

***Exploring Women's  
Contribution  
to Open Source  
Software in  
Jordan***

***motivations and  
disincentives***

# Abstract

Female programmers' contribution to open-source software has recently become an issue of global concern. A wealth of worldwide research papers have subsequently tried to explore the reasons behind the absence of women in ICT sectors in general and in open source software (OSS) communities particularly. Nonetheless, data and research in Jordan and the Arab countries remain scarce, incipient, and insufficient to form a clear picture of the reasons contributing to the lack of women in this field.

This paper presents results from research that was conducted by the Jordan Open Source Association (JOSA) over a period of three months to explore the experiences of female programmers in Jordan, and the motivations and disincentives for them to contribute to open-source projects. The research also aimed at exploring men's attitudes and perceptions towards women in open

source communities, in addition to the motivations and disincentives for men to contribute to open-source software since this comparison is important for us to pinpoint the problem and consider strategies for dealing with it in the near and distant future.

The results of individual interviews and focus group discussions of 36 technologists), This paper represents the results of the interviews and the focus group discussion with male and female programmers explaining their experiences and perspectives on open source software communities.

# Introduction

The lack of women's participation in Information and Communications Technology (ICT) sectors is nowadays a global area of concern and has been so over the past decade. Worldwide figures tell us that women make up at best 29 - 25 percent of all persons working in the tech industry<sup>1</sup> in comparison with 38.8 percent across other industries<sup>2</sup>. For instance, a 2017 report by PricewaterhouseCoopers (PwC) indicates that only one-fourth of the tech workforce worldwide are women<sup>3</sup>, and according to a 2021 research that was conducted by AnitaB.org, women make up only 26.7 percent of the ICT positions<sup>4</sup>. It is also worth mentioning that some researchers and academics worldwide have pointed out that the number of women in the ICT workforce in the 1980s was much higher than the number of women in the ICT workforce

nowadays<sup>5</sup>.

The situation is far worse in open source communities where women account for less than 10 percent of OSS contributors and participants<sup>6</sup>. In a 2021 survey by the Linux Foundation, only 7 percent of the respondents were women<sup>7</sup>, and according to a 2017 survey by GitHub, women made up no more than 5 percent of the respondents<sup>8</sup>. These figures are considered to be terrible and tragic given the fact that open-source software is viewed at the global level as an important tool and an efficient enabler for the growth of technology<sup>9</sup>.

It is also noteworthy that OSS communities over the past decade have shown no growth in the percentages of women participating in it. Consequently, The fact that women

<sup>1</sup> [TechTarget, Women in tech statistics: The latest research and trends.](#)

<sup>2</sup> [Catalyst, Women in the Workforce.](#)

<sup>3</sup> [PwC, Women in Tech: Time to Close the Gender Gap.](#)

<sup>4</sup> [AniTab, Top Companies for Women Technologists.](#)

<sup>5</sup> [ISEMAG, The Latest Stats on Women in Tech.](#)

<sup>6</sup> [Increasing Women's Participation in Open Source Software.](#)

<sup>7</sup> [Where are the Women in Open Source?](#)

<sup>8</sup> [Is Open Source Open to Women?](#)

<sup>9</sup> [Tozzi, Christopher, A History of the Free and Open Source Revolution.](#)

have ‘no voice’ in the development of the technologies that affect our present and our future has enormous consequences for our tech industry and our societies as a whole. This has given rise to a keen scientific and social interest in the status of women in OSS communities as worldwide interest in this issue has grown.

With regard to Jordan, the number of female graduates in ICT and related sectors is roughly equal to the number of male graduates, yet the ICT sector in Jordan is still to this day overwhelmingly male-dominated<sup>10</sup>, and according to the Information and Technology Association of Jordan ‘int@j’, women make up about 30 percent of the ICT jobs in Jordan<sup>11</sup>.

As for Jordanian women’s participation in OSS communities, no data is available to date, and although there is a growing body of global research on women participation in OSS communities, the issue at hand has never been studied by any academic and other research at national level in Jordan, and no serious investigations have been made to understand the issue from different socio-cultural

backgrounds.

If we are to improve Jordanian women’s participation in OSS communities, there needs to be a clearer conception and a better understanding of the context of Jordanian OSS communities and their contributors (both men and women) since participating in open source communities is the cornerstone of tech industries. So, we firmly believe that if OSS communities in Jordan were developed to encourage female contributors, it could have a very significant impact on the gender gap in the Jordanian ICT sector as a whole. Considering all these factors as well as the lack of research and data regarding the experiences of Jordanian women in OSS communities, our research investigated the experiences of women in OSS communities through focus group discussions, and individual interviews.

This research by Jordan Open Source Association (JOSA) is the culmination of tens of hours of dialogue with male and female technologists in Jordan. It is a preliminary step that aims to

<sup>10</sup> [UN Women. Jordanian Women in the ICT Space.](#)

<sup>11</sup> [The Jordan Times. Women occupy around %50 of ICT jobs in Jordan.](#)

determine the level of gender diversity amongst Jordanian OSS contributors and identify the reasons that may discourage women's participation in OSS communities.

# Research Questions

In this paper, we set out to answer the following research questions:

- What are the reasons preventing Jordanian women from participating in OSS communities? What are the barriers faced by them? What are the barriers faced by Jordanian men? Are there gender-based differences?
- What are the motivations for Jordanian women who contribute to OSS communities? And what are the motivations for Jordanian men? Do Jordanian men and women differ in their perceptions of what is motivating?
- What are Jordanian men's attitudes and perceptions towards Jordanian women in OSS communities? What are the major themes related to their opinions?
- What are the possible implications of the absence of women in Jordanian open source communities?

# Research Methods

Data was collected through interviews and focus group discussion of male and female technologists in Jordan, the sample was distributed in a manner that equitably covered different Jordanian cities/governorates.

Recruitment of interviewees and participants in the focus group discussion were selected through an online survey that was posted to male and female technologists across Jordan,

We have also asked the survey respondents for voluntary participation in focus group discussions and interviews by inserting an optional question at the end of the survey to collect the contact information of respondents who would like to participate in interviews (i.e. email

address, phone number, etc.).

Thirty-six respondents (out of 204) have indicated their willingness to participate in individual interviews and focus group discussions that were conducted in September and October 2021.

Focus group discussions, individual interviews, as well as open-ended questions from the survey were analysed using the qualitative analysis software “Taguette”. The qualitative analysis results are presented in the results section.

# Results

## Barriers faced by OSS contributors in Jordan

Across all the focus group discussions, individual interviews, there were a lot of comments that highlighted the barriers Jordanian women face in accessing OSS communities in particular and public spheres generally due to the cultural and social customs as well as traditional gender role beliefs in Jordan and the region. For instance, many comments implied that the burden of caring for children and for doing housework falls disproportionately to women.

Furthermore, a lot of female research participants echoed that since female ICT graduates in Jordan are generally

engaged more in the education sector than ICT companies, they are less likely to contribute to OSS communities.

On another level, many female research participants have pointed out that there are a lot of gender biases in IT companies in Jordan, including but are not limited to discrimination in

***“If you don’t feel comfortable working with technologists in your company, are you going to be comfortable working with strangers on the internet? I don’t think so.”***

*- 23 year old female, intern*

hiring as well as stereotyping men as better coders. These biases, in their opinion, lead to Jordanian women technologists experiencing sexism and feeling like they do not belong

and thereby being channelled toward withdrawal rather than being active contributors to OSS communities and the tech industry as a whole.

In stark contrast to the reasons behind female respondents not contributing



to OSS, we have noticed that male research participants have not mentioned anything about them facing barriers when it comes to participation in OSS communities. Rather, men's reasons for not contributing to OSS were almost purely personal and technical views.

***“The computer-related experience and knowledge that you obtain from teaching are scarce compared to that of a company. You might say being a computer science teacher here does not require me to bring large skill-sets to the job.”***

*- 29 year old female, public-school teacher*

***“If you don't feel comfortable working with technologists in your company, are you going to be comfortable working with strangers on the internet? I don't think so.”***

*- 23 year old female, intern*

***“Recruiters can read your resume, but I don't think they have enough technical knowledge to judge the quality of your work on an open-source project. I think that's why not every programmer in Jordan is interested in contributing to OSS.”***

*- 30 year old male, technologist*

***“I think that in order for you to contribute to a software, you have to understand the whole software and how it was built. Which, in my opinion, is time-consuming.”***

*- 21 year old male, student*

***“It's usually built using technologies and languages some of which I don't know well, and if you try to solve issues without knowing the logic behind them then you'll end up doing more harm than good.”***

*- 28 year old male, technologist*

## **Motivations for Jordanian OSS contributors**

We have noticed that male and female technologists in Jordan differ in their perceptions of what is motivating. Women who contribute to OSS have echoed repeatedly that building a good resume was the main motivation for them in contributing to open source repositories, followed by the desire to learn and the desire to build reputation respectively.

***“As a web developer, I believe***

***that having an active profile on platforms like GitHub or BitBucket is crucial if you want to have a strong resume. It could be an indicator of how passionate you are about your job.***

- 28 year old female, technologist

***"I don't contribute regularly, but I do think that it's a great way to learn the best programming practices from others."***

- 27 year old female, technologist

***"I'm still a learner and currently working on some projects that I have uploaded recently on GitHub. It's important for me to find a job in the upcoming months. Furthermore, I can learn a lot from my trainers and my peers in this Bootcamp."***

- 22 year old female, coding bootcamp student

However, we discovered that the majority of the males who participated in the study stated that their primary motivation for

becoming OSS contributors was for pleasure.

Moreover, a lot of male participants stated that they enjoy being around other

programmers, which, in their opinion, makes OSS communities a destination for them. Several male participants have also echoed that their desire to learn was one of the key drives for them to be open source contributors.

***"I'm not sure; I just enjoy contributing. I publish all of my work to GitHub and occasionally make contributions to other repositories. It's fun for me."***

- 26 year old male, technologist

***"You get the opportunity to receive immediate feedback on your code as well as your programming skills in general, the sort of feedback that you don't even receive from your professors at the university."***

- 20 year old male, student

***"I have been contributing to around two repositories for 5 months. The thing about it is that you can learn a lot from the experience of tech folks and, most importantly, you earn everyone's respect."***

- 24 year old male, intern

***"Open source communities are the best place where you can work with like-minded programmers with whom you share your interests."***

*- 31 year old male, technologist*

## **Jordanian men's attitudes and perceptions towards Jordanian women in OSS**

When asked about their opinion, male participants have pointed out that there are some reasons that they think channel women towards withdrawal from OSS communities. Across the focus group discussions, individual interviews, and responses to the open-ended questions in the survey, male participants highlighted some cultural and social barriers that face female programmers and prevent them from becoming active members in open source communities.

***“From a very young age, girls in Jordan are obliged to go home early after school, unlike boys. Boys can hangout with peers, for instance, to play video games after school. I think male programmers were prepared from an early age to engage more in communities than female programmers.”***

*- 25 year old male, technologist-*

***“Women are brilliant coders. But I think that since the whole field is male-dominated, women***

***usually feel that they are less than everybody else. Women won't apply for a tech position if they don't feel a hundred percent qualified, they won't share their thoughts unless they are pretty much sure about them, and similarly, they won't create a commit in repositories unless they think it is perfect.”***

*- 34 year old male, technologist*

***“I think that the whole tech industry in Jordan makes it nearly impossible to be a mother and a programmer at the same time, let alone being an active member of the open source community.”***

*- 29 year old male, technologist*

## **Implications of women's absence**

Through our work on this study, we have seen that it is very important at this stage to learn more about the problem at hand from experts in computer sciences as well as social sciences. We have asked them about the implications of women's absence in OSS communities. All the feedback we received boils down to the idea that the absence of women from the tech industry in general and the open

source communities particularly can impede not only the development of technology but also the development of the country. All the experts we interviewed have stressed the need to adopt strategies on a national level for greater involvement of women in the tech industry as well as open source communities.

***“The issue of Jordanian women in OSS could not be more important. Greater national endeavours are now necessary if we are to confront these challenges and ensure the empowerment of our women in the tech industry. Otherwise, we may lose the opportunity to resolve this problem at an early stage.”***

*- Professor of Computer Science*

***“There are different sociological factors behind the lack of women in the tech field despite the fact that female undergraduate students mostly outnumber male students. There is an urgent need to conduct more research at the national level in order to unravel the sociological and anthropological reasons behind this paradox.”***

*- Professor of Sociology*

# Limitations and future directions

Many limitations existed in our study beginning with the scarcity of ‘women in tech’ data at the national level. Moreover, there is a small number of female workers in the tech industry in Jordan, not to mention the unavailability of data on female open source contributors. We, therefore, needed to start with collecting preliminary qualitative inputs as a means to form a broad initial picture of the reasons impeding Jordanian women’s effective participation in open source communities. Thus, future work and research should actually focus more on conducting more quantitative research on the issue at hand with a focus on creating generalisable

statistical analysis that might be used at the national level to encourage the involvement of women in the ICT sectors generally and in open source communities in particular.