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Analyzing Farmers' Awareness and Perceptions of Digital Financial Services (DFS): A Step Towards Digital Agricultural Financing

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Abstract

Digital Financial Services (DFS) have the potential to revolutionize access to financial resources for smallholder farmers in Nigeria, thereby improving financial inclusion. This study examined farmers' awareness, perceptions, and use of Digital Financial Services (DFS) as a pathway toward strengthening digital agricultural financing in North-Central Nigeria. Specifically, the study identified the types of DFS available to farmers, assessed their awareness of these services, analyzed farmers' perceptions of DFS, and examined the determinants of their perception. A multistage sampling procedure was used to select respondents, and data were analyzed using descriptive statistics and multiple linear regression. Findings revealed varying levels of awareness across DFS types. Agent banking services recorded the highest awareness (61.8%), while mobile-based microloan services had the lowest (21.4%). In terms of usage, POS (90.4%) and ATMs (90.3%) were the most widely used, whereas e-wallet adoption remained relatively low (43.8%). Perception analysis showed that most farmers viewed DFS as easy to use, beneficial for farm financial management, and capable of improving convenience and efficiency. The regression model ($R = 0.617$; $R^2 = 0.380$) indicated that variables such as age, education, mobile-phone ownership, internet access, farming experience, and DFS awareness significantly influenced farmers' perceptions. The study demonstrates that while farmers largely rely on assisted digital channels like POS and ATMs, they show strong willingness and confidence to engage more fully with digital platforms when usability, security, and accessibility are enhanced. The study contributes evidence that improving awareness, strengthening digital literacy, and expanding rural connectivity can significantly accelerate DFS adoption and, ultimately, promote inclusive agricultural financing in Nigeria.

Keywords
Digital Finance, Perception, Awareness, Digital Literacy

1. Introduction

Agriculture remains the backbone of many economies in sub-Saharan Africa, including Nigeria, where a significant proportion of the rural population depends on smallholder farming for their livelihood (Ayim et al, 2020). However, smallholder farmers often face limited access to formal financial services, which include credit, savings, insurance, and payment systems, which constrain their ability to invest in inputs, manage risk, and scale production. In recent years, digital financial services (DFS), which include mobile banking, mobile money, e-wallets, digital payments, and other fintech-based financial products, have emerged as promising tools to extend financial inclusion to underserved rural populations (Aliu, 2023; Adedipe & Ogunsola, 2025).

DFS can improve financial access, ease payment operations, and facilitate credit/savings transactions for smallholder farmers (Aliu, 2023). Anane and Nie (2022) found that perceived facilitating conditions, security/privacy, awareness, and effort expectancy significantly impact DFS adoption among rural users. Moreso, while a high proportion of farmers reportedly use DFS, many remain limited in digital knowledge, experience scams or transaction failures, and express a relatively low satisfaction with using DFS for agricultural payments, especially when compared with traditional cash transactions. (Hornuf et al, 2024)

Despite these potentials, DFS adoption among smallholder farmers and its use for agricultural financing remains uneven across contexts. In many parts of sub-Saharan Africa, including Nigeria, persistent constraints such as inadequate digital infrastructure (internet, smartphones), low digital literacy, limited awareness, and lack of trust have hindered widespread adoption of DFS in agriculture (Ayim et al., 2020)

In view of these gaps, it is critical to understand not only the extent of awareness and use of DFS among smallholder farmers but also their perceptions, as these shape their willingness to adopt and use digital financial tools for agricultural financing and transactions. Understanding these perceptions is especially relevant in regions like North-Central Nigeria, where smallholder farmers face structural barriers to formal financial services and where digital financial inclusion may support sustainable agricultural development.

Research Problem and Justification

While DFS shows significant potential for improving financial inclusion and agricultural financing among smallholder farmers, evidence indicates that its adoption remains limited in many rural areas. Previous research has primarily examined how farmers adopt and use DFS (such as frequency of use and types of services accessed), but less attention has been given to farmers' perceptions and the factors influencing those perceptions. Without a clear understanding of what influences farmers' attitudes toward DFS, efforts to advance digital agriculture financing may fall short, especially if farmers lack trust or harbour negative perceptions, even when services and infrastructure are present.

In the context of North-Central Nigeria, there is little publicly available empirical research that jointly examines awareness, use, and perception of DFS among smallholder farmers. This study, therefore, seeks to fill that gap, providing evidence on how farmers view DFS, what factors drive their perceptions, and thereby laying a foundation for interventions aiming to improve uptake of DFS in agriculture and advance digital agricultural financing.

Objectives of the Study

The specific objectives of this study are to:

i) Identify the types of DFS used by farmers in the study area.
ii) Determine the level of awareness of DFS among farmers.
iii) Assess the perceptions of farmers toward DFS.
iv) Analyze the determinants of farmers' perception of DFS.

Hypothesis of the Study

H_0: There is no significant relationship between selected socioeconomic characteristics of the farmers and their perception toward DFS.

Theoretical Framework

Understanding farmers' awareness and perceptions of Digital Financial Services (DFS) requires grounding in theories of technology adoption, behavioural intention, and information processing. This study draws primarily on the Technology Acceptance Model (TAM), the Diffusion of Innovation Theory (DOI), and concepts from Financial Inclusion Theory, which collectively provide a robust explanation of how farmers come to understand, evaluate, and ultimately engage with emerging digital financial tools.

The Technology Acceptance Model (TAM), developed by Davis (1989), posits that users' behavioural intention to adopt a technology is influenced by two core factors: perceived usefulness and perceived ease of use. In the context of DFS, farmers are more likely to perceive value in digital payments, mobile banking, and mobile money platforms when they believe these tools enhance financial transactions and reduce time or cost burdens. Perception toward DFS can therefore be viewed as a reflection of farmers' evaluation of the usefulness, complexity, and relevance of digital tools in their agricultural operations.

Complementing TAM, the Diffusion of Innovation Theory (DOI) by Rogers (2003) explains how new technologies spread within a social system. DOI highlights attributes such as relative advantage, compatibility, complexity, trialability, and observability as key determinants of adoption. These attributes are particularly relevant in rural farming contexts where access to digital infrastructure, literacy levels, and social influences may facilitate or impede awareness and perception. For instance, mobile phone ownership and internet access increase the trialability and observability of DFS, thereby improving perceptions.

The study is also grounded in principles of Financial Inclusion Theory, which emphasizes access to affordable and convenient financial services as a driver of economic empowerment (Demirgüç-Kunt et al., 2018). Awareness and positive perceptions of DFS are critical components of financial inclusion, especially for smallholder farmers who often face barriers such as distance to banks, high transaction costs, and limited financial literacy. DFS provides an opportunity to bridge these gaps by enabling digital payments, savings, and credit access, thereby influencing overall perception.

Conceptual Framework

Based on these theories, the study's conceptual framework assumes that farmers' awareness and perceptions of DFS are shaped by a combination of socioeconomic characteristics (such as age, education, sex, marital status, and

farming experience) and digital access factors (such as mobile phone ownership and internet connectivity). Awareness of DFS is expected to influence perception either positively, through improved knowledge and familiarity, or negatively, when awareness includes exposure to risks or barriers such as fraud, network failures, or hidden charges.

Within the framework:

- Perception reflects farmers' attitudinal evaluation of DFS based on usefulness, reliability, trust, convenience, and accessibility.
- Awareness is conceptualized as farmers' knowledge of available DFS tools.
- Socioeconomic and digital access variables interact with awareness to determine perception.

The framework, therefore, positions perception as the dependent construct shaped by awareness and selected socioeconomic characteristics.

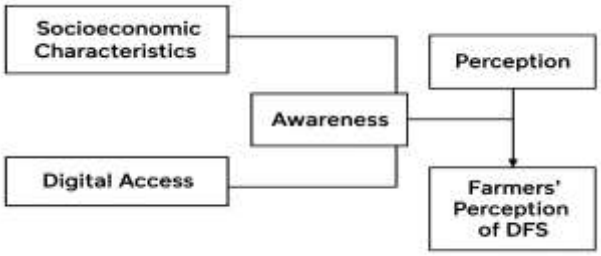

Figure 1. Conceptual Framework (Author's construct)

2. Materials and Methods

The study was conducted in North Central Nigeria. North Central Nigeria is made up of six states (Benue, Kogi, Kwara, Nasarawa, Niger, and Plateau) and the Federal Capital Territory (FCT), Abuja. While the states have 114 Local Government Areas with a total population of over 20million, the FCT has 6 council areas with a population of about 1.41 million. The zone is agrarian as the main employer of labour is agriculture with few commercial centers in form of modern and local markets. Crops produced in the zone include yam, rice, sorghum, maize, acha, beeniseed, fruits, vegetables, etc.

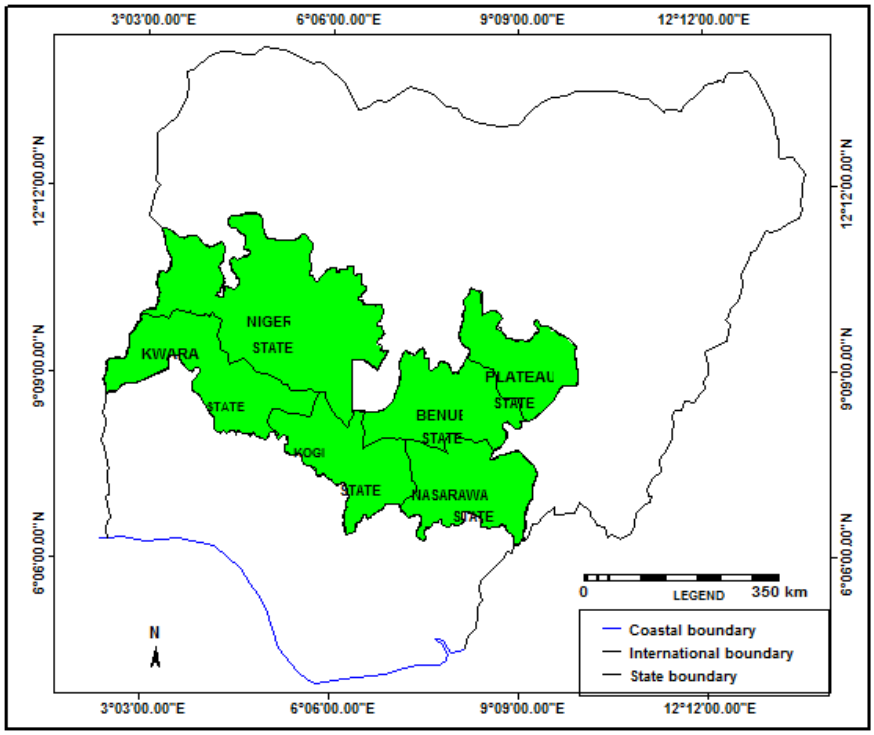

Figure 2. showing the study area

Measurement of variables

Perception towards DFS: The study employed a structured Likert-type scale. The perception statements were measured on a five-point Likert-type scale, with response options ranging from "Strongly Agree" to "Strongly Disagree." Each response was assigned a numerical value for the purpose of quantitative analysis. For positively worded statements, responses were coded as follows: Strongly Agree = 5, Agree = 4, Undecided = 3, Disagree = 2, and Strongly Disagree = 1. Conversely, for negatively worded statements, the coding was reversed to maintain consistency in interpretation: Strongly Agree = 1, Agree = 2, Undecided = 3, Disagree = 4, and Strongly Disagree = 5. This approach ensured that higher scores consistently reflected more favourable perceptions toward DFS, while lower scores indicated unfavourable perceptions. The coding procedure allowed for accurate aggregation and interpretation of perception scores across multiple items, facilitating meaningful analysis of the attitudinal disposition of smallholder farmers toward digital financial technologies.

Sampling procedure and sampling size

A multistage sampling technique was employed to select 812 smallholder farmers for the study. The total sampling frame was 2,410 registered smallholder farmers across 28 selected cells in the three states. From this, a final sample size of 812 respondents was drawn. Specifically, 318 respondents were selected from Niger State, 237 from Kwara State, and 257 from Kogi State as shown in Table 1.

Table 1. Sampling procedure

SN	Selected states	50% of zones from each state	20% of blocks from selected zone	20% of cells from selected block	Total number of registered farmers in selected cell (Sample frame)	Sample size
1	Niger	Zone A	Mokwa	Bokani	80	23
				Mokwa	75	21
			Kacha	Badegi	79	23
				Kacha	80	23
			Lavun	Kutigi	75	21
				Lanle	83	24
		Zone C	Ibbi	Ibbi	81	23
				Zugurma	77	22
			Kontagora	Kontagora	80	23
				Tungan Wawa	79	23
			Wushishi	Wushishi	76	22
				Kodo	78	22
			Zungeru	Zungeru	85	24
				Kaliko	85	24
					Total= 1,113	318
2	Kwara	Zone B	Lafiaji	Lafiaji	97	41
			Lade	Lade	83	35
		Zone C	Iporin	Oke Oyi	98	41
				Oke Ose	87	37
				Agbeyangi	96	40
			Shao	Sobi	103	43
					Total= 564	237
3	Kogi	Zone B	Egume	Anyigba	85	30
				Egume	108	38
			Ankpa	Ojapata	80	28
				Ankpa	110	39
		Zone D	Alloma	Ejule	90	32
				Umomi	85	30
			Okpo	Imane	95	33
				Okpo	80	27
					Total=733	257
Total	3	6	15	28	2410	812

Source: Field Survey. 2024

3. Results and Discussion

3.1 Type of Digital Financial Services Available in the study Area

Table 2 provides the types of Digital Financial Services (DFS) available and used by the respondents. Data in Table 2 shows that POS terminals and ATMs are nearly ubiquitous among surveyed farmers (90.4% and 90.3%, respectively), with payment cards also widely used (81.0%), while internet/mobile banking (58.3%) and e-wallets (43.8%) register lower uptake. This pattern suggests that farmers predominantly rely on off-device or assisted cashless channels (POS and ATMs) and card-based withdrawals for everyday transactions, whereas app-based or fully digital wallet services have not yet achieved the same penetration. The dominance of POS and ATM usage mirrors national transaction trends. Data and sector reports document large and growing volumes of e-payments processed through POS and instant payment rails, reflecting how rural users often access formal digital payments via physical touchpoints and bank cards rather than exclusively through smartphone apps (NIBSS, 2022). Likewise, industry and central-bank reporting highlight a rapid expansion of POS terminals across Nigeria in recent years, often outpacing ATMs in deployment and daily transactions because POS agents provide on-the-ground access, cash-in/cash-out services, and human support that are especially valuable in rural communities (GSMA, 2023).

The lower use of internet and mobile banking and the even lower adoption of e-wallets among farmers are consistent with evidence that app-centric services require better connectivity, smartphone access, and higher digital literacy conditions that are uneven in rural areas (World Bank, 2021; GSMA, 2023). In many contexts, POS agents and bank branches/ATMs remain the primary enablers of digital payments because they combine digital rails with local, trusted intermediaries who help customers overcome literacy, language, or device limitations (GSMA, 2023). The relatively high card usage (81.0%) reflects the continuing role of bank-linked instruments for cash access and payments, even as mobile-first channels expand; this mixed-channel behaviour, heavy reliance on POS/ATM and cards alongside growing but smaller app/wallet usage, has been observed (NIBSS, 2022; World Bank, 2021).

These findings imply that efforts to increase farmers' use of more sophisticated DFS (for example, wallet-based savings, input financing, or app-driven agricultural services) should build on the existing POS/agent and card infrastructure. Practical steps include leveraging agent networks for onboarding and training, designing low-bandwidth and USSD alternatives for non-smartphone users, and integrating wallet and app services with agent cash-in/cash-out flows so farmers can transition from assisted transactions to fuller digital engagement (GSMA, 2023).

Table 2. DFS Available and used by the Respondents

S/N	Digital Financial Service Used	Yes	No	Rank
		Freq. (%)	Freq. (%)	
1.	POS	734 (90.4)	78 (9.6)	1st
2.	ATMs	733 (90.3)	79 (9.7)	2nd
3.	Cards	658 (81.0)	154 (19.0)	3rd
4.	Internet and mobile banking	473 (58.3)	339 (41.7)	4th
5.	E-Wallets	356 (43.8)	456 (56.2)	5th

Source: Field Survey, 2024

3.2 Farmers Awareness of DFS

The findings in Table 3 reveal considerable variation in farmers' awareness of Digital Financial Services (DFS) in North-Central Nigeria. Agent banking services emerged as the most widely recognized DFS option, with 61.8% of respondents reporting awareness. This strong familiarity may be attributed to the widespread presence of agent banking outlets across rural communities, which has expanded significantly in Nigeria over the past five years due to commercial banks' reliance on last-mile financial inclusion strategies. Recent studies similarly report that agent networks remain the most visible and trusted digital finance touchpoints among rural populations in sub-Saharan Africa (Ejemeyovwi & Adebayo, 2022; CGAP, 2023). Awareness of mobile wallets (41.6%) and digital payment platforms (40.8%) was moderate, indicating that while these services are increasingly integrated into commercial and agricultural transactions, their penetration among rural farmers is still evolving. This aligns with findings by Ofori et al. (2021) and Abubakar & Bello (2023), who observed that low smartphone penetration, limited digital literacy, and inconsistent network connectivity continue to hinder widespread familiarity with mobile-based financial applications.

Awareness levels dropped considerably for mobile-based savings accounts (38.5%) and microloan platforms (21.4%), suggesting that more specialized or advanced DFS offerings remain largely unfamiliar to most farmers. This pattern echoes recent evidence indicating that digital credit and savings platforms are less understood in rural contexts due to mistrust, perceived complexity, and inadequate farmer-targeted sensitization campaigns (Kikulwe et al., 2021). The particularly low awareness of digital microloans aligns with the broader regional trend where smallholder farmers often rely on informal credit and remain unaware of emerging mobile-enabled microfinance solutions (Dalberg, 2024). Overall, the ranking of awareness underscores that farmers are more knowledgeable about DFS options that are physically accessible, agent-assisted, and require minimal technical engagement. This reinforces arguments that

reducing complexity and improving localized communication are essential for enhancing DFS uptake in rural farming communities (Banerjee et al., 2025).

Table 3. Awareness of accessible DFS

S/N	Digital Financial Service	Aware Freq. (%)	Not Aware Freq. (%)	Rank
1.	Agent banking services	502 (61.8.)	310(38.2)	1st
2.	Mobile wallets for financial transactions	338 (41.6)	474(58.4)	2nd
3.	Digital payments platforms	331 (40.8)	481(59.2)	3rd
4.	Savings account through mobile platforms	313 (38.5)	499(61.5)	4th
5.	Microloans through mobile platforms	174 (21.4)	638(78.6)	5th

Source: Field Survey, 2024

3.3 Farmers Perception of DFS

The data in Table 4 reveal the perception of the farmers about DFS. The perception data reveals a generally positive attitude toward the usability and benefits of Digital Financial Services (DFS) among farmers in North-Central Nigeria. Rural users increasingly view DFS as accessible and beneficial when supported by mobile penetration and rising digital literacy. For instance, more than 70% of respondents agreed that DFS features were easy to learn, and over 67% found the platforms user-friendly. This supports findings by Parlasca et al. (2022), who reported that ease of use and intuitive interfaces significantly shape digital finance uptake among rural populations in sub-Saharan Africa. Similarly, farmers' confidence in using DFS for day-to-day transactions echoes the conclusions of Hornuf et al (2020) and Rahman et al (2025), who found that perceived ease of use directly enhances behavioural intention toward DFS adoption.

Moreover, the perception that DFS is not overly complex, as evidenced by 44.7% disagreeing that it is too complicated, aligns with emerging evidence that rural farmers increasingly feel empowered to adopt digital tools when they believe the technology is manageable (Abdulai et al., 2023). This indicates that perceived technological self-efficacy is strengthening, possibly driven by increased smartphone usage and digital exposure in rural Nigeria.

Language barriers, cited by only 28.3% as a challenge, appear less restrictive than previously reported. Recent research shows that localized interfaces and USSD-based platforms are reducing linguistic barriers to DFS adoption (GSMA, 2023). The majority (38.8%) who dismissed language constraints support the argument that the availability of simplified mobile finance tools is facilitating wider inclusivity.

Farmers also demonstrated strong recognition of DFS benefits, 65.9% agreed that DFS can improve farm financial management, 69.4% believed it saves time and effort, and 69.2% acknowledged its convenience for remote access to services. These findings resonate with Parlasca et al (2020) and Bagmalek & Moosaei (2025), who showed that digital tools improve efficiency, reduce transaction costs, and enhance financial decision-making among smallholder farmers. The perception that DFS provides more services than traditional methods (68.1%) and helps in achieving financial goals (55.3%) also supports the finding that DFS is expanding economic empowerment opportunities (Kikulwe, 2021) Limited internet access (25.9%) remains a structural barrier, consistent with studies highlighting digital infrastructure deficits as a key impediment to DFS expansion in African rural communities (GSMA, 2023). Despite these challenges, the overall optimism suggests an enabling environment for DFS expansion.

The findings show that farmers in North-Central Nigeria possess strong awareness of DFS benefits and demonstrate favourable perceptions that support adoption. These patterns align with the of Abdulai et al (2023), and Hornuf et al (2020) that usability, perceived benefits, and trust as critical determinants of DFS uptake. Strengthening DFS adoption will require continued investment in digital infrastructure, security education, language-inclusive service design, and targeted capacity training to sustain and improve this growing

3.4 Factors Influencing Farmers' Perception of Digital Financial Services

The regression analysis in Table 5 assessed the influence of socioeconomic and technological characteristics on farmers' perception of Digital Financial Services (DFS). The results of the multiple linear regression show that multiple predictors significantly shaped perception. The overall pattern indicates that perception of DFS is strongly associated with education, digital access, and farming experience, whereas age plays no significant role.

Age had a negative but non-significant association with perception ($B = -0.060$, $p = .255$), indicating no meaningful difference between younger and older farmers after accounting for other variables. However, sex exhibited a significant positive effect ($B = 2.682$, $p = .014$), suggesting that male farmers hold more favourable perceptions of DFS than females. This aligns with findings that gender gaps persist in digital finance usage due to differences in digital literacy, phone ownership, and financial autonomy (Suri and Jack, 2021).

Table 4. Farmers' Perception of DFS

N	Perception Statement	SD	D	U	A	SA	Mean(SD)
		F (%)	F (%)	F (%)	F (%)	F (%)	
1.	DFS would allow me to access financial services more conveniently in remote areas	34(4.2)	121(14.9)	95(11.7)	428(52.7)	134(16.5)	3.62 (1.06)
2	Using DFS would save me time and effort compared to traditional methods	35(4.3)	130(16.0)	83(10.2)	433(53.3)	131(16.1)	3.61 (1.07)
3	I am concerned about the security of my money if I use DFS	113(13.9)	456(56.2)	90(11.1)	122(15.0)	31(3.8)	3.61 (1.02)
4	DFS gives me more control over my finances than traditional methods	30(3.7)	134(16.5)	84(10.3)	445(54.8)	119(14.7)	3.60 (1.04)
5	I am confident I could learn how to use DFS features easily	42(5.2)	124(15.3)	75(9.2)	454(55.9)	117(14.4)	3.59 (1.07)
6	I would feel comfortable using DFS to make every day financial transactions	34(4.2)	125(15.4)	90(11.1)	460(56.7)	103(12.7)	3.58 (1.03)
7.	I would adopt DFS if I received proper training and support	30(3.7)	139(17.1)	99(12.2)	414(51.0)	130(16.0)	3.58 (1.06)
8.	DFS platforms are user-friendly and easy to navigate	38(4.7)	130(16.0)	100(12.3)	423(52.1)	121(14.9)	3.57 (1.07)
9.	DFS offers a wider range of financial services than traditional methods	36(4.4)	119(14.7)	104(12.8)	466(57.4)	87(10.7)	3.55 (1.01)
10.	DFS can improve the financial well-being of smallholder farmers	34(4.2)	141(17.4)	87(10.7)	446(54.9)	104(12.8)	3.55 (1.05)
11.	DFS could significantly improve the way I manage my farm finances	37(4.6)	125(15.4)	115(14.2)	456(56.2)	79(9.7)	3.51 (1.01)
12.	DFS is a more efficient way to manage finances	44(5.4)	139(17.1)	105(12.9)	441(54.3)	83(10.2)	3.47 (1.06)
13.	Lack of access to reliable internet would limit my DFS use	106(13.1)	420(51.7)	76(9.4)	147(18.1)	63(7.8)	3.44 (1.16)
14.	The risk of fraud or scams associated with DFS worries me	76(9.4)	451(55.5)	85(10.5)	147(18.1)	53(6.5)	3.43 (1.09)
15.	Using DFS is too complicated for someone with limited experience with technology	143(17.6)	363(44.7)	54(6.7)	111(13.7)	141(17.4)	3.32 (1.37)
16.	I do not trust the technology behind DFS	70(8.6)	427(52.6)	88(10.8)	168(20.7)	59(7.3)	3.35 (1.12)
17.	I believe DFS can help me achieve my financial goals for my farm	38(4.7)	216(26.6)	109(13.4)	370(45.6)	79(9.7)	3.29 (1.10)
18.	DFS would make me feel more financially empowered	45(5.5)	219(27.0)	119(14.7)	329(40.5)	100(12.3)	3.27 (1.15)
19.	Potential fees for DFS features are a major concern	87(10.7)	342(42.1)	90(11.1)	233(28.7)	60(7.4)	3.20 (1.18)
20.	Language barriers would prevent me from using DFS effectively	98(12.1)	315(38.8)	92(11.3)	230(8.3)	77(9.5)	3.16 (1.23)

SA= Strongly Agree, A= Agree, U= Undecided, D=Disagree, SD= Strongly Disagree, Source: Field Survey, 2024

Marital status also showed a significant influence (B = 3.638, p = .002), indicating that married farmers may perceive DFS more positively, possibly because greater household financial responsibilities increase interest in efficient financial tools. Education emerged as the strongest socioeconomic predictor (B = 6.375, p < .001), reinforcing prior evidence that literacy enhances the ability to understand and navigate digital platforms (World Bank, 2021). Years of farming experience also contributed positively (B = .196, p < .001), suggesting that more experienced farmers better appreciate the relevance of DFS in managing agricultural transactions and accessing financial services, an observation supported by recent studies linking farming experience with digital finance adoption (World Bank, 2021).

Digital access variables demonstrated substantial importance. Mobile phone ownership significantly increased perception (B = 12.320, p < .001), consistent with research showing that device ownership is a primary gateway to DFS adoption among rural populations (GSMA, 2023). Internet access on mobile phones also exerted a strong positive effect (B = 9.139, p < .001), indicating that connectivity enhances exposure to digital applications and reduces uncertainty during digital transactions. This corroborates findings that internet access significantly boosts digital financial literacy, usage, and trust (Mothobi & Kebotsamang, 2024).

Table 5. Multiple Linear Regression Predicting Farmers' Perception of DFS

Predictor	B Coef. (β)	SE B	β	t	p
Constant	32.456	4.321	—	7.511	< .001
Age	–0.060	0.053	–.041	–1.140	.255
Sex	2.682	1.083	.074	2.475	.014
Marital Status	3.638	1.193	.092	3.049	.002
Educational Level	6.375	0.627	.400	10.169	< .001
Farming Experience (Years)	0.196	0.055	.123	3.585	< .001
Mobile Phone Ownership	12.320	2.943	.121	4.187	< .001
Internet Access on Phone	9.139	1.348	.253	6.778	< .001
Model Summary: R Square= 0.380, Adjusted R Square=0.374 Std. Error of the estimate = 12.774					

5. Conclusion and Recommendations

This study investigated farmers' awareness, perception, and use of Digital Financial Services (DFS) as a foundation for enhancing digital agricultural financing in North-Central Nigeria. The findings revealed that while farmers demonstrated relatively high awareness and use of traditional digital access points such as POS and ATMs, awareness and utilization of more advanced DFS, particularly mobile-based savings and microloan platforms, remained comparatively low. Nevertheless, farmers expressed strong positive perceptions toward DFS, characterized by confidence in ease of use, recognition of convenience, and appreciation of its potential to improve financial management. The regression results further showed that socioeconomic attributes such as education, farming experience, mobile phone ownership, and internet access significantly influenced these perceptions. The study concludes that DFS holds substantial promise for strengthening financial inclusion and supporting agricultural productivity, but its full potential can only be realized when infrastructural, literacy, and awareness gaps are effectively addressed. Based on the findings, the following are recommended:

1. Expand Digital Literacy and DFS Sensitization Programs: Stakeholders, including government agencies, financial institutions, and NGOs, should implement targeted training programs to deepen farmers' understanding of mobile banking, digital savings, and microloan platforms. Such initiatives will enhance user confidence and bridge existing awareness gaps.
2. Improve Rural Digital Infrastructure: Investment in reliable mobile network coverage and internet connectivity is essential to support seamless DFS access, particularly in underserved farming communities where infrastructural limitations remain a key barrier.
3. Promote User-Centered DFS Design: Financial service providers should prioritize simplified interfaces, support for local languages, and USSD-based options to ensure accessibility for farmers with low literacy or limited smartphone capabilities.
4. Strengthen Trust Through Security Assurance Measures: Regular sensitization on fraud prevention, transaction verification, and consumer protection rights can help mitigate concerns around security and build sustained trust in DFS platforms.
5. Integrate DFS Into Agricultural Support Schemes: Government and development partners should leverage DFS to deliver subsidies, credit, and extension services digitally, thereby reinforcing adoption while promoting transparency and financial inclusion.

Future research should explore gender dynamics in DFS utilization, specifically examining how disparities in access to mobile technology, digital literacy levels, financial decision-making power, and socio-cultural norms influence the adoption and effective use of Digital Financial Services among male and female farmers.

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