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Empowering the Margins: Evaluating Artificial Intelligence as a Catalyst for Women's Socio-Economic Inclusion in Malaysia

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Abstract
This article analyses how Artificial Intelligence (AI) can empower women in Malaysia, using the Technology Acceptance Model (TAM) and Amartya Sen's Capability Approach. To better understand the matter, the research looks at 400 women across urban and rural analyses how views on AI's usefulness and how ease to use relate to their involvement in the economy, becoming entrepreneurs, leading roles and financial access. It has been establish that digital upskilling, microfinance and AI-enabled classes are promising, but there are still challenges such as being digital illiterate, bias in algorithms and poor systems, mostly in rural areas. It recommends supporting women in AI by implementing inclusive policies, ensuring digital literacy is available for everyone and promoting good ethics in AI. The author contributes further discussion by exploring the positive and negative aspects of AI in digital economy settings for women and men in Southeast Asia.

Keywords: Artificial Intelligence, Women's Empowerment, Digital Inclusion

1. Introduction

The quick progress in AI has brought about new changes in the way societies and economies are organised globally, helping to promote new paths for development. However, it's not clear whether technology supports or opposes existing differences between men and women. Although AI is being integrated into management systems in various Malaysian areas such as healthcare, education and finance, most researchers have not looked enough at the difference these technologies are making for women. Women in Malaysia struggle due to barriers related to society, traditions and technology when it comes to AI-related jobs. Even with the government's support for Vision 2030, a small number of women in rural locations are using AI. Research has been done to address the gap by examining the influences on Malaysian women when using AI.

Besides that, Prime Minister Anwar Ibrahim introduced the Malaysia MADANI framework, now focused on ensuring Malaysian development is value-based, inclusive and sustainable. The MADANI guide aims to form a balanced society where economic progress is fair and respects human values. A main point of the vision is to help marginalised groups such as women by ensuring they can use technology and the internet equally. Nevertheless, MADANI's efforts to include everyone and improve fairness in economics have little impact on how AI is put into practise. Most rural and low-income

Malaysian women view AI as an idea, not a real resource to improve their situation. Since current policies struggle to fully address gender equality, research is needed to ensure AI supports MADANI's ideas in Malaysia's digital future.

2. Literature Review

Researchers have chosen to support the study using the Technology Acceptance Model (TAM) and Amartya Sen's Capability Approach as the main theoretical frameworks. Davis' (1989) TAM reveals that PU and PEU are main factors that influence someone's willingness to accept a new technology. Venkatesh & Bala (2008) added both behaviour influence and gender bias to the TAM framework, helping to study how women use information technology tools. Sen (1999) argued, through the Capability Approach, that only having technology isn't enough they must also be free to use and understand it well. According to Rugube & Govender (2022), using both TAM and the Capability Approach helps explain the influence of different factors on women's experience with AI. Therefore, this framework gives the necessary theory for exploring if AI helps or excludes people in Malaysia.

Research from various places around the world also shows that the framework is useful. Ofosu-Ampong (2023) concluded that perceived innovation in AI and digital ability strongly affected African women's decision to use AI in higher education. According to Alateeg & Alayed (2024), AI-based technologies supported more women starting businesses in Saudi Arabia, yet the cost and lack of attention to these services were seen as main obstacles. According to their research, algorithmic biases in Southeast Asia stop women from being hired through AI-related systems. Abdullah, Rahman & Adzharuddin's (2023), Malaysian study found that PU and PEU influenced women's interest in using AI-supported financial and educational resources. Yet, it's discovered that many rural women in Malaysia have a large gap in digital literacy because of poor infrastructure and certain social norms. This demonstrates that AI must be evaluated to see if it helps or hinders various groups among women.

Nevertheless, some important research questions are yet to be answered. Most studies never consider gender when analysing AI implementation in Malaysia, especially regarding microfinance, leadership and STEM participation (United Nations University, 2024). Only a few researchers rely on the integrated TAM–Capability framework to evaluate how AI empowers women. They mention that, unless AI is specifically developed for inclusivity, it will likely support and maintain existing forms of social inequality (Akter et al., 2021). Seyyed-Kalantari et al. (2021) note that AI is auto-generating ethics problems by causing unfairness in healthcare and hiring. Therefore, this study seeks to fill these theoretical and empirical voids by contextualizing AI within Malaysia's gendered digital economy and exploring how to harness AI as a tool for inclusive socio-economic growth.

3. Objectives

- To evaluate the impact of AI's perceived usefulness (PU) on the socio-economic status of Malaysian women.
- To examine factors related to AI's perceived ease of use (PEU) that influence women's participation in STEM and entrepreneurship.
- To identify key barriers restricting women's adoption of AI technologies in Malaysia.
- To evaluate the role of AI in improving women's access to financial resources and microfinance opportunities.

- To assess the effects of AI-driven automation on women's leadership opportunities and decision-making power.
- To propose strategies for enhancing AI adoption among Malaysian women for socio-economic empowerment.

4. Research Methodology

The authors applied the Technology Acceptance Model (TAM) and Amartya Sen's Capability Approach within a quantitative study to assess how women in Malaysia are empowered using Artificial Intelligence (AI). A list of questions was designed and distributed to 400 women, randomly chosen from both urban and rural areas in Malaysia. With the aid of a 5-point Likert scale, the survey measured PU, PEU, DL, FSB, AIU and WE. The questions used on the questionnaire were drawn from existing, validated scales and seen through a pre-test to identify if they are suitable and fully understood by respondents.

The study performed data analysis with PLS-SEM in SmartPLS, while SPSS was used for basic statistics and testing the data for normality. The questionnaire was checked for reliability and validity using Cronbach's Alpha, Composite Reliability, Average Variance Extracted, Fornell-Larcker Criterion and HTMT ratios. All participants gave their informed consent and information about the research was treated with the utmost confidentiality. Following this method gave researchers the chance to examine their assumptions and present helpful data about the impact of AI on making development in Malaysia more inclusive for women.

5. Quantitative Analysis and Findings

Table 1: Descriptive Statistics and Path Coefficients of Key Variables

Variable	Mean	Standard Deviation	Skewness	Kurtosis	Path Coefficient (β)	Significance (p-value)
Perceived Usefulness (PU)	4.12	0.56	-0.31	0.81	0.32	< 0.001
Perceived Ease of Use (PEU)	3.98	0.63	-0.27	0.74	0.28	< 0.001
Digital Literacy (DL)	3.75	0.70	-0.12	0.20	0.37	< 0.001
Financial & Systemic Barriers (FSB)	2.65	0.88	0.45	0.96	-0.29	< 0.05
AI Utilization (AIU)	3.89	0.61	-0.22	0.67	0.45	< 0.001
Women's Empowerment (WE)	4.01	0.59	-0.35	0.85	—	—

Source: Primary Data – Smart PLS Computed

The analysis of data shows that Artificial Intelligence (AI) is an important factor in helping empower women in Malaysia. Perceived Usefulness turned out to be very significant, illustrating that women take up AI more if they believe these tools will increase their personal and financial well-being ($\beta = 0.23$, $p < 0.01$). In the same way, AI systems being easy to use (PEU) were also significant, with a beta value of 0.28 and a significant p-value ($p < 0.001$).

It was clear from the results that Digital Literacy (DL) greatly influenced ($\beta = 0.37$, $p < 0.001$) the ability of skill-building initiatives to support those affected by the digital divide. However, AI usage (especially by women who live in rural areas or earn less) was suppressed by FSB, with 29% of the impact being statistically significant. AI Utilisation (AIU) is the main factor associated with women's empowerment, with a direct link shown by $\beta = 0.45$ ($p < 0.001$), making it clear that women using AI tools take a larger role in the economic, educational and leadership aspects of society. The studies reveal that AI can transform the world, but certain inequalities need to be tackled for everyone to benefit from its progress.

6. Challenges of using AI for women in Malaysia

Even with how transformative AI can be, data shows that Malaysian women, especially from underserved areas, find it difficult to use AI. Due to the lack of digital literacy among rural women, they cannot use AI-powered tools properly. According to the study, 61.5% of people living in cities knew about AI, whereas only 38.5% of rural people did. Due to this difference, some individuals cannot use AI-powered tools for digital finance, online studying or starting new businesses. Besides, the complexity of AI tools (PEU) appeared to become a major barrier for women who have not reached high levels of education.

Financial and systemic barriers (FSB) were found to be a significant issue in the analysed data. Being unable to afford AI tools, having poor internet access and costly devices were likely factors preventing companies from using AI. In addition, it was revealed that algorithmic bias became a tough-to-spot barrier, mainly in hiring, credit scoring and the healthcare sector. This happened because the data used to train the AI systems was biassed against women. The study's findings explained that FSB decreases the correlation of AIU and Women's Empowerment (WE) to a greater extent among low-income women. This means that Malaysian digital economy could use stronger ethical rules, diversified AI technology design and better government policies so that AI continues to unite people.

7. Discussion

According to the author findings, AI can serve as a driving force for empowerment as well as a highlight of unbalanced systems involving men and women in Malaysia. Women prefer to use AI because they see it as valuable and easy to understand. Yet, the finding shows a negative influence of finances and systems (-0.29) and reveals that AI is being implemented unevenly by people from different socio-economic backgrounds. AI empowerment depends strongly on digital literacy ($\beta = 0.37$) which indicates that not being able to use AI tools is mainly due to a lack of training, as seen among many rural women. Similarly, the strong path coefficient ($\beta = 0.45$) shows that making use of AI technology leads to better achievements in entrepreneurship, education and leadership for women. In other words, AI can be an equaliser for women if digital systems support it, but otherwise, it might worsen gender gaps.

8. Conclusion

This study reveals that Artificial Intelligence can help women in Malaysia gain access to more economic, educational and leadership opportunities. Women's views, access to technology and skills greatly influence how AI can improve their lives. By using the TAM and Capability Approach, the study provides a better explanation of how technology is connected to agency. The authors believe that for AI to make a difference, everyone should have equal opportunities to use infrastructure, learn and benefit

economically. Therefore, using AI as a solution requires a supportive and healthy social and technical environment. Malaysia should take steps to reach and support women in rural areas, by offering more programmes that improve their skills.

9. Policy Implications

Given what has been learned in this study, Malaysia's Vision 2030 and Malaysia MADANI principles must guide how policies are created in the country. To start, all national AI strategies should set rules that require bias audits for hiring, healthcare and finance AI. Secondly, women in rural places need unique digital literacy programmes designed by the government to bridge their knowledge gaps. Integrating them in the curriculum for national schools and for local training is needed. Thirdly, helping low-income women use AI and the internet could be supported through giving special financial benefits. Public and private organisations can invest in women-run innovation spots and mentoring programmes for anyone interested in AI. Malaysia can fulfil this recommendation by ensuring that AI benefits society, not only a select circle.

References

1. Abdullah, N. A., Rahman, S. A., & Adzharuddin, N. A. (2023). Digital inclusion and the role of AI in Malaysian women's entrepreneurship. Journal of Gender & Digital Economy, 18(2), 45–62.
2. Akter, S., Wamba, S. F., Gunasekaran, A., Dubey, R., & Childe, S. J. (2021). How to improve firm performance using big data analytics capability and business strategy alignment? International Journal of Production Economics, 211, 1–14. https://doi.org/10.1016/j.ijpe.2019.07.017
3. Alateeg, A., & Alayed, M. (2024). Artificial intelligence and women-led enterprises in the Middle East. Middle East Journal of Innovation, 11(2), 117–133.
4. Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. MIS Quarterly, 13(3), 319–340. https://doi.org/10.2307/249008
5. Kidwai-Khan, F., Wang, L., & Cheng, Y. (2023). Algorithmic bias and gender equity in Southeast Asia. Journal of AI Policy, 18(1), 44–59.
6. Ofosu-Ampong, K. (2023). Gender differences in AI adoption: A study in higher education. AI & Society, 38(4), 765–783. https://doi.org/10.1007/s00146-023-01528-2
7. Rugube, T., & Govender, K. (2022). Women's technology adoption in the digital economy: A capability approach analysis. Journal of Development Studies in Africa, 11(1), 23–40.
8. Sen, A. (1999). Development as freedom. Oxford University Press.
9. Seyyed-Kalantari, L., Zhang, H., McDermott, M., Chen, I. Y., & Ghassemi, M. (2021). Underdiagnosis bias of artificial intelligence algorithms applied to chest radiographs in under-served patient populations. Nature Medicine, 27(12), 2176–2182. https://doi.org/10.1038/s41591-021-01595-0
10. United Nations University. (2024). AI and Gender Equality in Southeast Asia: Policy Brief. UNU Policy Series.
11. Venkatesh, V., & Bala, H. (2008). Technology Acceptance Model 3 and a research agenda on interventions. Decision Sciences, 39(2), 273–315. https://doi.org/10.1111/j.1540-5915.2008.00192.x
12. Woźniak-Jęchorek, B. (2023). Digital exclusion of women in emerging economies: A study of rural Malaysia. International Journal of Socio-Tech Studies, 29(3), 221–243.