Does mobile financial services adoption mitigate financial vulnerability of small enterprises? The role of Government support

ERIOLA Akitola Jesse
Faculté des Sciences Economiques et de Gestion, Université d'Abomey-Calavi, Benin
jesse.eriola@uac.bj - jesse.eriola050@gmail.com
https://orcid.org/0000-0003-1893-6440

Received: November 18, 2024 Accepted: June 12, 2025 Published: June 30, 2025

Abstract

Purpose: This study investigates the impact of mobile financial services (MFS) adoption on the financial vulnerability of small businesses in Benin, with a focus on the moderating role of government support.

Method: Data were collected through a survey of 316 small business owners in Benin. We analyze the data using structural equation modelling (SEM) and analysis of variance (ANOVA). The reliability and validity of the measurement model were confirmed through exploratory and confirmatory factor analyses.

Results: The results reveal that mobile financial services' adoption significantly reduces the financial vulnerability of small businesses. Furthermore, there is a significant difference in terms of financial vulnerability between those who perceived government support and those who did not, but no significant difference in terms of mobile financial services adoption. Government support not only directly mitigates financial vulnerability but also enhances the positive effects of mobile financial services adoption on financial vulnerability. The moderating effect of government support indicates that firms benefit more from multi-sector financial services when these are complemented by institutional assistance.

Originality/Relevance: This study contributes to literature by integrating the roles of modern financial technologies and government interventions in addressing the financial challenges of small businesses in a developing country context. It provides empirical evidence on the synergistic effects of mobile financial services and government support, offering practical insights for policymakers and financial institutions that aim to promote financial inclusion and business resilience.

Keywords: Mobile financial services – financial vulnerability- small enterprises – government support – financial inclusion

Code JEL: G21; G28; O33; L26

L'adoption des services financiers mobiles atténue-t-elle la vulnérabilité financière des petites entreprises ? Le rôle de l'appui institutionnel

ERIOLA Akitola Jesse
Faculté des Sciences Economiques et de Gestion, Université d'Abomey-Calavi, Benin
jesse.eriola@uac.bj - jesse.eriola050@gmail.com
https://orcid.org/0000-0003-1893-6440

Résumé

Objectif : Cette étude examine l'impact de l'adoption des services financiers mobiles sur la vulnérabilité financière des petites entreprises au Bénin, en mettant l'accent sur le rôle modérateur du soutien gouvernemental.

Méthode : Les données ont été collectées au moyen d'une enquête par questionnaire auprès de 316 propriétaires de petites entreprises au Bénin. Ces données ont été analysées à l'aide de modèles d'équations structurelles et de l'analyse de la variance (ANOVA). La fiabilité et la validité du modèle de mesure ont été confirmées par des analyses factorielles exploratoires et confirmatoires.

Résultats : Les résultats révèlent que l'adoption des services financiers mobiles réduit considérablement la vulnérabilité financière des petites entreprises. De plus, une différence significative de vulnérabilité financière est observée entre les entreprises bénéficiant d'un soutien gouvernemental et celles qui n'en bénéficient pas, alors qu'aucune différence significative n'est constatée en termes d'adoption. Le soutien gouvernemental atténue non seulement directement la vulnérabilité financière, mais renforce également les effets positifs de l'adoption des services financiers mobiles sur cette vulnérabilité. L'effet modérateur du soutien gouvernemental montre que les entreprises qui ont adoptés les services financiers mobiles sont moins vulnérables financièrement lorsque l'adoption s'accompagne d'un soutien institutionnel.

Originalité/pertinence : Cette étude contribue à la littérature en intégrant les rôles des technologies financières modernes et des interventions gouvernementales dans la gestion des défis financiers des petites entreprises dans le contexte d'un pays en développement. Elle fait aussi des apport sur les effets synergétiques des services financiers mobiles et du soutien gouvernemental, offrant ainsi des perspectives pratiques aux décideurs politiques et aux institutions financières qui visent à promouvoir l'inclusion financière et la résilience des entreprises.

Mots-clés : Services financiers mobiles – Vulnérabilité financière – Petites entreprises – Appui institutionnel – Inclusion financière

Code JEL: G21; G28; O33; L26

Introduction

Access and use of financial services are essential and crucial for the effective and efficient functioning of any enterprise (Ofori-Okyere et al., 2023; Soetan et al., 2021; Mogaji et al., 2021). In Africa, Micro and Small Enterprises (MSMEs) play a significant role in economic growth, representing approximatively 95% of businesses and over 80% of employment (World Bank, 2020). Many small enterprises still encounter substantial challenges in accessing inclusive financial services (Nguyen et al, 2022; Adeola & Evans, 2017; Asuming et al., 2018), making them financially vulnerable.

Financial vulnerability, a specific aspect of consumer vulnerability, is defined as an entity's reduced ability to provide services (Ofori-Okyere et al., 2023; Despard et al., 2017; Tuckman and Chang 1991). It describes the susceptibility of individuals or businesses to financial challenges or instability (Despard et al., 2017; Tevel et al., 2014). For instance, entities with excessive debt but weak repayment ability, are considered financially vulnerable (Kim, et al., 2016; Anderloni et al., 2012). In particular, it related to the probability that an individual will experience money difficulties (O'Connor et al., 2019) and risk factors such as, high debt, low income or impactful changes in personal circumstances (Ofori-Okyere et al., 2023; Engidaw, 2022; Bartik et al, 2020). This vulnerability can manifest in different forms, including exposure to financial insecurity or an inability to manage finance effectively (Mogaji et al, 2021). In this context, financially excluded or vulnerable individuals or businesses often lack access to formal financial products and services (Yazdanfar & Öhman, 2020).), and face systemic bias or marginalisation, all of which are related to the design and marketing of banking services (Ofori-Okyere et al., 2023; Mogaji et al., 2021). However, financial vulnerability is not only the result of too much debt. Enterprises may be financially vulnerable if they cannot meet their operating expenses, invest in new opportunities, or respond to unexpected challenges (Despard et al., 2017; Tevel et al., 2014). A lack of sufficient reserves or savings to withstand financial shocks or prolonged periods of poor performance can be a significant indicator of financial vulnerability (Fernández-López et al., 2023; Daud et al., 2019). This is particularly true for small enterprises, in Africa where limited access to financial services further exacerbates their vulnerability (Alene, 2020; Beck et al, 2008). For instance, in Benin the survival rate of small enterprises is only 20% (National Institute of Statistics and Economic Analysis, INSAE, 2020), largely due to limited access to affordable finance and inadequate managerial skills, which are critical to the sustainability of their businesses (Adeola and Evans, 2017; Asuming et al., 2018).. Recent global crises have compounded the financial vulnerability of small enterprises intensifying liquidity shortages, debt burdens and reducing cash flow (Cowling et al., 2020; Bartik et al., 2020). Firms with small investment scale or small sales are more sensitive to this crisis, facing more negative returns (Juergensen et al., 2020). In addition, the limited geographical coverage of commercial banks in Africa, particularly their scarcity in rural areas, restricts access to essential financial services, further amplifying financial vulnerability among small enterprises (Ofori-Okyere et al., 2023; Soetan et al., 2021). This inequitable access forces underserved and excluding small enterprises to seek alternative higher interest financing options, deteriorating their financial stability (Eriola, 2023).

To reduce financial vulnerability and improve social conditions in Africa, the availability and accessibility of financials services must be increased. Financial technologies have the potential to enhance access to credit and capital, streamline financial operations, and reduce costs (Jie, 2023; Wang & He, 2020; Beck et al., 2018; Demirgüç-Kunt et al., 2021). However, in Africa, few enterprises have fully adopted these technologies. According to World Bank (2024), only 23 percent of firms in Africa have digital capabilities but do not fully use these technologies for productive tasks, such as business administration, planning, sales, and payments. Moreover, although 39 percent of firms adopt digital technologies, their usage is often limited (Ye et al., 2023). For instance, in Benin, online banking penetration, is estimated to at no more than 6.14% (World Bank, 2024), indicating low adoption rate of digital financial services.

Innovative technologies significantly and increasingly affect financial behavior as identified by previous study (Wewege & Thomsett, 2019; Gomber et al., 2017; Liu et al., 2021). However, there also concerns about the potential risks associated with the adoption of financial technologies. Some studies

(Seldal & Nyhus, 2022; Heo et al., 2021) have found that users of mobile financial services (MFS) in some countries face a higher risk of financial mismanagement compared to non-users. This finding is corroborated by de Bassa Scheresberg et al. (2020) who reported an association between the use of mobile payment and financial problems, suggesting that these technologies can sometimes exacerbate financial vulnerability. While the adoption of digital technology can offer firms various operational improvement, it remains uncertain whether it can significantly enhance their resilience (Ye et al., 2023). These risks underline the complexity of adopting financial technologies which can both offer opportunities for better financial management and introduce new challenges.

To encourage financial technologies adoption and improve their impacts, government support is necessary. Investment in technological infrastructures such as fiber network and broadband connectivity, spectrum and data center processing capabilities can help surmount spatial restrictions (Osei, 2024; Tang et al., 2021). African countries remain sluggish compared to the developed countries and most of Asia (Osei, 2024; Moreira & Mehra, 2022) in terms of technology infrastructures. Additionally, the cost of digital equipment and accessibility are higher than in other areas, hindering firms from adoption (World Bank, 2024). The Global Innovation Index (2023) for instance provides further evidence of this disparity, with no single African country has ever fallen amongst the 40 most innovative countries in the world (Osei, 2O24). All lowest ranked countries in this metric are Sub-Saharan African, including Benin (120^{th}), showing the necessity to improve digital infrastructures.

While some studies focus on the positive impact of both government support (Osei, 2024; Chege et al., 2020; Nasri & Charfeddine, 2012; Tan & Teo, 2000) and financial technologies adoption (Jack & Suri, 2011; Aker & Mbiti, 2010) on financial vulnerability, few have examined these three topics together. Research by Osei (2024) recognizes the importance of e-infrastructure regulatory framework, technological infrastructures in digital technology adoption. Meanwhile, other studies (Beck et al., 2005; Carpenter & Peterson, 2002; Storey, 1994) which include financial constraints, often overlook the complementary role and combined effect of government support and financial technologies. Previous studies (Chege et al., 2020; Nasri & Charfeddine, 2012; Wilson, 2007; Tan & Teo, 2000) have mostly examined the impact of either financial technologies or government support separately without their interactive effects on financial vulnerability. This study aims to fill this gap by focusing on the intersection of government intervention, mobile financial services and financial vulnerability reduction for small enterprises. The study emphasizes the combined effect of mobile financial services and government support because the adoption of MFS alone may not be sufficiently to have the greatest impact (Asongu et al., 2018). By analysing the moderation effect of government support, this study investigates how government support can stimulate the effect of financial technologies on financial vulnerability.

Although a substantial number of studies have explored technology adoption, there is a need for more focused research to support policies promoting financial inclusion and reducing financial vulnerability for small enterprises in Africa. This research aspires to provide a deeper understanding of the joint effect of government intervention and digital technologies on enhancing financial resilience among small enterprises.

To achieve the goal of this research, the rest of the study is structured as follows. First, we present the literature review followed by the empirical approach in section 2. Results and discussion are presented in section 3, and finally a conclusion is given.

1. Literature review and research hypotheses

1.1 Impact of Mobile financial services adoption on financial vulnerability

Financial vulnerability, often using interchangeably with concepts such as financial resilience (Klapper & Lusardi, 2020), financial fragility (Lusardi et al. 2012), financial distress (Heo et al., 2020; Anderloni et al., 2012), financial debt burden, and financial over indebtedness (Chipunza & Fanta, 2021; Daud et al., 2019). It is analysed from two perspectives; either essentially considered in terms of business climate or on a fairly personal level, revolving around individual circumstance (Ofori-Okyere et al., 2023). Indeed, this view generally treats financial vulnerability as a form of low liquidity and/or inefficiency, assuming that enterprises with no or minimal liquidity are financially vulnerable

(O'Connor et al., 2019). Vulnerability generally refers to ability to be harmed; consequently. It describes a circumstance where firms have poor resilience to withstand economics shocks and stresses, potentially leading to adverse financial events (Despard et al., 2017; Tevel et al., 2014). This condition may appear in a form of low savings, high debt levels, lack of access to credit or financial services and even poor financial literacy (Daud et al., 2019). This aligns with financial distress theory which states that financial distress occurs when a company struggles to manage its financial obligations, often leading to adverse outcomes such as bankruptcy and restructuring (Altman, 1968). The theory also adds to the argument that financial vulnerability is precursor to financial distress and suggests monitoring financial health to prevent possible crises.

In response to these challenges, financial technologies provide innovative tools for monitoring and improving financial health, thereby reducing the risk of small enterprise distress (Jack & Suri, 2010). The rapid advance of digital technologies, especially internet, wireless, social media and mobile apps (Abdinoor and Mbamba, 2017) in Africa in the last two decades have become a catalyst for innovation (Adeola, 2019). This revolution provided easy access to financial services for both large corporations and Micro and Small Enterprises (Fu et al., 2021), thereby enhancing their operational efficiency and performance (Demirgüç-Kunt et al.,2021; Fauzi and Sheng, 2020). According to Technology Acceptance Model (TAM) which posits that technology adoption is driven by perceived usefulness and ease of use (Davis, 1980), the rise of financial technologies—including mobile banking, online payment, electronic wallets—has improved financial inclusion for small enterprises and also reduce their financial vulnerability (Jebarajakirthy & Shankar, 2021; Fauzi and Sheng, 2020; Shankar et al., 2020, 2021).

Mobile financial services play a critical role in reducing financial vulnerability (Wang & He, 2020). This enables small enterprises to gain better access to credit and capital, simplifies financial processes, and reduces costs (Jie, 2023; Beck et al., 2018). Unlike traditional financial services, MFS can provide more accurate and transparent financial information, which improves decision-making and risks management for small businesses (Shinozaki, 2014). They also help small enterprises overcome traditional banking barriers, such as limited physical access to branches and stringent loan criteria (Xie et al., 2008). According to Gaglio et al (2022), the adoption of MFS helps enable not just basic transactions but a wider set of digital transformation processes that are vital for financial resilience. Similarly, research by Lestari et al (2021) mentioned that enterprises using electronic services tend to achieve greater income stability and continuity of operations than non-users, highlighting the role of digital platforms in reducing financial vulnerability by sustaining sales and operation during external shocks. Additionally, Bai et al (2021) sustain that digital tools and services facilitate more efficient management resources, help micro and small enterprises reach new markets, and maintain continuity, which are key factors in mitigating financial vulnerability.

As illustrated in the literature, financial technology is found to be one of the major factors in promoting productivity growth by enhancement of financial inclusion (Babilla, 2023). Theory of innovation diffusion (Rogers, 2003) provides an explanation for how technological innovation such as financial technologies, spread and enhance financial inclusion and stability. Digital innovation improves access to finance by alleviating financial fragility and addressing credit gaps between firms (Demirgüç-Kunt et al., 2021). By facilitating per-to-per transactions and direct funding, financial technologies help to mitigate an issue like moral hazard and adverse selection (Akerlof, 1970; Stiglitz & Weiss, 1981). Furthermore, mobile financial services substantially reduce costs and emphasize the fundamental role of financial intermediaries in providing liquidity insurance, enabling them to offer loans at the lower costs to borrowers while providing higher returns to lenders (Babilla, 2023). This access to financial services is particularly beneficial in regions with limited physical banking infrastructure (Ofori-Okyere et al., 2023).

In developed economies, mobile technologies have effectively facilitated access to financial services and driven economic developments (Nonvide et Alinsato, 2023). However, this trend has not been equally mirrored in the developing economies (Agwu, 2020). Research by Jack and Suri (2011) showed that the transactions cost associated with mobile money impacts risk-sharing, indicating that adopters are better equipped to handle negative income shocks and thus less financially vulnerable. Generally, individuals using mobile payment are more financially secure and exhibit better financial

management practices (Heo et al., 2021). Servon and Kaestner (2008) also observed that improving financial technology skills is beneficial to lower-income consumers. Despite these positives effect, some studies (Ye et al., 2023; Seldal & Nyhus, 2022; Heo et al, 2021; Liao & Chen, 2020) provided a more nuanced view of the impact of mobile financial services. For instance, Seldal & Nyhus (2022) found that addictions to such services might increase financial distress if not managed properly. Ye et al. (2023), state that the effectiveness of digital technology in enhancing firm resilience remains uncertain. De Bassa Scheresberg et al. (2020) also discovered a link between mobile payments and financial problems, indicating riskier financial behaviors among users. Similarly, Liao & Chen (2020) identified that frequent use of mobile payments may be associated with less probability to maintain stable financial behavior, demonstrating several risks factors connected to financial management practices. Therefore, we propose the following hypothesis:

H1: The adoption of mobile financial services reduces financial vulnerability.

Government support, such as subsidies, can provide stability to help financially vulnerable enterprises avoid distress and improve their resilience (Beck et al., 2008).

1.2. Government support effect on mitigating financial vulnerability through mobile financial services.

Access to funding has been identified as crucial for the growth and success of small and medium enterprises (SMEs) (Nguyen et Canh, 2021). Nevertheless, small enterprises frequently encounter significant challenges than large enterprises when trying to obtain financing (Nguyen et al., 2022; Eriola, 2022; Beck et al, 2008). These barriers are rooted in limited credit histories, insufficient collateral, and higher perceived risks by traditional financial institutions, which systematically exclude SMEs from the formal financial system (Nugraha et al., 2022). This exclusion not only limits their ability to invest and innovate, but also exacerbates their financial vulnerability, leaving them exposed to external shocks and limiting their operational viability (Eriola, 2020). This exclusion highlights the necessity for an inclusive financial system (Nugraha et al., 2022). To mitigate these challenges, government support such as SME Investment and Guarantee Fund is crucial to help MSMEs overcome financial and technical constraints (Wilson, 2007), particularly in Africa. Such support must be designed to foster sustainable, competitive and innovative business that can eventually operate without financial (Doh & Kim, 2014).

Government provides a range of support services for SME (Osei, 2024) including specialized business assistance, technical, and managerial training programs; reduction in administrative costs, cross sectors and cross borders networking; financial incentives, and legal framework reinforcement (Wilson, 2007). These initiatives help reduce the vulnerability of small enterprises, which are a special risk group and financially vulnerable (Nguyen et al., 2021), due to limited funds, reliance on a few numbers of customers, and a lack of collateral and/or credit history (Eriola, 2020). Prior studies (Beck et al, 2008; Berger et al, 2001) have shown that MSMEs usually face vulnerability due to restricted access to finance, complex bureaucratic procedures; a lack of infrastructure; and ineffective institutional structures. Additionally, small enterprises do not have the influence to shape their environment as larger firms do. Regulations are disproportionally restrictive on SMEs, imposing higher costs, increasing their transaction costs (Dabla-Norris et al., 2012) and limiting their ability to take advantage of economic opportunities, thereby reinforcing their vulnerability (Ofori-Okyere et al., 2023; Beck et al., 2008). To address these issues, governments provide SMEs immediate technical support, financial incentives and assistance, and managerial training programs (Guo et al., 2020) designed to promote innovation, enhance competitiveness, boost productivity and reduce vulnerability. Based on these considerations, we formulate the following hypothesis:

H2: Government support positively influences financial vulnerability

Previous (Sharma et al., 2023; Adjasi et al., 2023; Nugraha et al., 2022; Yoon et al., 2020; Kuan & Chau, 2001) highlight the role of government support in facilitating information technologies

adoption in SMEs. Government interventions create an enabling environment for SMEs by addressing structural barriers and fostering innovation. Nugraha et al., (2022) suggest that Government support improves the creation of favorable environment for the Fintech sector, which is facilitated by innovation office, and a regulatory sandbox. These initiatives allow enterprises to pilot new financial technologies in controlled environments, thereby reducing risks and promoting trust among stakeholders (Jaharmir & Cavadas, 2018). These studies show that clear regulatory frameworks not only encourage MFS adoption but also improve trust among SMEs. For instance, Chong et al. (2010) and Oliveira (2014) highlight the importance of transparent and consistent policies to reduce uncertainties surrounding new financial technologies. Similarly, Oliveira (2014) argues that existing laws and regulations are crucial for the adoption of new technologies as they can either encourage or discourage businesses from adopting them. Programs such as Digital India have demonstrated the transformative impact of government support Sharma & Singh, 2023 show that such programs have successfully connected rural SMEs to MFS platforms, enabling them to access credit and improve their financial management. Similarly, Adjasi et al. (2023) highlight that regulatory sandboxes and innovation offices have been instrumental in accelerating fintech development in countries such as Kenya and Nigeria. Government support is shown to be vital in driving technological innovation and is one of key factors affecting the adoption of mobile financial services (Chong et al, 2010). Indeed, Nasri & Charfeddine (2012) show that government support positively impacts online banking adoption in Tunisia. Osborn et al., (2015) observed that governments across the world implement policies and programs to bridge the digital divide by increasing access to digital technologies in developing countries.

The 2030 Agenda for Sustainable Development recognizes that the spread of ICT and global interconnection accelerate human resource development (Dutta et al., 2022) and thus narrows the digital divide. Digital technology adoption requires robust government ICT regulatory framework to provide support or reduce MSMEs vulnerability (Doh et Kim, 2014). In addition, Chege et al (2020) argue that a conducive business environment is correlated with high performance. While many studies suggest that government interventions amplify the benefits of mobile financial services by creating a more enabling environment (Nasri and Charfeddine, 2012; Nugraha et al., 2022), others caution that inconsistent policies or limited financial education can mitigate these effects. Furthermore, the success of these programs depends heavily on the quality of their implementation, with poorly designed initiatives potentially reinforcing existing inequalities rather than addressing them (Gupta et al., 2023). Based on this literature, the following hypothesis is proposed.

H3: Government support moderates the relationship between mobile financial services adoption and financial vulnerability.

2. Data and methodology

2.1 Sample and data collection,

To meet the objective of this research, we concentrated on small enterprise owners in Benin. The survey covered the southern region of Benin, particularly Cotonou and suburbs where economic activity is most concentrated. We use the Cochran method to approximate the sample size because the exact size of the targeted population is unknown. For the confidence value of 95%, 50% of estimate of estimated proportion of the targeted SEs and 5% margin of error, the minimum required sample size was approximatively 385 respondents. To account for potential non-responses and incomplete questionnaires, we increased the sample size to 500 questionnaires. Data was collected through both face to face and online surveys (using Google form) with a structured questionnaire. The online questionnaire was administrated with the support of specific SE associations, which facilitate access to the targeted population by sharing the survey in WhatsApp group and forums exclusively dedicated to entrepreneurs and small business owners. Face to face survey was conducted in key business areas in complement the online survey and capture response from those without using digital platforms.

A pre-test was conducted with 20 small enterprise owners through personal interviews to evaluate the clarity, relevance and appropriateness of the questions. From the pre-test, adjustments were made to some questions to improve comprehension. In some case, the original scale was in French and was

administrated in respondents' native language to ensure that comprehension had been maintained consistently across response. This approach is aimed at improving the response rate and avoiding potential misunderstanding or doubts that might arise when questions are presented in another language. Of 500 questionnaires administrated, 358 were returned with 316 valid for analysis after excluding incomplete responses.

The collected data was about general characteristics of the enterprises, their use of digital technologies particularly financial technologies, changes in their financial situation, financial vulnerability and proposed support policies for small businesses. Additionally, the questionnaire collected demographic information about owners such as sex, age, education level. Before the main survey was conducted, a pre-test was carried out with 30 owners through personal interviews to assess if the questionnaire was suitable, verify the scales and analyse adjustments that could be necessary for into some questions.

2.2 Measure and data analysis

All constructions in our model were measured using multi-item indicators (see table 1 for detail).

The dependent variable of this study is financial vulnerability defined as propensity or predisposition to be adversely affected (Anderloni et al., 2012). Assessment of financial vulnerability can be done using objective and subjective methods (Noerhidajati et al., 2021; O'Connor et al., 2019; Anderloni et al., 2012). The objective approach predicts the level of financial vulnerability by analysing measurable monetary variables, such savings, total expenditure, asset value, and others (Bialowolski et al., 2022; Abubakar et al., 2018). In contrast, the subjective approach assesses financial vulnerability through expectations, feelings or perceptions, including perceptions of debt repaying (O'Connor et al., 2019; Netemeyer et al., 2017). The measurement used is this study is adapted from Chipunza & Fanta (2021); Noerhidajati et al (2021); Anderloni et al., (2012). These items are evaluated through entrepreneurs' perception.

The key independent variable is the use of mobile financial services. To measure the level of consumer involvement in financial activities through new platforms like mobile banking and payments, questions related to different digital payment methods (mobile, online, and contactless payments) were employed. The measure of MFS was adapted from Seldal & Nyhus (2022) and Chong et al. (2010).

Government offers both financial and non-financial support to small enterprises (Hossain et al., 2020). Financial support typically comes in the form of subsidiaries offered by government while non-financial related to technical and training support, and adequate infrastructure. To measure Government support, we employed a unidimensional construct approach adapted from the studies of Hossain et al (2020), Yoon et al., 2020; Kuan & Chau, (2001) and Nugraha et al., (2022). Four items were used.

In line with previous research on financial vulnerability (Noerhidajati et al., 2021; Daud et al., 2018; Lusardi et al, 2011; Anderloni et al 2012), we controlled demographic variables to partial out their influence on financial vulnerability. Sex, education level are strong predictors of financial vulnerability. Sex was treated as dichotomous variable coded as 1 for male and 2 for female. Education was categorized based on the respondent's highest formal education with 1 representing primary school, 2 secondary first level, 3 for secondary second level, 4 for university. We also considered the type of sector as a control variable with 1 for agrobusiness, 2 for commercial, 3 for industry and 4 for service. Table 1 shows the list of items.

Table 1: Measurement of variables.

Constructs	**Items**
Financial vulnerability	In the past year, our enterprise ever had trouble in paying debt
	In the past year the company has struggled to meet some essential need
	Over the past year we needed to extend suppliers payment deadlines.
	In the past year, we experienced a lack of liquidity
Mobile financial services	online payment for transactions
	mobile banking

	Mobile Money
Government support	Financial aid
	Tax relief
	Adequate infrastructure
	Skill training programs

2.3 Data analysis

Structural equation modelling (SEM) was employed to carry out the analysis of the survey data. SEM is a statistical technique combining factor analysis and multiple regression to estimate complex relationship between observed and latent variables simultaneously (Hair et al 2017). We analyzed the data based on both the structural and measurement models by AMOS. We tested the overall model fit through several indices including GFI, RMSEA NFI, CFI and chi-square (Hu & Bentler, 1999).
SEM usually requires large sample size, as a small sample size might lead to unstable estimation (Kline, 2015). For complex models, is generally agreed that at least 200 individuals are necessary (Kline, 2O15; Boomsma, 1982). In this study, the model examines the relationship between Financial Vulnerability, Mobile financial services and Government support. The overall sample of 316 small firms is reasonable for the modest complexity of our model.

We also analyzed the surveyed data for signs of straight-lining that would indicate invalid response behavior, and none were found. De facto, it means that no respondents consistently rate the same scoring scale across survey items. We also perform an Exploratory Factor Analysis to uncover the factor structure, and the Confirmatory Factor Analysis to validate the measurement model.

2.3.1. Measurement model assessment

First, the Exploratory Factor Analysis was realized to identify whether the items loading reflected their respective latent constructions. The Principal Component Analysis was employed. Table 2 shows the results:

Table 2: Explanatory Factor Analysis results

Construct	KMO	Bartlett's test of Sphericity	Sig.	%variance
FV	0.834	652.305	0.000	73.7
GS	0.813	510.267	0,000	68.7
MFS	0.716	313.836	O.000	72.6

For each construct the KMO is all above the recommended threshold of 0.5. Moreover, the Bartlett's test of Sphericity for all constructs was significant ($P < 0.05$), indicating that the data was suitable for factor analysis.

Following the Explanatory Factor Analysis, the confirmatory factor analysis was conducted to validate the measurement model through the convergent and discriminant validity. Table 3 and 4 report reliability and validity metrics for the construct in the model. These metrics include Average Variance Extracted (AVE), Composite Reliability (CR), factor loadings Cronbach's α, Average Shared Variance (ASV) and Maximum Shared Variance (MSV).

Table 3: Convergent validity, internal composite reliability and factors loadings

Construct	Cronbach's α	Factors loading Range	AVE	CR	ASV	MSV
FV	0.881	0.776-0.835	0.650	0,881	0.031	0.071
MFS	0.811	0.746-0.792	0,580	0,805	0.033	0.147
GS	0.848	0.749-0.778	O.574	0.843	0.020	0.023

Table 4. Discriminant validity (HTMT)

	FV	MFS	GS	Sexe	Educ	Sector
FV						
MFS	0.470					
GS	0.326	0.182				
Sexe	0.016	0.020	0.261			
Education	0.128	0.016	0.109	0.026		
Sector	0.003	0.099	0.037	0.018	0.043	

We employed Hulland (1999) method of traditional test theory for assessing reliability and validity. For individual-item, reliability was checked by examining each factor loading of scale item, with a minimum acceptable value of 0.70 (Nunnally, 1978). According to Table 2 the factor loadings in the measurement model are acceptable, revealing adequate reliability. The Cronbach's Alpha for all constructs was in range of 0.73 to 0.88, superior to 0.7, showing the interna consistency. In addition, each measurement model demonstrates a composite reliability higher than 0.8, indicating adequate composite reliability.

The AVE was used to test the convergent validity of each construct. Table 2 shows that the AVEs for all constructs are greater than 0.5, which proves the convergent validity (Fornell & Larcker, 1981).

To further verify discriminant validity, we compared AVE to ASV and MSV. The constructs have ASVs and MSVs which are less than the AVE, indicating that they represent a unique distinct concept. Additionally, the Heterotrait-Monotrait ratio (table 3) are significantly lower than threshold of 0.85 as suggested by Henseler et al (2015). This confirms that the latent constructs of financial vulnerability, MFS and government support are different from each other as well.

Each construct satisfies the criteria for internal consistency, convergent validity, and discriminant validity, making them suitable for further analysis and interpretation in research.

2.3.2. Common bias

Common method bias refers to a threat to surveys where one respondent provides a response to all questionnaire items (Kock et al., 2021). Since both the dependent and independent variables in this study were measured using perceptions, and these perceptions were attained from the same participants, there was a reason to believe that common bias in the data could exist. To address this, we applied Harman's single-factor test to determine whether common method bias is existent in our data. In our case the results show no evidence of such bias, as the single factor explained only 37.25% of the variance, which is below the recommended threshold of 50% (Podsakoff et al, 2003). Thus, the analysis indicates that the data collected is free of common method bias.

2.3.3. Structural model assessment

The structural model is the next step after confirming the measurement model. This step involves calculating the fit indices criteria of the structural model.

Table 5: Goodness-of-fit indices.

Fit Indices	
(χ^2/df)	1.568
GFI	0.957
AGFI	0.931
CFI	0.977
NFI	0.940
RMSEA	0.042

From Table 5, the structural model assessment shows a good fit with data. The normalized chi-square (χ^2/df) of 1.568 is below the recommended threshold of 3 as suggested by Hair et al (1999), indicating an acceptable model fit Additionally, all the goodness-of-fit indicator, including GFI, NFI, and CFI, score more than 0.9, indicating an acceptable model fit. The RMSEA is 0.042, which also is in the acceptable range, reinforcing the adequacy of the fit model. These indices collectively demonstrate that the structural model is a good representation of the data.

3. Results and discussion

3.1 Descriptive statistics

Table 6: Descriptive statistics

Variables	%/Mean
Owner age	38.29
Sex	
Male	65.20
Female	34.80
Level of Education	
Primary	23.70
Secondary	68.10
University	8.20
Legal Status	
Sole proprietorship	95.90
Limited liability company	4.10
Type of business	
Agribusiness	18.00
Commercial	57.60
Manufacturing	4.40
Service	19.90
Firm age	9.88
Size	3.14

A total of 316 business operators completed the survey. Descriptive statistics are shown in table 6. Over 65% of respondents are male. Managers surveyed are, on average, 38 years old. In term of education levels, 24.4% of respondents have completed primary level, 68% secondary level, and less than 8% higher education. Most of the enterprises that make up our sample are commercial enterprises at 57.6%. The rest include an agribusiness (18%), manufacturing (4.4%), and service enterprises represent 19.9%. None of the enterprises in the sample have more than 10 employees.

3.2 Mobile financial services adoption effect on financial vulnerability

We tested the hypotheses using the SEM. The results of the structural model are summarized in Table 7.

Table 7: Structural model result

	Coef	P-value	
MFS -->FV	-0.422***	0.000	
GS --> FV	-0.284***	0.000	
Sex --> FV	-0.065	0.242	
Education --> FV	-0.149	0.006	
Sect-->FV	-0.050	0.345	

*** p<0.01, ** p<0.05

Among the three control variables — Sex, Education and Sector —only education showed a significant relationship with financial vulnerability (β = -0.149; p < 0.05 = 0.006. This finding indicates that small enterprises with more educated owners are less financially vulnerable. This outcome is consistent with Anderloni et al (2012) who indicated that a higher level of education contributes to financial vulnerability reduction. Additionally, it supports the conclusion of Lusardi et al. (2011) who observed that financial fragility is more pronounced among individuals with lower educational programs and lack of financial education. This suggests that owners with advanced education and better management skills are better equipped to make informed decisions and access financial resources more effectively.

One of our hypotheses was: mobile financial services have a positive effect in preventing financial vulnerability. The results are in favor of this hypothesis, evidenced a negative coefficient for mobile financial services (β = -0.419) and statistically significant (p < 0.05 = 0.000). This implies that the adoption of MFS is significantly and negatively related to financial vulnerability of MSME. In other words, using mobile financial services is more likely to reduce financial vulnerability of small enterprises. This indicates the multitude benefits mobile financial services bring to mitigate small enterprise vulnerability (Demirguc-Kunt et al; Gossavi, 2018). With regard to intrinsic qualities, MFS provide convenience and flexibility. For instance, the use of mobile payment and online banking optimize financial transactions, reduce time and costs related to traditional banking (Aron, 2018). This is particularly profitable for small entities that frequently face cash flow constraints and need to manage their resources diligently. Moreover, these services improve financial inclusion by overcoming the geographical exclusion of physical banking in remote areas. These findings are consistent with those of Gaglio et al (2022) and Lestari et al (2021) who showed how adoption mobile financial services facilitates broader digital transformation efforts that is necessary for robust financial resilience. Enterprises utilizing electronic services and other digital services had relatively more stable financial income stability and business continuity. However, while the findings underline the positive effect of MFS, they contrast with the study that the positive impact of digital technology on firm resilience remains uncertain (Ye et al., 2023). This is consistent with Heo et al. (2021) and Seldal & Nyhus (2022) who acknowledge higher financial distress of users compared to non-users. In this regard our finding differs to those of de Bassa Scheresberg et al. (2020) that the use of mobile payments correlates with financial problems, indicating vulnerability among mobile payment users. For small enterprises operating under constrained financial conditions, these services offer both opportunities and challenges (Jack & Mbiti, 2014). While mobile financial services can improve financial management and inclusion, they also introduce vulnerabilities that need to be carefully managed.

3.3 *Government support effect*

To investigate the effects of government support ANOVA one way was performed in addition to SEM. Results are summarized in table 8.

Table 8: Analysis of Variance (ANOVA)

		Sum of Squares	df	Mean Square	F	Sig.
FV	Between Groups	40.852	16	2.553	2.370**	0.002
	Within Groups	322.090	299	1.077		
MFS	Between Groups	15.945	16	0.997	0.885	0.946
	Within Groups	336.593	299	1.126		

*** p<0.01, ** p<0.05

Table 8 summarizes the significant difference among those who perceived government support and those who did not (F = 2.370; P-value = 0.002). This is an illustration of how much government support helps reduce financial vulnerability. The results are also consistent with the SEM results (table 6) which support that government support has a significant impact on the financial vulnerability of small enterprises. This supports our second hypothesis H2 that government intervention reduces financial vulnerability of small enterprises. This suggests financial aid, some form tax break or training programs go far in allowing small businesses meaningfully manage their risks/lists such as stay more liquid/just or meeting more bills. These findings align with Wilson (2007) who reported that government programs designed to decrease administrative costs, and financial incentives have a significant impact on financial vulnerability of small businesses. Similarly, our results support Doh & Kim (2014), by emphasizing that government support can reduce financial and technical constraints for SMEs, improving stable business environment. By reducing cost burdens and improving access to essential resources, government support allows small enterprises to cultivate more resilient financial systems which reduce their vulnerability (Jie, 2023; Jack & Mbiti, 2014).

A third hypothesis predicts the moderate effect of government support on the relationship between mobile financial services and financial vulnerability. For this, we initially analysed the relationship between government support and the adoption of MFS. The ANOVA results (table 8) show no significant difference in adoption between those who perceived government support and did not (F = 0.885; P-value = 0.587). This suggests that the level of adoption of MFS is similar across these groups. These results are in line with the results of SEM, which also show a non-significant association between government support and MFS (GS<--> MFS: $\beta = 0.183$, $p < 0.05 = 0.094$). However, when assessing the moderating effect of government support (table 9), a pure moderating is shown ($\beta = -0.386$, $p < 0.05 = 0.000$). This provides evidence of a strong complementarity between government support and MFS in reducing financial vulnerability.

Table 9: Results of moderation

	Coef	P-value
MFS -->FV	-0.134	0.074
GS --> FV	-0.080	0.900
MFS*GS-->FV	-0.386***	0.000
GS<--> MFS	0.183	0.094

*** p<0.01, ** p<0.05

Specifically, the positive effects of mobile financial services on relief from financial vulnerability are conditional upon MFS being combined with government support. This confirms Chege et al. (2019) who claim that enterprises operating within a more favorable business environment with government support, are susceptible to adopting digital technologies which then reduces financial vulnerability. MFS offer an innovative suite of tools for small enterprises to manage their finances more efficiently (Bai et al., 2021), even as government intervention open the playing field so that these businesses can benefit fully from digital financing options (Osei, 2024). However, the study showed that government support is necessary for efficient use of MFS. In other words, government support is

crucial and must prevail to facilitate widespread protection from financial vulnerability through mobile financial services. This support may be required given the significant effect of MFS services on reducing exposure to financial vulnerability.

Conclusion

This study investigated the role of mobile financial services and government support in alleviating financial vulnerability among small enterprises in Benin. Data was collected from owners of small enterprises in agribusiness, manufacturing, commercial and services, via a survey instrument.

Our findings show that both MFS and government support significantly reduce financial vulnerability of the small enterprises. However, the results also reveal pure moderating effect of government support on the relationship between MFS and financial vulnerability. This highlights the fact that small enterprises gain more from mobile financial services in mitigating financial vulnerability if they also perceive government support.

The study contributes to the literature by providing important theoretical and managerial implications regarding how mobile financial services, supported by government policies, can help reduce the financial vulnerability in Africa. By establishing that the combined effect of government support and mobile financial services further reduce the financial vulnerability of small enterprises, our study enriches the financial distress theory. Both factors stood out as key determinants to reduce the financial vulnerability of small businesses. This enriches the historical understanding of financial distress by emphasizing processes beyond traditional banking practices to incorporate modern financial innovation and institutional interventions. On both managerial and policy fronts, business owners should integrate financial technologies solutions to better cash flow management, overcome constraints related to transaction costs, and gain access to credit and capital, all of which increase their financial vulnerability. Banks must develop focused strategies on small enterprises as key growth segment through the marketing of digital financial products, specifically designing to attract small enterprises owners and improve financial inclusion. The findings point to the need for nuanced strategies for consumer uptake of mobile financial services and government support. Bank and government should develop partnerships to create more inclusive financial services. Policymakers must establish an environment that supports better adoption of financial technologies and is equipped with regulatory frameworks minimizing inherent risk issues. Government should aim to reduce dependency on external support, creating conditions that encourage small enterprises to develop self-sustaining financial practices.

This study presents limitations that orientate future research. The study relies on self-reported data from owners, which can lead to biases in reporting financial vulnerabilities as well their ability to mobile financial services. A possible expansion of this study with future research will need to look at the medium-term impact of mobile financial services on financial vulnerability and examine the effectiveness of different types of government support. Overall, there is a clear need for further research on the construct validity of financial vulnerability and its measures in small enterprises. Studies could investigate the potential risks of mobile financial services, along with appropriate risk management measures to move forward digital channels for enhanced financial inclusion benefits and minimize negative impacts.

List of abbreviations

FV: Financial Vulnerability
GS: Government Support
INSAE: National Institute of Statistics and Economic Analysis
MFS: Mobile Financial Services
MSMEs: Micro Small and Medium Enterprises
SMEs: Small and Medium Enterprises
TAM: Technology Acceptance Model

References

Abdinoor, A., and U.O.L. Mbamba. 2017. Factors influencing consumers' adoption of mobile financial services in Tanzania. Cogent Business and Management 4 (1), https://doi.org/10.1080/23311975.2017.1392273

Adeola, O., & Evans, O. (2019). Digital tourism: mobile phones, internet and tourism in Africa. *Tourism Recreation Research*, *44*(2), 190-202.

Adeola, O., & Evans, O. (2017). Financial inclusion, financial development, and economic diversification in Nigeria. *The Journal of Developing Areas*, *51*(3), 1-15.

Adjasi, C., Hamilton, C., & Lensink, R. (2023). Fintech and financial inclusion in developing countries. In *The Fintech disruption: How financial innovation is transforming the banking industry* (pp. 297-328). Cham: Springer International Publishing.

Aker, J. C., & Mbiti, I. M. (2010). Mobile phones and economic development in Africa. *Journal of economic Perspectives*, *24*(3), 207-232.

Akerlof, G. A. (1970). 4. The market for 'lemons': quality uncertainty and the market mechanism. *Market Failure or Success*, *66*.

Alene, E. T. (2020). Determinants that influence the performance of women entrepreneurs in micro and small enterprises in Ethiopia. *Journal of Innovation and Entrepreneurship*, *9*, 1-20.

Anderloni, L., Bacchiocchi, E., & Vandone, D. (2012). Household financial vulnerability: An empirical analysis. *Research in Economics*, *66*(3), 284-296.

Aron, J. (2018). Mobile money and the economy: a review of the evidence. The World Bank Research Observer, 33(2), 135-188.

Asongu, S. A., Nwachukwu, J. C., & Aziz, A. (2018). Determinants of mobile phone penetration: Panel threshold evidence from Sub-Saharan Africa. *Journal of Global Information Technology Management*, *21*(2), 81-110.

Babilla, T. U. K. (2023). Digital innovation and financial access for small and medium-sized enterprises in a currency union. *Economic Modelling*, *120*, 106182.

Bai, C., Quayson, M., & Sarkis, J. (2021). COVID-19 pandemic digitization lessons for sustainable development of micro-and small-enterprises. *Sustainable production and consumption*, *27*, 1989-2001.

Bartik, A. W., Bertrand, M., Cullen, Z., Glaeser, E. L., Luca, M., & Stanton, C. (2020). The impact of COVID-19 on small business outcomes and expectations. *Proceedings of the national academy of sciences*, *117*(30), 17656-17666.

Beck, T., Pamuk, H., Ramrattan, R., & Uras, B. R. (2018). Payment instruments, finance and development. *Journal of Development Economics*, *133*, 162-186.

Beck, T., Demirguc-Kunt, A. S. L. I., Laeven, L., & Levine, R. (2008). Finance, firm size, and growth. *Journal of money, credit and banking*, *40*(7), 1379-1405.

Bialowolski, P., Cwynar, A., & Weziak-Bialowolska, D. (2022). The role of financial literacy for financial resilience in middle-age and older adulthood. *International Journal of Bank Marketing*, *40*(7), 1718-1748.

Chege, S. M., Wang, D., & Suntu, S. L. (2020). Impact of information technology innovation on firm performance in Kenya. *Information Technology for Development*, *26*(2), 316-345.

Chipunza, K. J., & Fanta, A. (2022). Quality financial inclusion and its determinants in South Africa: evidence from survey data. *African Journal of Economic and Management Studies*, *13*(2), 177-189.

Chong, A. Y. L., Ooi, K. B., Lin, B., & Tan, B. I. (2010). Online banking adoption: an empirical analysis. *International Journal of bank marketing*, *28*(4), 267-287.

Cowling, M., Brown, R., & Rocha, A. (2020). Did you save some cash for a rainy COVID-19 day? The crisis and SMEs. *International Small Business Journal*, *38*(7), 593-604.

Dabla-Norris, E., Kersting, E. K., & Verdier, G. (2012). Firm productivity, innovation, and financial development. *Southern Economic Journal*, *79*(2), 422-449.

Davis, F. D. (1989). Technology acceptance model: TAM. *Al-Suqri, MN, Al-Aufi, AS: Information Seeking Behavior and Technology Adoption*, *205*, 219.

de Bassa Scheresberg, C., Hasler, A., & Lusardi, A. (2020). *Millennial mobile payment users: A look into their personal finances and financial behavior* (No. 1074). ADBI Working Paper Series.

Demirgüç-Kunt, A., Klapper, L., Singer, D., & Ansar, S. (2021). Financial inclusion, digital payments, and resilience in the age of covid-19. *World Bank Report*.

Despard, M. R., Nafziger-Mayegun, R. N., Adjabeng, B. K., & Ansong, D. (2017). Does revenue diversification predict financial vulnerability among non-governmental organizations in sub-Saharan Africa?. *Voluntas: International Journal of Voluntary and Nonprofit Organizations*, *28*, 2124-2144.

Doh, S., & Kim, B. (2014). Government support for SME innovations in the regional industries: The case of government financial support program in South Korea. *Research policy*, *43*(9), 1557-1569.

Dutta, S., Lanvin, B., Wunsch-Vincent, S., & León, L. R. (Eds.). (2022). *Global innovation index 2022:: what is the future of innovation-driven growth?* (Vol. 2000). WIPO.

Engidaw, A. E. (2022). Small businesses and their challenges during COVID-19 pandemic in developing countries: in the case of Ethiopia. *Journal of Innovation and Entrepreneurship*, *11*(1), 1.

Eriola, A. J. (2023). Informal financing and the success of female entrepreneurship: the Moderating role of financial education. *La revue du financier, 45(256), 4-19. https://signal.sciencespo-lyon.fr/article/875433*

Fauzi, A. A., and Sheng, M. L. (2020). The digitalization of micro, small, and medium-sized enterprises (MSMEs): An institutional theory perspective. *Journal of Small Business Management, 1-26*. https://doi.org/10.1080/00472778.2020.1745536

Fernández-López, S., Álvarez-Espiño, M., Rey-Ares, L., & Castro-González, S. (2023). Consumer financial vulnerability: review, synthesis, and future research agenda. *Journal of Economic Surveys*.

Fu, X., Avenyo, E., & Ghauri, P. (2021). Digital platforms and development: a survey of the literature. *Innovation and Development*, *11*(2-3), 303-321.

Gaglio, C., Kraemer-Mbula, E., & Lorenz, E. (2022). The effects of digital transformation on innovation and productivity: Firm-level evidence of South African manufacturing micro and small enterprises. *Technological Forecasting and Social Change*, *182*, 121785.

Global Innovation Index (2023). Innovation in the face of uncertainty. *URL: https://www. wipo. int/global_innovation_index/en*.

Gomber, P., Koch, J. A., & Siering, M. (2017). Digital Finance and FinTech: current research and future research directions. *Journal of Business Economics*, *87*, 537-580.

Gosavi, A. (2018). Can mobile money help firms mitigate the problem of access to finance in Eastern sub-Saharan Africa? Journal of African Business, 19(3), 343-360. https://doi.org/10.1080/15228916.2017.1396791

Guo, H., Yang, Z., Huang, R., & Guo, A. (2020). The digitalization and public crisis responses of small and medium enterprises: Implications from a COVID-19 survey. *Frontiers of Business Research in China*, *14*, 1-25.

Gupta, B. B., Gaurav, A., Panigrahi, P. K., & Arya, V. (2023). Analysis of artificial intelligence-based technologies and approaches on sustainable entrepreneurship. *Technological Forecasting and Social Change*, *186*, 122152.

Heo, W., Lee, J. M., & Rabbani, A. G. (2021). Mediation effect of financial education between financial stress and use of financial technology. *Journal of Family and Economic Issues*, *42*, 413-428.

Jack, W., and T. Suri. 2014. Risk Sharing and Transactions Costs: Evidence from Kenya's Mobile Money Revolution. American Economic Review 104: 183–223. https://DOI:10.1257/aer.104.1183.

Jack, W., Ray, A., and Suri, T. (2013). Transaction networks: Evidence from mobile money in Kenya. American Economic Review, 103(3), 356-61.

Jebarajakirthy, C., and A. Shankar. 2021. Impact of online convenience on mobile banking adoption intention: A moderated mediation approach. Journal of Retailing and Consumer Services. https://doi.org/10.1016/j.jretconser.2020.102323.

Juergensen, J., Guimón, J., & Narula, R. (2020). European SMEs amidst the COVID-19 crisis: assessing impact and policy responses. *Journal of industrial and business economics*, *47*(3), 499-510.

Kim, Y. I., Kim, H. C., & Yoo, J. H. (2016). Household over-indebtedness and financial vulnerability in korea: evidence from credit bureau data.

Klapper, L., & Lusardi, A. (2020). Financial literacy and financial resilience: Evidence from around the world. *Financial Management*, *49*(3), 589-614.

Kock, F., Berbekova, A., & Assaf, A. G. (2021). Understanding and managing the threat of common method bias: Detection, prevention and control. *Tourism Management*, *86*, 104330.

Kuan, K. K., & Chau, P. Y. (2001). A perception-based model for EDI adoption in small businesses using a technology–organization–environment framework. *Information & management*, *38*(8), 507-521.

Lestari, D., Siti, M., Wardhani, W., & Yudaruddin, R. (2021). The impact of COVID-19 pandemic on performance of small enterprises that are e-commerce adopters and non-adopters. *Problems and Perspectives in Management*, *19*(3), 467.

Liao, C. F., & Chen, C. D. (2020). Financial literacy and mobile payment behaviors. *Journal of Accounting and Finance*, *20*(7).

Liu, Y., Luan, L., Wu, W., Zhang, Z., & Hsu, Y. (2021). Can digital financial inclusion promote China's economic growth?. *International Review of Financial Analysis*, *78*, 101889.

Lusardi, A., Schneider, D. J., & Tufano, P. (2011). *Financially fragile households: Evidence and implications* (No. w17072). National Bureau of Economic Research.

Mogaji, E., Adeola, O., Hinson, R. E., Nguyen, N. P., Nwoba, A. C., & Soetan, T. O. (2021). Marketing bank services to financially vulnerable customers: evidence from an emerging economy. *International Journal of Bank Marketing*, *39*(3), 402-428.

Moreira, E. P., & Mehra, R. (2022). *Innovation in Africa: Evidence and Implications for Growth and the Transition to High-Income Status* (No. 1950). Policy Center for the New South.

Nasri, W., & Charfeddine, L. (2012). Factors affecting the adoption of Internet banking in Tunisia: An integration theory of acceptance model and theory of planned behavior. *The journal of high technology management research*, *23*(1), 1-14.

Nguyen, H. T., Nguyen, T. T., Dang, X. L. P., & Nguyen, H. M. (2022). Informal financing choice in SMEs: do the types of formal credit constraints matter?. *Journal of Small Business & Entrepreneurship*, *34*(3), 313-332.

Nguyen, B., & Canh, N. P. (2021). Formal and informal financing decisions of small businesses. *Small Business Economics*, *57*(3), 1545-1567.

Nonvide, G. M. A., & Alinsato, A. S. (2023). Who uses mobile money, and what factors affect its adoption process? Evidence from smallholder households in Cote d'Ivoire. *Journal of Financial Services Marketing*, *28*(1), 117-127.

Nugraha, D. P., Setiawan, B., Nathan, R. J., & Fekete-Farkas, M. (2022). FinTech adoption drivers for innovation for SMEs in Indonesia. *Journal of Open Innovation: Technology, Market, and Complexity*, *8*(4), 208.

O'Connor, G. E., Newmeyer, C. E., Wong, N. Y. C., Bayuk, J. B., Cook, L. A., Komarova, Y., ... & Warmath, D. (2019). Conceptualizing the multiple dimensions of consumer financial vulnerability. *Journal of Business Research*, *100*, 421-430.

Ofori-Okyere, I., Edghiem, F., & Kumah, S. P. (2023). Marketing inclusive banking services to financially vulnerable consumers: a service design approach. *Journal of Services Marketing*, *37*(2), 232-247.

Okello, G.C.B., and J.M. Ntayi. 2020. Mobile money adoption and usage and financial inclusion: Mediating effect of digital consumer protection. Digital Policy, Regulation and Governance: https://doi.org/10.1108/DPRG-01-2019-0005

Oliveira, T., Thomas, M., & Espadanal, M. (2014). Assessing the determinants of cloud computing adoption: An analysis of the manufacturing and services sectors. *Information & management*, *51*(5), 497-510.

Osei, D. B. (2024). Digital infrastructure and innovation in Africa: Does human capital mediates the effect?. *Telematics and Informatics*, *89*, 102111.

Ozili, P. K. (2018). Impact of digital finance on financial inclusion and stability. Borsa Istanbul Review, 18(4), 329-340. https://doi.org/10.1016/j.bir.2017.12.003

Padungsaksawasdi, C., & Treepongkaruna, S. (2023). Investor attention and global stock market volatility: Evidence from COVID-19. *Journal of Emerging Market Finance*, *22*(1), 85-104.

Rogers, E.M. 2003. Diffusion of Innovations, 5th ed. New York, NY: Free Press/Amazon

Seldal, M. N., & Nyhus, E. K. (2022). Financial vulnerability, financial literacy, and the use of digital payment technologies. *Journal of Consumer Policy*, *45*(2), 281-306.

Shankar, A., C. Jebarajakirthy, and M. Ashaduzzaman. 2020. How do electronic word of mouth practices contribute to mobile banking adoption? Journal of Retailing and Consumer Services 52: 101920. https://doi.org/10.1016/j.jretconser.2019.101920.

Shankar, A., and A. Behl. 2021. How to enhance consumer experience over mobile wallet: A data-driven approach. Journal of Strategic Marketing. https://doi.org/10.1080/0965254X.2021.1999306.

Sharma, S. K., Janssen, M., Bunker, D., Dominguez-Péry, C., Singh, J. B., Dwivedi, Y. K., & Misra, S. K. (2023). Unlocking the potential of smart technologies: addressing adoption challenges. *Information Systems Frontiers*, *25*(4), 1293-1298.

Shinozaki, S. (2014). Innovative financing models for SMEs and the regulatory implications. In *Global Shock, Risks, and Asian Financial Reform* (pp. 628-675). Edward Elgar Publishing.

Soetan, T. O., Mogaji, E., & Nguyen, N. P. (2021). Financial services experience and consumption in Nigeria. *Journal of Services Marketing*, *35*(7), 947-961.

Stiglitz, J. E., & Weiss, A. (1981). Credit rationing in markets with imperfect information. *The American economic review*, *71*(3), 393-410

Tan, M., & Teo, T. S. (2000). Factors influencing the adoption of Internet banking. *Journal of the Association for information Systems*, *1*(1), 5.

Tang, C., Xu, Y., Hao, Y., Wu, H., & Xue, Y. (2021). What is the role of telecommunications infrastructure construction in green technology innovation? A firm-level analysis for China. *Energy Economics*, *103*, 105576.

Tevel, E., Katz, H., & Brock, D. M. (2015). Nonprofit financial vulnerability: Testing competing models, recommended improvements, and implications. *Voluntas: International Journal of Voluntary and Nonprofit Organizations*, *26*(6), 2500-2516.

Wang, X., & He, G. (2020). Digital financial inclusion and farmers' vulnerability to poverty: Evidence from rural China. *Sustainability*, *12*(4), 1668.

Wewege, L., & Thomsett, M. C. (2019). *The digital banking revolution: how fintech companies are transforming the retail banking industry through disruptive financial innovation*. Walter de Gruyter GmbH & Co KG.

Wilson, T. A. (2012). Supporting social enterprises to support vulnerable consumers: the example of community development finance institutions and financial exclusion. *Journal of consumer policy*, *35*, 197-213.

World Bank (2020). Mobile financial services, p. 54

Yoon, C., Lim, D., & Park, C. (2020). Factors affecting adoption of smart farms: The case of omputers in Human Behavior, 108,

Ye, F., Ke, M., Ouyang, Y., Li, Y., Li, L., Zhan, Y., & Zhang, M. (2024). Impact of digital technology usage on firm resilience: a dynamic capability perspective. Supply Chain Management: An International Journal, 29(1), 162-175.