Journal of Research Administration
Society of Research Administrators International

AN INTEGRATED WAQF FINTECH INNOVATION AND FINANCIAL LITERACY IN PROMOTING WOMEN'S SUSTAINABLE FINANCIAL INCLUSION IN NIGERIA

[1]Fahd Al-Shaghdari and [2]Tijjani Muhammad
[1]Institute of Islamic Banking and Finance, International Islamic University Malaysia, Selangor, Malaysia
[2]Department of Banking and Finance, Federal University, Gashua, Yobe State, Nigeria

ABSTRACT

Purpose: *This study examines the innovative integration of Waqf-Fintech solutions and financial literacy initiatives to promote sustainable financial inclusion for women in Nigeria.*

Methodology / Approach / Method: *The study proposes a synergistic framework. It combines Waqf-based Fintech innovations with targeted financial literacy programs for Nigerian women. The study employs a quantitative approach, using surveys to assess the perceptual impact of women using Waqf-Fintech technology. The respondents were 346 Muslim women from both rural and urban areas. Data were analyzed using structural equation modeling (SEM) to explore factor relationships using SPSS. The Sobel test examined the mediation effect of sustainable financial inclusion.*

Findings: *Findings indicate that integrating Waqf-Fintech innovations with financial services and providing technological services that comply with religious and cultural norms improve access to finance. This fosters economic employability, promotes gender equality, and supports sustainable financial inclusion in Nigeria.*

Originality / Value: *This research uniquely integrates the concepts of Waqf and Fintech innovation. It addresses women's financial exclusion in both rural and urban areas. The study contributes to the literature and offers policy guidance for stakeholders seeking sustainable financial inclusion for women in Nigeria.*

Research Limitations / Implications: *The study's limitations include a sample limited to rural and urban women in Northern Nigeria. This means the findings are specific to this region and may not be applicable to other regions.*

Practical and Theoretical Implications: *The findings highlighted both practical and theoretical implications. Practically, financial inclusion is among the world's most pressing issues. It can hinder sustainable development in developing countries. The study also makes contributions to the theoretical domain. It contributes to the literature on Waqf-Fintech for financial inclusion. Some studies indicate that waqf is a significant factor in promoting financial inclusion.*

Keywords: *Waqf, Fintech, Financial literacy, Women, financial inclusion.*

1. INTRODUCTION

Nigeria has made strides in financial inclusion by employing various strategies and tactics to address financial exclusion (Soetan & Mogaji, 2024). However, the majority of the country's population was women, who were highly neglected and considered dependent and of lesser concern (Muhammad & Fahd, 2024). Additionally, women in rural areas are underserved and face significant barriers to accessing financial services within the country (Ozili, 2024). Nigerian women were concerned due to the lack of formal financial services that render support to vulnerable situations, especially in rural communities (Idowu, 2024). The credit cannot be assessed, and savings cannot be tendered due to the physical infrastructure of any financial institution (Kandpal, 2024). The potential of entrepreneurship is stifled, while a study indicates that access to funds and financial services boosts and increases women's enterprise status and economic benefit within communities. Muhammad and Fahd (2024) suggest that women's

© 2026 The Authors

financial status is not only crucial to their activities but also critical for promoting gender inclusion, reducing poverty, and fostering economic growth and employment.

Moreover, the limited financial advocacy and understanding of financial services, rooted in cultural norms, inadequate financial infrastructure, and low awareness, often hinder the full potential participation of vulnerable communities in financial services. It is also indicated that the financial standing of rural and some urban women still experiences a significant percentage of financial exclusion, despite the fact that cultural and religious barriers are the strongest reasons (Elouaourti & Ibourk, 2024). Developing a system that suits the population within such communities must highlight the relationship between accessible infrastructure and the religious backing system to enhance the credibility of financial services for vulnerable women (Kamran & Uusitalo, 2024; Ramya et al., 2024). Muhammad and Fahd (2025) indicate that only 27 per cent of rural women own accounts in Nigeria, which is considered worrisome and still highlights the existing gap within the rural communities in the country.

Considering the above challenges, a creative solution is needed that addresses the most significant areas of awareness, cultural and religious concerns, as well as infrastructural solutions, to address the financial difficulties and provide access to credit and savings that meet the community's needs (Mhlanga, 2025). Looking at the innovative idea, the combination attempts to leverage Islamic endowment (Waqf) and financial technology (Fintech) services and maintain the advocacy on financial literacy towards women in rural areas, adopting such solution help providing lasting solution and achieve the huge percentage of financial exclusion and promote financial inclusion in the country (Dirie et al., 2024).

Waqf is an Islamic benevolent and generous charitable tradition in which community, group or individual donate or dedicate assets or cash for continues charitable use, it has a strong impact and long history of supporting social program, school and mosques, attaching with financial technology (fintech) can address the physical infrastructural challenges and can been seeing as sustainable financial tool for sustainable development (Mahomed & Saba, 2024). When Waqf is paired with modern technology, fintech produces a sound digital platform that streamlines the creation, management, and utilization of waqf technology, addressing fundamental issues surrounding women and gender exclusion in the financial sector (Jafar et al., 2025). For Nigerian women, especially those in northern Nigeria, where the majority are 80 percent Muslim and familiar with the Islamic endowment, it may be considered valuable and such addresses cultural or religious reasons of financial exclusion (Adigun & Busari, 2025). These innovations can create new opportunities for financial investment, business growth, and community development.

Pairing Islamic endowment (Waqf) with financial technology (Fitech) and financial advocacy is considered key to enabling women to participate meaningfully in financial services and bridge the barrier of exclusion from the financial mainstream (Mahomed & Saba, 2024). As women understand the concept of the financial system, they can make more informed decisions, effectively manage their finances, and participate in economic empowerment in Nigeria (Smolo, 2024). For instance, digital Waqf platforms may establish a small fund for women entrepreneurs and initiate affordable financing for business purposes, or finance innovative ideas or projects that target and benefit women (Al-Daihani et al., 2025). Using smart fintech technology contracts, which make Waqf administration more manageable, accountable, transparent, and trustworthy, definitely encourages more women to engage in and benefit from innovation, and helps women save and invest (Ishak et al., 2024). Therefore, considering Nigeria's cultural diversity and broader financial inclusion plans to address financial exclusion, gender inequality, and national growth, the strategies need to be explored, which involves preserving the religious and cultural values of communities using financial technology infrastructure to bridge the exclusion of rural women in the financial sector. Using digital and Islamic endowments is considered an active and sound way to achieve a lasting solution to financial inclusion and reduce poverty and unemployment within rural and some urban communities. In addition, the evolve solution assists all women in accessing financial services and credit usage through waqf-fintech innovation in Nigeria.

© 2026 The Authors

2. LITERATURE REVIEW

Numerous studies have examined the development of digital financial inclusion in both developing and developed countries (Ozili, 2024). For instance, Ediagbonya & Tioluwani (2023) indicate that Nigeria has progressively promoted digital financial services. However, the level of digital financial inclusion remains comparatively low compared to other developing countries. Several studies suggest that improving and integrating digital infrastructure, as well as advocating for financial literacy, can significantly increase success. The adoption of robust digital financial services can enhance financial services and promote greater digital financial inclusion by leveraging digital financial services. Kamran and Uusitalo (2024) indicate that financial technology rendered convenience services with less financial stress and charges towards lower-income individual earners and the vulnerable. Mukalayi and Inglesi-Lotz (2023) demonstrated that the state of digital infrastructure in various parts of the world, particularly in Asia, has significantly improved from 2011 to 2014. The data was generated from the Global Findex Database. The study found that the use of banking accounts has increased the level of technology infrastructure and development of the banking sector.

Numerous studies have shown that women's position towards financial services is considered negligible due to their financial exclusion in Nigeria (Ezzahid & Elouaourti, 2021; Offiong et al., 2021). However, the development of digital infrastructure in the financial institutions has increased and promoted the number and level of women towards financial inclusion. Muhammad and Khalil (2021) opined that women clearly indicates the vulnerability of not access dividend of financial services where majority of rural women suffered financial exclusion; the physical infrastructure become an issue the utilization of digital infrastructure should be targeted to women to ensure financial services are accessible to ensure efficiency and effective to enhance their welfare standard within the country. The marginalization of women toward financial services and access to credit and savings in African countries is a significant concern, as introducing digital financial services helps to address financial inclusion and create employment opportunities for women in both rural and urban areas (Hasan et al., 2023; Liu et al., 2024). Showkat et al. (2025) investigated the level of digital financial inclusion in relation to women's economic empowerment in some African countries. The study found that the co-opting of women in the digital financial services has immensely enhanced women's empowerment and digital financial inclusion in Africa. Adera and Abdisa (2023) expressed concern about the impact of women's empowerment and financial inclusion on women's opportunities in Africa, specifically in Ethiopia, using the women's modules of the Ethiopian Demographic and Health Survey. The study found that strengthening policy and financial inclusion innovative initiatives for women's empowerment offers greater access to empowerment and improves strategies for advancing gender equality.

Khan and Shahid (2025) examined the relationship between women's participation in employability and digital financial inclusion to identify where digital financial inclusion addresses gender inequality. The study analyzed data gathered from 29 African countries using Probit model estimation approach. The finding indicates that digital financial inclusion has significantly contributed to the level of financial inclusion in the labour market and addressed exclusion. Sherwani et al. (2024) investigated the acceptability of digital financial inclusion in enhancing women's entrepreneurship within certain regions of the developed world. The findings suggest that women's role in entrepreneurship has a significant influence on access to financial inclusion and financial services worldwide. Le Quoc (2024) investigated women's barriers in developing countries, including India, and further focused on the women's disparity and financial exclusion. The findings suggest that the digitalization of financial services, combined with effective technological infrastructure, enhances women's financial inclusion and reduces gender disparities in economic employability in developing countries. While some research indicates that cultural and religious factors constitute barriers to financial inclusion (Suhrab et al., 2024).

Kurniasari and Lestari (2024) assessed the primary factors influencing access to finance for women entrepreneurs building their businesses in Indonesia to address gender inequality. The study employed

© 2026 The Authors

270 women entrepreneurs using structural equation modeling to assess the women's perceptions of financial inclusion. The finding indicates that digital financial technology is considered crucial and also a mediating factor in addressing financial advocacy and cultural barriers. Further adoption of digital financial technology and financial literacy is considered key in addressing gender inequality. Zhao and Jiao (2024) investigate the relationship between digital financial inclusive common prosperity and regional innovation using panel data from 31 provinces from 2011 to 2021. The findings indicate that digital inclusion has a favorable influence favorably in boosting prosperity through digital inclusiveness based on common prosperity and regional innovation.

There are studies investigated the barriers of financial inclusion. For example, Muhammad et al. (2020) noted the rapid expansion barriers of financial inclusion in Nigeria are related to negligent of the religious and cultural recognition. The finding shows that addressing religious and cultural barriers affects local and regional financial inclusion, creates employment opportunities, and reduces gender inequality. In related studies, Umar et al. (2020) investigated whether addressing cultural and religious barriers influences the level of financial inclusion in both rural and urban areas in Nigeria. The study found a positive relationship between the barriers and cultural and religious factors. The findings further recommend that using digital infrastructure could help address the rural and urban areas where physical structures are not visible, allowing the locality to utilize them. Another related study, Kulkarni and Ghosh (2021) used a perceptual analysis framework to investigate the impact of women’s barriers to financial inclusion on economic growth. Interestingly, the study found that the women's barriers have a significant impact on the country's financial inclusion and economic growth, and further indicates that the more solutions are provided to address financial inclusion, the more opportunities are opened to accommodate women and boost financial inclusion, especially through digital finance. In a related study, the question of whether financial inclusion empowers women. There are heated debates among scholars regarding whether financial inclusion enhances the stability level of women in society. While some opined that women may have a better position to manage their finances and ensure their financial stability, as well as be exposed to related shocks, and effectively manage their finances (Agyemang et al., 2025). In related studies in India, Kochar et al. (2022) investigated subsidized credit programs and the gender effects associated with fund transfers. The study found that women receiving credit transfer experience a significant increase in decision-making power. In a related study, Islam (2021) indicates that the participation of women in micro credit programs in Bangladesh helps improve women's living standards in economic empowerment and decision making, and attracts financial inclusion. Pal et al. (2022) show that participation of women in financial inclusion programs and activities leads to a remarkable improvement in women’s financial decision-making, income earning, living standards, and purchasing power. The study further revealed that such initiatives and activities empower rural women to tackle emergencies, reduce dependence, access good medical facilities, and enhance their children's education. Koomson et al. (2023) investigated the limited access to credit and savings services hinder the growth of business in Kenya. In trial, the researcher provided access to non-interest banking account for women vendor and bicycle-taxi drivers to assess the experiment based on the rondomised assessment. The study revealed despite the huge percetange of withdrawal the women maintained the huge percentage of savings and saved more compared to bicycle taxi drivers. The study further disclosed the significant barriers of financial inclusion towards women due to the lack of access to financial services. Zahid et al. (2024) investigate commitment to product and savings held by individuals in the Philippines. The finding indicates that the product has significantly impacted women's decision-making in the household and the stability of the living standard within the community. In a related study, Jose and Younas (2023) opined that financial inclusion can increase women's bargaining power and improve their living standards within the household, thereby overcoming gender norms and intra-household dynamics. The study further argued that having an increase in bargaining power can empower women to access the labour market and play a key role in promoting women's economic empowerment and addressing financial inclusion.

© 2026 The Authors

Financial inclusion is widely recognized as crucial and significant for women's empowerment. Cicchiello (2021) investigated the effect of gender inequality on financial inclusion in the Middle East and North Africa region. The study found that women have limited access to financial services, including access to accounts and credit cards, as well as limited access to financial products. Therefore, the study recommends creating awareness of financial inclusion, promoting access to financial services, and enhancing women's empowerment in the region. Cicchiello et al. (2021) examined the relationship between financial inclusion and financial development, using literacy rates, economic growth, gender inequality, and unemployment as indicators. The study revealed a significant relationship between factors indicating literacy enhancement, addressing gender inequality, promoting financial inclusion programs, and fostering the development of financial activities, which influence the impact in the region. In a similar study, Giron et al. (2021) examined the financial determinants of financial inclusion in developing countries within Africa and Asia. The study found that underscoring the financial literacy gap and the exclusion of women and young people within the financial services sector significantly increases the level of financial exclusion in those countries. Mossie (2022) examined the level of awareness assessment within Ethiopia using the World Bank's Findex database from 2017. The study shows that education, age, gender, and wealth are associated with financial inclusion. Gender inequality is highly attributed to the exclusion of women from financial services.

Available studies have contributed immensely to valuable and timely insights on gender inequality; however, the existing literature on financial inclusion in Nigeria primarily generates conventional solutions. Likewise, the role of women's employment remains largely unexplored in the context of Nigeria, particularly in Northern rural areas and other rural regions across the country. These studies investigate the relationship between digital financial inclusion and empowerment in various regions worldwide. The literature has also examined the relationship between women's digital financial inclusion and various variables that promote financial inclusion. Therefore, this study aims to utilize integrated Waqf-Fintech innovation and financial literacy to promote women's sustainable financial inclusion in Nigeria. This study aims to fill the gap in the literature.

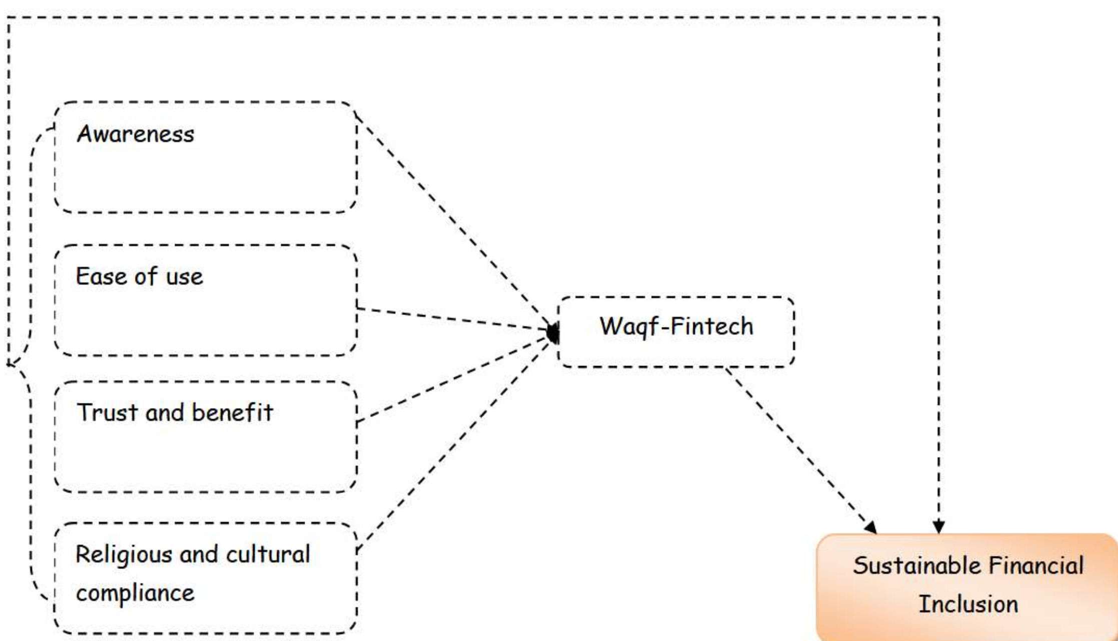

Figure 1. Conceptual framework

Source: Authors'own

Figure 1 above illustrates the proposed relationship between the variables, examining both the direct and indirect relationships. The variables consist of the independent variables (Awareness, Ease of use, trust, benefit, and religious and cultural compliance), the mediating variable (Waqf-Fintech), and the dependent variable (sustainable financial inclusion) for testing the complex relationship and providing perceptual justification.

3. METHODOLOGY

This research proposes a synergistic framework combining Waqf-based Fintech innovations with targeted financial literacy programs tailored for Nigerian women. The integration leverages Waqf assets to fund innovative Fintech solutions that promote financial inclusion, thereby fostering creation of opportunities and sustainable economic participation among women.

The study adopted a quantitative research approach, employing structural equation modeling to examine complex relationships between variables within the proposed conceptual framework. The targeted population comprised women aged 18 and above, with a significant proportion residing in rural areas of Nigeria. A random sampling technique ensured representation across various categories of women from both urban and rural regions nationwide. To satisfy the estimation requirements for structural equation modeling, a sample size of 346 respondents was collected using a structured questionnaire (Cheah et al., 2021). Study constructs were measured using 5-point Likert scales (1-strongly disagree, 5-strongly agree). The preliminary data analysis provides a summary of the respondents' demographic characteristics. Reliability and validity were assessed through Cronbach’s alpha, composite reliability, and Average Variance Extracted (AVE) to evaluate the internal consistency and data quality. In addition, confirmatory factor analysis and discriminant validity were conducted to validate the measurement model.

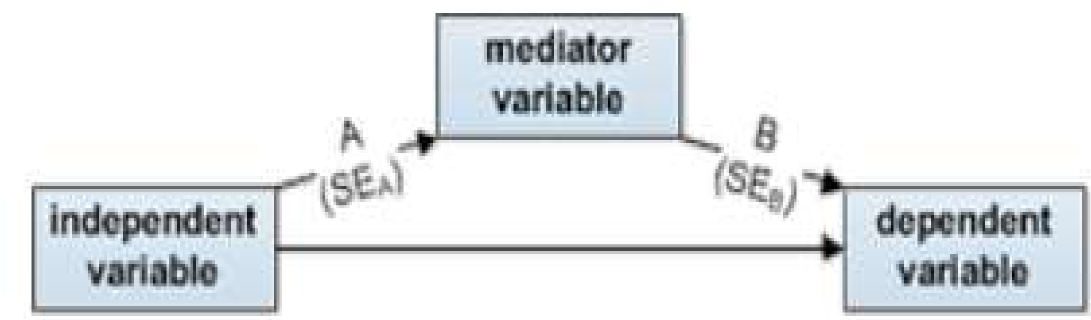

Figure 2. Mediating measurement

Source: Xu and Zhao, (2025)

This study employs the Sobel test to examine the mediating role of Waqf-Fintech, determining whether a mediator variable significantly mediates the influence of an independent variable on a dependent variable and whether the indirect effect of the independent variable on the dependent variable through the mediator variable is statistically significant. This calculator returns the Sobel test statistic and both two-tailed probability values. Sobel test equation *z*-value = *a***b*/SQRT(*b*2**s*a2 + *a*2**s*b2)

Table 1. Measurement Items

Structural Measurement	Items	Sources
Waqf-Fintech platforms effectively raise awareness about accessible financial services among underserved communities	AW1	Ozili, 2024 Ediagbonya & Tioluwani (2023) Kamran and Uusitalo (2024) Mukalayi and Inglesi-Lotz
Increased awareness of Waqf-Fintech solutions has led to higher participation in sustainable financial activities	AW2	
Waqf-Fintech initiatives play a significant role in educating people about the benefits of financial inclusion	AW3	

© 2026 The Authors

Structural Measurement	Items	Sources
Awareness campaigns conducted by Waqf-Fintech organizations are crucial in bridging the gap in financial literacy	AW4	(2023)
Waqf-Fintech platforms make financial services more accessible to underserved communities through user-friendly technology	EU1	Mahomed & Saba, 2024 Jafar et al., 2025 Adigun & Busari, 2025 Smolo, 2024
The integration of Waqf-Fintech solutions simplifies the process of charitable giving and financial transactions for users	EU2	
The ease of use of Waqf-Fintech applications encourages greater participation among low-income and rural populations	EU3	
The adoption of easy-to-use technology in Waqf-Fintech services increases trust and confidence among users, leading to greater financial inclusion	EU4	
Waqf-Fintech platforms enhance users' trust in accessing and utilizing financial services.	TB1	Al-Daihani et al., 2025 Ishak et al., 2024 Kamran and Uusitalo (2024 Mukalayi and Inglesi-Lotz (2023)
The integration of Waqf principles in Fintech services increases users' perception of the benefits and sustainability of financial inclusion	TB2	
Trust in Waqf-Fintech solutions mediates the relationship between financial accessibility and user engagement in underserved communities	TB3	
The perceived benefits of Waqf-Fintech encourage more individuals from low-income groups to participate in formal financial systems	TB4	
The trust and perceived benefits associated with Waqf-Fintech are significant mediators in promoting sustainable financial inclusion among marginalized populations	TB5	
Waqf-Fintech platforms effectively incorporate religious principles to promote trust among Muslim users seeking financial services	RC1	Khan and Shahid (2025 Sherwani et al. (2024) Le Quoc (2024 Suhrab et al., 2024
The integration of Islamic financial regulations within Waqf-Fintech services enhances religious and cultural acceptance and encourages wider participation in financial inclusion	RC2	
Waqf-Fintech solutions are designed to align with religious and cultural norms, making financial products more accessible and acceptable to Muslim communities.	RC3	
Cultural and religious considerations embedded in Waqf-Fintech contribute to the sustainability and long-term success of financial inclusion initiatives	RC4	
Waqf-Fintech platforms effectively increase access to financial services for underserved communities	WF1	Elouaourti & Ibourk, 2024 Kamran & Uusitalo, 2024; Ramya et al., 2024 Muhammad and Fahd (2025) Mhlanga, 2025
The integration of Waqf principles with Fintech innovations facilitates greater financial inclusion among low-income populations	WF2	
Waqf-Fintech contributes to reducing the financial gap between different socio-economic groups	WF3	
The use of Waqf-Fintech solutions enhances transparency and	WF4	

© 2026 The Authors

Structural Measurement	Items	Sources
trust in financial transactions for marginalized groups		
Financial literacy programs effectively improve understanding of sustainable financial practices	SFI1	Kulkarni and Ghosh (2021 Koomson et al. (2023) Zahid et al. (2024) Jose and Younas (2023)
Technology has made it easier for me to participate in sustainable financial activities	SFI2	
I trust that sustainable financial products are secure and reliable Sustainable Financial Inclusion Initiatives	SFI3	
Financial institutions should consider religious and cultural factors when designing sustainable financial services	SFI4	
Waqf-Fintech platforms make it easier to manage and allocate charitable funds	SFI5	

Source: Authors' own

Table 1 illustrates the description of variables and how constructs are created using the above description. However, the questionnaire has revealed fundamental questions that will clearly indicate the direction of addressing financial inclusion through a survey, addressing the raised question for a better account and outcome of the research. Therefore, the paper consists of three variables: the independent variable, the mediating variable, and the dependent variable.

Table 2. Demographic analysis

Demographic	Frequency	Percentile (%)
Gender		
(Women)	346	100
Age		
(18-35)	90	26
(36-45)	83	24
(46-55)	121	35
(56-Above)	52	15
Education		
(Islamic School)	104	30
(Primary)	69	20
(Secondary School)	114	33
(Diploma/NCE)	35	10
(Degree)	17	5
(Master and Above)	7	2
Monthly Income		
(5000-50,000)	208	60
(51,000-100,000)	104	30
(101,000-150,000)	24	7
s(151,000-500,000)	10	3

Source: Author's own

Table 2 presents the demographic characteristics of the participants, grouped by location. All participants are women from both rural and urban areas. The age distribution is as follows: 26 per cent are between 18 and 35 years old, 24 per cent are between 36 and 45 years old, 35 per cent are between 46 and 55 years old, and 15 per cent are aged 56 years and above. The largest proportion of respondents falls within the 46 to 55-year age group. Educational attainment varies: 30 per cent attended Islamic school, 33 per cent attended secondary school, 20 per cent attended primary school, and the remainders are classified in other

© 2026 The Authors

categories. Monthly income also varies; 60 per cent of respondents report incomes between N5,000 and N50,000, while 30 per cent report incomes between N51,000 and N100,000 using Nigerian currency. These findings suggest that the sample comprises predominantly women with lower income levels, which is relevant for research focused on new product development targeting vulnerable populations.

Table 3. Assessment of Normality

Variables	Skewness	Kurtosis
AW1	-.948	.116
AW2	-1.048	.783
AW3	-.942	.266
AW4	-.903	.439
EU1	-.896	.348
EU2	-.633	.505
EU3	-.974	.745
EU4	-.821	.484
TB1	-1.511	1.850
TB2	-1.233	.812
TB3	-.957	.305
TB4	-1.007	.422
TB5	-.957	.696
RC1	-1.139	.905
RC2	-.988	.953
RC3	-1.120	1.022
RC4	-1.138	1.257
WF1	-.829	.225
WF2	-.764	.412
WF3	-1.001	.822
WF4	-.383	.706
SFI1	-1.091	.725
SFI2	-.935	.723
SFI3	-.895	.754
SFI4	-.811	.642
SFI5	-.967	.798

Source: Author’s own

Table 3 shows that data normality, assessed by structural equation modelling, is significant. This relates to the validity estimate for better justification. In the evaluation above, normality was tested using Kurtosis (<7) and Skewness (<2) thresholds. The results confirm that the analysis is acceptable. Meeting these thresholds supports reliable structural equation modelling, reducing bias in study results and enhancing the accuracy of relationship estimates between variables.

Table 4. Factor loadings

Variables	Items	Loadings
Awareness	AW1	0.750
	AW2	0.768
	AW3	0.628
	AW4	0.767
Ease of Use	EU1	0.700
	EU2	0.741
	EU3	0.740

© 2026 The Authors

Variables	Items	Loadings
	EU4	0.733
Trust and Benefit	TB1	0.720
	TB2	0.789
	TB3	0.814
	TB4	0.858
	TB5	0.762
Religious and Culture	RC1	0.719
	RC2	0.765
	RC3	0.775
	RC4	0.736
Waqf-Fintech	WF1	0.727
	WF2	0.765
	WF3	0.757
	WF4	0.697
Sustainable financial inclusion	SFI1	0.826
	SFI2	0.767
	SFI3	0.789
	SFI4	0.690
	SFI5	0.700

Source: Author's own

Table 4 indicates the loadings of the constructs, which are above 0.5, as a threshold (Sahoo 2019). However, any loadings that are below 0.5 indicate a lack of absolute loadings, which may involve two different scenarios: adjusting the variables or deleting them to improve the loading of the other constructs. Therefore, in the current scenario, the loadings perfectly met the minimum requirement of the threshold.

Table 5. Model fit indices

Measurement	Modified	Recommended	Supported theories
X^2/df	2.345	<3.0	Coşkun and Mardikyan, (2016)
p-value	0.000	0.05	Thakkar (2020)
GFI	0.922	>0.9	Thakkar (2020)
AGFI	0.910	>0.9	Thakkar (2020)
CFI	0.941	>0.9	Bajoulvand et al., (2019)
TLI	0.936	>0.9	Bajoulvand et al., (2019)
IFI	0.939	>0.9	Bajoulvand et al., (2019)
RMSEA	<0.06	<0.08	Vellone et al., 2013

Source: Author's own

Table 5 indicates the Coskun and Mardikyan (2016) recommend a chi-square/degrees of freedom ratio should be less than 0.3. A comparative fit index (CFI) greater than 0.9 and a root mean square error of approximation (RMSEA) below 0.08 indicate good model fit (Vellone et al., 2013). A CFI of 0.9 or above indicates a good fit, while an RMSEA of 0.06 or less indicates that the model fits the estimated population covariance matrix well. A non-significant chi-square also suggests a good-fitting model. Both GFI and AGFI demonstrated good fit, each exceeding the 0.9 threshold. TLI and IFI scores also met the required thresholds, indicating absolute fit.

Table 6. Reliability and validity measurement

Construct (s)	Item (s)	AVE	Composite Reliability	Cronbach's Alpha
Awareness	(4)	0.728	0.768	0.766

© 2026 The Authors

Ease of Use	(4)	0.729	0.731	0.730
Trust and Benefit	(4)	0.789	0.838	0.837
Religious and Culture	(5)	0.749	0.799	0.799
Waqf-Fintech	(4)	0.736	0.793	0.790
Sustainable Financial Inclusion	(5)	0.754	0.743	0.740

Source: Author's own

The reliability and validity of the variables used in the research were explained, supported by three tests that justified their acceptability. Table 6 explained how average variance extracted (AVE), composite reliability (CR) and Cronbach's alpha are utilised to determine reliability and validity, while factor loading is utilised to determine reliability and validity. The AVE has a threshold value of >0.5, while the composite reliability threshold of 0.7 is the same as Cronbach's alpha with 0.7.

Table 7. Discriminant validity

Variables	(1)	(2)	(3)	(4)	(5)	(6)
Awareness	**0.529**					
Ease of Use	0.249	**0.531**				
Trust and Benefit	0.376	0.483	**0.622**			
Religious and Culture	0.315	0.332	0.674	**0.561**		
Waqf-Fintech	0.257	0.493	0.586	0.504	**0.541**	
Sustainable Financial Inclusion	0.214	0.367	0.312	0.512	0.380	**0.568**

Source: Author's own

Table 7 shows the intercorrelations among the constructs ranged from 0.529 to 0.622, all of which were below the recommended cut-off value of 0.85 (Bajoulvand et al., 2019). This finding demonstrates that the correlations were lower than the average variance extracted, which supports the discriminant validity of the measurement model. The standardised factor loadings further indicate an acceptable model fit. The relationship between financial inclusion and both individual and societal well-being was analysed using structural equation modelling (SEM). Structural equation modelling is a statistical technique that evaluates relationships among observed and latent variables. As noted by Coşkun and Mardikyan, (2016), SEM enables the identification of relationships among latent constructs and clarifies the underlying theoretical framework.

Table 8. Testing Structural Modeling

Description	Estimate	SE	CR	P-value	Hypothesis Result
SFI -> AW	0.310	0.070	4.428	0.000	Supported (H1)
SFI -> EU	0.289	0.090	3.211	0.003	Supported (H2)
SFI -> TB	0.185	0.046	4.021	0.000	Supported (H3)
SFI -> RC	0.211	0.070	3.014	0.003	Supported (H4)
WF -> AW	0.117	0.039	3.001	0.004	Supported (H5)
WF -> EU	0.228	0.080	2.850	0.005	Supported (H6)
WF -> TB	0.331	0.089	3.719	0.003	Supported (H7)
WF -> RC	0.410	0.100	4.100	0.000	Supported (H8)
WF -> SFI	0.450	0.117	3.850	0.002	Supported (H9)

Source: Author's own

Table 8 summarises the structural modelling results, which test the direct relationships among the study variables. The first hypothesis (H1) suggests that sustainable financial inclusion has a direct impact on both awareness and ease of use. Specifically, sustainable financial inclusion has a significant influence on

© 2026 The Authors

awareness (β = 0.070, $p < 0.000$) and the ease of use of fintech (β = -0.090, $p < 0.003$). The third hypothesis (H3) posits that sustainable financial inclusion has a positive influence on trust and perceived benefits in the context of Waqf-Fintech. Table 8 shows that the standardised parameter estimates for the effect of sustainable financial inclusion on customer adoption of trust and benefit in Waqf-Fintech are positive and statistically significant (β = 0.070, $p < 0.000$), supporting H3. The fourth hypothesis (H4) posits that religious and cultural factors influence the sustainability of financial inclusion and have a positive impact on individual well-being. The standardised parameter estimate for the relationship between religious and cultural adoption is positive and statistically significant (β = 0.070, $p < 0.004$), supporting H4. The fifth hypothesis (H5) predicts that Waqf-Fintech adoption will positively impact sustainable financial inclusion. Consistent with expectations, the standardised parameter estimates indicate positive and statistically significant relationships between Waqf-Fintech adoption and the variables of awareness, ease of use, trust, and benefit, as well as religious and cultural factors, supporting hypotheses H5, H6, H7, H8, and H9.

Table 9. Testing Mediating outcome

Variables	Direct X->Y	Indirect X->M->Y	Mediation	Decision result
AW ->WF->SFI	0.310(0.000)	2.903(0.003)**	**X->M->Y**	Partial Mediation
EU ->WF-> SFI	0.289(0.003)	2.464(0.01)*	**X->M->Y**	Partial Mediation
TB ->WF-> SFI	0.185(0.185)	2.779(0.005)**	**X->M->Y**	Partial Mediation
RC ->WF-> SFI	0.211(0.003)	2.372(0.01)*	**X->M->Y**	Partial Mediation

Source: Author's own

Table 9 illustrates the results of mediation, indicating direct and indirect relationships. The hypotheses were accepted and none rejected. Therefore, the mediating results indicate partial mediation for the entire test, which clearly indicates that AW ->WF-> SFI, EU ->WF-> SFI, TB ->WF-> SFI, and RC ->WF-> SFI have direct effects on studies, as indicated in the relationship in Table 7.

4. DISCUSSION

The objective of the study is to examine the integration of Waqf-Fintech as a solution to enhance women's financial inclusion in Nigeria using technological awareness, ease of use of the Fintech technology, trust and benefit of the innovative technology and religious and cultural compliance, as people considered religious and cultural background are fundamental to their daily activities. Based on the demographic profile of the participants, showing more than 29 per cent attended Islamic school, which indicates any financing approach or method used in contrast with fundamentals will be rejected, and also visible in the demographic analysis that 60 per cent of the respondents are lower earners, which earned (5000-50,000) per month and equivalent to (3.2 USD-32.8USD). The ages of respondents with the highest percentages were 46-55 years old, followed by 18-35 years old and then 36-45 years old. Upon reviewing this analysis, the discussion clearly highlights the level of financial exclusion and proposes an innovative approach to addressing financial inclusion in Nigeria.

As a result of their insufficient income and lack of access to financial services, especially in rural areas where physical financial institutions do not exist, innovative financial services, such as financial technology, enhance financial inclusion in these areas. The study employed a different approach in addressing financial inclusion and ensured that the data were appropriately assembled, using an assessment of normality in Table 3, which included Kurtosis and Skewness. In Table 4, the factor loadings of the constructs were tested and justified, as the loadings were above 0.5. This indicates that all constructs used were perfectly loaded, which also indicates the direction of the research and its relative importance as a reflective indicator of financial inclusion. In addition, the Waqf-Fintech integration financing enhances financial inclusion. Table 5 of the study indicates the absolute model fit index as all parameters were loaded as recommended (Vellone et al., 2013; Coşkun and Mardikyan, 2016; Bajoulvand et al., 2019; Thakkar, 2020).

© 2026 The Authors

Moreover, Table 6 addresses reliability and validity measurement, which was perfectly loaded, and the same applies to discriminant validity, as it met the requirement threshold of acceptability, with none of the loadings exceeding 0.85, as recommended (Bajoulvand et al., 2019). Furthermore, Table 8 presents the regression analysis of testing structural modeling using the proposed hypotheses, as shown in Figure 1. The study's findings established Waqf-fintech as an advocate for awareness of Waqf-fintech integration, ease of use of innovative products, and friendly use, trusting the invented products and harnessing the related benefits, as well as the religious and cultural integration of the product based on Waqf-fintech, which attracts financial inclusion and addresses exclusion. Therefore, these hypotheses aim to improve financial inclusion through Waqf-Fintech, which also enhances the well-being of individuals in both rural and urban areas. Therefore, the findings show that having physical financial institutions in our rural area is insufficient to facilitate and address financial inclusion in normal financial transactions. Stakeholders should go beyond making finances available; they must be assessed in a suitable situation. The positive and partial mediation of awareness and sustainable financial inclusion through waqf-fintech justifies the direct and indirect relationship, as waqf-fintech mediates the ease of use, resulting in partial mediation between the direct and indirect relationships. Additionally, trust and benefit exhibit partial mediation, as do religion and culture, as indicated in Table 9. Moreover, this result suggests the potential positive role of Waqf-Fintech technological innovation in enhancing sustainable financial inclusion in Nigeria. Furthermore, this study found that awareness, ease of use, trust, benefit, and religious and cultural compliance of Waqf-fintech integration will definitely improve sustainable financial inclusion and address exclusion in the country.

5. IMPLICATION AND CONCLUSION

The findings highlighted practical and theoretical implications. From a practical perspective, financial inclusion has become one of the most pressing issues the world faces, and can also be categorized as a hindrance to achieving the Sustainable Development Goals (SDGs) in developing countries. These steps have long been considered by stakeholders and policymakers as a means to promote financial inclusion and foster economic growth by providing a range of financial services. This also proposes a way to attract financial inclusion through Waqf-Fintech programs, where individuals or groups, regardless of whether rural or urban, can access financial services without hindrance. The research offers policymakers, academics, and practitioners valuable insights on how to enhance financial inclusion in Nigeria. Therefore, decision-makers of financial inclusion should diversify the means by which Waqf-Fintech outreach reaches both rural and urban areas, providing financial services. Based on the theoretical aspect, the study contributes to the literature on Waqf-Fintech for financial inclusion, as some literature indicates that waqf is one of the most significant factors in promoting financial inclusion. The study made a significant contribution through its unique approach, which utilized structural equation modeling to assess people's views on Waqf-Fintech in Nigeria.

DECLARATION

Credit Authorship Contribution:

The authors have been involved in the entire research work.

Declaration of Competing Interest:

The authors have no potential conflict of interest.

Acknowledgement:

The authors acknowledge the Institute of Islamic Banking and Finance for supporting the research as part of Postdoctoral Fellowship at IIBF. However, the research has not received any external funding.

Use of AI in Proofreading and Enhancing Readability Quality:

We acknowledge the use of grammarly in enhancing the readability and linguistic quality of the works. However, do not replace the original task of the authors.

© 2026 The Authors

Data Availability:
The data used in research are available upon request.

REFERENCES

[1] Adera, A., & Abdisa, L. T. (2023). Financial inclusion and women's economic empowerment: Evidence from Ethiopia. *Cogent Economics & Finance*, *11*(2), 2244864.

[2] Adigun, W. F., & Busari, J. M. (2025). Halal Opportunities for Women Financial Inclusion in the Blue Economy for Halal Sustainability. In *Green and Blue Economy Frameworks for Halal Industry Sustainability* (pp. 47-72). Singapore: Springer Nature Singapore.

[3] Agyemang, A. O., Yusheng, K., & Osei, A. (2025). Addressing sustainability footprint disclosure for high pollutant firms in China and the US: The roles of firms governance structure, financing decisions, and eco-technology. *Corporate Social Responsibility and Environmental Management*, *32*(2), 2835-2858.

[4] Al-Daihani, M., Dirie, K. A., Alam, M. M., & Abdullah, A. S. (2025). Business process model for "crowdfunding cash waqf model". *Journal of Islamic Accounting and Business Research*, *16*(1), 147-169.

[5] Bajoulvand, R., González-Jiménez, E., Imani-Nasab, M. H., & Ebrahimzadeh, F. (2019). Predicting exclusive breastfeeding among Iranian mothers: application of the theory of planned behavior using structural equation modeling. *Iranian Journal of Nursing and Midwifery Research*, *24*(5), 323-329.

[6] Cheah, J. H., Roldán, J. L., Ciavolino, E., Ting, H., & Ramayah, T. (2021). Sampling weight adjustments in partial least squares structural equation modeling: guidelines and illustrations. *Total Quality Management & Business Excellence*, *32*(13-14), 1594-1613.

[7] Cicchiello, A. F. (2021). Gender disparity effect among financially included (and excluded) women in Middle East and North Africa. Economics and Business Letters.

[8] Cicchiello, A. F., Kazemikhasragh, A., Monferrá, S., & Girón, A. (2021). Financial inclusion and development in the least developed countries in Asia and Africa. Journal of Innovation and Entrepreneurship, 10(1), 1–13. https://doi.org/10.1186/s13731-021-00190-4

[9] Coşkun, M., & Mardikyan, S. (2016). Predictor factors for actual usage of online evaluation and assessment systems: a structural equation model (SEM) study. *Education and Science*, *41*(188).

[10] de La Roche, D., Curl, A., & Fitt, H. (2025). The power of community: Perspectives from women with disabilities on making healthcare journeys in Yogyakarta, Indonesia. *Journal of transport geography*, *124*, 104182.

[11] Dirie, K. A., Alam, M. M., & Maamor, S. (2024). Islamic social finance for achieving sustainable development goals: a systematic literature review and future research agenda. *International Journal of Ethics and Systems*, *40*(4), 676-698.

[12] Ediagbonya, V., & Tioluwani, C. (2023). The role of fintech in driving financial inclusion in developing and emerging markets: issues, challenges and prospects. *Technological Sustainability*, *2*(1), 100-119.

[13] Elouaourti, Z., & Ibourk, A. (2024). Financial Technologies for All MENA citizens: Tackling barriers and promoting inclusion. *Regional Science Policy & Practice*, *16*(6), 100019.

[14] Ezzahid, E., & Elouaourti, Z. (2021). Financial inclusion, mobile banking, informal finance and financial exclusion: micro-level evidence from Morocco. *International Journal of Social Economics*, *48*(7), 1060-1086.

© 2026 The Authors

[15] Hasan, R., Ashfaq, M., Parveen, T., & Gunardi, A. (2023). Financial inclusion–does digital financial literacy matter for women entrepreneurs?. *International Journal of Social Economics*, *50*(8), 1085-1104.

[16] Idowu, D. L. (2024). Can Women Put Their Breasts on a Hot Paraffin Lantern and Go to Sleep? Interrogating the Anguish of Financing Small-and Medium-Scale Enterprises (SMEs) with Microcredits in Nigeria. In *Gender-Responsive Budgeting in Africa: Access and Future Measures* (pp. 97-108). Cham: Springer Nature Switzerland.

[17] Ishak, M. S. I., & Mohammad Nasir, N. S. (2024). The applicability of Islamic crowdfunding as an alternative funding for micro-entrepreneurs in Malaysia. *Qualitative Research in Financial Markets*, *16*(3), 548-564.

[18] Islam, M. S. (2021). Role of Islamic microfinance in women's empowerment: evidence from rural development scheme of Islami bank Bangladesh limited. *ISRA International Journal of Islamic Finance*, *13*(1), 26-45.

[19] Jafar, A., Ibrahim, H., & Malik, R. (2025). Waqf: From classical charitable system to modern financial tool. *International Journal of Ethics and Systems*.

[20] Jose, J., & Younas, J. (2023). Financial inclusion and women's bargaining power: evidence from India. *International Review of Applied Economics*, *37*(1), 76-92.

[21] Kamran, S., & Uusitalo, O. (2024). How informal financial service institutes facilitate the financial inclusion of low-income, unbanked consumers. *International Journal of Bank Marketing*, *42*(6), 1232-1263.

[22] Kamran, S., & Uusitalo, O. (2024). How informal financial service institutes facilitate the financial inclusion of low-income, unbanked consumers. *International Journal of Bank Marketing*, *42*(6), 1232-1263.

[23] Kandpal, V. (2024). Dimensions of financial inclusion in India: a qualitative analysis of bankers perspective. *Qualitative Research in Financial Markets*, *16*(4), 660-679.

[24] Khan, A. S., & Shahid, S. (2025). Gender and social inclusion: impact of mobile payment system on micro-entrepreneurs' perceived success and subjective well- being. *Aslib Journal of Information Management*, *77*(4), 780-796.

[25] Kochar, A., Nagabhushana, C., Sarkar, R., Shah, R., & Singh, G. (2022). Financial access and women's role in household decisions: Empirical evidence from India's National Rural Livelihoods project. *Journal of Development Economics*, *155*, 102821.

[26] Koomson, I., Martey, E., & Etwire, P. M. (2023). Mobile money and entrepreneurship in East Africa: The mediating roles of digital savings and access to digital credit. *Information Technology & People*, *36*(3), 996-1019.

[27] Kulkarni, L., & Ghosh, A. (2021). Gender disparity in the digitalization of financial services: challenges and promises for women's financial inclusion in India. *Gender, Technology and Development*, *25*(2), 233-250.

[28] Kurniasari, F., & Lestari, E. D. (2024). DEVELOPMENT OF FINANCIAL LITERACY AND FINTECH ADOPTION ON WOMEN SMEs BUSINESS PERFORMANCE IN INDONESIA. *Eastern-European Journal of Enterprise Technologies*, *131*(13).

[29] Le Quoc, D. (2024). The relationship between digital financial inclusion, gender inequality, and economic growth: dynamics from financial development. *Journal of Business and Socio-Economic Development*, *4*(4), 370-388.

[30] Liu, J., Chen, Y., Chen, X., & Chen, B. (2024). Digital financial inclusion and household financial vulnerability: An empirical analysis of rural and urban disparities in China. *Heliyon*, *10*(15).

[31] Mahomed, Z., & Saba, I. (2024). Sustainable Development: Exploring the Role of Islamic Social Finance in Promoting Sustainable Development and Social Welfare. In *The Future of Islamic Finance: From Shari'ah Law to Fintech* (pp. 103-120). Emerald Publishing Limited.

[32] Mahomed, Z., & Saba, I. (2024). Sustainable Development: Exploring the Role of Islamic Social Finance in Promoting Sustainable Development and Social Welfare. In *The Future of Islamic Finance: From Shari'ah Law to Fintech* (pp. 103-120). Emerald Publishing Limited.

[33] Mhlanga, D. (2025). The state of financial inclusion in Sub-Saharan Africa. In *Financial Inclusion and Sustainable Development in Sub-Saharan Africa* (pp. 8-31). Routledge.

[34] Mossie, W. A. (2022). Understanding financial inclusion in Ethiopia. Cogent Economics & Finance, 10(1), 2071385. https://doi.org/10.1080/23322039.2022.2071385

[35] Muhammad, T., & Al-Shaghdari, F. (2024). Islamic social finance system: an alternative tool for tackling educational setbacks in Northern Nigeria. *Journal of Islamic Marketing*, *15*(11), 3115-3136.

[36] Muhammad, T., & Al-Shaghdari, F. (2025). Waqf microfinance as an alternative and sustainable government empowerment tool towards women in Northern Nigeria: a perceptional analysis. *Journal of Business and Socio-economic Development*.

[37] Mukalayi, N. M., & Inglesi-Lotz, R. (2023). Digital financial inclusion and energy and environment: Global positioning of Sub-Saharan African countries. *Renewable and Sustainable Energy Reviews*, *173*, 113069.

[38] Offiong, A. I., Bassey Riman, H., James, G. B., Ogar, A., Okon, E. E., & Mboto, H. W. (2021). Primary school enrolment rate, completion rate and gender balancing in Nigeria; the financial inclusion perspective. *International Journal of Social Economics*, *48*(4), 602-621.

[39] Okoth, D., Ogweno, J. O., & Okeyo, C. (2022). The relationship between microfinance saving services and SMEs growth in Kenya: a case study of manyatta sub- location, kisumu, Kenya. *AJFBM*, *1*(1), 26-38.

[40] Ozili, P. K. (2024). Women digital financial inclusion and economic growth in Nigeria. *Journal of Internet and Digital Economics*, *4*(3), 161-178.

[41] Pal, M., Gupta, H., & Joshi, Y. C. (2022). Social and economic empowerment of women through financial inclusion: empirical evidence from India. *Equality, Diversity and Inclusion: An International Journal*, *41*(2), 294-305.

[42] Ramya, U., Pushpa, A., & Ghosh, N. (2024). Women entrepreneurship–A way towards sustainability. In *The framework for resilient industry: A holistic approach for developing economies* (pp. 281-299). Emerald Publishing Limited.

[43] Sahoo, M. (2019). Structural equation modeling: Threshold criteria for assessing model fit. In *Methodological issues in management research: Advances, challenges, and the way ahead* (pp. 269-276). Emerald Publishing Limited.

[44] Sherwani, F. K., Shaikh, S. Z., Behal, S., & Siddiqui, M. S. (2024). Determinants of financial inclusion among women-owned enterprises: a case study of the informal sector. *Arab Gulf Journal of Scientific Research*, *42*(4), 1340-1358.

© 2026 The Authors

[45] Showkat, M., Nagina, R., Baba, M. A., & Yahya, A. T. (2025). The impact of financial literacy on women's economic empowerment: exploring the mediating role of digital financial services. *Cogent Economics & Finance*, *13*(1), 2440444.

[46] Smolo, E., Saba, I., Ismail, N., & Mahomed, Z. (2024). Integrating Islamic Finance Into the Sustainable Development Goals (SDGs). In *The Future of Islamic Finance* (pp. 65-82). Emerald Publishing Limited.

[47] Soetan, T. O., & Mogaji, E. (2024). Financial Inclusion in Nigeria. In *Financial Services in Nigeria: The Path Towards Financial Inclusion, Economic Development and Sustainable Growth* (pp. 189-211). Cham: Springer Nature Switzerland.

[48] Suhrab, M., Chen, P., & Ullah, A. (2024). Digital financial inclusion and income inequality nexus: can technology innovation and infrastructure development help in achieving sustainable development goals?. *Technology in Society*, *76*, 102411.

[49] Tennin, K. L., & Brunswick, S. (2024). Sustainable Approaches to Poverty and Challenges From the 21st Century. In *Understanding the Multi-Dimensional Nature of Poverty* (pp. 13-41). Emerald Publishing Limited.

[50] Thakkar, J. J. (2020). Structural equation modelling. *Application for Research and Practice*, *285*.

[51] Umar, U. H., Ado, M. B., & Ayuba, H. (2020). Is religion (interest) an impediment to Nigeria's financial inclusion targets by the year 2020? a qualitative inquiry. *Qualitative research in financial markets*, *12*(3), 283-300.

[52] Vellone, E., Riegel, B., D'Agostino, F., Fida, R., Rocco, G., Cocchieri, A., & Alvaro, R. (2013). Structural equation model testing the situation-specific theory of heart failure self-care. *Journal of Advanced Nursing*, *69*(11), 2481-2492.

[53] Xu, Y., & Zhao, Y. (2025). Mediation analysis with graph mediator. *Biostatistics*, *26*(1), kxaf004.

[54] Zahid, R. A., Rafique, S., Khurshid, M., Khan, W., & Ullah, I. (2024). Do women's financial literacy accelerate financial inclusion? Evidence from Pakistan. *Journal of the knowledge economy*, *15*(1), 4315-4337.

© 2026 The Authors