

(RESEARCH ARTICLE)



## Effect of financial inclusion on market participation of rice farmer's cooperative members in Anambra State

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### Abstract

This study on the effect of financial inclusion on market participation of rice farmer's cooperative members in Anambra State, Nigeria used a combination of analytical tools like descriptive statistics, beta, and linear regression models to operationalize the data collected from a random sampling of 328 respondents. Descriptively, the study found that the majority of the respondents had access to savings accounts (87.0%) and point of sales (85.0%). Additionally, 81.0% confirmed the availability of microfinance bank (MFB) services, highlighting the extensive presence of MFBs in Anambra State. The study also delves into the market participation of rice farmers. The average farm size for the cooperative was found to be 9.85 hectares, producing an output of 39.73 tons. A high market participation index (0.848) showed that 84.8% of the total rice output was offered for sale. Furthermore, the result of the beta regression analysis revealed that online banking or self-service platforms (0.097), and microfinance services (0.180) positively influence farmer's decisions to participate in the market. Furthermore, cooperative age, legal status, and gender significantly determined the use of these financial products. It was also discovered that various challenges faced by farmers for financial inclusion, such as high interest rates and poor internet services hamper on market participation ability of the farmers. The study therefore recommends that financial institution should revise their interest rate to help accommodate a diverse range of rice farmers.

**Keywords:** Financial Inclusion; Market Participation; Rice Farmers' Cooperative; Anambra State

### 1. Introduction

Financial exclusion has manifested prominently in Nigeria with the bulk of the money in the economy staying outside the banking system [1]. In 2008, a survey by Enhancing Financial Innovation and Access (EFInA) revealed that about 53% of Nigerian adults were excluded from financial services [2]. Also, in 2012, the Central Bank of Nigeria (CBN) launched the National Financial Inclusion Strategy (NFIS) to reduce the exclusion rate to 20% by 2020 [2]. The NFIS set targets for increasing access to payment, savings, credit, insurance, and pension services, as well as improving delivery channels such as bank branches, ATMs, POSs, and mobile agents [2]. Again, in 2018, another survey by EFInA showed that the exclusion rate had declined to 36.8%, but still far from the 2020 target [3]. The survey also found that the main barriers to financial inclusion were lack of income, lack of trust, high cost, and distance [3].

Equally, in 2020, the CBN revised the NFIS to NFIS 3.0, which incorporated new policy documents such as the National FinTech Strategy, the Strategy for Leveraging Agent Networks to Drive Women's Financial Inclusion, and the Payment System Vision 2025 [4]. The revised NFIS also extended the timeline for achieving the 20% exclusion rate to 2025. Furthermore, in 2021, a study by Ozili analyzed the determinants, challenges, and achievements of financial inclusion in Nigeria. The study found that education, income, and employment status were positively associated with financial

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inclusion, while gender, age, and location were negatively associated. The study also suggested that the Nigerian authorities should remove obstacles such as income and education bias and gender discrimination in the delivery and use of financial services [4].

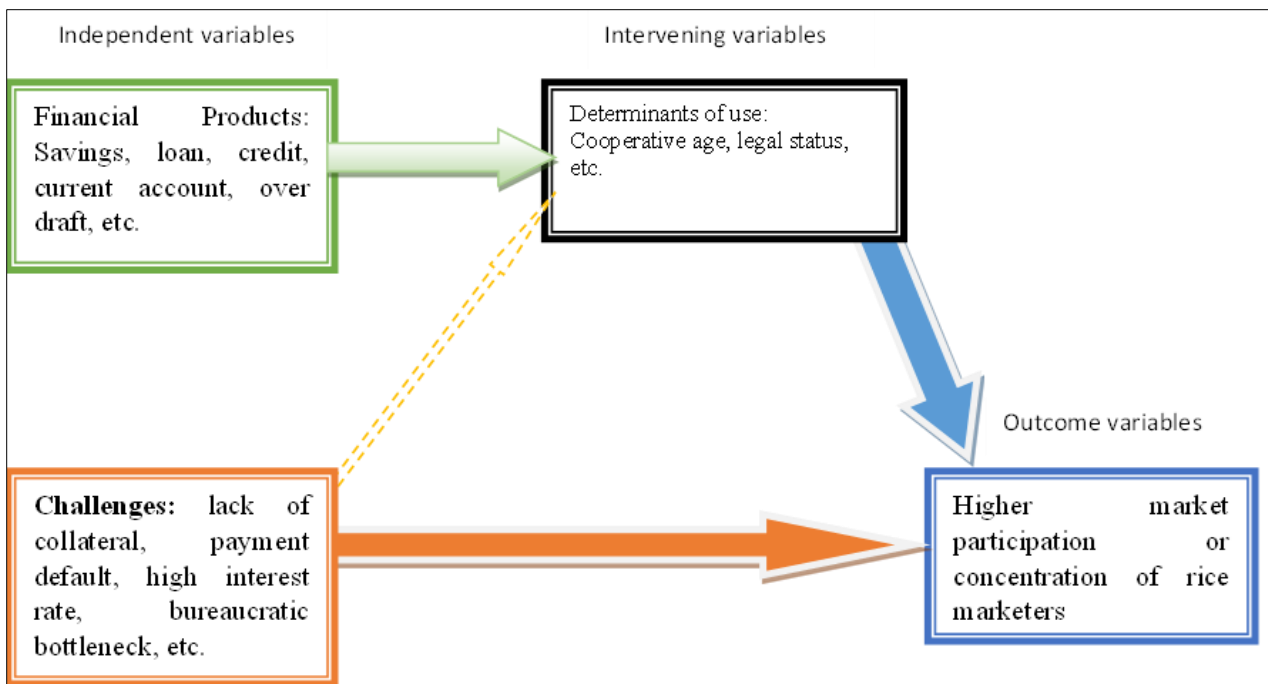
### 1.1. Statement of Problem

The low participation of smallholder farmers in markets due to poor market access and high transaction costs is a significant challenge in sub-Saharan African countries, including Nigeria. Smallholder farmers lack the necessary resources to overcome these obstacles [5-6], such as poor infrastructure and weak institutions. This limits their market participation and income generation. Rice production and marketing in Nigeria are also constrained by the financial exclusion of resource-poor rice farmers, resulting in low productivity and limited market participation [7]. Financial inclusion plays a crucial role in improving farmers' access to credit and enhancing productivity [8], and market engagement. However, there are challenges to implementing financial inclusion, including low financial literacy, inadequate infrastructure, and high-interest rates [9-10].

Cooperative societies can help educate and empower farmers regarding financial inclusion. Government involvement in promoting financial inclusion is inadequate due to weak governance and regulatory oversight [11]. Addressing the credit deficit in rice production is crucial for increasing farmers' production decisions and market participation. Understanding the depth and breadth of financial inclusion, including various financial metrics, is essential for delivering effective financial inclusion products. The implementation of financial inclusion in rural areas is influenced by factors such as literacy levels, government policies, and inherent agricultural risks [12]. Small farm sizes and high interest rates pose challenges to rural financial inclusion. Overcoming these challenges requires promoting cooperativeness among farmers. These formed the basis why the study is anchored on the following research objectives:

- to identify the financial inclusion products available to cooperative rice farmers;
- to ascertain the extent of market participation of rice farmers due to access to financial products;
- to examine the determinants of the use of financial inclusion products,
- iv to determine the effect of the products of financial inclusions on the market participation decision of cooperative rice farmers; and
- to identify the constraints faced by rice farmers to be financially included.

### 1.2. Conceptual Framework



**Figure 1** Researcher’s concept of financial inclusion effect on market participation

The conceptual framework (Figure 1) illustrates the main objectives of the study. The independent variables in this framework represent financial products associated with financial inclusion, including savings, loans, credit, savings and current accounts, and financial technologies such as POS, ATM, and internet banking. The proper utilization and accessibility of these products by groups or beneficiaries can potentially impact the structure of rice marketing in the study area. Increased prevalence of these products can reduce monopoly and promote a shift towards more competitive markets. These expectations are based on the anticipated effects of financial inclusion interventions.

The study aims to investigate the outcomes of this interaction, specifically examining how it can contribute to higher market participation among rice farmers through cooperative approaches. Many farmers in the study area have the financial means to increase their investment in rice production. However, some obstacles hinder the realization of higher market participation, including challenges in accessing financial products such as high interest rates, loan defaults, lack of collateral, and bureaucratic hurdles. Figure 1 also suggests that market structure acts as a mediator between financial products and market participation. Additionally, the figure highlights the direct impact of challenges faced by farmers in accessing these financial products.

### 1.3. Empirical Review

Toluwase *et al.* conducted a study on the economic analysis of rice marketing in Ekiti State, utilizing primary data from 120 randomly selected rice marketers. Descriptive statistical techniques were employed, revealing that a majority (52%) of the marketers were married females. Additionally, 57% of the respondents were identified as financially excluded. The study indicated a gross margin of ₦106,207.80, indicating profitability in rice marketing within the study area [13].

Ajah *et al.* examined the factors influencing access to credit among rice farmers in Cross River State. Data was collected from 96 rice farmers, and logistic regression and simple descriptive statistics were employed for analysis. The study found that 70% of the respondents were male, with an average age of 55 and 6 years of farming experience. Thirty percent of the farmers obtained loans from informal money lenders, with a mean loan amount of N106,269. The significant determinants of credit access were age and annual income. The major obstacles faced by rice farmers in accessing credit from formal sources were high interest rates, lack of guarantors, and collateral [14].

Ojo *et al.* estimated the financing gaps in rice production in Southwestern Nigeria. They analyzed the financing gaps in relation to the production frontier of rice farmers in the region. A multistage sampling technique was used to survey 360 rice farmers. The study employed a Cobb-Douglas stochastic frontier model and an adapted form of the Harrod-Domar growth model to determine the financing gap required to bring farmers to the frontier level. The findings highlighted the significance of labor, rice planting material, and herbicides as important inputs for efficient rice production in Nigeria. Moreover, factors such as age, gender, farming experience, household size, access to credit, access to information, adoption of improved varieties, and location of rice farmers were identified as sources of technical inefficiencies. The average amount of credit accessible to farmers was ₦38,630.56, while the mean financing required in the form of credit to achieve production at the frontier level was ₦193,626.50, indicating a financing shortfall of approximately 80% [15].

Abdul-Rahaman and Awudu conducted a study on the adoption of mobile money, input use, and farm output among rice farmers. They emphasized the importance of digitizing transactions and procurement through mobile money technology among value chain actors to promote financial inclusion and enhance agricultural value chain transformation. The study examined the factors influencing the adoption of mobile money technology and its impact on input use and farm output. To address selection bias, a linear regression with endogenous treatment effects method was employed. The findings revealed a positive and significant marginal effect of mobile money technology on input use and farm output. Education, membership in farmer-based organizations, access to credit, input prices, and location-fixed effects were identified as significant factors influencing the adoption of mobile money technology, input use, and farm output [16].

Ofeh and Nashipu investigated the relationship between financial exclusion, sustainable rice production, and poverty reduction among smallholder rice farmers. They employed factor analysis and structural equation modeling to analyze the data. The results demonstrated a negative relationship between financial exclusion and sustainable rice production, as well as poverty reduction. Specifically, the study revealed that a unit increase in the level of financial exclusion led to a 24% reduction in sustainable rice production and a 7% increase in poverty levels [17].

Fang and Zhang highlighted the positive role of financial inclusion in safeguarding agriculture during and after disasters. Their study focused on the protective effect of digital financial inclusion on the agricultural supply chain pre- and post-disaster. Three mechanisms of the protective effect were analyzed: financial widening, financial deepening, and financial services digitization. Logistic regression was employed to achieve the study's objectives. The regression results indicated that a 1% increase in digital financial inclusion resulted in approximately a 1.6% increase in agricultural trade during the COVID-19 pandemic. Furthermore, the study identified heterogeneous protective effects across different regions in China [18].

Ogunleye conducted a study to assess the level of market participation among smallholder rice farmers and identify the factors influencing their participation. Data from 120 farmers were analyzed using the market participation index, simple descriptive statistics, and fractional logistic regression. The results showed that all sampled farmers participated in the output market, with an average participation rate of 89%. The fractional logistic regression revealed that farm size, formal education, fertilizer application, land ownership through inheritance, and transportation costs were significant determinants of the level of market participation [19].

Donkor *et al.* [20] examined the determinants of rice farmer participation in direct marketing channels and analyzed the factors influencing their level and intensity of participation. Primary data was collected, and a double hurdle model was employed for the analysis. The study found that a lower percentage of farmers sold their rice output to processors. Farm size, rice output price, access to market information, and access to credit positively influenced farmers' participation in direct marketing channels, while payment period and ownership of a bicycle negatively affected their participation [20].

Vukey *et al.* analyzed the motives behind farmers' savings with Rural and Community Banks (RCBs) and the impact of these savings on rice yield. A Likert scale was used to rank the motives for farmers' savings, and the endogenous switching regression model was employed to estimate the effect of savings on rice yield. The results indicated that most farmers save to enhance farm investment, which is crucial for increasing rice productivity. Improved labor and fertilizer use were found to have a positive influence on rice yield, while farm size had an inverse relationship with rice yield [21].

Adaobi *et al.* [22] investigated the effect of institutional factors on the marketing decisions of cooperative farmers in Anambra State. The study involved 710 farmers. The findings revealed that cooperative experience did not significantly influence marketing decisions. However, institutional factors such as traditional and cultural practices, the legal environment related to agricultural product sales, the land tenure system, government organizational support, availability of market information, and the use of grades and standards in agricultural marketing significantly influenced the marketing decisions of farmers. The study also indicated that institutional factors did not have an impact on the market participation of cooperative farmers [22].

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## 2. Materials and Method

### 2.1. Area of the Study

The study will be conducted in Anambra State, which is located in the southeastern part of Nigeria. Anambra State consists of 21 Local Government Areas, including Aguata, Awka North, Awka South, Anambra East, Anambra West, Anaocha, Ayamelum, Dunukofia, Ekwusigo, Idemili North, Idemili South, Ihiala, Njikoka, Nnewi North, Nnewi South, Ogbaru, Onitsha North, Onitsha South, Orumba North, Orumba South, and Oyi. The state is divided into four agricultural zones (Onitsha, Aguata, Awka, and Anambra), which Obianefo, *et al.* [23] believe facilitates agricultural planning and rural development. Anambra State shares borders with Delta State to the West, Imo State and Rivers State to the South, Enugu State to the East, and Kogi State to the North. The administrative headquarters of the state is located in Awka. Anambra State is situated between Latitudes 5° 32' and 6° 45' N and Longitudes 6° 43' and 7° 22' E. The state has an estimated land area of 4,865 square kilometers and a population of approximately 4,177,828 people according to the last census conducted in 2006 [23]. The average annual temperature in the state is 25.9°C, and the average annual rainfall is 138 mm [24].

### 2.2. Sampling Technique and Sample Size

Before the survey, the sample frame or list of registered rice farmers that was obtained from ASADP in March 2022 will be used to calculate the sample size. Taro Yamane sample size determination will be used to derive the adequate sample size for the study. The formula adapted from Obianefo *et al.* [23] is stated as:

$$n = \frac{N}{1 + N(e)^2}$$

Where:

- N = Population of the Study
- n = Sample Size
- (e) = Level of significance
- 1 = Unit (a constant)

Note: (e) = 0.05

$$n = \frac{7255}{1+7255(0.05)^2} = \frac{7255}{1+7255(0.0025)}$$

$$= \frac{7255}{1+18.14} = \frac{7255}{19.14}$$

= 379.10 = approximately = 380 rice farmers to be sampled.

Multi-stage sampling technique will be adopted to select the study representatives. Agricultural Development Project (ADP) frame will be used. In the first stage two ADP zones: Aguata and Anambra will be purposively selected due to high dominance of rice production in the areas. In the second stage, two blocks each from the ADP zones will be randomly selected from which three cells will be selected randomly to make it a total of twelve cells

Finally, 32 cooperative rice farmers each will be randomly sampled from twelve cells proportionate to size to have a total of 384 cooperative rice farmers.

The primary data for the study was collected using a well-structured questionnaire. This structured questionnaire was coded in the Kobocollect Android tool kit. This approach of digital data collection helped to reduce malpractices and improve the accuracy of data for analysis. Another advantage is that it complied with the Covid-19 protocol of physical distance. 4 Researcher assistants were engaged and trained to assist in data collection.

### 2.3. Data Analysis

Statistical and econometric tools were used to analyze the data collected to achieve the stated objectives. The study utilized a combination of analytical tools of simple descriptive statistics, participation index, logistic, and a Beta regression analysis. Objectives one and five were achieved using descriptive statistics: mean, frequency, and percentage. Objective two was achieved with a composite score. Objective three utilized a logit model, and objective four was achieved with a Beta regression analysis.

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## 3. Results and Discussions

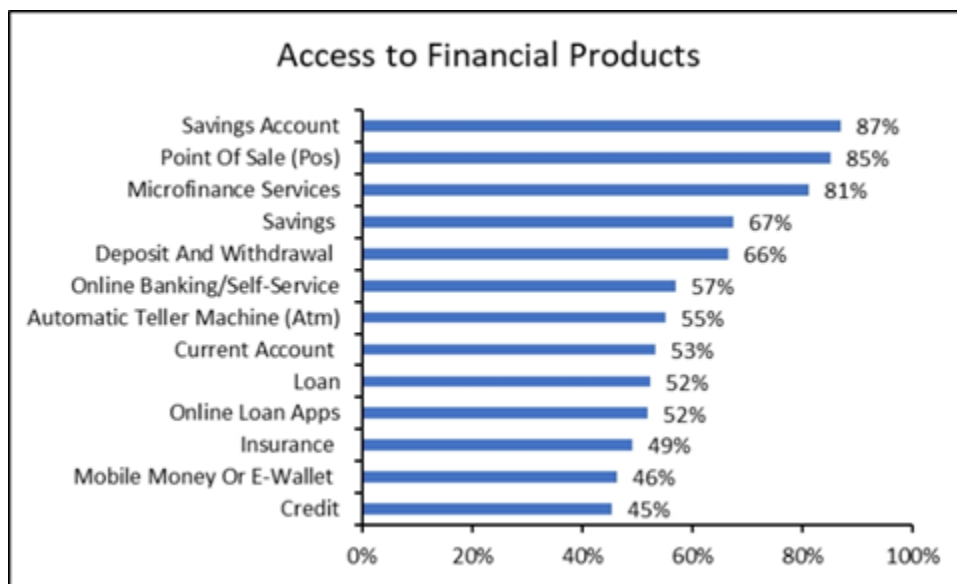
### 3.1. Identification of the Financial Inclusion Products Available to Cooperative Rice Farmers

The result of findings about the financial inclusion products available to the cooperative rice farmers in the study area is descriptively presented in Figure A. It is noteworthy that financial inclusion plays a crucial role in driving rice production and market participation in Anambra State. To ensure the financial inclusiveness of rice farmers, they need to gain convenient access to a wide range of formal financial services that cater to their needs at affordable costs. However, from the study, it was discovered that 87.0% of the respondents accessed savings accounts, and another 85.0% accessed point of sales (POS). Jimoh et al. suggested that POS is nearly available in every corner of Nigeria, and this has made transactions relatively easy [25].

The next 81.0% confirmed that microfinance bank (MFB) services are readily available to them, there is over one MFB stationed in every Local Government area of Anambra State. To demonstrate the availability of the MFB, there are 64 MFBs in Anambra State which is officially recognized by the Central Bank of Nigeria [26]. 67.0% of the respondents

accessed savings. The FindDev Gateway noted that one of the most significant benefits of savings to farmers' cooperatives is that it allows them a smooth cash flows, and improves crop production management [27]. Savings can help farmers to diversify their income sources by investing in a wider range of crops and to become more and more financially autonomous from the cooperatives.

Equally, other financial inclusion products available or accessible by the rice cooperative farmers include withdrawal and deposit (66.0%), online banking/self-service (57.0%), and automated teller machine (ATM) – 55.0%. Among other products, 53.0% reported access to current accounts, the ability to maintain a transaction account for farmers' groups is considered a gateway to financial inclusion, making it crucial for individuals worldwide to have access to such accounts [28-30]. The last 45.0% had access to credit. The fact that credit scored least among the list of several products of financial inclusion is an indication that attention needs to be given to the agricultural sector to ensure rice sufficiency and sustainable production.



**Figure 2** Products of financial inclusion available to cooperative rice farmers

### 3.2. The Extent of Market Participation of Rice Farmers Due to Access to Financial Products

The extent of market participation of rice farmers belonging to farmers' cooperatives resulting from their access to the products of financial inclusion is presented in Table 1. On average, the study found that the mean farm size for the cooperative is 9.85 hectares, whereas their reported rice output is 39.73 tons. This result will mean that farmers produce 4.03 tons/ha. This rice output is close to the 4.81 reported in Obianefo *et al.* [31]. The quantity of the rice produce that the farmers were able to offer for sale was 33.70 tons at N288,932.93/ton. They further realized a revenue of N9,607,42.45 from the sales of the 33.70 tons.

**Table 1** Extent of market participation of rice farmers due to access to financial products

Item description	Mean	Standard Deviation
Cooperative farm size	9.85	3.28
Quantity of rice produced (tons)	39.73	16.12
Quantity of rice sold (tons)	33.70	13.90
Unit price per ton (N/ton)	288932.93	86252.02
Revenue (N)	9691484.15	5048511.55
Revenue per hectare (N/ha)	960742.45	48527.31
Participation Index	0.848	0.060

Source: Field Survey, 2023.

Also, this result confirmed the assertion of Obianefo *et al.* [23] who noted that rice production and sales is a very lucrative business. Interestingly, the study revealed that the market participation index was 0.848, this implies that the farmers offered 84.8% of their total rice output for sales in the study area, which is in agreement with the 89.0% reported in Ogunleye [19]. According to the findings of Anumudu *et al.* [32], active participation in a competitive market is instrumental in promoting rural economic growth.

### 3.3. Determinants of the use of Financial Inclusion Products

Regression analysis of how the farmers' enterprise characteristics influenced the use of financial inclusion products is presented in Table 2. To attain a more robust result, the adjusted R-square value was used in place of the R-square. The adjusted R-square value of 0.614 implies that 61.4% of the variation in the use of financial inclusion products is determined by the farmers' enterprise characteristics, while the remaining 38.6% is unexplained resulting from external factors like bureaucracy, and inconsistency of government policy among other reasons. The F-statistics value of 58.83 is significant at a 1% level of significance which is an indication that at least, one of the chosen variables influenced the farmers' decisions to use the product of financial inclusion. This means an outright rejection of the null hypothesis two.

The coefficient of cooperative age (0.026) was positive and significant at a 1% level of significance, this implies that a unit increase in the age of farmers cooperatives included in the study will increase the use of financial inclusion products (F.I.P.) by 2.6%. Older cooperative members understand the needs of finance in a cooperative business and the need to explore several avenues available to them. Again, the coefficient of legal status (0.243) was positive and significant at a 1% level of probability, this implies that a marginal increase in the number of farmers cooperatives that are registered or identified with the government will increase the use of F.I.P. by 24.3%. The cooperative association is one of the mediums through which the government and other non-governmental organizations extend support to rural people [33].

**Table 2** Enterprise characteristics of cooperative rice farmers significantly determined the use of financial products

Parameters	Coefficients	Standard Error	t Stat
Intercept	8.354	0.085	98.44
Cooperative age	0.026	0.003	8.73***
Legal status	0.243	0.034	7.12***
Cooperative farm size	-0.043	0.003	-15.23***
Frequency of meeting	0.073	0.015	4.75***
Cooperative bank account	0.114	0.034	3.36***
Democratic governance structure	-0.042	0.034	-1.23
Keeping of minute	-0.463	0.034	-13.52***
Share	0.209	0.034	6.19***
Gender	0.077	0.034	2.28**
F-stat.	58.83		
Adjusted-R	0.614		
Obs.	328		

Source: Field Survey, 2023.

The coefficient of cooperative farm size (0.043) was negative and significant at a 1% level of probability, this implies that a unit increase in the size of farm cultivated by farmers will reduce their use of F.I.P. by 4.3%. This result is in agreement with Donkor *et al.* [20] who found a significant relationship between farm size and the use of F.I.P. A significant and marginal increase in the frequency of meetings and bank accounts will increase the use of F.I.P. by 7.3% and 11.4% respectively at a 1% level of probability.

From the result, it was discovered that keeping minutes was negatively significant at a 1% level of significance, which implies that a marginal increase in the number of cooperatives with minutes if the meeting will reduce the use of F.I.P. by 46.3%. This is an indication that the responsible with F.I.P. pay less attention to meeting records. The coefficient of shares was positive and significant at a 1% level of significance, this implies that a marginal increase in the number of groups with shares will increase the use of F.I.P. by 20.9%. Lastly, the study uncovered that the coefficient of gender was positive and significant at a 5% level of probability, this implies that a unit increase in the number of male-dominated cooperatives will increase the access and use of F.I.P. by 7.7%.

### 3.4. The Effect of the Products of Financial Inclusions on the Market Participation Decision of Cooperative Rice Farmers

The beta regression analysis was used to examine the effect of the products of financial inclusion services on the market participation decision of cooperative rice farmers. The market participation decision was measured by the proportion of rice sold by the farmers. The results are shown in Table 3. Diagnostically, the Likelihood Ratio chi-square test (LR Chi<sup>2</sup>) is 24.20, significant at the 1% level of probability, suggesting that the overall model is statistically significant. This indicates that at least, one of the independent variables is affecting the cooperative farmer's decision to participate in rice marketing. Equally, the Log-likelihood is 562.835, providing a measure of how well the model fits the data.

Online banking/self-service: This variable had a positive and significant effect on the market participation decision of cooperative rice farmers at a 5% level of probability. This implies that farmers who used online banking or self-service platforms to access financial services were more likely to sell a higher proportion of their rice output by 9.7%. This could be because online banking or self-service platforms reduced transaction costs and improved the convenience and efficiency of financial transactions for the farmers.

**Table 3** Effect of the Products of Financial Inclusions on the Market Participation Decision of Cooperative Rice Farmers

Covariates	Coefficient	Std. Err.	Z-test
Loan	-0.028	0.039	-0.72
Credit	-0.016	0.039	-0.41
Savings	0.013	0.041	0.31
Savings account	-0.079	0.142	-0.56
Current account	-0.046	0.039	-1.19
Online loan Apps	0.045	0.050	0.89
Insurance	-0.051	0.039	-1.32
Point of sale (POS)	-0.034	0.132	-0.26
Automatic teller machine	-0.007	0.040	-0.19
Mobile money or e-wallet	-0.059	0.038	-1.53
Online banking/self-service	0.097	0.039	2.51**
Deposit and withdrawal	-0.056	0.038	-1.46
Microfinance services	0.180	0.063	2.84**
Constant	1.721	0.080	21.57***
Scale constant	4.154	0.078	53.32
Diagnostics tools			
LR chi2(13)	24.20***		
Prob > chi2	0.029		
Log-likelihood	562.835		
Obs.	328		



Source: Field Survey, 2023. Significant @ 10% (\*), 5% (\*\*), and 1% (\*\*\*)

Microfinance services: This variable also had a positive and significant effect on the market participation decision of cooperative rice farmers by 18.0%. This suggests that farmers who used microfinance services such as loans, savings, and insurance were more likely to sell a higher proportion of their rice output. This could be because microfinance services enhanced the access to credit and risk management for the farmers, enabling them to invest more in their rice production and marketing activities. This result is in agreement with Adaobi *et al.* [22] who noted that the products of microfinance services influence the farmer's decision to participate in the market.

However, the other variables, such as loan, credit, savings, savings account, current account, online loan apps, insurance, point of sale, automatic teller machine, mobile money or e-wallet, and deposit and withdrawal, did not have a significant effect on the market participation decision of cooperative rice farmers. This indicates that these products of financial inclusion services did not influence the proportion of rice sold by the farmers. This could be due to the low usage, availability, or suitability of these products for the farmers.

### 3.5. Identification of the constraints faced by rice farmers to be financially included

The financial inclusion of farmers has witnessed a number of challenges that have limited its full implementation. Iiyasu and Lawal noted that financial inclusion plays a crucial role in improving farmers' access to credit and enhancing productivity [8], and market engagement. Due to the multiple responses to the challenges, the results in Table 4 revealed that the majority (85.4%) of the farmers complain of high-interest rates. This high interest rate is consistent with the earlier report of Turvey [9] who found that high interest rates affect the implementation of financial inclusion. Another 83.5% and 75.0% reported bad internet services in rural areas, and lack or poor access to market information respectively. Accurate market information allows participants to make decisions based on real and timely data, reducing the chances of making costly mistakes. For example, knowing the current demand for a product can help a producer decide how much to produce [34]. On two occasions, 64.0% of the farmers complained of documentation requirements and distance barriers. These issues should be properly thought of during implementation because many rural farmers in need of financial inclusion products are not literate enough to handle most documentation processes.

**Table 4** Constraints faced by rice farmers to be financially included

Sn.	Constraints variables	Frequency	Percentage
1	Lack or poor access to information	246	75.0%
2	High-interest rate	280	85.4%
3	Poor financial infrastructure	160	48.8%
4	High financial illiteracy	162	49.4%
5	High cost of account opening	170	51.8%
6	Documentation requirement	210	64.0%
7	Distance barriers	210	64.0%
8	Religious/cultural beliefs about loan	163	49.7%
9	Lack of financial capacity	160	48.8%
10	Bad internet service in rural areas	274	83.5%

Source: Field Survey, 2023.

51.8% are constrained by the high cost of account opening, another 49.7% and 49.4% submitted that they are challenged with religious/cultural beliefs about the loan and high financial illiteracy. This high financial illiteracy is among the issues pointed out by Terfa [10] as a constraint to the product of financial inclusion to rural farmers. Even the study by Adaobi *et al.* [22] indicated that religious and cultural heritage influence the application and implementation of financial inclusion products in some settings. The lack or poor financial infrastructure, and lack of financial capacity are respectively reported

#### 4. Conclusion

The study underscores the vital role financial inclusion plays in advancing rice production and market participation in Anambra State. A significant portion of the respondents utilized savings accounts, point of sales (POS), and microfinance bank (MFB) services. The lesser use of credit among financial products pinpoints the need for more emphasis in the agricultural sector to achieve rice sufficiency and sustainable production. Again, rice farming remains a critical economic activity in Nigeria, and market participation is vital for rice farmers to achieve sustainability. A significant proportion of the rice produced by farmers was sold in the market, validating its profitability. However, it has been uncovered that farmers' enterprise characteristics, such as the age of the cooperative, legal status, and the size of the farm, significantly influence their use of financial inclusion products. For instance, older cooperatives are more inclined towards using financial products, while larger farms tend to reduce their use of such products.

In conclusion, while financial inclusion products have a notable impact on the market dynamics and decisions of cooperative rice farmers, there are still challenges to be addressed to enhance their full utilization and benefits. Tailored financial solutions and the removal of barriers can significantly contribute to sustainable rice production and broader economic growth.

#### *Recommendation*

- Financial institutions should revise their interest rates to make them more favorable for farmers.
- The government of Anambra State should consider infrastructure development to boost internet connectivity in rural areas.
- Policymakers should set up information hubs to relay real-time market data to farmers.
- The Central Bank of Nigeria should introduce simpler documentation processes and ensure that financial services are accessible to rural farmers, both in terms of distance and comprehension.
- Microfinance Banks in Anambra State should embark on awareness campaigns to address misconceptions related to loans and finance. They can organize financial literacy programs to enlighten the farmers.

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#### Compliance with ethical standards

This study has not been submitted to any journal for review and publication.

#### *Disclosure of conflict of interest*

The authors have declared no conflict of interest.

#### *Statement of informed consent*

I confirm that I am the corresponding author and have the authority to act on behalf of all co-authors listed in the manuscript. I have reviewed the manuscript and agree to its submission for publication in the International Journal of Life Science Research Archive. I understand that this consent is given voluntarily and that the manuscript will undergo a peer-review process to determine its eligibility for publication.

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