Impact of Microfinance on Smallholder Cassava and Rice Farms Productivity in Makurdi Metropolis, Benue State, Nigeria

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Abstract

The concept of microfinance lies in the belief that microfinance institutions could empower poor farmers through easy access to credits so as to increase their agricultural productivity and fight against food poverty. Thus, this study was undertaken to investigate the impact of microfinance on agricultural productivity by smallholder farmers in Makurdi Metropolis of Benue State, Nigeria. Data were randomly collected from 120 farmers consisting of 60 credit beneficiaries (CB) and 60 non-credit beneficiaries (NCB) by means of well-structured questionnaire which were analyzed through descriptive statistics and multiple regression analysis. The results of the regression analysis showed a clear impact of microfinance credit on agricultural productivity. Findings revealed that, the accessed credits help farmers to purchase inputs and improve farming technologies which ultimately transformed into higher productivity of the credit beneficiaries as CB farmers realized higher yields (52.1 bags) compared to the NCB farmers (24.6 bags). This is partly because the CB were relatively better in the use of inputs such as adoption of improved seeds, use of fertilizers and affordability of hired labor which ultimately enhanced their farm productivity. The study concluded that though microfinance credits has significant impact on agricultural productivity under smallholder farmers, access to microfinance credits by smallholder farmers in the study area is constrained by lack of microfinance credit information, high interest rates, and inadequate supply of credit institutions as well as risk averse nature of some farmers. Thus, in order to enhance agricultural productivity and improve the well-being of smallholder farmers, it is recommended that smallholder farmers should be facilitated to form "Savings and Credits Cooperative Unions" (SACCOS) for collective responsibilities of accessing credits and paying loans.

Keywords:
Credits,
Determinants,
Farmers
Microfinance,
Outputs,
Productivity

1. Introduction

The revitalization of the agricultural sector has been the major concern of Nigeria government (Opara, 2010). There is need to increase agricultural productivity as agriculture remains the leading non-oil sector of Nigerians population (Opara, 2010). The main objective of the agricultural policy of Nigeria is attainment of self- sufficiency in basic foods commodities through increase food production and processing of export crops, modernization of agricultural production, as well as processing and storage for distribution. In the 1980s, the agricultural sector accounted for 53% of Nigeria GDP and this has drastically dropped to 21.9% in 2019 (Opara, 2010). The agricultural sector of Nigeria is dominated by small farm producers who usually reside in the rural areas. It is observed that over 80% of the rural population in Nigeria are smallholder farmers (Mellor and Malik, 2017). Thus, the present system by which small-scale farmers depends on non-institutional finance sources (friends, relatives and money lenders) for loans has been hindering agricultural productivity. However, it is often argued that capital from these sources is generally low and inadequate relative to the need of agriculture in general (Guirkinger and Boucher, 2008).

Besides, there are many factors which hindered sustained development of small scale agriculture such as low technological level,

inadequate inputs, poor storage facilities, inaccessibility to credits among others. Based on the above, the Federal Government have realized that raising small scale farmers output and income is essential for economic development and political stability. As part of government strategy to address the problem of low agricultural productivity in the sector, several policies and projects were being formulated. These include developing rural infrastructure, supply of fertilizers, seeds and other inputs, improving agricultural extension services, and provision of credits to smallholder farmers. Thus the concept of microfinance was premised in the belief that microfinance institutions could empower farmers through easy access to credits so as to increase their agricultural productivity and fight against food poverty.

Modern microfinance in Nigeria began as non-profit institutions, a strategy initiated to address poverty. These microfinance institutions have grown phenomenally, driven largely by expanding informal sector activities and the reluctance of commercial banks to fund emerging government supported cooperatives with collateral requirement which majority of the poor cannot fulfil. In response to this, poor households have developed a wide variety of informal community-based arrangements to meet their financial needs (Majeha and Nwachukwu, 2008). Currently, Nigeria is estimated to have more than 5,000 microfinance institutions (MFIs). As the number of MFI has increased across the country, there is growing interest in understanding the nature of MFI and how they are impacting on the credit beneficiaries. Although there have been a number of studies to access the impact of microfinance on rural development, a high proportion of them have been focusing on poverty eradication such as children's education(MkNelly and Christopher, 1999), improving health outcomes for women and children (Khandker, 2005) and empowering women by participation in microfinance programs (Premaratne, 2009). In contrast, there is inadequate empirical evidence to assess the impact of microfinance on agricultural productivity in rural areas where majority of low income and subsistence farmers exist. This study sets out to fill this important information gap, especially by comparing those who have access to micro-credit with those who do not in areas of input use and agricultural outputs.

It is hoped that using those who have no access to credit as a control group will show clearly whether credit makes or does not make a difference to agricultural output among small scale farmers. Thus, the broad objective of this study was to investigate the impact of microfinance on smallholder cassava and rice farms productivity in Makurdi

Metropolis of Benue State, Nigeria. The specific objectives of the study are to: (i) describe the socio-economic characteristics of the respondents in the study area; (ii) describe the profile of microfinance institutions and amounts of loan accessed by credit beneficiaries; (iii) investigate the effect of microfinance on aggregate productivity and output levels of beneficiary farmers ; (iv) assess the effect of credit accessibility and levels of input use between credit and non-credit beneficiaries; (v) ascertain the determinants of agricultural productivity of smallholder farmers ; and (vi) identify the constraints faced by smallholder farmers in accessing credits in the study area.

Theoretical Framework

The Theoretical framework is based on the 'minimalist-integrated approaches' argumentation to the provision of rural microfinance. Borrowing from the works of Ledgerwood (2002), who discussed the 'minimalist-integrated' nexus, the study used the perspectives to establish the relationship between microfinance and smallholder farming. The minimalists argue that the only single "missing piece" in enterprise development is credit (Ledgerwood, 2002).

The 'minimalist approach' does not work well for smallholder farmers, since provision of 'credit only' without follow-up services is likely to be detrimental. The poor farmers are tempted to use the acquired credit for other uses other than the intended. The 'fungible' behavior is explained by lack of follow-up services, such as training in financial management.

On the other hand, the integrated approach looks attractive and convincing. This calls for the provision of both financial and non-financial intermediation. The latter includes training, social intermediations, social services provision and enterprise developmental services.

According to Legderwood (2002), MFIs that offer non-financial services often face sustainability challenges, hence, they need to be sufficiently funded. They can also form strategic partnerships with the government and donor agencies to promote the integrated approach to microfinance provision. Such partnerships are likely to enhance the sustainability of smallholder farmers. This study argues that the integrated approach to the provision of microfinance can effectively promote smallholder farmers and other vulnerable groups of society. Smallholder farmers need government support so as to improve their productivity which also promotes their livelihood so as to contribute towards rural economic development.

2. Materials and methods
2.1 The Study Area

The study was carried out in Makurdi Metropolis of Benue State, Nigeria. The choice of this local government for this study stemmed from the fact that it is an agricultural dominated area, and there are considerable number of microfinance institutions in the area. Geographically, the Local Government lies between Latitude 70 43'50N and Longitude 80 32'10E with estimated population of three million, three hundred and seventy-seven (300,377) people (NPC, 2007).

The State is predominantly an agriculture catchment area specializing in human capital and material resources. The average rainfall is 1500-1800mm. with average temperature of 27oC. The local government is made up of 11 wards namely North Bank1, North Bank11, Tse Bank, Fiidi Ward, Clerk/market, Ankpa/Wadata, Wailomayo/High Level, Makurdi central. Others are Modern Market, Agan and Mbalagh council wards. Makurdi is the Administrative Headquarters of the Local Government Area.

2.2 Population and Sampling Procedure

The population of this study consisted smallholder cassava and rice farmers. The study used households as a sampling frame. According to the National Population Census (NPC, 2007), Makurdi Local Government Area had a population of 300,377 people with 59,816 households comprising 154,138 males and 146,239 females. Respondents were categorized into credit beneficiaries (CB) and non-credit beneficiaries (NCB).

Purposive and multi-stage random sampling procedure were used to selection the respondents. The first stage was the purposive selection of Makurdi Metropolis of Benue State due to considerable number of microfinance institutions in the area. The second stage involves the random selection of five (5) main wards in the study area. From available statistics, there are 24,000 households in the sampled area. The third stage was a random selection of 0.5% of the total number of households (sample frame) across the five wards making a total of 120 respondents (i.e. 60 credit beneficiaries and 60 non-credit beneficiaries) of microfinance credits. Well-structured questionnaire were administered to respondents as research instrument.

2.3 Methods of Data Analysis

The data from the study were subjected to both descriptive and inferential statistics. Simple descriptive tools such as averages, frequency distribution, and standard deviation were used to describe the socio-economic characteristics of the respondents and constraints faced by smallholder farmers in the study area (objectives i and vi). T-test was used to estimate smallholders' credit accessibility and levels of inputs (objective iii). Multiple linear regression model was used to ascertain the impact of microfinance on agricultural productivity of smallholder farmers in the area (objective v).

3.4 Model Specification

(a)T- test: This was applied to test the difference between means of variables regarding the two farmer categories (i.e. CB and NCB).

(b) Multiple linear regression model: It is assumed that there is approximately linear relationship between the dependent variable (Y) and the independent variables X1, X2, X3, X4, X5, X6. Therefore, regression model was expressed as follows:

$Y= f (X1, X2, X3, X4, X5, X6)$ …………….... (1)
$Y = \alpha + \beta 1X1 + \beta 2X2 + \beta 3X3 + \beta 4X4 + \beta 5X5 + \beta 6X6 + \mu$ …………………………………… (2)

Where:
Y = Output from farm (Kg)
X1 = Quantity of fertilizers (Kg)
X2 = Quantity of herbicides (Liters)
X3 =Technology used (Tractor)
X4 = Quantity of improved seed (Kg)
X5 = Land size (Hectares)
α = Constant
β's = Coefficients to be estimated
μ = Stochastic error term

3. Results and discussion
3.1 Socio-economic Characteristics of Respondents

The results of descriptive statistics (Table 1) showed percentage of respondents based on credit beneficiaries (CB) and non-credit beneficiaries (NCB). A gender comparison showed that 63.3% of the CB was men compared to 36.7% of women, suggesting that men were more active in seeking and accessing credits compared to women. This is quite similar with the experience observed in most commercial banks in Nigeria where only few women are able to access credit facilities compared to men. This is because a high proportion of women in Nigeria do not own valuable assets such as houses or land which commercial banks often demand as collateral for obtaining loans. In other words, the cultural and traditional belief that women will get married and will belong to another clan limits women access to fungible assets used as collateral for loans in Nigeria. These findings are similar to those reported by Ajagbe (2012) who observed that the demand for credit was strongly influenced by the gender, age, education, value of assets owned and other dwelling characteristics.

The study revealed that the main economic activity of the respondents was agriculture as majority (87.5%) are involved in agriculture. However, a larger proportion (13.3%) of the CB were involved in other petty businesses compared to 11.7% for NCB. Majority (53.3%) of the CB aged between 36-45 years suggesting that this group consists of the most economic active segment of the population. Also, a high proportion of this age category have more family responsibilities such as raising children, payment for education and health services. Thus, accessing to credit for this age group has multiplier effect in that, it benefits the applicants and also the dependants. In terms of education, the study finds no significant difference between CB and NCB in the sampled area. Majority (77.5%) of the respondents obtained primary education while few (19.5%) has secondary education or tertiary education. Findings showed that 78.3% of the respondents from the CB group obtained primary education and only 21.7% had their secondary or tertiary education while it was 76.7% and 20.3%, respectively, for NCB respondents. None of the CB had no formal education compared to 3.0% for NCB. Majority (52.5%) of the respondents had a range of 5 to 8 persons per household with an average of 6.7 persons. A comparison across CB and NCB showed that the former had an average of 6.6 persons per household with corresponding figure of 6.8 for the latter.

Majority (60.0%) of the farmers in the study area had a farm size of between 3.0 – 4.0 hectares. The mean farm size was 4.1 hectares for CB as compared to 3.9 hectares for NCB. This implies that farmers in the study area had enough farmland that if effectively put into use can produce the desired output for family consumption. The result agrees with the report by Olawepo (2010), who found that over 90% of the Nigeria's local food production comes from farms, which are usually not more than 10 hectares in size.

Table 1. Socio-economic Characteristics of Respondents (n = 120)

Variables	Credit beneficiaries (CB)		Non- beneficiaries (NCB)	
	Frequency	Percentage	Frequency	Percentage
Gender				
Male	38	63.3	33	55.0
Female	22	36.7	27	44.0
Age (years)				
16-25	3	5.0	9	15.0
26-35	13	21.7	12	20.0
36-45	32	53.3	27	45.0
46-54	9	15.0	8	13.3
55 and above	3	5.0	4	6.7
Education				
Non formal	0	0.0	2	3.0
Primary	47	78.3	46	76.7
Secondary	11	18.3	11	18.3
Tertiary	2	3.4	1	2.0
Main occupation				
Farming(agriculture)	52	86.7	53	88.3
Petty trading (business)	8	13.3	7	11.7
Family size				
1-4	9	15	12	20.1
5-8	31	51.7	32	53.3
9-12	18	30	14	23.3
13 and above	2	3.3	2	3.3
Mean		6.6		6.8
Farm size(hectares)				
1-2	5	8.3	6.0	10.0
3-4	34	56.7	38	63.3
5-6	15	25.0	13	21.7
7-8	4	6.7	2	3.3
9 and above	2	3.3	1	1.7
Mean		4.1		3.9

Source: Author's Computation, 2020.

Table 2. Profile of Microfinance Institutions and Mean Amount of Loan Accessed by Beneficiaries

Loan (₦)	No. of Beneficiaries (%)	Mean of Loan disbursed (₦)	Proportion of Loan used for Agriculture (%)
>400,000	2.8	362,255	12.5
400,001-600,000	38.0	820.000	20.0
600,001-800,000	33.2	1,002,200	20.4
800,001-1,000,000	21.3	1,227,611	26.4
1,000,001-1,200,000	0	0	0
1,200,001-1,400,000	2.0	1,441,118	32.1
1,400,001-1,600,000	0	0	0
1,600,001-1,800,000	1.7	1,334,122	24.1
1, 800,001+	1.0	1,664,232	26.3
Overall mean loan	100	700,000.49	28.2

Source: Author's Computation, 2020

Table 3. Effects of Credit Accessibility and Levels of Inputs Used among Credit Beneficiaries and Non-beneficiaries

Inputs	Respondent category	Mean	Variance	Standard deviation	t-value	2-Tail sig. (P-value)
Fertilizer	With credit (n =60)	100.0	1.96	1.4		
	Without credit (n =60)	44.6	2.56	1.6	0.16	0.78***
Improved seed	With credit (n =60)	20.4	256	16		
	Without credit (n =60)	9.2	196	14	2.8	0.03**
Tractor	With credit (n =60)	0.3	0.36	0.6		
	Without credit (n =60)	0.02	0.16	0.4	1.88	0.09NS
Hand hoe	With credit (n =60)	60	0.81	0.9		
	Without credit (n =60)	60	0.49	0.7	1.52	0.44NS
Pesticides	With credit (n =60)	1.4	0.81	0.9		
	Without credit (n =60)	1.2	0.36	0.6	0.28	0.87NS

*** Significant (P< 0.01), ** (P < 0.05), NS (not significant), Source:Author's Computation, 2020.

3.2 Profile of Microfinance Institutions and Amount of Loan Accessed by Beneficiaries

Makurdi Metropolis had 12 registered MFI with members being organized in the form of Savings and Credit Cooperative Organizations (SACCOS). All these SACCOS were supervised by the Local Government Cooperative officers. In total, there were 4,820 members of the SACCOS in the Metropolis of which 52% were men and 48% were women.

The results of descriptive statistic showed that average credit per beneficiaries was N700, 000.49. Majority of the beneficiaries invested only N197, 400.2 or 28% of the total amounts of credit for agricultural production. This may suggest that the loan received by smallholder farmers had multiple use and not necessarily intended for agricultural production. The study found rural farmers were also likely to seek for credit for other pressing needs such as food, health, and education. Oboh and Ekpebu (2010) also reported a similar experience from Benue State, Nigeria, where their study found that about 43.9% of the loan received by smallholder farmers was diverted to non-farming activities. The implications is that farmers who divert credit to other activities different from what they borrow the money for, are likely to fail in producing optimally, an act that will contribute to their failure to repay the loans.

3.2 Effects of Credit Accessibility and Levels of Inputs Used among Credit Beneficiaries and Non-beneficiaries

The results of descriptive statistics showed that there was significant difference in the levels of improved seeds (P<0.05) and fertilizer (P<0.01) used between CB and NCB. The CB used on average, 20.4kg improved seeds and 100.00kg fertilizer compared to an average of 9.2 and 44.6kgs respectively for NCB. The accessed credits from microfinance help farmers to purchase inputs and improve farming technologies. According Green and Ng'ong'ola (1993) access to credits by farmers could influence fertilizers application. Carte (1989) also reported a positive relationship between credit and agricultural productivity. The emphasis of microfinance is that farmers should be in groups for accessing credits. This helps to reduce the transaction costs and creates a collective responsibility of borrowers to repay the loan. Credit access by smallholder farmers also improves their market accessibility for agricultural commodities. It was

found that 79.6% of the respondents from the CB used the loan for buying farm inputs while 20.4% reported to use the loan for hiring farm laborers. Findings showed that farmers who accessed credits were able for hired labor and trucks to carry products to the market centers where they fetched relatively high price compared to farm gate prices.

Among the Non CB, it was found that credit constraints reduced their agriculture outputs. This is in line with study by Guirkinger and Boucher (2008) who found that credit constraints reduced agricultural output in Peru by 26%. However, the study suggested that access to credit by smallholder farmers is important but not sufficient by itself to have optional farm productivity. It needs other factors such as extension services and efficient markets to compliment credit accessibility in order to have optimal farm productivity. Nevertheless, this study observed no significant difference in using tractor and hand hoe. Generally farming technology was dominated by hand hoe.

3.3 Effects of Microfinance Credit on Aggregate Agricultural Productivity and Mean Output
Levels

Results of the T-test showed a significant difference (P<0.01) in aggregate productivity between CB and NCB. Credit beneficiaries (CB) produced an average of 52.1 bags per hectare (5210kg) compared to 24.6 bags or 2460.2kg for NCB. Credit beneficiaries also had more output for individual crop of cassava (P<0.01) and rice (P<0.1). This implies that, the farms managed by CB were more productive than that of the NCB mainly became of high inputs used.

3.4 Determinants of Agricultural Productivity of Smallholder Farmers

Results obtained from multiple regression analysis showed positive and significant impact of fertilizer, improved seeds and hired labor on cassava and rice outputs. The study found that the coefficient of fertilizer was positively correlated with agricultural productivity and was statistically significant (P <0.01), suggestive that increase fertilizer application by one unit will increase productivity by 0.266 units. Also, the coefficient of improved seeds showed positive and direct relationship with agricultural productivity and was statistically significant at 1% level of probability. This implies that a one unit increase in improved seed application will result in 0.211 unit increase in agricultural productivity in the study area. Similarly, hired labor was positively correlated with agricultural productivity and was statistically significant (P< 0.01). Thus, a one unit increase in hired labor would

increase agricultural productivity by 0.321 level of probability ceteris paribus.

Although, improved farming technology (tractor), land size and herbicides were not significant. However, these variables have positive correlation with agricultural productivity suggesting that increase use of farming technology, proper application of herbicides as well as increasing land size will increase agricultural productivity in the study area. These findings are in contrast with those of Cornia (1985) who reported a higher yield by farmers with small farms. The author reported a strong negative correlation between farm sizes on the one hand, and factor inputs and yields per hectare on the other where it was observed that the decline in yields for increasing farm size could be attributed to decreasing returns to scale.

3.5 Constraints Facing Smallholder Framers Access to Microfinance Credits

Results of descriptive statistics (Table 6) showed various reasons for failure to access credit services in the study area. Majority (61.2%) of respondents reported lack of MFI information as main constraint hindering them from accessing credit. This problem was similarly reported among female smallholder farmers in Sri- Lanka which according to Premaratne (2009), found that accessibility of microfinance depends on factors such as the level of household income, availability of information, interest rate and collateral availability. Also, most (60.4.0%) of the farmers complained of small size of loans and high interest rates. When interest rates are high, it is disincentive for farmers to borrow as the benefit from agricultural productivity will not be realized because of paying the debts.

More importantly, the amount of loans accessed by beneficiaries have some implications. If a small amount of loans is accessed by farmers, it will increase the household transaction costs as well as will not enable them to make long-term income change for the household. This results agrees with the findings of Chulangani and Ariyawardana (2010) who reported that the transaction costs of borrowing declines as the size of loan increases. Finding further revealed that some respondents could not access loan simply because they are risk averse (29.6%) or did not want any credit (20.4%). This results supported those reported by Rweymamu et al. (2003) who reported that 60% of the respondents in Mbozi district of Tanzania mentioned the level of interest rate to be a factor affecting their decision to borrow.

Table 4. T-test Results for Effects of Credit on Aggregate Agricultural Productivity and Mean Output Level of Farmers

Category	Mean	Variance	Standard deviation	t-value	2-Tail sig. (P-value)
Total production					
Credit beneficiaries(n =60)	52.1	784.0	28		
Non beneficiaries (n =60)	24.6	309.8	17.6	3.3	0.002***
Cassava					
Credit beneficiaries (n =60)	30.2	376.4	19.4		
Non beneficiaries (n =60)	14.3	158.8	12.6	2.6	0.004***
Rice					
Credit beneficiaries(n =60)	21.9	222.0	14.9		
Non beneficiaries (n =60)	10.1	139.3	11.8	2.4	0.027*

*** Significant (P< 0.01), ** (P < 0.05), * (P < 0.1), Source: Author's Computation, 2020.

Table 5. Regression Estimates of Determinants of Agricultural Productivity

Variables	Coefficients	t-value	2-Tail sign. (P-value)
Constant	-1.626	4.118	0.000***
Fertilizer	0.266	3.255	0.001***
Improved seeds	0.211	2.520	0.012***
Tractor	0.133	1.677	0.087 NS
Hired labor	0.321	3.224	0.002***
Land	0.511	2.618	0.877 NS
Herbicides	0.154	1.545	0.065 NS
R^2	0.76		
Adjusted R^2	0.74		

*** Significant (P < 0.01), NS (not significant), Source: Author's Computation, 2020.

Table 6. Constraints of Smallholder Farmers Access to Microfinance Credits

Constraints	Frequency	Percentage
Lack of information about microfinance activities	98	81.7
Small loan size	79	65.8
High interest rate	66	55.0
Simply risk averse	48	40.0
Do not want loan	33	27.5

* >100% due to multiple responses, Source: Author's Computation, 2020.

4. Conclusions and recommendations

The study was undertaken to investigate the impact of microfinance institutions (MFIs) on smallholder farm productivity with particular reference to cassava and rice farmers. Findings showed a significant difference in input use and farm productivity between credit beneficiaries (CB) and non-credit beneficiaries (NCB), where it was found that the outputs of the CB was persistently high compared to the outputs of NCB. The estimates of the regression analysis suggest that the level of input use (fertilizers, improved seeds, and hired labor) has significant impact on agricultural productivity. Although, the use of tractor, herbicides as well as land size were not significant in determining agricultural productivity, nevertheless, they were found to have positive relationship with agricultural productivity. This suggests that increase use of tractors, proper application of herbicides as well as increasing land size will increase agricultural productivity in the study area. The study revealed that though, MFI credits has significant impact on agricultural productivity under smallholder farmers, access to microfinance credits by smallholder farmers in the study area is constrained by lack of microfinance credit information, high interest rates, and inadequate supply of credit institutions as well as risk averse nature of some farmers.

In order to enhance agricultural productivity and improve the well-being of smallholder farmers, it is recommended that smallholder farmers should be facilitated to form Savings and Credit Cooperative

Unions (SACCOS) for collective responsibilities of accessing credits and paying loans.

Authors' Contributions

This work was carried out in collaboration among authors. The first author designed the research instrument and analyzed the data. All the authors interpreted the data, read the final manuscript, and agreed with all contents.

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