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Empowering Women through Artificial Intelligence: Opportunities and Challenges

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Abstract

This study investigates the impact of artificial intelligence (AI) on women's empowerment, addressing the pressing problem of gender inequality in various sectors. With the rapid advancement of AI technologies, understanding their role in enhancing women's access to education, safety, and leadership opportunities has become essential. The primary purpose of this research is to explore the perceptions of female students at an online women's university regarding AI's potential benefits and challenges in promoting empowerment. Employing a quantitative research methodology, a structured questionnaire was distributed to 160 female participants across various faculties. The data collected were analyzed using descriptive and inferential statistical techniques, revealing significant insights into the participants' attitudes towards AI. The results indicate a generally positive perception of AI, with many participants recognizing its potential to improve educational opportunities, enhance online safety, and support women's leadership in technology. However, there are notable concerns regarding the accessibility and implementation of AI, suggesting the existence of barriers that may hinder its effectiveness. In conclusion, this study underscores the importance of addressing these barriers to maximize AI's benefits for women. By fostering an inclusive approach to AI development and deployment, stakeholders can create an environment that empowers women, thereby contributing to the overall goal of gender equality in the digital age.

Keywords: Artificial intelligence, Women Empowerment, Gender Inequality, Quantitative Research, Educational Opportunities.

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INTRODUCTION

Artificial intelligence (AI) has been rapidly advancing and impacting various sectors worldwide, reshaping industries, and influencing key societal domains. One such area of impact is education, where AI technologies have been integrated to enhance student engagement and academic performance in universities, particularly in Afghanistan [1]. Similarly, the intersection of AI with the Internet of Things (IoT) has contributed to advancing women's empowerment in the technology sector [2]. These innovations present both challenges and opportunities, especially in regions like Africa, where AI implementation is pivotal in overcoming infrastructural barriers [3]. Moreover, AI's evolution offers a broad spectrum of challenges and opportunities, influencing technological advancements in developing countries [4].

The rise of AI technologies in various sectors, including social media, has also sparked discussions on safety and security concerns [5]. Additionally, managerial barriers and strategic opportunities for e-learning deployment in regions such as Afghanistan highlight the significant role AI can play in overcoming educational challenges [6]. The integration of AI in these areas, while opening doors for improvement, also brings to the forefront critical issues of inequality and access [7]. Empowering women through AI, particularly in regions like Bahrain, has shown significant progress, reflecting the

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potential of AI to create positive social change [8]. This narrative aligns with emerging research on e-learning platforms designed specifically for women, which aim to enhance educational access in developing countries [9].

The growing impact of artificial intelligence (AI) on women's empowerment has attracted significant scholarly attention, with research exploring both the opportunities and challenges posed by these technologies. AI has been increasingly recognized as a transformative tool for enhancing women's participation in various sectors, including education, technology, and business. For instance, [1] highlight how AI technologies have improved student engagement and academic performance in university settings in Afghanistan, emphasizing the potential for AI to bridge educational gaps. Similarly, [2] discuss the role of AI and the Internet of Things (IoT) in advancing women's empowerment in the technology sector, showing how these innovations can help women thrive in traditionally male-dominated fields.

Despite these opportunities, significant challenges remain, particularly in regions with limited infrastructure and access to technology. [3] examine the challenges of implementing AI in Africa, focusing on the technological and socio-economic barriers that hinder women's full participation. [4] extend this discussion by analyzing the technological evolution of AI and its implications for gender equality, noting that the digital divide continues to exacerbate inequalities. Furthermore, [7] explore how AI can either mitigate or worsen existing social inequalities, depending on how it is deployed, emphasizing the need for inclusive technological policies. In business, AI has also opened new avenues for women's empowerment. [8] explore AI's role in enhancing women's entrepreneurship in Bahrain, revealing how AI tools can provide women with new opportunities for economic independence. In education, [6] examine the barriers to e-learning in Afghanistan, suggesting that AI-driven e-learning platforms could offer women greater access to education, particularly in conflict zones. Similarly, [5] assess the use of AI for improving safety and security on social media, highlighting its potential to protect women from online harassment and abuse.

The literature also underscores the ethical considerations and risks associated with AI. Kumar and Choudhury [13] argue that AI systems, when designed without considering gender biases, can inadvertently perpetuate gender inequalities. Furthermore, [14], [15] emphasize the importance of integrating feminist ethics into AI development to ensure that AI technologies contribute to gender equality. The potential for AI to support the Sustainable Development Goals (SDGs), including gender equality, is well-documented in [16], [17] who argue that AI can significantly contribute to women's empowerment if ethical and equitable approaches are adopted. While the potential of AI for women's empowerment is substantial, the literature stresses the importance of overcoming the technical, cultural, and economic barriers that limit its widespread adoption. By addressing these challenges, AI can serve as a powerful tool for advancing gender equality and fostering women's leadership in the digital age [18],[19], [20].

The objectives of this research are to explore the role of artificial intelligence in empowering women across various sectors, analyze the opportunities AI presents for advancing gender equality, identify the challenges hindering its effective implementation, and propose strategic recommendations for leveraging AI to enhance women's participation and leadership in technology and education. This study aims to provide a comprehensive understanding of how AI can contribute to women's empowerment, particularly in developing countries, while addressing the potential barriers and ethical considerations.

METHOD

Research Design and Participants

This study employs a quantitative research design to gather measurable data that can be statistically analyzed. This approach facilitates the examination of the relationships between variables and allows for generalization of findings across the defined population. The target population for this study comprised female students from an online women's university. The convenience sampling method was utilized to select participants, enabling efficient data collection from a readily available group. In total, 160 participants were surveyed, providing a substantial dataset for meaningful analysis. To ensure the sample's representativeness, the inclusion criterion was that participants must be enrolled in one of

the faculties at the university, aligning the sample with the broader student body. This approach ensured that the data collected reflected a diverse set of student experiences across faculties.

Data Collection Methods

A structured questionnaire was designed to evaluate participants' perceptions of artificial intelligence (AI) and its potential impact on their empowerment. The questionnaire featured both closed-ended questions, which facilitated quantitative analysis, and open-ended questions, which allowed for a more nuanced understanding of the participants' views. This combination of question types ensured comprehensive data collection. The questionnaire was distributed through Google Forms, enabling efficient and streamlined data collection and management. This online platform ensured accessibility for all participants, facilitating a smooth and organized survey process. Informed consent was obtained from all participants prior to data collection. This step ensured that participants were fully aware of their rights, the purpose of the study, and how their data would be used, aligning with ethical research practices.

Data Analysis

Data were analyzed using descriptive and inferential statistical techniques, employing software such as Excel for calculations. This analysis included frequency distributions, measures of central tendency.

RESULT AND DISCUSSION

Result

The results section presents the findings from the data analysis conducted on the survey responses of female students regarding the impact of artificial intelligence on women's empowerment. The analysis provides insights into participants' perceptions and attitudes toward AI's potential benefits and challenges across various domains.

Table 1. Demographic Distribution of Participants

Faculty	Age Group	Number of Participants	Percentage (%)
Computer Science	20-25	50	31.25
Economics	18-23	50	31.25
Medical	20-24	40	25.00
Education	20-24	20	12.50
Total		**160**	**100.00**

The above **Table 1** illustrates the demographic breakdown of participants in the study, categorized by faculty, age group, and the number of participants. The total sample consists of 160 female participants from an online women's university, divided into four faculties: Computer Science, Economics, Medical, and Education. The participants' age ranges are provided to show the distribution within each group, with the majority between ages 18 to 25. This demographic data is essential to understanding the population being surveyed and provides context for analyzing the study's outcomes.

Table 2. Perception of AI Tools in Empowering Women

AI Tools	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Avg.
AI Job Matching and Recommendation Systems	10 (6.25%)	15 (9.38%)	30 (18.75%)	50 (31.25%)	55 (34.38%)	3.78
AI-powered Educational Platforms	5 (3.13%)	10 (6.25%)	25 (15.63%)	70 (43.75%)	50 (31.25%)	3.94
AI Healthcare Solutions (Women's Health)	7 (4.38%)	12 (7.5%)	40 (25%)	55 (34.38%)	46 (28.75%)	3.76
AI-based Security and Safety Tools	15 (9.38%)	20 (12.5%)	35 (21.88%)	50 (31.25%)	40 (25%)	3.50
AI Financial Inclusion Tools	8 (5%)	14 (8.75%)	28 (17.5%)	60 (37.5%)	50 (31.25%)	3.81

The above **Table 2** shows that AI-powered Educational Platforms (with an average score of 3.94) are perceived as the most effective tool for empowering women, particularly in education and skill development. AI Financial Inclusion Tools and AI Job Matching Systems also received strong support, highlighting their impact on economic empowerment. AI Healthcare Solutions were positively rated, with women's health monitoring seen as beneficial. However, AI-based Security and Safety Tools had

the lowest score (3.50), indicating some room for improvement in how these tools are perceived in ensuring women's safety and security.

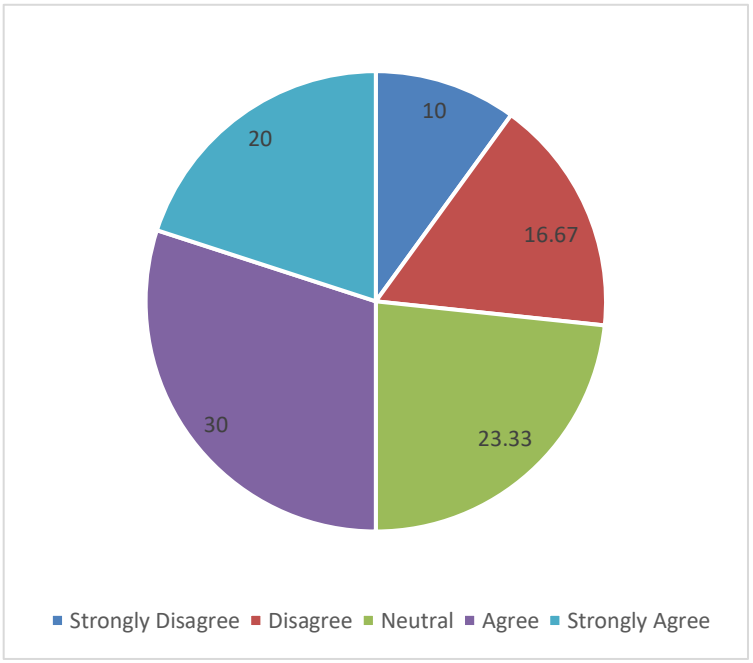

Figure 1. Participants' Agreement on AI's Role in Enhancing Educational Opportunities for Women

Above **Figure 1** presents the responses of 150 participants regarding the extent to which they agree that artificial intelligence (AI) can help women access better opportunities in education. The responses are categorized into five options ranging from "Strongly Disagree" to "Strongly Agree." The results indicate that 30.00% of participants agree with the statement, while 20.00% strongly agree. Conversely, 10.00% strongly disagree, and 16.67% disagree, while 23.33% remain neutral. These findings reflect varying perceptions of AI's potential impact on women's educational opportunities, highlighting a general trend toward optimism among participants.

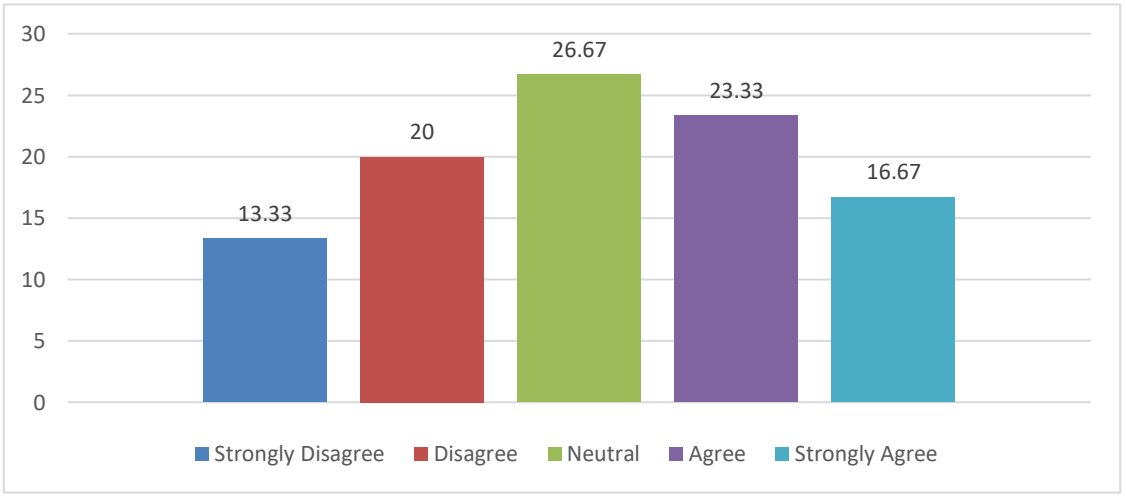

Figure 2. Participants' Belief in AI Technologies Contributing to Women's Safety in Online Environments

Figure 2 summarizes the responses of 150 participants regarding their belief in the extent to which AI technologies contribute to improving women's safety in online environments. The options range from "Strongly Disagree" to "Strongly Agree." The data shows that 23.33% of respondents agree that AI technologies play a significant role in enhancing women's safety online, while 16.67% strongly agree. In contrast, 13.33% strongly disagree, and 20.00% disagree, with 26.67% remaining neutral. These findings indicate a mixed perception among participants, with a notable proportion recognizing the potential benefits of AI technologies for women's online safety.

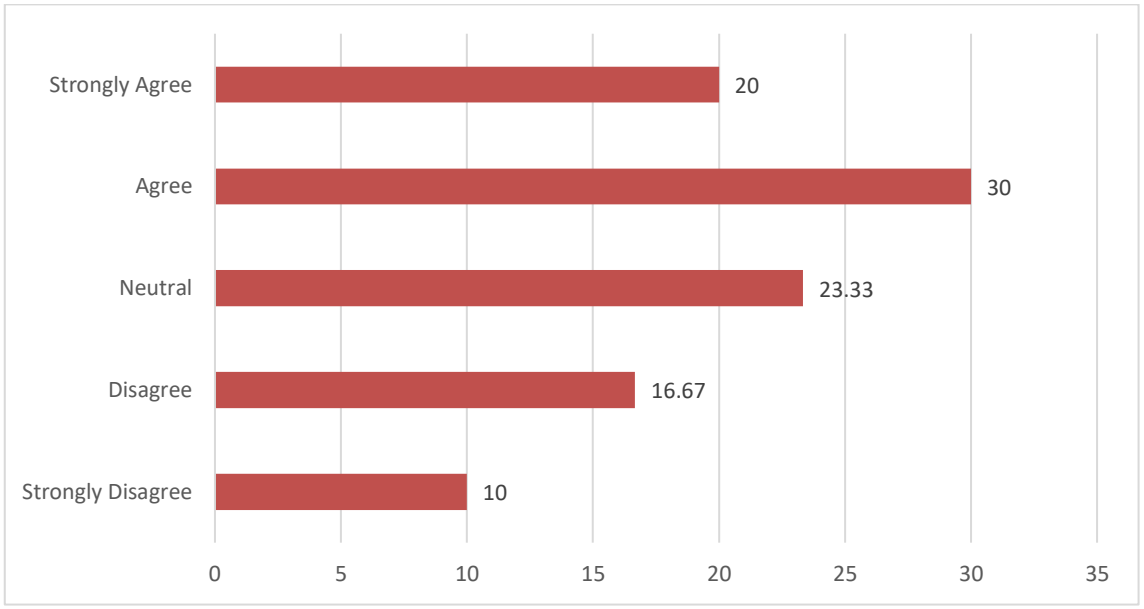

Figure 3. Participants' Perception of AI's Role in Reducing Gender Inequality in the Workplace

Figure 3 presents the responses of 150 participants regarding their views on whether AI can help reduce gender inequality in the workplace. The response options range from "Strongly Disagree" to "Strongly Agree." The results indicate that 30.00% of participants agree that AI can significantly aid in addressing gender inequality, while 20.00% strongly agree. Conversely, 10.00% strongly disagree, and 16.67% disagree, with 23.33% remaining neutral. Overall, the data suggests a favorable perception of AI's potential to mitigate gender disparities in professional settings.

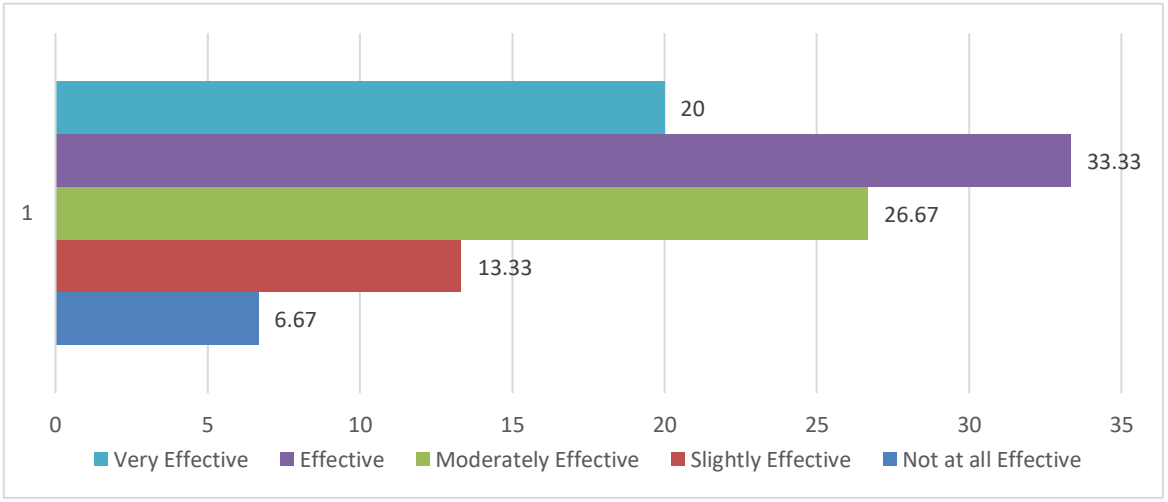

Figure 4. Participants' Perception of AI-Driven Tools in Promoting Women's Entrepreneurship and Economic Independence

Figure 4 summarizes the responses of 150 participants regarding the effectiveness of AI-driven tools in promoting women's entrepreneurship and economic independence. Participants rated the effectiveness on a scale from "Not at all Effective" to "Very Effective." The data indicates that a significant portion of participants (33.33%) find these tools effective, with 20.00% rating them as very effective. Meanwhile, only 6.67% perceive them as not at all effective, and 13.33% view them as slightly effective. Notably, 26.67% rated AI-driven tools as moderately effective, highlighting a generally positive sentiment toward the impact of AI on women's economic empowerment.

Figure 5 illustrates the confidence levels of 150 participants regarding the potential of AI to promote women's leadership in technology and innovation sectors. The responses indicate a generally positive outlook, with 33.33% of participants expressing confidence in AI's role, and 28.00% feeling very confident about this potential. Conversely, a small portion (5.33%) are not confident at all, while 10.00% are slightly confident. A significant percentage (23.33%) remains neutral, suggesting varying levels of awareness and beliefs regarding AI's influence on women's leadership opportunities in these fields.

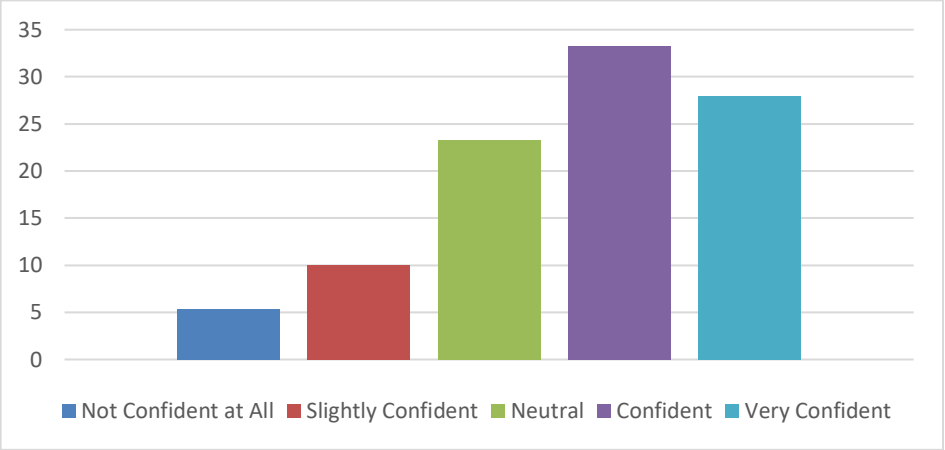

Figure 5 Participants' Confidence in AI Promoting Women's Leadership in Technology and Innovation Sectors

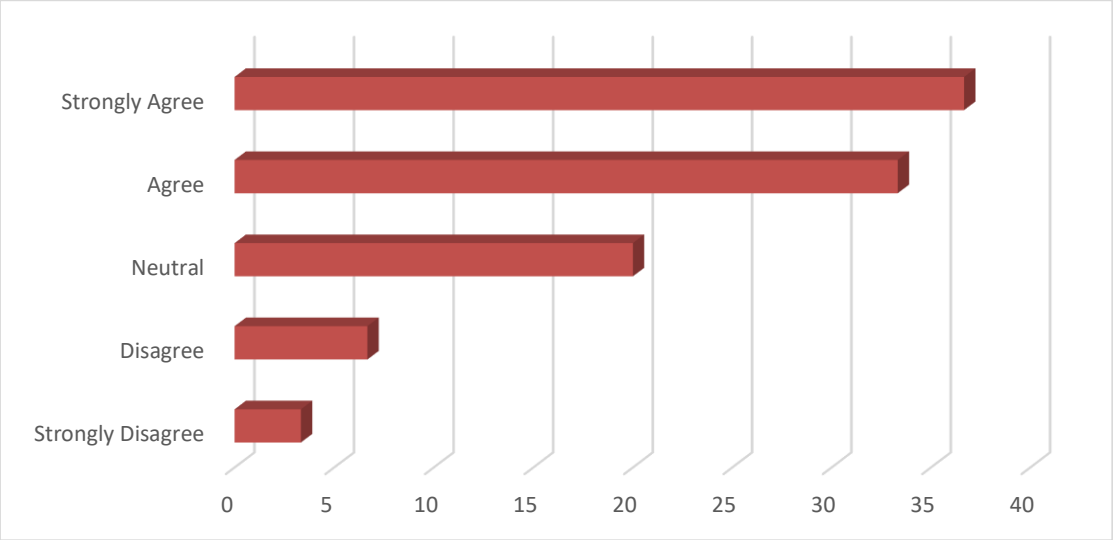

Figure 6. Participants Opinions on AI Integration in E-Learning Platforms for Overcoming Educational Barriers

Figure 6 presents the opinions of 150 participants regarding the role of AI integration in e-learning platforms in helping women overcome traditional educational barriers. A significant majority (36.67%) strongly agree that AI enhances educational access, while 33.33% agree, reflecting a generally favorable perspective. Only 3.33% strongly disagree, and 6.67% disagree, indicating a low level of opposition. Meanwhile, 20.00% of respondents remain neutral, highlighting some uncertainty regarding the impact of AI on educational barriers for women. Overall, the data suggest a strong belief in the potential of AI to facilitate improved educational opportunities for women.

Discussion

The findings from this study underscore the transformative potential of artificial intelligence (AI) in enhancing women's empowerment across various domains, including education, safety, and economic independence. The data reveal a general optimism among participants regarding AI's ability to improve educational opportunities for women, with 50% of respondents either agreeing or strongly agreeing that AI facilitates better access to education. This aligns with existing literature, such as the work of [1], which emphasizes the positive impact of AI on student engagement and academic performance in Afghanistan. These results suggest that AI can bridge educational gaps, particularly in contexts where traditional learning methods may be inadequate.

Moreover, the perception of AI's role in improving women's safety in online environments is notably mixed. While 39.99% of respondents expressed agreement that AI technologies contribute positively to safety, a significant proportion (40%) remained neutral or disagreed. This indicates a recognition of the potential benefits of AI in protecting women online, as highlighted by Hakimi et al. [5], yet it also reflects concerns regarding the effectiveness and implementation of these technologies. The challenges related to the deployment of AI in safety applications may stem from varying levels of

awareness and confidence in these technologies, as noted by [7], who discuss the necessity for inclusive and ethical AI deployment.

The positive views on AI's potential to reduce gender inequality in the workplace further illustrate the growing recognition of technology as a catalyst for social change. With 50% of participants either agreeing or strongly agreeing that AI can address workplace disparities, this finding-echoes [2], who argue that AI and IoT can create pathways for women in traditionally male-dominated fields. The sentiment surrounding AI-driven tools for promoting entrepreneurship is similarly affirmative, with 53.33% of respondents acknowledging their effectiveness. [8] reinforce this notion by discussing how AI tools can empower women economically, thus enabling greater financial independence. Despite these encouraging perspectives, it is vital to address the barriers hindering the full realization of AI's benefits. The literature points to technological, cultural, and economic challenges that can impede women's access to these advancements. For instance, [3] emphasize the need for robust infrastructure and policies that promote equitable access to technology. Additionally, [13] highlight the risk of perpetuating gender biases if AI systems are not designed with inclusivity in mind. Hence, ethical considerations must guide the development of AI technologies to ensure they support gender equality rather than reinforce existing inequalities.

AUTHOR DECLARATION

Author contributions and responsibilities - The authors made major contributions to the conception and design of the study. The authors took responsibility for data analysis, interpretation and discussion of results. The authors read and approved the final manuscript.
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Availability of data and materials - All data is available from the author.
Competing interests - The authors declare no competing interests.
Did you use generative AI to write this manuscript? - We do not use AI assistance in the script.
Declaration of generative AI and AI-assisted technologies in the writing process - During the preparation of this work the author did not use AI for writing, editing, or anything else related to the manuscript.

CONCLUSION

This study reveals the significant potential of artificial intelligence (AI) as a transformative force for women's empowerment across various sectors. Participants expressed a generally positive outlook on AI's ability to enhance educational opportunities, improve safety in online environments, and contribute to reducing gender inequality in the workplace. The results indicate that a considerable proportion of respondents recognize the role of AI in providing women with better access to education, promoting economic independence, and fostering entrepreneurship.

However, while optimism exists, the findings also highlight the need for a nuanced understanding of the challenges that persist. Many participants expressed mixed feelings about AI's effectiveness in enhancing safety and addressing workplace disparities, indicating that awareness and trust in these technologies can vary significantly. It is essential to recognize that the full potential of AI cannot be realized without addressing the technological, cultural, and economic barriers that limit women's access to these advancements. Moreover, as AI continues to evolve, stakeholders must prioritize the ethical implications of its implementation. Ensuring that AI systems are designed with inclusivity in mind is crucial for avoiding the perpetuation of existing gender biases. Policymakers, educators, and technology developers must collaborate to create frameworks that promote equitable access to AI resources and opportunities.

Overall, the findings of this study emphasize the critical need for ongoing efforts to harness AI as a tool for advancing gender equality. By actively addressing the barriers women face and ensuring that AI technologies are developed and deployed ethically, it is possible to create a more inclusive digital landscape that empowers women and promotes their leadership across all sectors. The commitment to achieving these goals will ultimately determine the extent to which AI can contribute to meaningful change in women's lives and broader societal structures.

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