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ORIGINAL SCIENTIFIC PAPER

Assessing Performance of Women Home-Based Businesses from the Low-Income Group: Testing Multiple Mediator Model

Nurul Hidayana Mohd Noor[1]
Azizan Zainuddin[2]
Faculty of Administrative Science and Policy Studies, Universiti Teknologi MARA (UiTM), Seremban, Negeri Sembilan, Malaysia
Syeliya Md Zaini[3]
Faculty of Accountancy, Universiti Teknologi MARA (UiTM), Puncak Alam, Selangor, Malaysia
Ibraheem Saleh Al Koliby[4]
School of International Studies, Universiti Utara Malaysia (UUM), Sintok, Kedah, Malaysia
Mohammed A. Al-Hakimi[5]
Korea University Business School, Korea University, Seoul, South Korea

A B S T R A C T

A home-based business is a micro-business carried out more by women than men to increase personal and family income. The lack of attention given by past researchers has resulted in less-known information about the performance of these entrepreneurs, even though this activity has been around for a long time, and many women are engaged in it. This study examines the determinants of sustainable

[1] Corresponding author, e-mail: hidayana@uitm.edu.my
[2] E-mail: azizan_zainuddin@uitm.edu.my
[3] E-mail: syeliya@uitm.edu.my
[4] E-mail: ibrahimalkoliby@gmail.com
[5] E-mail: alhakimi111@gmail.com

performance in women's home-based businesses to fill this gap. The second objective is to investigate the multiple mediating effects of digital competencies and Artificial Intelligence (AI) adoption towards the connections between entrepreneurial resources (i.e., access to finance, access to entrepreneurial education, and access to networking) and sustainable business performance. The data collection approach used a questionnaire directed to 300 low-income women home-based entrepreneurs in the Central Zone, Malaysia. The Structural Equation Modelling (SEM) analysis showed that digital competency and AI adoption have significant effects and mediate the relationship between entrepreneurial resources and sustainable business performance. This study provides an overview of the resources that can contribute to the business's abilities, which leads to a competitive advantage by applying physical and non-physical resources.

KEYWORDS: *entrepreneurial resources, artificial intelligence (AI) adoption, digital competencies, sustainable business performance*

Introduction

Permitting women entrepreneurs from low-income groups could support zero poverty (SDG1), gender equality (SDG5), and reduce inequality (SDG10), which are central elements of human rights. With half of the world's population being women, it is significant for this group to be empowered (Bilal et al., 2023). These should not be a topic of discussion among women's empowerment groups. Therefore, action must be taken, augmented by the government's commitment to enact policies that empower women and low-income groups' accessibility to equal opportunities in employment and economic expansion (Muthukrishnan & Bhattacharyya, 2024; Pulka et al., 2021).

Many women nowadays have entered the field of online business. Women entrepreneurs play a vital role in fostering economic growth and promoting gender equality (Kutlu & Ngoasong, 2024). The Department of Statistics of Malaysia disclosed that the population of Malaysia is 34.0 million people in 2024, with a male population of 17.8 million and a female population of 16.1 million. Overall, the sex ratio for the citizen population is 103 males for every 100 females (Department of Statistics Malaysia, 2024).

In Malaysia, progress has been made toward gender-related Sustainable Development Goals, particularly Goal 5 on gender equality (Xu et al., 2024), with government initiatives supporting women's entrepreneurship through agencies (Pulka et al., 2021), such as the Community Development

Department (KEMAS), the Federal Land Development Authority (FELDA), the Rubber Industry Smallholders Development Authority (RISDA), and various regional development boards. However, Malaysia ranked 114th of 146 in the 2024 WEF Gender Gap Index, a drop of 12 places from 2023 (World Economic Forum, 2024). This underscores the need for concrete policies ensuring equal opportunities for women (Ognjenović, 2023; Ong et al., 2021).

The ascent of digital entrepreneurship has created newfound opportunities for women to participate in business, specifically through online platforms and social media. Online businesses have expanded traction as they are cost-efficient, support broader market reach, and offer flexible working conditions (Kabbara, 2025). Despite this growth, only a small percentage of women entrepreneurs achieve long-term success in online businesses (Mohd Noor et al., 2024). Many small businesses in Malaysia are still doubtful to accept digital technologies due to inadequate knowledge, a lack of training, and an inclination toward traditional business methods (AlKoliby et al., 2024; Omrani et al., 2022).

These challenges can cause enterprise financial and hiring difficulties (AlKoliby et al., 2024). Many small business owners struggle to find financing to support their business' progress (Manzoor et al., 2021; Pulka et al., 2021). Research suggests that overcoming these barriers enhances resilience and improves business performance (Mohd Noor et al., 2024). Women entrepreneurs who successfully navigate business challenges demonstrate strong expertise, technological adaptability, sufficient financial capital, and receive strong institutional support (AlKoliby et al., 2024; Gerhart & Feng, 2021; Ioannou & Retalis, 2025; Kohda et al., 2023).

Entrepreneurial resources, such as financial capital, skills, knowledge, and networks, are vital for the success and growth of small businesses (Amadasun & Mutezo, 2022; Manzoor et al., 2021). Evidence shows these resources positively influence business performance and lead to better entrepreneurial endeavors (Barney et al., 2021; Sitaridis & Kitsios, 2024; Saoula et al., 2025). This study explores the impact of entrepreneurial resources, AI adoption, and digital competencies on the sustainable performance of home-based women entrepreneurs from low-income groups. It examines whether digital competencies and AI adoption mediate this relationship.

This study focuses on the context of women's home-based businesses from low-income groups. Despite their contributions to the economy, home-

based businesses are often overlooked in policy and underrepresented in academic research (Hamidi et al., 2023; Shahid et al., 2022). Most home-based businesses in Malaysia are classified as micro enterprises (registered) or small businesses operating in the informal sector (unregistered). The motivation for this is to generate income or get job satisfaction. In Malaysia, there is a lack of specific policies to cater to entrepreneurs in the informal economy, and even the government seems to neglect their current growth and development. In the context of gender, home-based business is more often undertaken by women than men and those from the low-income group (Jaaffar et al., 2024). Aware of the importance of home-based businesses in achieving sustainable development goals (i.e., SDG 1, SDG5, and SDG10), only a few studies, such as Mohd Noor et al. (2024), Noor et al. (2025), and Wan Ali and Ali Othman (2025), have explained the performance of home-based businesses in Malaysia.

Wan Ali and Ali Othman (2025) found that over half of Malaysia's home-based women entrepreneurs do not concentrate on a single business, often starting new ventures before the previous ones are established. Despite their significant socio-economic role, few studies address specific resources for such businesses. Noor et al. (2024) note that low-income women entrepreneurs often lack strong management skills and ICT exposure, leading to traditional business practices. Strengthening entrepreneurial skills is crucial for enhancing competitiveness and ensuring sustainability in the digital economy.

Literature Review

Resource-Based View (RBV) and Sustainable Business Performance

Most businesses have executed a sustainability structure to gauge their financial, social, and environmental performance, recognized as the Triple Bottom Line (TBL) (Telukdarie & Munsamy, 2024). The term TBL was devised in 1990 by business specialist John Elkington, who states that organizational performance should be measured based on economic, environmental, and social aspects (Telukdarie & Munsamy, 2024). Moreover, TBL assumes that organizational sustainability can only succeed when an equilibrium connects economic, environmental, and social elements. Preceding studies have shown that the environmental dimension should converge on the influence of the organization on living and non-

living systems such as ecosystems, soil, air, and water (Pangarso et al., 2022). It is attached to efficiently using energy resources, lowering greenhouse gas emissions, and curtailing the ecological footprint. On the other hand, the economic dimension refers to the organization's outlook to construct value and to balance costs and revenues in the production and allocation of goods and services (Zaharia & Zaharia, 2021). Finally, the social dimension is indicated by employees, customers, and the surrounding community. Since customers are also involved in society, improving customer welfare also improves the welfare of the surrounding community. Social sustainability implies the actual achievement of an organization in improving and insisting on the quality of life without neglecting social and environmental aspects (Zaharia & Zaharia, 2021).

A resource-based view (RBV) framework is used in strategic management to evaluate and pinpoint the strategic assets that a company might use to gain a long-term competitive edge and sustainable performance (Barney et al., 2021). It highlights that an organization’s internal resources and competencies are the focal factors that determine the performance and strategic success of the organization. Key constituents of the RBV include the assets, capabilities, activities, attributes, information, and knowledge retained by an organization (Gerhart & Feng, 2021). Resources may be classified as intangible, such as intellectual property and brand reputation, or physical, containing buildings and equipment (Amadasun & Mutezo, 2022; Ioannou & Retalis, 2025; Manzoor et al., 2021).

Additionally, the RBV is a way to look at gender equality in the digital economy. It centers on using resources and skills to create equal opportunities and lower gender gaps (Sitaridis & Kitsios, 2024; Saoula et al., 2025). The RBV emphasizes the significance of giving women equal access to vital resources to close the gender gap in the digital economy. These resources include human capital (i.e., skills, education, and training), technology resources (i.e., digital tools, internet connectivity, and platforms), financial resources (i.e., funding, credit, and investment opportunities), and social and cultural resources (i.e., networks, mentorship, and role models) (Barney et al., 2021; Ioannou & Retalis, 2025; Kohda et al., 2023).

Entrepreneurial Resources and Sustainable Business Performance

Financial resources are essential in starting a business, as they are the basis for funding and capital (Amadasun & Mutezo, 2022; Saoula et al., 2025). Financial resources can be obtained through various resources such as personal accounts of the company founder, loans and credits from financial institutions, and assistance from family, friends, or government agencies. Government support schemes are crucial for small businesses (Pulka et al., 2021), and Manzoor et al. (2021) found that financial capital and impetus strongly correlate with the success of women entrepreneurs. In line with a study by Khan et al. (2021), microfinancing is among the fundamental strengths of a group of small businesses.

Next, a person must have knowledge linked to entrepreneurship to undertake entrepreneurship (Kohda et al., 2023). This is because entrepreneurship education can help a person learn and comprehend how to operate a business more effectively (Sitaridis & Kitsios, 2024). Entrepreneurship education can also develop leadership characteristics, creativity, and innovation skills needed in business. Ioannou and Retalis (2025) noticed that the impact of education and learning outcomes obtained could indirectly improve the economy for small businesses by further developing product markets internationally. This is in line with a study by Saoula et al. (2025), which suggests that to meet economic development objectives, institutions have a role in delivering education and training opportunities, investing in infrastructure, or providing financial and non-financial assistance. Similarly, Marvel et al. (2025) found that empowerment and coaching from non-financial institutions showed positive outcomes for single-mother participants because they could develop their business skills.

Encouraging a great network is essential for entrepreneurs aiming to succeed in the global market (Abu-Rumman et al., 2021). In networking, the principle of "quality over quantity" is paramount. Prioritizing a small circle of meaningful connections is often more beneficial than amassing a vast list of contacts. Shared respect, joint goals, and genuine interests characterize high-quality interactions. Such relationships can offer deeper insights, concentrated support, and more significant prospects for partnership. Also, profound relationships are more likely to result in valuable exchanges, such as referrals or partnerships, which can be necessary for business growth (Pulka et al., 2021). By leveraging online platforms, entrepreneurs can

connect with mentors, investors, and partners who provide invaluable guidance and resources (Barney et al., 2021). Based on the above literature, the current study assumes:

H1: Entrepreneurial resources positively contribute to the sustainable performance of women's home-based businesses from low-income groups.

Mediation Role of Artificial Intelligence (AI) Adoption

AI adoption plays a central role in improving the sustainable performance of women's businesses by improving efficiency, enhancing decision-making, and supporting competitiveness (Kulkov, 2021). AI-powered tools such as automation software, chatbots, and predictive analytics streamline operations, decrease costs, and improve resource allocation, ultimately nurturing long-term business sustainability (Kanbach et al., 2024). By automating routine tasks and increasing workflow optimization, AI decreases operational inefficiencies and enhances business resilience despite market fluctuations. These technologies facilitate entrepreneurs to increase production, govern supply chains more effectively, and provide personalized customer experiences (Townsend, 2023). Beyond operational advances, AI adoption empowers women entrepreneurs by relieving the burden of repetitive tasks, allowing them to focus on strategic decision-making and innovation. Additionally, predictive analytics aid in demand forecasting and inventory management, minimizing waste and maximizing profitability (Crockett et al., 2021). Hence, we recommend the hypothesis:

H2: AI positively mediates the nexus between entrepreneurial resources and sustainable businesses from low-income groups.

Mediation Role of Digital Competencies

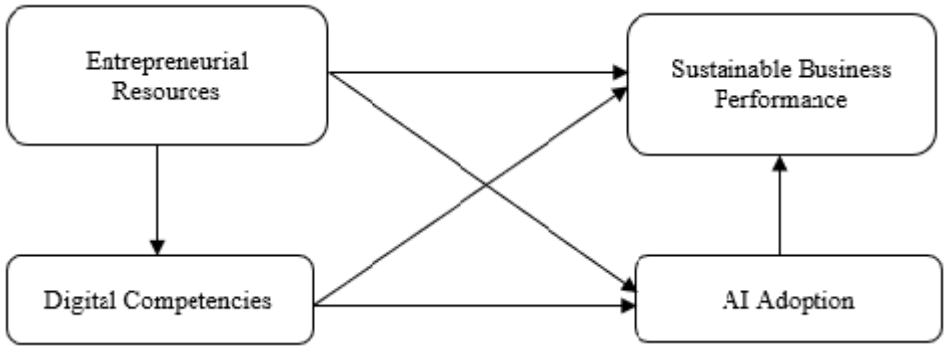
d'Ignazio et al. (2025) asserted that the existence of competencies is seen as an important agenda item in business management, other than in the field of education. He added that with the existence of competencies, an entrepreneur can work and continue sustaining in a globally competitive society. Entrepreneurs must master the technologies that suit their business and overcome potential cybersecurity and data privacy issues. In addition, there is a risk of a digital divide where entrepreneurs with limited access,

knowledge, and technology skills will be left behind (Khoo et al., 2024). Technology opens new opportunities, changes business management, and stimulates innovation. Therefore, a grasp of technology is an important aspect of the triumph of entrepreneurs in the digital era. One of the most important aspects of running an online business is letting people know that businesses exist in the vast digital world (Bachmann et al., 2024). Some digital competencies that need to be mastered include developing Search Engine Optimization (SEO) content, inbound marketing, pay-per-click (PPC), affiliate marketing, and native advertising (Sitaridis & Kitsios, 2024). Considering the proposition, we conjecture:

H3: Digital competencies positively mediate the nexus between entrepreneurial resources and sustainable businesses from low-income groups.

Figure 1 elucidates the model of the study.

Figure 1: Research model



Source: Authors' Creation

Methodology

This study uses a quantitative and survey research method to collect data. The population of this study is home-based women entrepreneurs. Previous examinations recommend that a minimum sample size of 100 to 200 samples be acceptable for structural equation modeling (SEM) (Hair et al., 2017). Hence, 300 responses were chosen, and 255 data samples were collected. The study sample collection is carried out using a multi-stage sampling. First, employing a purposive sampling, the study respondents are

women entrepreneurs of home-based businesses. Among the criteria used are: 1) local women home-based entrepreneurs in the Central Zone of Malaysia (i.e., Selangor and Kuala Lumpur), 2) operating in the informal sector (i.e., unregistered with the Companies Commission of Malaysia or any regulative bodies), 3) having at least one year of business experience, and 4) the low-income group. The low-income group in Malaysia is the Bottom 40 or B40, with an average monthly household income under Ringgit Malaysia (RM) of 4,850.

For the second stage, a convenience sampling technique is used. The researchers allocated a Google form questionnaire to several women entrepreneur groups' social media, such as Ibupreneur, Women of Will, Women Entrepreneur Network Association Malaysia (WENA), and Peniagawati. In Malaysia, since the business is run from home and there is no obligation to apply for a license, it is not officially categorized, and there is no official list of home-based businesses in Malaysia. Thus, convenience sampling allows research studies to be conducted reasonably and involves selecting participants based on accessibility and availability.

The study began by determining face validity. Three experts translated the original questionnaire twice using the back translation process. The first translation was done from the English version to the Malay version. Then, the questionnaire was translated back into English. Corresponding to the study's requirements and application, all the questions are altered from previous studies. Entrepreneurial resources contain three dimensions, namely, access to finance, access to entrepreneurial education, and access to networking. The 10-item scale was adapted from Anwar and Ali Shah (2020) and Duong (2022). Four items were designed from the research of Rubach and Lazarides (2021) to assess digital competencies. Artificial intelligence (AI) adoption measures used five-item scales adapted from Abrokwah-Larbi and Awuku-Larbi's (2024) study. Six items for sustainable business performance were taken from Agrawal et al. (2022) and Lee and Roh (2023). The Likert scale method from 1 to 5 was used to measure respondents' agreement level with the constructed items. The measurement of the items in this study is shown in the Appendix. The assessment method used is structural equation modeling (SEM) with IBM-SPSS-AMOS 28.0 software.

Results

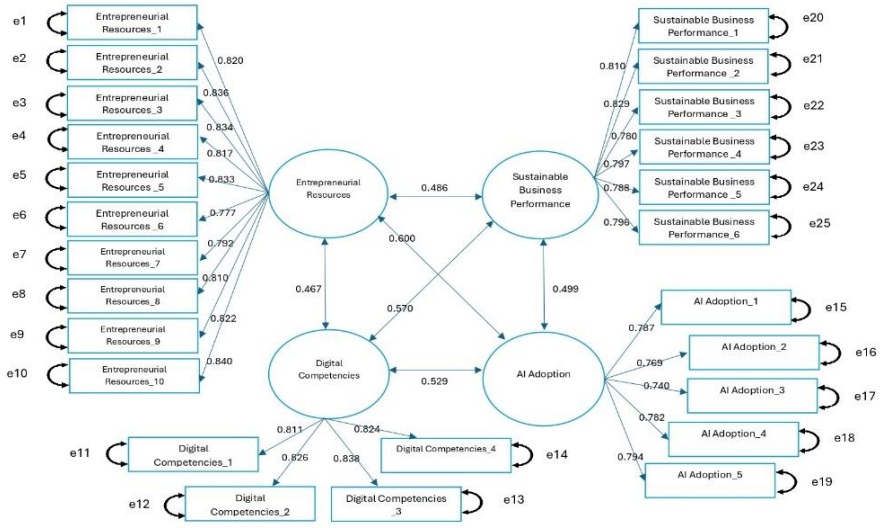
Demographic Profile

Out of 255 respondents, most are from the age group of 25 – 29 years (n=100, 39.2%). This is followed by 18–24 years (n=74, 29%), 35–40 years (n=40, 15.7%), 30–35 years (n=25, 9.8%), and 40 years and above (n=16, 6.3%). Most of the respondents also have academic qualifications at the secondary level, with 163 respondents (63.9%). This is followed by a Diploma or Foundation (n=44, 17.3%), a bachelor's degree (n=35,13.7%), a Graduate degree (MA or PhD) (n=2, 0.8%), and others (n=11, 4.3%). Then, most women entrepreneurs live in urban areas (n=168, 65.9%). This is followed by semi-urban (n=64, 25.1%) and rural areas (n=23, 9%). Finally, most entrepreneurs have operated their businesses for four to five years (n=218, 85.5%).

Confirmatory Factor Analysis (CFA)

Model fit can be determined with several indices. The Root Mean Square Error of Approximation (RMSEA) value must be less than 0.08.

Figure 2: CFA model



Source: Authors' Creation

Next, CMIN/DF less than 3.00 signifies an acceptable fit. The Comparative Fit Index (CFI), the Goodness of Fit Index (GFI), the Normed Fit Index (NFI), and the Tucker-Lewis index should be more than 0.90. The goodness of fit indices are produced as follows: 1) CFI=0.957, 2) GFI=0.949, 3) NFI=0.958, 4) TLI=0.950, 5) RMSEA=0.049, and 6) CMIN/DF=1.707. Figure 2 reveals the CFA model.

Validity and Reliability Tests

The validity test is performed with the AMOS application. If the item loading is less than 0.50, the item needs to be discarded from the model (Hair et al., 2010). As shown in Table 1, the items for each variable have achieved validity assumptions. For example, the loading factor value of the ER1 indicator is 0.820, which is greater than 0.50, so the ER1 indicator is declared valid. For the reliability test, two assumptions are used, including Composite Reliability (CR), which must be more than 0.70, and Average Variance Extracted (AVE), which must be more than 0.50 (Hair et al., 2010). As shown in Table 1, the AVE and CR values for Entrepreneurial Resources (AVE=0.669, CR=0.952), Digital Competencies (AVE=0.680, CR=0.894), AI Adoption (AVE=0.600, CR=0.882), and Sustainable Performance (AVE=0.640, CR=0.914) exceed the minimal requirement. Thus, the reliability assumption for each construct is achieved. Then, Cronbach's Alpha value is used to determine the internal consistency of the constructs. Based on Table 1, the range of Alpha values of Entrepreneurial Resources (α=0.840), Digital Competencies (α=0.850), AI Adoption (α=0.800), and Sustainable Performance (α=0.770) are above 0.60, which implies internal consistency (Nunnally & Bernstein, 1994).

Table 1: Item loadings, Composite Reliability (CR), Average Variance Extracted (AVE), and Cronbach's Alpha Results

Variable	Items	Item Loadings	AVE	CR	α
Entrepreneurial Resources	ER1	0.820***	0.669	0.952	0.840
	ER2	0.836***			
	ER3	0.834***			
	ER4	0.817***			
	ER5	0.833***			
	ER6	0.777***			
	ER7	0.792***			

Variable	Items	Item Loadings	AVE	CR	α
	ER8	0.810***			
	ER9	0.822***			
	ER10	0.840***			
Digital Competencies	DC1	0.811***	0.680	0.894	0.850
	DC2	0.826***			
	DC3	0.838***			
	DC4	0.824***			
AI Adoption	AI1	0.787***	0.600	0.882	0.800
	AI2	0.769***			
	AI3	0.740***			
	AI4	0.782***			
	AI5	0.794***			
Sustainable Performance	SP1	0.810***	0.640	0.914	0.770
	SP2	0.829***			
	SP3	0.780***			
	SP4	0.797***			
	SP5	0.788***			
	SP6	0.796***			

Source: Authors' calculations

Discriminant Validity

Validity testing is a crucial step in any research that involves measuring variables. Research results cannot be trusted or used to make valid decisions without adequate validity. Discriminate validity quantifies how far a construct is distinctive from other constructs. The test relates the Average Variance Extracted (AVE) square root value with the association value between constructs (Fornell & Larcker, 1981). In Table 2, the square root value of AVE for Entrepreneurial Resources (√AVE=0.817), Digital Competencies (√AVE=0.824), AI Adoption (√AVE=0.774), and Sustainable Performance (√AVE=0.800) is higher than the value of the correlation between latent variables; this shows that the construct varies from other indicators. This also indicates that the measurement model of a construct is free from overlapping items.

Table 2: Discriminant Validity for the Variables

No.	Variable	1	2	3	4
1	Entrepreneurial Resources	**0.817**			
2	Digital Competencies	0.467**	**0.824**		
3	AI Adoption	0.600**	0.529**	**0.774**	
4	Sustainable Performance	0.486**	0.570**	0.499**	**0.800**

Note: Values in the diagonal show the square root of AVE

Source: Authors' calculations

Hypothesis Testing

From Table 3, the results showed entrepreneurial resources (β=0.425, p<0.001) significantly predict the dependent variable, sustainable business performance. Thus, H1 was accepted. This means the direct influence of entrepreneurial resources on sustainable performance amounts to 0.425, which means that entrepreneurial education positively influences sustainable performance by 42.5%. Then, the first mediating variable, digital competencies (β=0.305, p<0.001), also significantly predicts sustainable business performance, indicating that digital competencies positively influence sustainable performance by 30.5%. The second mediating variable, AI adoption (β=0.337, p<0.001), also significantly influences sustainable business performance. This indicates that AI adoption influences sustainable performance by 33.7%. Direct effect analysis shows that entrepreneurial resources have the most significant direct influence on sustainable business performance.

Next, the analysis also showed that entrepreneurial resources significantly influence AI adoption (β=0.166, p<0.001). Furthermore, entrepreneurial resources predict digital competencies (β=0.249, p<0.001). These findings indicated that entrepreneurial resources influence digital competencies by 16.6% and AI adoption by 24.9%. Mediation analysis is discussed in Table 3. The standardized indirect effects of digital competencies (β=0.051, p<0.001) and AI adoption (β=0.084, p<0.001) showed that digital competencies and AI adoption have partial mediation effects toward the relationship between entrepreneurial resources and sustainable business performance. Thus, H2 and H3 were accepted. These findings revealed that the connection between entrepreneurial resources and sustainable performance has occurred due to the emergence of mediators,

digital competencies, and AI adoption. Both mediating variables act as stimuli that function as intermediaries or filters. Digital skills are needed by businesses in the digital economy (Bachmann et al., 2024; Sitaridis & Kitsios, 2024), and AI improves the way businesses operate and deliver value (Kanbach et al., 2024; Townsend, 2023).

Table 3: Assessment of the Structural Model

Path			***β***	**S.E.**	**C.R.**	**Bootstrap (95% CI)**	
Standardized Direct Effects						**LLCI**	**ULCI**
Entrepreneurial Resources	→	Sustainable Performance	0.425***	0.009	45.235		
Digital Competencies	→	Sustainable Performance	0.305***	0.091	3.275		
AI Adoption	→	Sustainable Performance	0.337***	0.008	38.728		
Entrepreneurial Resources	→	AI Adoption	0.166***	0.005	30.478		
Entrepreneurial Resources	→	Digital Competencies	0.249***	0.093	4.288		
Standardized Indirect Effects (Mediation Effect via Digital Competencies)							
Entrepreneurial Resources	→	Sustainable Performance	0.051***			0.1478	0.1807
Standardized Indirect Effects (Mediation Effect via AI Adoption)							
Entrepreneurial Resources	→	Sustainable Performance	0.084***			0.3179	0.3554
Standardized Total Effects (Direct Effect + Indirect Effect)							
Entrepreneurial Resources + Digital Competencies	→	Sustainable Performance	0.476***				
Entrepreneurial Resources + AI Adoption	→	Sustainable Performance	0.509***				

*Note: ***Paths are significant at the 1% level (p < 0.01). ***Indirect effects are significant at the 1% with bootstrap at 5000 and the bias-corrected percentile method.*

Source: Authors' calculations

Bootstrapping procedures with 5,000 resamplings were used to produce empirical t-values and verify the significance of the hypothesized relations (Hair et al., 2017). As shown in Table 3, the Lower-Level Confidence Intervals (LLCI) and Upper-Level Confidence Intervals (ULCI) values do not contain zero to confirm the mediation effects are significant (Preacher & Hayes, 2004).

Discussion

Women entrepreneurs are important in the domestic context and are considered the backbone of economic activities. They have proven that they not only play traditional roles in managing family life but also help improve the family economy by engaging in various activities to increase income, whether at home or in the community (Kutlu & Ngoasong, 2024). Determining the sustainable business performance of home-based women entrepreneurs is important to help the government and relevant agencies formulate an action plan to help women entrepreneurs expand their businesses. The analysis first showed that entrepreneurial resources (i.e., access to finance, access to entrepreneurial education, and access to networking) significantly influence sustainable business performance. Second, digital competency and AI adoption have significant effects and partially mediate the relationship between entrepreneurial resources and sustainable business performance. The path analysis indicates that in the absence of mediator constructs, the impact of entrepreneurial resources on sustainable business performance is not merely substantial.

AI and digital competencies are no longer just an option but a necessity to remain relevant in an increasingly competitive business world (Crockett et al., 2021; d'Ignazio et al., 2025; Khoo et al., 2024; Sitaridis & Kitsios, 2024). With the ability to automate processes such as inventory management, customer service via chatbots, and targeted marketing, AI helps reduce operating costs while increasing productivity (Kanbach et al., 2024; Kulkov, 2021). Entrepreneurs can also use this technology to understand customer needs more deeply, thus strengthening their business relationships. In addition, AI allows entrepreneurs to make smarter and faster decisions through real-time data analysis (Bachmann et al., 2024).

The study's investigation has unveiled the formation and development of revitalizing entrepreneurial resources. Prevailing studies concern entrepreneurial resources to regional and national entrepreneurship, but the

metaphors are inaccurately outlined, theoretically underestimated, and inadequately assessed. For example, some studies have narrowed their focus on physical resources (e.g., Amadasun & Mutezo, 2022; Manzoor et al., 2021; Pulka et al., 2021), and a handful of studies have focused severely on non-physical resources (e.g., Abu-Rumman et al., 2021; Sitaridis & Kitsios, 2024). Advanced research is required to understand the development and utility of entrepreneurial resources, especially from the perspective of women entrepreneurship in developing economies. Small businesses have a collection of resources to employ, and underdeveloped external and internal resources commonly cause small business failure (Barvey, 2021; Zaharia & Zaharia, 2021).

Moreover, although the literature suggests entrepreneurial resources impact business performance, these associations have yet to be discovered from the perspective of sustainability performance (Zaharia & Zaharia, 2021). Recent decades have seen a record demand for sustainability. Driven by a wish to remain driven during economic instability and climate change, businesses are inserting sustainable measures into their long-term goals (Telukdarie & Munsamy, 2024). Even though this has been conceded, most studies have focused on the financial measure of business performance, and non-financial aspects are disregarded (Zaharia & Zaharia, 2021). Therefore, examining the interchange between digital competencies and AI adoption is necessary for comprehending how entrepreneurial resources reinforce sustainable business performance.

Some practical suggestions that can be considered are providing entrepreneurial training and education. The government, entrepreneurship agencies, and institutions must organize entrepreneurship platforms, events, or exhibitions to promote networks for women entrepreneurs (Ioannou & Retalis, 2025). Women entrepreneurs are also encouraged to attend industry events and conferences that can provide entrepreneurs with valuable opportunities to connect with potential investors and industry experts (Kohda et al., 2023). These events often feature keynote speakers, workshops, and panel discussions offering insights into various industry aspects. By actively participating in these sessions, they can learn about best practices, emerging technologies, and market forecasts (Ognjenović, 2023). Conferences also serve as a breeding ground for new ideas and collaborations. These networking sessions allow entrepreneurs to showcase their business ideas or products while getting feedback from potential customers or investors (Marvel et al., 2025). The next step is to provide

mentoring or guidance programs for women entrepreneurs by skilled individuals in digital technology and AI. With the help of mentors, women entrepreneurs can receive guidance in overcoming digital technology challenges (Saoula et al., 2025). To achieve competitive entrepreneurs, it is recommended to develop a community or network of digital women entrepreneurs where they can share their experiences, knowledge, and strategies for overcoming digital technology challenges.

Conclusion

This study examines the determinants of sustainable performance in women's home-based businesses. The second is to investigate the multiple mediating effects of digital competencies and Artificial Intelligence (AI) adoption towards the connection between entrepreneurial resources (i.e., access to finance, access to entrepreneurial education, and access to networking) and sustainable business performance. The results showed that digital competency and AI adoption have significant indirect effects and mediate the relationship between entrepreneurial resources and sustainable business performance. To expand the business, women entrepreneurs need to take steps to acquire entrepreneurial resources and integrate digital capabilities and AI adoption. This paper makes several contributions since much research focuses on the relationships between entrepreneurial resources, digital competencies, AI adoption, and sustainable business performance. A few studies have been done to evaluate the performance of home-based women entrepreneurs despite their long existence. It is rarely considered and often neglected by policymakers (Noor et al., 2024; Noor et al., 2025; Wan Ali & Ali Othman, 2025). This study can provide an effective action plan to help empower this group.

However, this study still has some limitations. First, this study only covers home-based women entrepreneurs from low-income groups, which may differ from other entrepreneurship groups. Future studies may expand the sample to other contexts or areas. Second, because of limited objective conditions, we did not explore the specific categories of resources such as human capital, technological capital, social capital, financial capital, and others. Thus, future studies may expand the current research model. Third, this study used a cross-sectional design, which involves looking at different people with one key characteristic at a particular time. The cross-sectional method cannot determine the cause-and-effect relationship between the

studied variables. This can be a limitation in understanding the relationship between the variables. To overcome this, future studies are encouraged to use a longitudinal study.

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Appendix

Entrepreneurial Resources (Sources: Anwar & Ali Shah, 2020; Duong, 2022).
Access to Finance

1. The loan product provided by the bank suits our needs.
2. The terms and conditions for using loans provided by the bank favor us.
3. The financial services provided by the bank are safe for us.

Entrepreneurial Education

1. Entrepreneurship education helps in improving business management skills.
2. Entrepreneurship education in Malaysia enables me to think creatively about being an entrepreneur.
3. The formal educational institution in Malaysia presents the knowledge needed related to entrepreneurship.
4. The formal educational institution in Malaysia promotes the skills and abilities toward entrepreneurship.

Networking

1. The business has a good network with suppliers and distributors.
2. The business has a good network with competitors.
3. The business has a good network with local or national government politicians/institutions/or agencies.

Digital Competencies (Source: Rubach & Lazarides, 2021)

1. I can communicate using different digital tools.
2. I can actively participate in society using digital media.
3. I know about the dangers and risks in digital environments and consider them.
4. I can independently use digital learning opportunities and appropriate tools.

Artificial Intelligence (AI) Adoption (Source: Abrokwah-Larbi & Awuku-Larbi, 2024)

1. AI helps my enterprise to predict customer needs accurately.
2. AI supports the marketing promotion of my enterprise by eliminating human errors.
3. AI is important to the collaborative decision-making process in my enterprise.
4. AI has increased my enterprise's brand awareness in real time.
5. AI enables my enterprise to personalize its marketing activities to individual customers.

Sustainable Business Performance (Sources: Agrawal et al., 2022; Lee & Roh, 2023)

1. I have a well-managed relationship with suppliers.
2. I tried to minimize energy consumption.
3. I tried to reduce the waste.
4. I tried to reduce the emission of air pollutants.
5. Sales are increasing.
6. Net profit is increasing.

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