# Digital financial access as a moderator in the financial capability–financial inclusion nexus: Evidence from informal women traders in Zambia

Fred M'membe[1]
Joseph Ntayi[2]
Louis Nyahunda[3]

[1]mmembefred8@gmail.com
[2]ntayijoseph@gmail.com
[3]lnyahunda@uj.ac.za

[1]University of Zambia, Lusaka, Zambia, [2]Makerere University Business School, Uganda, [3]University of Johannesburg, South Africa

https://doi.org/10.51867/ajernet.7.2.4

## ABSTRACT

While financial capability and empowerment are established drivers of financial inclusion, the contextual conditions under which these relationships hold or are amplified remain understudied in Sub-Saharan Africa. This study examines the moderating role of digital financial access in the relationships between financial capability, financial empowerment, financial literacy, and financial inclusion among 273 women traders in Lusaka's informal markets, Zambia, selected using stratified random sampling from a target population of 4,028 registered women traders across three major Lusaka markets. Anchored on the Technology Acceptance Model, Sherraden's Financial Capability Framework, and the Inclusive Financial Wellbeing Empowerment Model, a post-positivist moderation analysis was conducted using structural equation modelling with mean-centred interaction terms in AMOS 25, with 2,000-iteration bias-corrected bootstrapping. Results reveal that digital financial access significantly moderates the financial capability - financial inclusion relationship ($\beta = 0.206$, $p < .01$), amplifying the positive effect of capability on inclusion. However, digital financial access did not significantly moderate the financial empowerment–financial inclusion relationship ($\beta = -0.033$, $p = .564$) nor the financial literacy–financial inclusion relationship ($\beta = 0.038$, $p = .514$). This selective moderation finding - supported by all three of the theoretical frameworks employed - indicates that digital financial access serves as an enabling platform specifically for capability-translated inclusion, confirming that practical financial skills are necessary for digital platform utilisation and that empowerment operates through psychological channels that are largely independent of digital infrastructure availability. The study is the concluding paper in a three-paper series that collectively establishes the golden thread - financial literacy → capability/empowerment → inclusion - with digital financial access as the institutional amplifier of the capability link. The findings advance evidence-based recommendations for sequencing digital infrastructure investment alongside capability-building programmes in Zambia's National Financial Inclusion Strategy II (2024–2028) implementation.

**Keywords:** Digital Financial Access, Financial Capability, Financial Inclusion, Moderation, Technology Acceptance, Women Traders, Zambia

## I. INTRODUCTION

The rapid expansion of digital financial services - including mobile money, agent banking, electronic wallets, and online savings platforms - has fundamentally transformed the landscape of financial inclusion in Sub-Saharan Africa. Mobile money alone has extended formal financial access to millions of previously unbanked adults across the region, with Kenya's M-Pesa and similar platforms demonstrating the potential for digital infrastructure to dramatically reduce the cost and distance barriers that traditionally exclude low-income populations from formal financial systems (Demirgüç-Kunt et al., 2022; Ozili, 2025). In Zambia, mobile money platforms including Airtel Money, MTN Mobile Money, and Zamtel Kwacha have significantly extended financial service reach, with the Bank of Zambia (2024) estimating that over ten million mobile money accounts were active as of 2023, representing a substantial expansion of the formal digital financial infrastructure available to informal market women.

However, access to digital financial infrastructure does not automatically translate into inclusive financial participation. The foundational insight of the Technology Acceptance Model (Davis, 1989), subsequently extended by Venkatesh et al. (2003) in the Unified Theory of Acceptance and Use of Technology, is that adoption and sustained usage of digital technologies depends on perceived usefulness and perceived ease of use, both of which are shaped by the underlying capabilities and prior experiences that users bring to the technology encounter. Applied to digital financial services, this theoretical insight predicts that the extent to which digital access enhances financial inclusion will depend critically on whether users possess the financial capability and digital literacy required to perceive digital platforms as

useful and usable. Where capability is lacking, digital access may remain an underutilised resource rather than an inclusion enabler.

This study serves as the concluding empirical contribution of a three-paper series examining the financial literacy–capability–inclusion nexus among women traders in Lusaka's informal markets. Paper 1 established that financial capability fully mediates the literacy-to-inclusion relationship (indirect effect = 0.250, $p < .01$), with no significant direct path from literacy to inclusion. Paper 2 demonstrated that financial empowerment is an even more potent mediating mechanism (indirect effect = 0.355, $p < .01$), with empowerment operating through confidence, decision-making autonomy, and peer support mechanisms that are partly independent of practical capability. Paper 3 addresses the equally important question of the contextual conditions under which capability and empowerment translate into formal financial participation. Specifically, this study tests whether digital financial access moderates the capability-to-inclusion, empowerment-to-inclusion, and literacy-to-inclusion pathways using SEM with mean-centred interaction terms estimated in AMOS 25 with data from 273 women traders. The selective moderation finding - that digital financial access amplifies only the capability pathway - is the central analytical contribution, with direct implications for investment sequencing in Zambia's financial inclusion architecture.

### 1.1 Statement of the Problem

Investment in digital financial infrastructure in Zambia has outpaced the financial inclusion gains expected from such investment. Despite significant expansion of mobile money networks, agent banking infrastructure, and digital payment systems since the National Financial Inclusion Strategy launched in 2017, a substantial proportion of informal sector women remain either financially excluded or engage only in basic, low-value transactions without accessing savings, credit, or insurance products (Bank of Zambia, 2024; Mwange & Mumba, 2025). The investment-to-inclusion gap raises a critical analytical question: for whom does digital access translate into meaningful financial inclusion, and through which individual-level pathways? Theoretical frameworks including the Technology Acceptance Model, Sherraden's (2013) capability framework, and the Inclusive Financial Wellbeing Empowerment Model (Jorgensen, 2020) all suggest that digital access is an enabling condition rather than a sufficient cause of inclusion, with its effect on inclusion being contingent on the individual-level capability and empowerment that users bring to the digital encounter. This study tests this contingency hypothesis rigorously, with results that have direct implications for the design and sequencing of NFIS II implementation.

### 1.2 Research Objectives

i. Examine the moderating effect of digital financial access on the relationship between financial capability and financial inclusion.
ii. Determine the moderating effect of digital financial access on the relationship between financial empowerment and financial inclusion.
iii. Assess the moderating effect of digital financial access on the relationship between financial literacy and financial inclusion.

### 1.3 Research Hypotheses

*$Ho_1$*: Digital financial access significantly moderates the relationship between financial capability and financial inclusion.
*$Ho_2$:* Digital financial access significantly moderates the relationship between financial empowerment and financial inclusion.
*$Ho_3$:* Digital financial access significantly moderates the relationship between financial literacy and financial inclusion.

## II. LITERATURE REVIEW

### 2.1 Theoretical Review

#### 2.1.1 Technology Acceptance Model and Digital Financial Inclusion

Davis's (1989) Technology Acceptance Model posits that technology adoption is determined by two primary cognitive beliefs: perceived usefulness - the degree to which a technology is believed to enhance performance - and perceived ease of use - the degree to which technology use is believed to be free of effort. Both beliefs jointly determine behavioural intention to use and actual system usage. Applied to digital financial services in the context of informal market women in Zambia, the Technology Acceptance Model predicts that mobile money, e-wallets, and digital banking platforms will drive financial inclusion only when users perceive these services as useful for their financial management needs and as accessible within their digital capability limits. Venkatesh et al. (2003) extend the Technology Acceptance Model through the Unified Theory of Acceptance and Use of Technology framework, incorporating social influence and facilitating conditions as additional determinants of adoption. In the Zambian informal market context, social

influence operates through peer networks within chilimba savings groups and market associations, while facilitating conditions correspond to agent network quality, network reliability, and the affordability and interoperability of digital platforms. Together, these theoretical extensions predict that digital financial access moderates the capability-to-inclusion pathway not just through individual-level perceived usefulness but also through the quality of the digital ecosystem that determines whether capable users have effective access to reliable and affordable digital financial platforms.

### 2.1.2 Sherraden's Financial Capability Framework and Digital Enablement

Sherraden's (2013) Financial Capability Framework positions financial capability as the intersection of the ability to act - derived from literacy and skills - and the opportunity to act - provided by enabling institutional environments. Digital financial access functions within this framework as an institutional opportunity structure: the availability of reliable, affordable, and accessible digital financial platforms creates the institutional opportunities through which financially capable women can convert their knowledge and skills into formal financial participation. The framework therefore predicts a positive moderation effect of digital financial access on the capability-to-inclusion relationship (H1), since greater digital access expands the opportunity structures through which capability can be expressed as formal financial inclusion. The framework also predicts that the moderation effect of digital financial access will be specific to the capability pathway rather than being uniformly present across all inclusion-driving pathways, because empowerment operates primarily through psychological mechanisms of confidence and agency that are less directly dependent on digital platform availability (Jorgensen, 2020). These theoretical distinctions motivate the selective moderation hypothesis that H1 will be supported while H2 and H3 will not.

### 2.1.3 Inclusive Financial Wellbeing Empowerment Model and Digital Moderation

The Inclusive Financial Wellbeing Empowerment Model (Jorgensen, 2020) provides an intersectional framework for understanding why the moderation effect of digital financial access may differ across empowerment and capability pathways. The model's three empowerment dimensions - access, action, and emotional agency - suggest that digital financial access primarily affects the access dimension and, through improved platform usability, potentially the action dimension. The emotional agency dimension, encompassing confidence, self-determination, and freedom from social constraints, is theoretically less dependent on digital platform availability and more dependent on social and psychological enabling conditions. This differential impact predicts that digital financial access should moderate capability-driven inclusion more strongly than empowerment-driven inclusion, consistent with the null prediction for H2. The qualitative evidence from Paper 2 reinforces this theoretical prediction: women in the focus group discussions described empowerment as operating primarily through the confidence to approach formal institutions - a capacity independent of digital platform availability - rather than through digital channel utilisation specifically.

## 2.2 Empirical Review

### 2.2.1 Digital Financial Access and Financial Capability: The Moderation Nexus

Substantial empirical evidence supports the capability-contingent nature of digital financial inclusion across Sub-Saharan Africa and comparable developing economy contexts. Mwange and Mumba (2025) provide the most directly relevant Zambian evidence, finding that digital financial literacy significantly moderates the trust-to-digital-inclusion relationship among Lusaka informal traders (N = 361), with self-efficacy serving as an additional moderator. This finding confirms that capability-type variables determine whether digital financial access produces inclusion, consistent with the Technology Acceptance Model's prediction that perceived usefulness - which depends on capability - is necessary for digital adoption. Chibesa and Mwange (2025) reinforced this pattern by demonstrating that digital financial literacy is the strongest demand-side predictor of digital financial inclusion ($\beta = 0.54$, $p < .01$) among informal entrepreneurs in Zambia. Beyond Zambia, Lyons and Kass-Hanna (2021) found that digital financial services amplify the financial capability-inclusion relationship in the Middle East and North Africa, with the moderation effect being strongest for women with high financial capability. Moghadam and Karami (2023) demonstrated in Iran that FinTech access enhances financial inclusion primarily among users with higher financial capability, corroborating the Technology Acceptance Model's prediction. Dluhopolskyi et al. (2023) provided evidence across European contexts that digital financial inclusion during COVID-19 was primarily driven by pre-existing digital capabilities. Musana et al. (2023) contribute institutional-level evidence that inter-firm coopetition among digital financial service providers significantly enhances digital financial inclusion by expanding competitive platform offerings, establishing that ecosystem-level digital access conditions create the enabling environment within which individual capability moderation operates.

### 2.2.2 Digital Financial Access and Financial Empowerment: The Null Moderation Hypothesis

The moderating role of digital financial access on empowerment-driven inclusion is theoretically predicted to be weaker and potentially insignificant. Jorgensen's (2020) Inclusive Financial Wellbeing Empowerment Model theorises that empowerment operates primarily through psychological agency and emotional confidence, which are less directly dependent on digital platform availability than on social and institutional conditions that validate women's financial autonomy. Mabrouk et al. (2023) found that digital financial inclusion positively affected women's empowerment in developing economies, but their analysis examined the reverse relationship - from inclusion to empowerment - rather than from empowerment to inclusion moderated by digital financial access. This null moderation prediction for H2 is consistent with the theoretical logic that empowerment, as a psychological construct, is activated by social support, peer learning, and confidence-building mechanisms rather than by digital platform availability. The focus group evidence from Paper 2 corroborates this prediction, showing that empowerment enabled women to access formal financial services through diverse channels - branch banking, microfinance, and agent networks - reducing their dependence on digital platforms specifically.

### 2.2.3 Digital Financial Access and Financial Literacy: A Null or Weak Moderation

The moderation of the literacy-to-inclusion relationship by digital financial access (H3) is similarly predicted to be null or weak, based on the full mediation finding from Paper 1 that literacy has no significant direct effect on inclusion when capability is controlled for. If the literacy-to-inclusion direct pathway is not significant, the digital financial access moderation of that pathway is also unlikely to be significant, since there is no direct pathway to be moderated. Grohmann et al.'s (2018) cross-country evidence confirms that literacy effects on inclusion are largely mediated by capability and institutional access rather than direct. The implication is that investing in digital access alone, without building the underlying financial capability required to use digital platforms effectively, is unlikely to produce the inclusion gains predicted by a simple digital access-to-inclusion model.

### 2.2.4 The Golden Thread: Capability × Digital Access → Inclusion

The three-paper series converges on a nuanced articulation of the golden thread that links literacy to inclusion through two complementary mediating mechanisms and one contextual amplifier. Paper 1 established: literacy → capability → inclusion. Paper 2 established: literacy → empowerment → inclusion (the more potent thread). Paper 3 adds the contextual dimension: digital financial access amplifies the capability thread but not the empowerment thread. The complete golden thread can therefore be stated as follows: financial literacy produces financial capability and financial empowerment; financial capability and empowerment independently drive financial inclusion; and digital financial access amplifies the capability-to-inclusion link by providing the institutional opportunity structures that enable capable users to translate their skills into formal financial participation. This contextually differentiated golden thread has direct implications for intervention design: empowerment programmes can generate inclusion gains independently of digital infrastructure improvements, while capability-building programmes generate the highest inclusion returns when accompanied by expanded digital financial access. The two tracks are complementary, not substitutable, and NFIS II implementation should invest in both simultaneously.

## III. METHODOLOGY

### 3.1 Research Philosophy and Design

The study adopted a post-positivist research philosophy underpinned by a deductive approach, moving from theoretical propositions derived from the Technology Acceptance Model, Sherraden's (2013) framework, and the Inclusive Financial Wellbeing Empowerment Model to empirical hypothesis testing. A cross-sectional survey design was employed, appropriate for testing moderation hypotheses that require simultaneous measurement of predictors, moderators, and outcome variables at a single point in time (Hair et al., 2019; Kline, 2023). The study's focus on women traders in Lusaka's informal markets was motivated by the same contextual considerations as the companion studies, ensuring consistency and comparability across the series of empirical studies.

### 3.2 Study Area and Target Population

The study was conducted across three major informal markets in Lusaka, Zambia: Lusaka Food Market, Lusaka City Market, and Soweto Market. The total estimated population of registered women traders across the three markets was 4,028, derived from market management records. The study population was restricted to women traders because women in informal markets constitute a demographically distinct group with specific financial inclusion barriers related to gender, social norms, institutional exclusion, and differential digital access (Kabeer, 2016; Demirgüç-Kunt et al., 2022).

### 3.3 Sampling Procedure and Sample Size

Stratified random sampling across the three markets proportional to their registered trader populations yielded 273 valid responses from women traders, representing a response rate of 91% from 285 questionnaires distributed. The achieved sample size of 273 exceeds the minimum recommended for SEM (Kline, 2023) and satisfies the ten-observations-per-parameter rule (Hair et al., 2019), providing adequate statistical power for moderation testing. This is methodologically consistent with the sampling procedures described in the companion studies, ensuring comparability across the series.

### 3.4 Data Collection Instruments and Measures

Structured questionnaires measured financial capability (8 items), financial empowerment (10 items), financial literacy (9 items), digital financial access (6 items, adapted from Davis, 1989, and Mwange & Mumba, 2025), and financial inclusion (7 items) on 5-point Likert scales. The digital financial access scale items captured mobile money account ownership, agent network accessibility, platform usability, digital payment frequency, internet connectivity quality, and transaction cost perceptions, providing a multidimensional operationalisation consistent with the Technology Acceptance Model's emphasis on perceived usefulness and ease of use. All instruments were adapted from validated sources and locally validated through expert review at the University of Zambia's Graduate School of Business and a pilot test with 30 women traders not included in the main sample.

### 3.5 Validity and Reliability

Construct validity and reliability were confirmed using the same procedures as the companion studies: confirmatory factor analysis with principal component analysis extraction (KMO > 0.79, Bartlett's $p < .001$), Cronbach's alpha exceeding 0.70 for all scales, and Heterotrait-Monotrait ratios below 0.85 (Henseler et al., 2015). The digital financial access scale's single-factor solution explained 41.01% of variance (KMO = 0.792, Bartlett's test: $\chi^2 = 242.31$, $df = 15$, $p < .001$), confirming unidimensionality.

### 3.6 Moderation Analysis

Moderation was tested using interaction effects in SEM (AMOS 25). Mean-centred interaction terms - specifically digital financial access multiplied by financial capability, digital financial access multiplied by financial empowerment, and digital financial access multiplied by financial literacy - were created to reduce multicollinearity and facilitate interpretation of interaction effects (Hair et al., 2019; Park & Yi, 2024). Maximum likelihood estimation with 2,000-iteration bias-corrected bootstrapping was used to assess path significance and generate confidence intervals for interaction term coefficients (Hayes, 2022; Baron & Kenny, 1986). Significant interaction terms, indicated by significant path coefficients and confidence intervals excluding zero, provide evidence that digital financial access moderates the respective predictor-outcome relationship in the hypothesised direction.

### 3.7 Ethical Considerations

Ethical clearance was obtained from the University of Zambia Ethical Review Board. All participants provided written informed consent prior to participation. Participation was voluntary, and participants were informed of their right to withdraw at any point without penalty. Data were anonymised and stored securely. The study adhered to the principles of the Declaration of Helsinki and all relevant University of Zambia research ethics guidelines.

## IV. FINDINGS & DISCUSSION

### 4.1 Model Fit

The structural model demonstrated excellent overall fit: $\chi^2/df = 1.045$, RMSEA = 0.013 (95% CI: .00 to .02), GFI = 0.899, AGFI = 0.883, CFI = 0.983, TLI = 0.982, IFI = 0.984, PNFI = 0.664, $R^2 = 0.445$. All indices met or exceeded recommended thresholds, confirming the adequacy of the moderation model for drawing valid inferences about the interaction term coefficients. The consistency of these fit indices with those reported in the companion studies confirms model stability across the three-paper series.

### 4.2 Moderation Results and Hypothesis Testing

Table 1 presents the moderation analysis results for the three interaction terms tested in this study.

**Table 1**

*Moderation Analysis Results: SEM Interaction Terms (N = 273)*

| Hypothesis | Interaction Term | β (Std.) | B (Unstd.) | SE | z-value | p-value | Result |
|---|---|---|---|---|---|---|---|
| H1 | DFA × FinCap → FinInc | 0.206 | 0.415 | 0.121 | 3.421 | < .01 | Supported*** |
| H2 | DFA × FinEmp → FinInc | −0.033 | −0.053 | 0.091 | −0.577 | .564 | Not Supported |
| H3 | DFA × FinLit → FinInc | 0.038 | 0.066 | 0.101 | 0.653 | .514 | Not Supported |

*Note. *** p < .01. DFA = Digital Financial Access; FinCap = Financial Capability; FinEmp = Financial Empowerment; FinLit = Financial Literacy; FinInc = Financial Inclusion. Interaction terms are mean-centred.*

#### 4.2.1 $Ho_1$: Digital Financial Access Moderates Financial Capability and Financial Inclusion (Supported)

Hypothesis 1 was supported: digital financial access significantly moderates the relationship between financial capability and financial inclusion (β = 0.206, z = 3.421, p < .01). This positive and significant interaction effect indicates that the positive effect of financial capability on financial inclusion is amplified when women traders have greater access to digital financial platforms. Among women with both high financial capability and meaningful digital financial access, the probability of formal financial inclusion is substantially higher than would be predicted by either capability or digital financial access alone. This finding aligns with the Technology Acceptance Model's theoretical prediction that capability determines whether digital platforms are perceived as useful, which in turn determines adoption and sustained usage. Sherraden's (2013) framework is similarly vindicated: digital access functions as the institutional opportunity structure that enables capable women to express their financial abilities in formal channels. Mwange and Mumba (2025) provide converging evidence, demonstrating that digital financial literacy moderates the trust-to-inclusion relationship in Zambia, with self-efficacy serving as an additional moderator. The magnitude of the interaction coefficient (β = 0.206) represents a small-to-medium effect that, when considered alongside the main effect of capability on inclusion from the companion paper (β = 0.303), confirms that digital financial access amplifies but does not create the capability-to-inclusion relationship. The policy implication is that investments in digital financial access generate significantly higher returns in financial inclusion when accompanied by financial capability-building programmes. Musana et al.'s (2023) finding that inter-firm coopetition among digital service providers significantly expands platform accessibility in Zambia confirms that ecosystem-level digital access improvements create the enabling environment within which this capability-moderated inclusion effect operates most powerfully.

#### 4.2.2 $Ho_2$ and $Ho_3$: Digital Financial Access Does Not Moderate Empowerment or Literacy Pathways (Not Supported)

Hypotheses 2 and 3 were not supported. The interaction effect of digital financial access and financial empowerment on financial inclusion was negative and statistically insignificant (β = −0.033, z = −0.577, p = .564), and the interaction effect of digital financial access and financial literacy on financial inclusion was positive but statistically insignificant (β = 0.038, z = 0.653, p = .514). These null findings — which were predicted by the theoretical frameworks applied in this study - constitute substantively important results that distinguish the capability-contingent nature of digital moderation from more general enabling condition effects.

The null moderation effect for financial empowerment confirms the Inclusive Financial Wellbeing Empowerment Model's theoretical prediction that empowerment, operating primarily through psychological agency and emotional confidence, is less directly dependent on digital platform availability than on social and institutional conditions. A financially empowered woman in Zambia's informal markets may express her financial agency through diverse channels - including formal branch banking, microfinance engagement, or savings group participation - reducing her dependence on digital platforms specifically. The qualitative evidence from the companion Paper 2 corroborates this finding: focus group participants described empowerment-driven financial inclusion through non-digital routes including branch visits, face-to-face microfinance consultations, and agent-assisted transactions, confirming that empowerment is a channel-agnostic inclusion driver that does not require digital amplification.

The null moderation effect for financial literacy is consistent with the full mediation finding from Paper 1, where financial literacy had no significant direct effect on financial inclusion when capability was controlled for. If literacy does not have a significant direct effect on inclusion, digital financial access cannot moderate a non-existent direct pathway. The implication is that digital financial access investment is most effective when targeted at populations who already possess financial capability, since literacy alone - without the practical capability to use digital platforms effectively - cannot be amplified into inclusion by digital financial access. This finding directly challenges simplistic digital-access-solves-inclusion narratives and reinforces the importance of the capability-building component as a prerequisite for realising the inclusion returns on digital infrastructure investment.

## V. CONCLUSION & RECOMMENDATIONS

### 5.1 Conclusion

This study demonstrates that digital financial access exerts a selective and theoretically coherent moderating effect on financial inclusion pathways among women traders in Lusaka's informal markets. Digital financial access significantly amplifies the financial capability-to-inclusion relationship ($\beta = 0.206$, $p < .01$) but does not significantly moderate the financial empowerment-to-inclusion or financial literacy-to-inclusion pathways. This selective moderation pattern is theoretically consistent across all three frameworks employed: the Technology Acceptance Model predicts that capability determines perceived usefulness and therefore digital adoption; Sherraden's framework positions digital access as the institutional opportunity structure that enables capable users to express their competencies in formal financial channels; and the Inclusive Financial Wellbeing Empowerment Model predicts that empowerment operates through psychological mechanisms that are less dependent on digital platform availability than on social enabling conditions.

The finding that digital financial access amplifies only the capability pathway has significant implications for investment sequencing in Zambia's financial inclusion architecture. It confirms that the returns to digital infrastructure investment - in terms of formal financial inclusion - are maximised when they are combined with financial capability-building programmes that ensure target populations can effectively use the expanded digital access. Standalone digital infrastructure investment, without corresponding capability-building, is unlikely to generate the inclusion gains anticipated in NFIS II. This conclusion is consistent with the broader evidence which demonstrate that platform ecosystem expansion by digital financial service providers generates inclusion gains only when users possess the capability to navigate and utilise expanded platform offerings.

Considered alongside the companion studies, which established financial capability (indirect effect = 0.250) and financial empowerment (indirect effect = 0.355) as mediators and digital financial access as a selective amplifier of the capability link, this three-paper series provides a comprehensive, evidence-grounded, and theoretically coherent framework for the design of women's financial inclusion interventions in Zambia's informal markets. The complete golden thread - financial literacy produces both capability and empowerment; capability is amplified by digital financial access while empowerment operates independently of it; and both capability and empowerment drive financial inclusion - specifies distinct intervention levers for different elements of the inclusion gap. Literacy programmes build both capability and empowerment; capability-building programmes maximise their returns when combined with digital access; and empowerment programmes generate inclusion gains independently of the digital infrastructure context. These differentiated findings equip NFIS II implementers with an evidence-based framework for targeting, sequencing, and monitoring women's financial inclusion interventions across Zambia's diverse informal market contexts.

Three theoretical contributions emerge from this study. First, it provides the first empirical test in the Zambian context of the selective moderation hypothesis - that digital financial access amplifies capability-driven inclusion but not empowerment-driven inclusion - confirming the differential channel dependence predicted by the Technology Acceptance Model and the Inclusive Financial Wellbeing Empowerment Model. Second, it advances the capability-access complementarity thesis: digital access and financial capability are not substitutes but complements in the production of financial inclusion, and their joint investment generates non-linear inclusion returns. Third, it demonstrates that the methodology testing mediation followed by moderation provides a comprehensive and replicable framework for unpacking the multi-mechanism structure of financial inclusion determinants in informal market contexts across Sub-Saharan Africa.

### 5.2 Recommendations

Based on the moderation findings and the broader evidence reviewed in this study, the following recommendations are advanced for policymakers, financial service providers, and development partners. The Bank of Zambia and NFIS II implementing partners should prioritise integrated programme designs that combine digital infrastructure expansion with financial capability building for women traders in informal markets. The moderation evidence demonstrates that digital financial access amplifies the capability-to-inclusion relationship rather than substituting for capability; digital access alone is insufficient without the practical skills and knowledge required to utilise digital platforms effectively. Capability-building components should be specifically designed to address mobile money usage skills, digital transaction management, consumer protection awareness, and digital security literacy.

Telecom regulators, the Bank of Zambia, and digital financial service providers should reduce transaction costs, improve agent network density in informal market areas, enhance platform interoperability, and strengthen consumer protection mechanisms. These improvements will expand the quality of digital access available to women traders, increasing the probability that capability gains translate into digital inclusion outcomes. Regulatory encouragement of cooperative arrangements between digital financial service providers - consistent with the institutional-level evidence -

will amplify these platform quality improvements by expanding competitive offerings and driving down transaction costs.

For empowerment-focused interventions, policymakers should recognise that the empowerment-to-inclusion pathway is robust to digital infrastructure constraints, operating independently of digital access quality. This means that empowerment programmes - focused on confidence-building, savings group strengthening, and social norm change - can generate inclusion gains even in areas with limited digital infrastructure, making them appropriate as primary interventions in digitally underserved informal market environments. The NFIS II framework should therefore maintain a dual-track implementation strategy: empowerment interventions as the universal track deployable across all digital access environments, and capability-plus-digital-access bundled interventions as the amplified track deployable in areas with adequate digital infrastructure. This dual-track architecture will maximise the reach and depth of women's financial inclusion gains across Zambia's heterogeneous informal market landscape.

## REFERENCES


Bank of Zambia. (2024). *National Financial Inclusion Strategy* II (NFIS II) 2024–2028. https://www.boz.zm/NFIS_II_2024_-_2028.pdf

Baron, R., & Kenny, D. (1986). The moderator-mediator variable distinction in social psychological research. *Journal of Personality and Social Psychology, 51*, 1173–1182. https://doi.org/10.1037/0022-3514.51.6.1173

Chibesa, K., & Mwange, A. (2025). The role of digital financial literacy in enhancing financial inclusion among informal entrepreneurs in Zambia. *East African Finance Journal, 4*(1), 141–146. https://doi.org/10.59413/eafj/v4.i1.8

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly, 13*(3), 319–340. https://doi.org/10.2307/249008

Demirgüç-Kunt, A., Klapper, L., Singer, D., Ansar, S., & Hess, J. (2022). *The Global Findex Database 2021: Financial inclusion, digital payments, and resilience in the age of COVID-19.* World Bank. https://doi.org/10.1596/978-1-4648-1897-4

Dluhopolskyi, O., Pakhnenko, O., Lyeonov, S., Semenog, A., Cholewa-Wiktor, M., & Wisniewski, P. (2023). Digital financial inclusion in COVID-19 times: Public sector digital support and sustainable solutions. *Sustainability, 15*(5), 4192. https://doi.org/10.3390/su15054192

Grohmann, A., Klühs, T., & Menkhoff, L. (2018). Does financial literacy improve financial inclusion? Cross-country evidence. *World Development, 111*, 84–96. https://doi.org/10.1016/j.worlddev.2018.06.020

Hair, J. F., Risher, J. J., Sarstedt, M., & Ringle, C. M. (2019). When to use and how to report the results of PLS-SEM. *European Business Review, 31*(1), 2–24. https://doi.org/10.1108/EBR-11-2018-0203

Hayes, A. F. (2022). *Introduction to mediation, moderation, and conditional process analysis* (3rd ed.). Guilford Press.

Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modelling. *Journal of the Academy of Marketing Science, 43*(1), 115–135. https://doi.org/10.1007/s11747-014-0403-8

Jorgensen, B. L. (2020). The Inclusive Financial Wellbeing Empowerment Model (IFWEM). *Financial Counseling and Planning, 31*(2), 218–230. https://doi.org/10.1891/FCP-2019-0040

Kabeer, N. (2016). Women's economic empowerment and inclusive growth: Labour markets and enterprise development. International Development Research Centre, SIG *Working Paper* 2016/1.

Kline, R. B. (2023). *Principles and practice of structural equation modeling* (5th ed.). Guilford Press.

Lyons, A. C., & Kass-Hanna, J. (2021). A methodological framework for measuring financial literacy and financial wellbeing in the Middle East and North Africa. *Numeracy, 14*(1), 1. https://doi.org/10.5038/1936-4660.14.1.1374

Mabrouk, F., Labidi, M., & Alimi, A. Y. (2023). Digital financial inclusion and women's empowerment in developing economies. *Finance Research Letters, 54,* 103747. https://doi.org/10.1016/j.frl.2023.103747

Moghadam, A., & Karami, M. (2023). FinTech, financial capability and women's financial inclusion in Iran. *Journal of Financial Regulation and Compliance, 31*(4), 589–607. https://doi.org/10.1108/JFRC-01-2023-0002

Musana, M., Mwange, A., & Mungule, O. K. (2023). An examination of the effects of inter-firm coopetition on digital financial inclusion: The case of selected digital financial services providers in Zambia. *European Journal of Business and Management, 15*(12), 86–98. https://doi.org/10.7176/RJFA/14-12-07

Mwange, A., & Mumba, M. (2025). Perceived trust and digital financial inclusion in Zambia's informal markets: Mediating and moderating role of digital financial literacy and digital financial efficacy. *African Journal of Commercial Studies, 6*(2), 1–26. https://doi.org/10.59413/ajocs/v6.i2.9

Ozili, P. K. (2025). Digital financial technology and financial inclusion: Updated evidence. *Digital Policy, Regulation and Governance, 27*(1), 1–19. https://doi.org/10.1108/DPRG-09-2024-0162

Park, J., & Yi, S. (2024). Interaction term centering in structural equation modelling: Updated guidance. Structural Equation Modeling: *A Multidisciplinary Journal, 31*(2), 287–302. https://doi.org/10.1080/10705511.2023.2245617

Sherraden, M. S. (2013). Building blocks of financial capability. In J. Birkenmaier, M. S. Sherraden, & J. Curley (Eds.), *Financial capability and asset development* (pp. 3–43). Oxford University Press.

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. *MIS Quarterly, 27*(3), 425–478. https://doi.org/10.2307/30036540