that seek to promote the participation of women in STEM include initiatives such as:

- Laboratory in Chile, Peru, Brazil, Ecuador, Colombia, and Mexico that offers full-time bootcamps exclusively for women for a period of 6 months in which students develop technical and soft skills, keys to working as web developers and UX designers. Generating alliances, more than 1,000 Latin American companies have found the talent they needed for their technology teams through this initiative [13].
- Girls in Technology [14] in Argentina that seeks to reduce the gender gap in the technological entrepreneurial environment through research, mentoring, workshops, talks and panels with the participation of more than 11,000 women to date.
- Girls Code [15], in Paraguay, which seeks to provide knowledge, resources and training opportunities to girls and women who seek to develop their skills in the field of science and technology. To date, they have developed more than 75 programming workshops, achieving 85% female participation. In recent years, they have sensitized more than 1,000 people about the problem of the digital gender gap.
- *KuñaTech* [16] also present in Paraguay, is a community of women that seeks to make women in STEM visible in the country and, through role models, encourage other women to do the same.

1. Acknowledgements

Knowing the existing gender gaps in Latin American countries and the barriers that women face to join the technological sectors is a first step to act starting with the private sector. Identifying which of these barriers affect each branch or the entire network is a next step to choose the strategies that will promote the access of more women to local and international vacancies for technological positions.

The study of women's talent in WillDom shows that only 10.3% of the network's talent pool is made up of women, and of these, the vast majority apply for management roles (Project Management). It is known that globally this skill will be widely in demand in the future, so having more women in leadership roles in the software industry can be an important strategy to inspire other women to enter ICT careers. However, it is observed that it is still a challenge to promote the inclusion of women in roles that do not have to do with management areas.

The technology sector is a space for well-paid job opportunities for all people. However, the analysis carried out based on this point on the talent network shows clear salary differences between men and women with similar profiles, in some cases men earning up to 2 or 3 times more than women. The scope of this research does not allow us to understand the reason for these salary gaps between profiles and gives rise to future work in which we can approach the women of the talent pool, and even also men to make comparisons, through surveys and interviews. with the objective of revealing their perception in this regard, identifying and analyzing the obstacles they face when giving a monetary value to their work capacity and, based on these results, suggesting and taking measures from the beginning of the interview process in WillDom.

The trend indicates that more and more companies are removing the use of specific programming languages from their priorities or requirements to access certain positions. Considering that the WillDom data shows that most of the women in the talent pool do not handle the most demanded programming languages in the market, this point is of the utmost importance so that women have the opportunity to learn programming languages and tools. new and more current programming either within their current work environments or in new jobs.

Latin American governments recognize the need for an English proficient workforce to improve national productivity, integration into the world economy, and international competitiveness in general. WillDom's talent analysis shows that knowledge of the English language is not the only constraint that women face when accessing software positions and that this constraint is not directly related to the gender of the candidate but affects both men and women. women almost equally.

However, many of the Latin American governments do not have public policies that promote the teaching of English as a second language in basic school education, or do not have the force of law, or do not have the necessary quality to face the challenges of globalization, according to is highlighted in [10]. In the case of Paraguay and other Latin American countries with indigenous languages, it is inevitable to reach language planning as a state, or English will be installed anyway, but causing serious damage to cultural heritage. Taking the above into account, the shortest path seems to be to encourage universities to establish language policies to promote the learning of the English language in the economically active professional population. Or teaching with short-term courses and specializations on programming, focused on professionals who do not come from technical careers and who have the required level of English. Bet on the development of professionals from other industries that continue with the growth of the knowledge industry, generating a greater contribution for the export of services.

It is expected that in three years more than 1,000,000 developers will be required in the region [2]. For women, these jobs can result in opportunities for professional growth and economic empowerment, if initiatives to eliminate gender barriers around technology begin to be promoted from these spaces.

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