

Microfinance Services and Agricultural Production: A Case of Smallholders' Rice Farmers in Anambra State, Nigeria

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Abstract: The agricultural sector provides food and raw materials for human use, this sub-sector in Nigeria is dominated by smallholder farmers who are often time limited by finance. An important crop in this sector is rice which have gain acceptance among the populace. Most farmers in rural areas engaged in rice production are sometimes un-bankable which calls for the microfinance services to bridge the gap created by long absence of commercial banks. To this effect; the study was on the effect of microfinance services on smallholder rice productivity in Anambra State, Nigeria. The study had three specific objectives which identified the microfinance services smallholder farmers receive to improve their rice productivity, ascertained the effect of microfinance services on smallholder rice productivity, and examined the constraints to smallholder rice productivity in Anambra State, Nigeria. Data for the study were collected with a structured questionnaire from a cross-section of randomly selected 300 smallholder rice farmers. The data were analyzed with a combination of analytical tools such as descriptive statistics, Logit regression model, principal factor analysis (PFA), linear regression analysis, and inferential statistics such as t-test. The researcher found that in order of ranking, the services that the smallholders' rice farmers received in the study area to improve their productivity are micro-savings (60.3%), remittance service (54.0%) among other services. These microfinance services significantly influenced rice productivity at a 1% level of probability. The socioeconomic determinants to microfinance services received by the smallholders' farmers are: age, marital status, education, household size, and farm size. Lastly, the study equally, rotated the constraints to rice production into three factors which is named as management, institutional, and location factors; at the management factor; there is a need to keep a close watch over poor access to information (0.777), high cost of machines (0.745), and inadequate access to finance for expansion (0.707) among other constraints. At the institutional factor; eagle eye should be kept on cattle menace (0.755), and high cost of input (0.705). While at the location side; one should be mindful of high cost of water management (0.784), and transportation issue (0.733). The researcher therefore recommend that information on how to access microfinance service and the best way to produce and sell rice should be made available to the public domain, government should invest in setting up a good information management system to help popularize the services of microfinance banks in the rural areas.

Keywords: Microfinance Services, Smallholder, Rice Production, Anambra State, Nigeria

1. Introduction

The main purpose of agriculture is to provide food and raw materials for human use. Nigeria is richly blessed with an abundance of arable land of which Ikponmwoosa [1] noted that 80% (82 million hectares) of the land mass in Nigeria is considered good enough to support crop planting activities. Unfortunately, only about half of these arable land mass are being currently put into use [1]. Nigeria has different climate

and ecology that support agricultural systems to make the sector thrive well. One reason these 82 ha of arable land is not fully cultivated is because agricultural sector in Nigeria is dominated by subsistent farmers (mainly rural dweller) operating with crude implements [2]. The major crops grown in economic quantities in Nigeria are beans, sesame, cashew nuts, cassava, cocoa beans, groundnuts, gum-Arabic, kola-nut, maize, melon, millet, oil palm, rice, plantain and banana, rubber, sorghum, soybeans and yams among other crops,

with all these, the assertion that the sector is saddled with the responsibilities of massive employment, foreign exchange earnings, provision of raw materials to support industries, diversification of the economy and food security [1] cannot be overemphasized. Thus, Obianefo, *et al.* [3] allude that the agricultural sector has remained the highest employer of labour in Nigeria such that one cannot play down on agricultural contributions to economic development in terms of gross domestic products (GDP).

As pointed in above that rice is one of the crop with economic importance in Nigeria, it is mainly produced by smallholder farmers whom according to Obianefo, *et al.* [4] are resource poor and are operating in a small scale or subsistent production and are experiencing paucity of improve production varieties due to lack of fund which ordinarily would have helped them to upscale. To elaborate on this small farm holding, the smallholder farmers are characterized by marginalization, in terms of accessibility, resources, information, technology, capital and assets [5]. The Food and Agriculture Organization of the United Nations [6] adopted a 2 ha threshold as a broad measure of a small farm holding [7]. Since the farmers are experiencing limited access to fund for agricultural production activities explained why Nigeria as a nation is yet to attain food sufficiency in terms of rice production and supply to her citizens despite the federal government investment to revive the ailing and moribund agricultural sector [3]. Therefore the need to increase finance in the sector cannot be overemphasized. Again, subsistent rice production due to inadequate finance resulted to the inability of the farmers to optimize potentials, food insecurity, and poverty at individual and national levels. Hence, boosting agricultural production through adequate finance becomes imperative [8]. This means that credit is an invaluable ingredient to the agricultural development of any country. Osugiri *et al.* [9] contend that agricultural credit is an effective means of improving the quantity and quality of agricultural production. Equally, microfinance banks is an effective and efficient mechanism through which agricultural credit is made available to the farmers for poverty reduction all over the world.

According to Olawuyi *et al.* [10], microfinance banks (MFBs) believe in people and not collaterals solely, it recognizes the credibility of the people and trusts them. They use the approaches of a collective appraisal to loan application, loan utilization; monitoring, peer pressure and cross guarantee to enforce repayment. The policy framework establishing MFBs in Nigeria saddles them with the responsibility of providing diversified, affordable and dependable financial services to the active poor in a timely and competitive manner. MFBs intends to undertake and develop long-term, sustainable entrepreneurial activities, mobilize savings to create employment opportunities, and increase the productivity of active poor in the country, therefore, increasing their individual household income and uplifting their standard of living. Equally, MFBs works to enhance organized, systematic and focused participation of

the poor in the socioeconomic development and resource allocation process, provide veritable avenues for the administration of micro credit programme of government. This is to say that, for farmers to benefit from this microfinance services (credit), they are better organized in a formidable group or cooperative societies where they can cross guarantee each other for mutual benefit.

According to Okpara, microfinance services refer to loans, deposits, insurance, fund transfer and other ancillary non-financial products targeted at low-income clients. Three features distinguish microfinance from other formal financial products and they include; smallness of loans and savings, absence or reduced emphasis on collateral, and simplicity of operations. Microfinance services are viewed as an intervention that can be employed for the promotion of smallholder farming for rural agricultural development [11].

1.1. Statement of the Problem

Rice production has continued to play an important role in Nigeria's economic development process as a staple food for most farm families [12]. It is as staple food in several African counties which constitutes a large portion of the diet of Nigerian on a regular basis [13]. Yet; its production has remained in the hand of subsistence farmers who barely produce more to sell to the national food economy; rice supply has never equaled demand because its production is mostly practiced in the rural areas by resources poor farmers [4], who are finding it difficult to obtain fund to enable them commercialized their production.

Evidence to the above assertion is the fact that annual rice demand grows by 7.8% while supply grows by 5.5% suggesting a deficit demand-supply gap of 2.3% which is being imported from other countries [12]. The inability to meet demand was as a result of the challenges that the farmers are being confronted with in the rice production industry which has often translated to low production of output and frail agricultural economy as small holder farmers still rely on rudimentary tools and techniques [14]. To breakout of this rudimentary production technique, investment in modern technology is eminent and this necessitate the need to make credit available through the influx of microfinance banks in the sector.

The entry of the microfinance banks will help to reach out many rural farmers whose financial inclusion ability in in doubt. Ojo, *et al.* noted that a number of issues has limited the rural farmers from active participation in the microfinance industry, some of the problems pointed include inadequate household assets for collateral, high transaction cost, distance of the bank to the farmers' location, climate variables [15]. If these farmers are properly insured during farming season, it will boost the confidence of the microfinance attendant to the farmers [16]. This means that agricultural insurance is one major issue affecting credit implementation of microfinance banks. On the other hand, the farmers have often complained of the microfinance operators' sharp practices; though Nagvi & Sejian [17] submit that these are not far from some bottlenecks

(incomplete disclosure of necessary information required from the farmers, weak financial strength of the farmers, lack of collateral by the smallholder farmers, wrong targeting due to fund diversification by the farmers among other reasons) that constrained credit implementation. This wrong targeting is caused by the farmers' high loan default which makes the MFBs to target low risk ventures [8]. With this in mind, this study will be of valuable document to policymakers in a bid to increase the MFBs' services delivered to the farmers to help them upscale their production so the country can attain self-sufficiency in rice production industry.

1.2. Objectives of the Study

The broad objective of the study is to examine the effect of microfinance services on smallholder rice productivity in Anambra State, Nigeria. However, the specific objectives are to:

- i. Identify the microfinance services smallholder farmers receive to improve their agricultural productivity in the study area;
- ii. examine the effect of microfinance services on smallholder rice productivity in the study area; and
- iii. ascertain the constraints to smallholder rice productivity in the study area.

1.3. Research Hypotheses

The following hypothesis is hereby postulated for the research:

H₀₁. Smallholder's rice farmers' socioeconomic characteristics has no significant relationship with microfinance service received.

2. Review of Related Literature

2.1. The Microfinance Services Smallholder Farmers Receive to Improve Their Agricultural Productivity

Credit is a necessity for agricultural production since the farmers depends much on it to procure farm inputs as well as to pay for agricultural labour. Though smallness of landholding has often limited smallholder farmer's access to credit, this limited access to finance caused paucity of improved farm inputs [18]. Anumudu *et al.* [2] equally alluded that smallholder farmers are more involved with subsistence farming which has often time caused stagnation in a bid to meeting food security in Nigeria. To this effect, microfinance banks were established to meet rural farmer's financial needs that will enable them to purchase farm inputs that will help to direct the farmers towards commercial agriculture. Microfinance banks helps to increase the rural farmer's financial inclusion and access to credit [19]. This credit as noted by Madugu & Bzugu [19], when secured are used to purchase farm inputs, agrochemicals, pay for farm labour among other things. Microfinance services do not necessarily mean credit in form of cash but also come in form of financial advice. Sometimes; farmers are been assisted to purchase farm inputs through direct cash transfer to the input

vendors to reduce fund diversion by the smallholders farmers. These institutions can either offer microcredit or compare it to various other forms of support. They can offer further financial services like micro-savings, remittance services, transaction payment and micro insurance [20-23]. When these farmers access these microfinance offering, they uses the service received as protection against natural disasters, starting new business or activities, investment in marketing, land improvement and repairs refinancing an older loan, purchasing supplies and livestock, buying farm equipment and vehicles, and new construction and repairs of building [24]. Corroboratively, Omorogbe & Aina [25] affirmed that microfinance provides loans to the farmers to enable them purchase farming inputs and livestock. Umaru & Mni [26] went further to submit that microfinance banks renders credit mobilization, promote savings culture, credit extension to customers, generate employment, promote entrepreneurship etc. Ejewule [27] reports that microfinance banks products include savings, loan, deposit, insurance, money transfer, mobile money, social security, warehouse receipt among other services. The work of Alliance for Financial Inclusion elaborated more on service of microfinance banks to include but not limited to savings account, payroll account, savings account in cooperative, other personal or consumer loan, cooperative loan, online banking service, payroll loan, loan for the purchase of appliances, equipment or fixed assets, SME loan, loan or deferred credit line, and SME loan from microfinance [28].

2.2. The Effect of Microfinance Services on Smallholder Rice Productivity

Obtaining a loan from microfinance bank for agricultural purpose is not enough if it has no effect in the productivity of smallholder farmers, this is because significant increase in their production will go far to better their livelihood opportunity. Many scholars have dedicated time and effort to understand how the services of microfinance bank effect the lives of the users especially in the rural area. Thus, the work of Enimu, *et al.* [29] in "analysis of the effects of microfinance banks loans on the livelihood of small-holder farmers in Delta State, Nigeria" reports that microfinance banks distributed different sizes of loans to farmers irrespective of their socio-economic background, on the order hand, the smallholder farmers have been positively influenced by microfinance banks loans which has witnessed an increase in production and income diversification. An evidence to this effect was 79.1% loan repayment rate of the farmers witnessed by the study. No wonder Terfa submitted that access to microfinance credit benefit rural farmers who are financially disadvantaged especially among women [30]. This was the reason.

So far in review, only the study of Adetiloye boldly allude that microfinance credit has not made any significant change in the economic activities of rural farmers [31]. Ashaolu, *et al.* conducted a research in Ogun State Nigeria and found that farming household with access to microfinance credit are more productive than those with minimal or no access [32].

But Abdulraheem & Adeola [33] connote that smallholder farmers enjoy microfinance credit through cooperative societies but the effect of the credit on agricultural productivity is not yet impactful to food security of the nation. Not in affirmative statement, Nosiru [34] contend that access to microcredits could have prospect in improving the productivity of farmers and contributing to uplifting their livelihoods. The researcher made this assertion despite the study reported that farmers with access to credit are more productive in the study area. Interestingly, Ahmad, *et al.* [35] noted that rural farmers' access to microfinance services increases production through which farmers are able to reinvest its surplus amount in form of income diversion to gain maximum profit.

2.3. The Constraints to Smallholder Rice Productivity

Nigeria has not been able to break away from heavy dependence on rice importation due to its inability to attain self-sufficiency in rice production and supply. Internationally, the study of Mohammad *et al.* [36] classified these constraints into three important variables to include (a) economic problems, lack of quality seedlings, high price of input, low price of output, lack of sufficient fund, poor

communication, transport and marketing facilities. (b) technical problems, lack of scientific knowledge and technology, attack of disease and insecticides, lack of required pesticide, lack of good water management, and (c) social problems; high salinity, illegal cuts, hurry. Domestically, a number of challenges have prevented the country from breaking even in the area of rice production which some scholars identified as problems hindering Nigeria from meeting local demand as well as causing low productivity. These challenges are but not limited to inefficiency in resource allocation, little or no access to improved varieties, and production in the hand of small scale out-growers who rely heavily on traditional technology [37]. Also, farmers are challenged by inadequate farm inputs like improved seeds, cost of agrochemicals, insufficient knowledge and information for best practices [38]. Thus, empirical review presents that the challenges to rice productivity in Anambra State which formed part of this study location are high cost of input, scarcity of labour, flood, high incidence of pest and diseases, increased bird attack, to control water is expensive, competition, high cost of labour, poor irrigation facilities, high cost of farming equipment to aid mechanization, cattle menace among other issues [18].

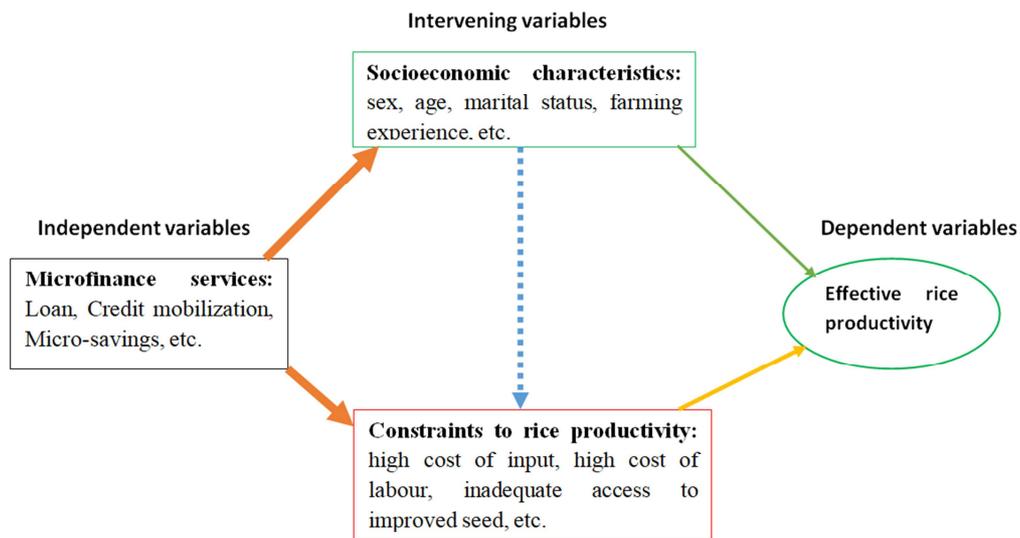


Figure 1. Researchers' concept of the study, 2021.

2.4. Conceptual Framework

This framework described how the variables involved in the study interact with each other. The independent variables contains all the microfinance service available to the smallholder's farmers. The farmer's usability of these services greatly depends on their socioeconomic profile which the microfinance institutions considers to understand how to deal with the individual farmers. These socioeconomic variables is acting as an intervening variables with the challenges that hampers rice productivity. This is because they determine how the services are being utilized to create productivity in the rice production sector. When the

recipients of the microfinance services properly channel the service to their rice production activities, it will to a great extent increase rice output per hectare in the study area.

3. Materials and Methods

3.1. Area of the Study

Anambra state is located in the south-eastern part of Nigeria, and comprises of 21 Local Government Areas (LGAs) which include 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 sub-divided into four agricultural zones to aid planning and rural development (Obianefo et al., 2020). Its name is an anglicized version of the original Oma Mbala, the Igbo name of the Anambra River. The state administrative head quarter is in Awka. The state is bounded 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 indigenous ethnic groups in Anambra state comprised of 98% Igbo and 2% Igala mainly living in the north-western part of the state. Anambra state people are good with agriculture, hunting trade and commerce among others.

Anambra State is situated between Latitudes 5°32' and 6°45' N and Longitude 6°43' and 7°22' E respectively. The state has an estimated land area of 4,865sqkm² [39].

3.2. Sampling Technique

The study adopted a multistage sampling technique to gather the sample for the study. Stage one witnessed a purposive selection of 3 LGAs (Ayamelum, Awka North, and Ogbaru) due to their long history of rice production in the state. At stage two; the study randomly selected 2 communities from each LGA. In stage three; the study randomly selected 5 villages from each community to make it a total of 30 villages. At the final stage; 10 smallholder rice farmers were randomly sampled for the study. This action brought the sample size to 300 smallholder rice farmers in Anambra state.

3.3. Data Collection

Data for the study were collected from primary source. The primary data were generated through the use of structured questionnaire to elicit required information. Copies of structured questionnaire were administered and the participants were placed on objective response for each statement.

3.4. Method of Data Analysis

Statistical tools were used to analyze the data collected in order to achieve the stated objectives. The study utilized a combination of analytical tools of descriptive statistics, Logistic regression model, robust regression analysis, and inferential statistics such as t-test. Objective one was achieved using descriptive statistics which included frequency, percentage, chart and mean; this technique was adopted to provide statistical description of the variables like measure of central tendency. Objective two was achieved with a Logit regression analysis; the model was used due to the binary nature of the dependent variable (productive farmers take on one, while none productive farmers take on zero. This logit approach will help to control the presence of heteroscedasticity in the dataset. Objective three was achieved with a principal factor analysis; this technique was adopted to predict the effect size of the constraints to rice production as well as to make an inform policy recommendation. The null hypothesis one was achieved from

the z-value from the Logit analysis of objective three, the null hypothesis two was tested from the t-ratio from the robust regression analysis and the null hypothesis three was tested with a simple t-test.

3.5. Model Specification

3.5.1. The Logit Model

The LM models was used to model relationships between a dichotomous response (one for productive farmers and zero for none-productive farmers) variable and a set of regression variables. According to Greene & Ng'ong'ola [40], the LM is quite applicable to this study because it is employed when individuals make choice between two alternatives and with each case it is assumed that the alternatives are mutually exclusive. Also it has the advantage of not treating categories in any continuous form, this make it also to be different from ordered or sequential probit models. Logit models estimate the effects of the explanatory variables on a dependent variable with unordered response categories. The advantages above ordinary least square model are that it eliminates heteroskedasticity in the error term, make the error term to be normally distributed and the predicted probabilities ranges between 0 and 1. Additional advantage of Logit model is its computational ease and also it is relatively robust, as measured by goodness of fit or prediction accuracy [40]. The logit model used to achieve objective two adopted from Greene & Ng'ong'ola [40] is defined as:

$$P_r(Y = 1) = \frac{e^{\beta x}}{1 + e^{\beta x}} \quad (1)$$

With the cumulative distribution function given by:

$$f(\beta_x) = \frac{1}{1 + e^{\beta x}} \quad (2)$$

Where β represents the vector of parameters associated with the factor x.

Assuming the probability that n smallholder rice farmers are productive when the farmers' rice output is within or above the computational mean output in the study area or not productive when the farmers' output is below the computational mean output. This productivity of the smallholder rice farmers were subjected to 1 for those whose productivity value is from mean output and above, while those below the mean value take up the value of 0. Thus, the individual empirical models to be estimated is specified as:

$$P_1^* = \beta_0 + \beta_1 X_1 + \dots + \beta_n X_n + \varepsilon_i \quad (3)$$

$$P_2^* = \gamma_0 + \gamma_1 X_1 + \dots + \gamma_n X_n + \varepsilon_i \quad (4)$$

Where

P_1^* = Not productive smallholder rice farmers.

P_2^* = productive smallholder rice farmers.

β and γ are vectors of respective parameters to be estimated.

X_1 = vectors of explanatory variables.

ε_i = error terms.

3.5.2. The Principal Factor Analysis (PFA)

$$X_{ij} = \delta_{i1}F_{i1} + \delta_{i2}F_{i2} + \delta_{im}F_{im} + e_{ij}$$

Where:

X_{ij} = observation on variable X_j for the i th sample number.

F_{iK} = score on factor F_K ($K = 1, 2, 3 \dots m$).

F_1 - F_m = common factors.

e_{ij} = the value on the residual variable or stochastic error term.

$\delta_i - \delta_{jm}$ = factor loading (regression weight).

The associated assumption was applied accordingly while the suitable number of factors were subjectively selected based on varimax rotated factor matrix obtained using SPSS version 25 software. The explanatory techniques using PFA model with interactions and varimax rotation was adopted. The factor loading under constraint (beta weight) represented a correlation of the variables (constraints areas) factors that has the same interpretation as any correlation coefficient Kaiser's criterion using factor loading of 0.30 and above in naming and interpretation.

3.5.3. The Multiple Regression

$$MS^* = \beta_0 + \beta_1Z_1 + \beta_2Z_2 + \beta_3Z_3 + \dots \beta_8Z_8 + e$$

Where:

MS^* = mean weight of microfinance services accessed by the smallholder farmers.

$\beta_1 = \beta_8$ = parameter to be estimated, β_0 = intercept, Z_1 = Sex (dummy: 1 = Male, 0 = Female), Z_2 = Age (years), Z_3 = Farming experience (years), Z_4 = Years of school attendant (years), Z_5 = Marital status (nominal scale: single = 1, married = 2, widow/widower = 3, separated/divorced = 4), Z_6 = Farm size (ha), Z_7 = Household size (No), Z_8 = extension access, e = random error term.

3.5.4. The Non-parametric T-test

$$t = \frac{P-Q}{\sqrt{n(P-Q)}}$$

t = computed t-value, P = probability of success, Q = probability of failure, and n = sample observation.

4. Results and Discussions

4.1. Microfinance Services Smallholder Farmers Receive to Improve Their Agricultural Productivity

The different types of microfinance services received by the smallholder rice farmers in Anambra State of Nigeria that was targeted at improving their agricultural productivity especially in rice production was captured and presented in table 1. The list of services rendered to the farmers was made from the empirical review by the researcher. Farmers were allowed to record multiple responses depending on how it applies to them. Their result were ranked and presented in order of priority or in a descending order. The descriptive result shows that 60.3% of the farmers received microfinance

service in form of micro savings, and 54.0% received remittance service. Other services that microfinance services renders to the smallholder rice farmers especially in the rural area among the un-bankable communities were promotion of entrepreneurship (53.0%), generation of employment (51.7%), promotion of savings culture (51.3%) among the rural farmers. at the 6th position, the farmers agreed that microfinance banks provided loan services (51.0%), they also help in credit mobilization (49.7%). Another interesting thing about the services is that 49.3% smallholder farmers recorded that microfinance bank provides micro insurance services, and 49.0% of them confirmed that microfinance bank renders credit extension to customers. Furthermore, 47.7% of smallholder farmers reports that microfinance banks offers transaction payment; this means paying direct for their farm inputs and more like it. This findings confirmed the importance of microfinance services in the study area as agreed by the farmers, interestingly, the results were in agreement with the services reported by Omorogbe & Aina [25]; Ejewule [27] who submitted that microfinance banks provides loan services to the farmers to cater for their farming activities.

Table 1. Microfinance services smallholder farmers receive to improve their agricultural productivity.

Sn.	Service	Frequency	Percentage	Ranking
1	Micro saving	181	60.3	1
2	Remittance services	162	54.0	2
3	Promote entrepreneurship	159	53.0	3
4	Generate employment	155	51.7	4
5	Promote savings culture	154	51.3	5
6	Loan	153	51.0	6
7	Credit mobilization	149	49.7	7
8	Micro insurance	148	49.3	8
9	Credit extension to customers	147	49.0	9
10	Transaction payment	143	47.7	10

Source: Field Survey Data, 2021.

4.2. Effect of Microfinance Services on Smallholder Rice Productivity

Different empirical study reported that microfinance service influenced or affected the productivity of farmers, but this study particularly attempted to find out about these effect on smallholders' rice production in the study area and the result was presented in table 2. The study subjected the productivity of the farmers and the services received to logistics regression analysis where the marginal effect size was later predicted in a post-test analysis to find out the linear relationship between the services and the productivity of smallholder rice farmers. Those farmers whose output were below the mean output per hectare of 2.77 tons/ha were regarded as not productive and vice versa.

As seen in the table 2, the study had a Pseudo R^2 value of 0.422 which amounted to 42.2% of the coefficient of multiple determinants (R^2); which implies that all the microfinance services received by the farmers explains 42.2% of the farmers' productivity, while the remaining 57.8% unexplained were as a result of factors outside the control or

influence of the services the microfinance banks renders to the farmers. The study also found a significant likelihood ratio (LR) of 153.07*** at 10 degree of freedom (DF); this implies that the general model was significant and that additional service will bring a change in the general significance level of the model. The also produced a Log likelihood value of -104.996 in which the study of Obianefo, *et al.* [16] in the effect of Anambra State value chain development programme partnership with Nigerian agricultural insurance corporation (NAIC) on farmer's production security and risk management opined that the more negative the likelihood ratio function; the better the result the model. Based on individual service effect of farmers' productivity:

The marginal effect size of micro-savings (0.113) was negative and significant at a 5% level of probability, which implies that an increase in the number of microfinance banks that renders micro-savings to the smallholder farmers will reduce their rice productivity by 11.3%. This is because the money that would have been used to purchase farm inputs meant for agricultural expansion is tied up in savings. The marginal effect size of loan (0.130) was positive and significant at a 1% level of probability, this implies that an increase in loan services rendered by the microfinance banks will increase rice productivity by 13.0% in the study area. This findings was in agreement with the a priori expectation since loan increase the volume of cash available to the farmers to purchase farm inputs at the right time. Again, the marginal effect size of remittance services (0.180) was positive and significant at a 1% level of probability, the implication is that a marginal increase in the number of remittance services rendered to the smallholder farmers will increase rice productivity by 18.0% in the study area. Sometimes; the microfinance banks helps the farmers on

direct transaction payment which the marginal effect size (0.137) was positive and significant at a 1% level of probability, which implies that a unit increase in the number transaction services that the bank undertake will increase rice productivity by 13.7% in the study area. Sometimes the banks undertake direct payment to avoid fund diversion by the farmers.

Though, negatively significant at a 5% level of probability; the marginal effect size of 0.088 for micro-insurance is an indication that a marginal increase in the number of microfinance banks that renders insurance service is perceived by the farmers to reduce their productivity by 8.8%. This means that the farmers' insurance culture is poor or that the insurance market in the study area is not yet developed. Interestingly, the marginal effect size for credit mobilization (0.335), and promotion of entrepreneurship (0.0145) were all positively significant at a 1% level of probability, which implies that a marginal increase in the variable deliverables will increase rice productivity by 33.5% (credit mobilization), and 14.5% (promotion of entrepreneurship) respectively. Furthermore, the marginal effect size of credit extension to customers (0.203), and generate employment (0.143) were all negatively significant at a 1% level of probability, this implies that a marginal increase in the aforementioned will reduce rice productivity by 20.3% (credit extension to customers), and 14.3% (generate employment) respectively. This report confirmed that assertion of Ahmad *et al.* [35] whose study noted that rural farmers' access to microfinance services increases production through which farmers are able to reinvest its surplus amount inform of income diversion to gain maximum profit. In the same vain, Terfa & William [41] suggested that farmers seek credit from microfinance banks to protect themselves against the effect of climate that hampers agricultural productivity.

Table 2. Effect of microfinance services on smallholder rice productivity.

Independent variables	Coefficient	z-value	Marginal effect	z-value
Micro saving	-1.024	-2.69**	-0.113	-2.83**
Promote savings culture	-0.165	-0.46	-0.018	-0.46
Loan	1.180	3.25***	0.130	3.49***
Remittance services	1.639	4.17***	0.180	4.69***
Transaction payment	1.241	3.26***	0.137	3.48***
Micro insurance	-0.796	-2.23**	-0.088	-2.30**
Credit mobilization	3.045	6.82***	0.335	10.09***
Credit extension to customers	-1.845	-4.82***	-0.203	-5.72***
Generate employment	-1.301	-3.46***	-0.143	-3.74***
Promote entrepreneurship	1.321	3.56***	0.145	3.84***
Constant	0.015	0.03		
Pseudo R ²	0.422			
LR chi2 (10)		153.07***		
Log likelihood	-104.996			
Number of obs.	300			

Source: Field Survey Data, 2021. (*, **, ***) Sig. @ 10%, 5%, and 1% respectively.

4.3. Constraints to Smallholder Rice Productivity

The constraints to rice production in the study area were

captured and analyzed with a principal component factor analysis technique, the choice of the model was to give room for policy recommendation. The result was presented in table

3 where the constraints were rotated into three important factors named as management, institutional, and location factors. The naming was adopted according to the characteristics of the constraints that loading under the factors, this method of naming was adopted from the study of Mohammad *et al.* [36] who equally rotated their work as economic, technical and social problems. The study adopted a Promax rotation method to ensure no variables loaded in more than one factor. Diagnostically, the Kaiser-Meyer-Olkin measure of sampling adequacy (KMO) value of 0.761 was in agreement with the benchmark value given and adopted in Uchemba *et al.* [42] who recommend that KMO of 0.700 is significant to proceed with the analysis. The management factor explained 28.6% variance of factor constraining rice production in the study area, institutional factor explained 11.2% variance of factors constraining rice production, and location factor explained 10.8% variance of factors constraining rice production in the study area. The three factors cumulatively explained

50.5% variance of factors constraining rice production in the study area. The effect size or factor weight shows the extent of challenges pose by the constraining variable in an attempt to hamper rice production in Anambra State, Nigeria. The constraints identified in each factors and their effect size are given as:

Management factor 1: poor access to information (0.777), high cost of machines (0.745), inadequate access to finance for expansion (0.707), inadequate storage facility (0.600), heavy reliance on traditional tools (0.526), and inadequate access to quality seed (0.524).

Institutional factor 2: cattle menace (0.755), high cost of input (0.705), scarcity of labour during farming season (0.523), and off-takers or buyers disappointment (-0.323).

Location factor 3: high cost of water management (0.784), and transportation issue (0.733).

The challenges with high factor loading that demands urgent attention are in agreement with those challenges of rice production identified in Obianefo, *et al.* [18].

Table 3. Constraints to smallholder rice productivity.

Sn.	Constraints	Management factor	Institutional factor	Location factor
1	Poor access to information	0.777		
2	High cost of machines	0.745		
3	Inadequate access to finance for expansion	0.707		
4	Inadequate storage facility	0.600		
5	Heavy reliance on traditional tools	0.526		
6	Inadequate access to quality seed	0.524		
7	Cattle menace		0.755	
8	High cost of input		0.705	
9	Scarcity of labour during farming season		0.523	
10	Off-takers disappointment		-0.323	
11	High cost of water management			0.784
12	Transportation issue			0.733
	Diagnostics tools			
	Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO)	0.761		
	% variance of factor 1	28.55		
	% variance of factor 1	11.21		
	% variance of factor 1	10.78		
	Cumulative % variance of factors	50.54		
	Degree of freedom (DF)	66		

Source: Field Survey Data, 2021.

4.4. Significant Relationship Between the Smallholders' Socioeconomic Profiles and the Microfinance Service Accessed

A Robust regression was used to identify the socioeconomic variables that are significantly related or determined access to microfinance services by smallholder rice farmers in the study area. The result of the analysis is presented in table 4. The study found the coefficient of multiple determinant (R^2) value of 0.372 implies that socioeconomic profile of the farmers explains 37.2% of access to microfinance services, while the remaining 62.8 unexplained were as a result of external factors or error beyond the smallholder farmers. The significant F-statistic of

(8.35)*** implies that socioeconomic profile of the farmers relates to the services they accessed. The coefficient of age (0.009) was negative and significant at a 1% probability level, this implies that a unit increase in age will reduce the farmer's access to microfinance service by 0.9%. The microfinance banks (MFB) seems to extend their services to younger farmers. Also, the coefficient of marital status (0.036) was negative and significant at a 5% level of probability, this implies that a marginal increase in the number of married smallholder farmers will reduce their access of MFB services by 3.6%. Married farmers seem to have more responsibilities that demands money; these could lead to fund diversion which suggest the reasons MFB operators may find it difficult to extend their services to married smallholder farmers.

The coefficient of years of formal education (0.018) was positive and significant at a 1% level of probability, this implies that a unit increase in the number of years the smallholder farmers spend in school will increase their access to MFB services by 1.8%. Farmers with better education will understand other repayment terms and loan conditions. The coefficient of household size (0.027) was positive and significant at a 1% probability level, this implies that an increase in the number of household size will increase MFB services accessed by 2.7%. Large household size will provide cheap family labour which will help them to put to use the credit accessed into agricultural productions. The coefficient of farm size (0.048) was negative and significant at a 5% level of probability, this implies that a unit increase in farm holding will reduce access to MFB service by 4.8%. This is because MFB are meant to support small-scale farmers and not those involve in a commercial farming. No wonder, Enimu, *et al.* [29] in analysis of the effects of microfinance banks loans on the livelihood of small-holder farmers in Delta State, Nigeria reported that microfinance banks distributed different sizes of loans to farmers irrespective of their socio-economic background.

Table 4. Significant relationship between the smallholders' socioeconomic profiles and the microfinance service accessed (Robust regression).

Socioeconomic profile	Coefficient	Std. Err.	t-ratio
Sex	-0.030	0.028	-1.07
Age	-0.009	0.001	-6.92***
Marital status	-0.036	0.014	-2.64**
Years of formal education	0.018	0.003	6.90***
Farming experience	0.002	0.002	0.82
Household size	0.027	0.005	5.28***
Farm size	-0.048	0.019	-2.57**
Extension contact	0.025	0.029	0.85
Constant	5.239	0.080	65.36
R ²	0.372		
F-statistics			8.35***
Obs.	300		

Source: Field Survey Data, 2021. (*, **, ***) Sig. @ 10%, 5%, and 1% respectively.

5. Conclusions and Recommendations

5.1. Conclusion

About 60% of Nigerians lives in rural areas where over 70% of them are employed in the agricultural sector [3]. These rural dwellers are resource poor and are engage in subsistence farming operation. These subsistent farmers are the major supply of food in the Nigeria food market. Seen that they are resource poor and the practice of commercial agriculture becomes nearly impossible to the farmers; these people are nearly un-bankable with poor financial inclusion or financial knowledge. The Central Bank of Nigeria (CBN) is the regulator of microfinance institutions in Nigeria with the mandate to support those involved in small-scale business and smallholder farmers, this effort is meant to make cash available at the onset of farming season to enable the farmers purchase quality farm inputs at the right

time and when needed. By expansion, these microfinance banks, when registered and approved by the CBN go beyond providing loan services but are found engaged in other financial advice that will help to improve the livelihood of the rural people. This study has been able to bring to the public domain that the numerous service received from the microfinance institutions proved effective in rice productivity to support the assertion of scholars like Terfa & William [41]; Ahmad *et al.* [35] only to name a few who submit that microfinance institution provides succor to farmers during the farming season. The study therefore establish that:

1. Microfinance services such as micro saving, loan, remittance services, transaction payment, and credit mobilization, etc. significantly influenced rice productivity.
2. The study has been able to decompose the constraints to rice production into three important factors (management, institutional and location) for quick policy-makers action, this means that poor access to information is the top on management factors, issue of cattle menace is top on institutional factor, and top on the location factor is high cost of water management.
3. The study equally established that the determinants to microfinance services received by the smallholder farmers are age, marital status, education, household size, and farm size.

5.2. Recommendations

The following key recommendation were raised:

1. Information on how to access microfinance service and the best way to produce and sell rice should be made available to the public domain, government should invest in setting up a good information management system.
2. To maximize production, one should be able to integrate the use of machine, these farm machines are expensive and are not within the reach of smallholder farmers due to cost. The study therefore recommend that the government should be able to set up fabricating outfit to meet farmers' specification at affordable price.
3. Government should ensure farm inputs are subsidize to the farmers as this will help to encourage more farmers into rice production if found profitable.

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