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## Automation and Gender

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### Abstract

Automation and artificial intelligence (AI) are taking over various aspects of human life.

Automation is making systems operate automatically without human intervention and artificial intelligence is designing systems able to do tasks requiring human intelligence. Automation and AI have produced important changes in different sectors including industry, military, marketing, agriculture, and even transportation. These changes are expected to lead to a redistribution of labor roles that might widen the gender gap, increase unemployment, lead to instability, and contribute to a lack of security. Therefore, a question arises: How will automation and AI affect gender equality in general and specifically in the Arab region, a region known for high levels of inequality? The main goal of this paper is to examine whether automation could create new forms and kinds of careers that are equally available for all.

**Keywords:** automation, artificial intelligence, gender, gender equality, peace, security

### Introduction

Over the last several years, we have been hearing the words artificial intelligence (AI) more and more frequently, as discussions focus on robotics and automation as well as the utopic future they will bring. Automation and the use of AI have been linked to job creation, increased job efficacy, and various other important benefits. However, an important question emerges:

Are such advances really without risk? Given the hierarchical organization of society around gender and sexuality, race, migration status, and disability, among others, it is important to examine how automation and the increasing prevalence of AI will affect marginalized populations. Toward that end, this paper focuses on the following question: How will automation and AI affect gender equality in general, and specifically in the Arab region, a region known for high levels of inequality and consequently, war and violence? To answer these questions, this paper will draw from a rigorous literature review as well as the results of a survey distributed to Lebanese university students.

The issue of gender equality within automation and the emergence of AI is critical. If we transition into an automated future with gender equality in mind, we would be making major social and political progress. Addressing the topic of gender equality and automation allows us to assess and acknowledge the many benefits of automation and AI without compromising the well-being of marginalized groups, including women and the LGBTQ+ population. Studying this relationship between gender and automation and AI will help us to ensure that automation and AI would create balance and equality for all people by increasing their quality of life, improving their skill sets, and ensuring security for them and their communities in the future.

### **What is Automation, and Why is it Important?**

Automation is the process through which a system becomes able to operate automatically with minimum human intervention; robotics falls under this category. Relatedly, AI is the ability of a computer, or a robot controlled by a computer, to do the tasks that are usually done by humans, either because they are complex or because they require the real-time decision-making capabilities of a human. Both automation and AI are already integrated in

various aspects of human life. For example, in the military field, automation and AI are being used in processes related to transportation, maintenance, rescue, communication, data and information mining such as target acquisition, damage assessment, surveillance, and defensive or offensive strategizing. In agriculture, AI has improved the quality of crop yields through soil monitoring, insect and plant disease detection, intelligent spraying, which is a technique used to distribute pesticides in a measured and intentional way, and automatic weeding. Moreover, robots have started to replace farmhands because they can ensure more accuracy and a faster workflow. In the transportation sector, AI can replace human travel agents and automated systems can take the place of workers in ports, airports, and distribution centers. Most recently, self-driving cars have emerged on roads and highways across the world. Furthermore, marketing can rely on AI to make automated decisions on the distribution of campaigns to certain customers depending on their personalized likes and dislikes. Finally, robotics has come to dominate the medical field, where doctors are relying on them for precise and accurate surgeries and to perform redundant tasks, all with a much lower risk of human error occurring. These are only some of the many scientific and technological advancements we have made because of automation and AI.

From an outsider's perspective, these drastic changes seem to improve our quality of life and our efficiency across various sectors. However, switching between two completely different ways of doing things, in other words, between human manual labor and complete automation, is not risk-free. In fact, the changes automation will bring, and those that it has already brought to many industries currently using AI or other automated processes, are expected to lead to a redistribution of roles in the labor force that will affect employment. Despite automation having

the ability to create as many jobs as it destroys over time, and despite the fact that increased production due to automation has been shown to create more job growth in some instances, research shows that adding one robot to a geographic area reduces employment in that area by six workers (Brown, 2020). This is a big deal, as recent research predicts that 47% of jobs in the United States, 85% of jobs in Ethiopia, and 77% of jobs in China are at risk of automation in the coming years (Faith, 2017). However, unemployment is not the only negative outcome of increasing automation. It is important to note that jobs are already disproportionately distributed between men, women, and LGBTQ+ identified people. Work is also distributed along race and ethnic lines, class lines, and disability. Therefore, the impact of automation on jobs cannot be properly assessed without analyzing the very different ways that people of different genders will be affected by increasing usage of AI across different economic sectors. For example, increasing automation might actually worsen the gender gap rather than ameliorating it. These are the issues that are at stake as we continue to turn toward automation and AI.

### **Methodology**

This paper is based on a literature review, which is coupled with an analysis of the results from a survey distributed to university students concerning the effects of automation and AI on the gender gap. The survey was administered using Google Forms and was distributed electronically using WhatsApp and Instagram. Fifty-six students from various Lebanese universities participated in the study, including the Lebanese American University (LAU), the American University of Beirut (AUB), Université Saint-Joseph de Beyrouth (USJ), Lebanese University (LU,) Beirut Arab University (BAU), Al Maaref University (MU), Lebanese International University (LIU), the Islamic University of Lebanon (IUL), and the American University of Culture

and Education (AUCE). Both graduates and undergraduates participated in the study. Of these participants, 44.6% were men, 53.6% were women, and one identified as non-binary. The ages of survey respondents ranged from 18 to 23 years old. The questionnaire started by studying the impact of automation on different groups. Then, it investigated its possible changes in the society. Finally, the questionnaire looked at the participants' suggested solutions for minimizing any possible negative consequences of automation.

### **Women and Automation: Good or Bad for Gender Equality?**

First, Jurgen (2019) touched on the nature of women's jobs and how they correlate to automation. He indicated that since women are more likely to occupy jobs that require social skills, such as jobs in the health and education sectors, they would not be greatly affected by automation, perhaps even not at all, because those kinds of jobs are not easily automated. Moreover, the author cited findings to support his claim: Men under the age of 25 have a 46% rate of potential automation of their jobs compared to 26% for women. Similarly, Carmignani (2022) notes that women can better resist the automation of work compared to men due to their overrepresentation in industries such as education, care work, and nursing, where automation cannot fully replace a human being. Carmignani also emphasized how automation might positively benefit women's employment rates. He points out how professions that historically had more women have grown because of newer technologies that paved the way for distance learning and training, networking, and more flexible work arrangements, all of which have been shown to support women in the workforce. He also added that even though automation will not completely put an end to the gender gap in the labor market, women will benefit from the automation of the labor market, potentially even more than men. According to

Lara (2019), the expected loss in skilled workers due to automation in the manufacturing and technology sectors can serve as an opportunity for women to infiltrate these historically male-dominated sectors. However, Lara also emphasizes that we need to focus on increasing the number of women in AI development for fear that the automated world will be infused by gender biases because of its creation by sectors and organizations dominated by men. Badran (2019) similarly claims that technological change will create new types of jobs, which is an opportunity for both women and men to access more equitable jobs. As Faith (2017) argues, automation in fields historically dominated by poor working conditions, such as agriculture, can relieve women from some of the most exploitative work around the world.

### **Job Loss: The High Stakes for Women**

Concerning job loss, both Faith (2017) and Gilmore (2016) presented data that states that men will gain one job for every three job losses, while women have a lower rate of one job gain for every five job losses. In fact, according to Gilmore (2016), since automation will greatly affect office and administration spaces, online shopping, checkouts, and bookkeeping, women—who historically dominate these types of jobs due to gender stereotypes that dictate the types of job women are “best suited for,” among other reasons—risk facing higher unemployment rates. Faith (2017) gives a specific example, highlighting how 89% of salaried call center staff in the Philippines are at risk of losing their jobs. In the Arab region, Badran (2019) pointed out how the gender imbalance in the Arab labor market might be exacerbated in an automated world due to the types of jobs women historically occupy. Meaning, because women are pushed into care sectors, for example, where automation cannot replace human labor, they might become further entrenched in these gender stereotyped roles. According to a recent 2018 study by the

International Monetary Fund, 9% of employed men were at risk of unemployment compared to 11% of women (EIGE, 2020). Furthermore, Madgavkar et al. (2019) emphasized that due to the displacement of jobs caused by automation, women will find it harder to transition than men and may not find new opportunities due to the barriers they face. Likewise, Lara (2019) also discussed the transition required by women after automation. She goes on to argue that while this may shield women from the impact of automation, preexisting gender inequalities will make it more difficult for women to reskill and adapt to these shifts in the labor market.

To conclude, because automation and AI build on preexisting inequalities without actually addressing them, it seems unlikely that they will be able to overcome gender inequality. As Roberts et al. (2019) point out, this is already happening given the very limited number of women working in automation and AI. In their study of LinkedIn profiles, they were able to identify that of those profiles where the person worked in AI, only 22% identified as women. However, if gender equality is taken into consideration when AI is being developed, and if gender is centered in automation processes, it might lead to better outcomes.

### **Analysis and Discussion**

This section analyzes the results of the survey conducted and discusses the case of the Arab region. First, it was found that the four sectors most affected by automation and AI according to respondents are industry (73.2%), agriculture (55.4%), transportation (53.6%), and healthcare (46.4%). According to respondents, the least impacted fields are retail (12.5%) and academia (32.1%). These results are similar to the claims advanced by Jurgen (2019) and Carmignani (2022) regarding the nature of the jobs that will be the least impacted by



automation. 28.5% and 25% of respondents disagreed and strongly disagreed, respectively, that women and LGBTQ+ folks would experience negative consequences due to automation. In contrast, 23.2% identified men, 30.5% identified women, and 26.7% identified that LGBTQ+ people would specifically experience negative consequences because of automation. 46.4% of respondents agreed or strongly agreed that men would primarily benefit from automation. Meanwhile, 44.6% of respondents noted that women would benefit specific from automation and increasing AI, while only 28.5% thought that LGBTQ+ persons would benefit from automation and increasing AI.

The next section of the survey focused on unemployment. Based on respondents' choices using a numerical scale from 1 to 5, with 5 representing a strong agreement with the statement, 57.1% of respondents chose 4 or 5, or were strongly in agreement with the statement that men's unemployment would increase with automation. Meanwhile, 51.8% of respondents agreed or strongly agreed (selecting numbers 4 or 5 on the scale) that women's unemployment would increase due to automation. These varied responses reflect the findings of the literature, which has not produced a definitive consensus on whether one gender is more affected than the other in relation to increasing automation.

Lastly, the survey assessed participants' opinions about the gender gap, gender inequality, and stereotypes. First, respondents largely disagreed or strongly disagreed with the statements that "automation widens the gender gap" and that "automation contributes to gender inequality" using the 1-5 scale. 82.1% chose 1, 2 (strongly disagree) and 3 (disagree) in response to the statement that automation widens the gender gap. 78.6% chose 1, 2 and 3 in response to the statement that automation contributes to gender equality. In response to the

statement about whether artificial intelligence reproduces gender stereotypes, responses varied. 32.2% chose 1 and 2 (strongly disagree); 32.4% voted 4 and 5 (strongly agree/agree); and 35.7% picked 3 (disagree). These results showcase that the participants may not be fully aware of extant gender inequalities, and the ways that automation might exacerbate these inequalities, as Lara (2019) noted. Similarly, respondents did not seem to acknowledge the ways that sexism is already encoded into current AI programming, such as the sexualization of the female virtual artificial intelligence assistant Alexa (Faith, 2017). These findings explain why 58.9% of respondents largely agreed with the statement that automation and AI will move us closer to achieving gender equality in society.

To conclude the survey, respondents were asked to select one option from a provided list as a possible solution for addressing any current or future gender inequality within the field of AI and automation. Most students picked education (67.9%), while 48.2% chose reskilling to combat uneven gender outcomes from automation. 35.7% were in favor of encouraging workers to shift to careers that cannot be automated, and 1.8% picked reskilling after changing the system to one that firmly supports gender equality and equity.

While these survey findings are interesting and provide us with various avenues for exploring this topic more in-depth in the future, it is important to note that the results of this survey do not represent the views of all Lebanese students, nor do they necessarily represent the general opinion of Arab students on automation and gender equality. Further, the small sample size prevents us from claiming that the findings of this survey are reflective of a broader societal consensus.

As previously mentioned, the responses of this survey regarding gender stereotypes and inequality show that the Arab region has not adequately addressed gender inequality. In fact, as indicated by Badran (2019), the gender gap in science, technology, engineering, and math (STEM) careers in the Arab region is continuously widening, putting the region at a severe disadvantage when it comes to advancements in AI and automation that can support and promote gender equality, most importantly because of the low numbers of women and girls in STEM. Therefore, there is a need for reskilling and upskilling the Arab labor force and increasing education about gender equality. These issues must be addressed to develop automation processes that are gender inclusive.

### **Recommendations**

To avoid exacerbating gender equality in automation processes, several recommendations have been made across the existing literature. First, Faith (2017) argues that the impact of automation on different and diverse groups in developing countries must be evaluated by nongovernmental organizations (NGOs) and other independent parties. Further, Faith advocates for an “early warning” function to help organizations and companies identify gender inequalities related to the use of AI and increasing automation. Lastly, the experiences of women and other marginalized groups must be considered as more AI is developed and as automation expands into different sectors. Finally, according to Madgavkar et al. (2019), the private sector, schools, colleges, and governments should encourage young girls to pursue careers in STEM so that they can participate directly in the work of developing AI and automating the labor force and other parts of human life.

Similar recommendations can be made based on this research and the survey results discussed above. Governments should institute programming that supports gender equality. For example, digital education opportunities as well as lifelong learning should be made available to everyone, especially girls and women, to make them more knowledgeable about automation. Furthermore, increasing women's political participation and putting them in positions with decision-making power can help to promote legislation that guarantees gender equality. Donors and policymakers should also further women's economic status. They can also work to lower digital inequalities that exist. In terms of the labor force, it is important to provide support and courses that can help workers with reskilling, career shifts, and the redesign of job roles as automation increases. Finally, robots and AI can be developed with respect to LGBTQ+ communities, including correct pronoun use and other activities to encourage inclusivity. Policymakers will also have to play an important role in monitoring wealth inequality as automation processes and the use of AI grows, especially since the owners of automated technologies are continuing to get richer at the expense of those whose jobs are replaced by these technologies. For example, an initiative like Universal Basic Income will ensure that those who lose their jobs due to automation are adequately protected until they are able to find another job.

## **Conclusion**

Industrial automation is an inevitable outcome of decades of technological advances. Just as previous breakthroughs completely altered the way human beings live, automation is certainly going to produce groundbreaking consequences. Therefore, it is important to carefully transition into this new automated world instead of avoiding it or worse, approaching it blindly. On the one

hand, automation presents some bleak possibilities: Jobs will be lost faster than employees can adapt and reskill, unemployment will peak, women will be thrown to the sidelines, and the rich tech giants will only get richer. On the other hand, there are more positive scenarios: More jobs will be created, the low-skilled workforce will reskill and cohabit with the new technology, and women will thrive as automation expands. Automation might also provide another avenue for combatting gender inequality. The results of this survey, as well as the existing literature, examine these potential outcomes. In fact, it is apparent that there is no definitive consensus on how automation will impact our lives and more specifically, how it will impact gender equality. We should also note that the study has shown that the Arab region may not be completely ready to tackle this issue as people are still not fully aware of the correlation between gender and automation. However, if appropriate policies are implemented, we could launch ourselves on a journey toward a positive automated future that ensures equality for all genders.

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