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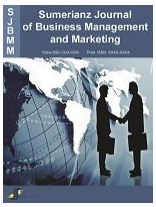

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Agricultural Micro Financing and Rural Poverty Reduction in Plateau State: The Role of SMES

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Abstract

The specific objective of this study is to examine and evaluate the impact of agricultural microfinance on rural poverty reduction in Plateau State. This study adopts a survey research design; specifically both quantitative and qualitative mixed approach was employed. Primary data were sourced via questionnaire instrument, informant interview, and focus group discussion on the contribution of agricultural microfinance to rural poverty reduction. Secondary data were sourced from various financial institutions. The primary data analysis was carried out using descriptive analysis, simple percentages, mean, correlation and the Analysis of Variance (ANOVA). We found that agricultural micro financing is an effective strategy for poverty reduction in Plateau State, but it has not achieved optimum results. The microfinance institutions in Plateau State have the capacity of reaching out to wider and poorer households if they develop and innovate their loan products based on the livelihood activities. We recommend sustainable and cost-effective socio-economic development of the poor in Plateau State through micro financing. The village-level network is essential. The study is useful in agricultural entrepreneurship, limited by non inclusion of agricultural value chain.

Keywords: Microfinance; Agriculture; Poverty reduction; Operational efficiency; Rural areas.

1. Introduction

In Nigeria, microfinance has been recognized as an essential tool for promoting small and Micro Enterprises (SMEs). About 70 percent of the population is engaged in the informal sector or in agricultural production, (Sanusi, 2013). The Federal and State governments have recognized that for sustainable growth and development, the financial empowerment of the people is vital. Agricultural microfinance seems to have potentials in developing latent entrepreneurial capabilities, employment, wealth creation and poverty reduction in Nigeria. The important role played by microfinance in poverty reduction was realized early in the history of Nigeria, and this realization has made government at all levels to attempt to reach the poor with one form of credit or the other through the conduit mechanism of agricultural policies. In spite of all these efforts aimed at poverty reduction, the transmission mechanism through agricultural microcredit seems not to have yielded the desired results. Poverty index in Nigeria is on the rise since the 1980s up to 2019. According to the National Bureau of Statistics (2010), has remained high especially in the rural areas, where agriculture is the main source of livelihoods sustenance. It is now widely recognized that poverty is a global problem that affects over one billion people in the world, with Nigeria overtaking India in 2019 as the world's poorest population, (Agenda, 2019). Nigeria has overtaken India as the country with the largest number of people living in extreme poverty, with an estimated 87 million Nigerians, or around half of the country's population, thought to be living on less than $1.90 a day. Despite its vast oil riches and impressive

economic growth, Nigeria has struggled to lift its population out of poverty over the past three decades. The facts stand out in the World Bank Annual Report (2017) Atlas of Sustainable Development Goals, which shows that 35 million more Nigerians were living in extreme poverty in 2017 than in the year 2000. Nigeria's progress in poverty reduction has been significantly impeded by its inability to distribute the countries immense oil wealth to the absolute poor population. This is corroborated by a recent report from a London-based research institute, a think-tank which measured "prosperity delivery" to citizens in comparison with a country's actual wealth in 2018. Among the 38 countries covered by the research, Nigeria ranked 26th, with the report stating that it was under delivering" prosperity to its citizens.

Successive governments have come up with special programs; the principal targets are the overall empowerment of low income earners in rural areas. These programs range from Agricultural Development Projects (ADPs), the establishment of Agricultural Credit Banks to Better Life Program for Rural Women and the like. Unfortunately most of the programs failed to achieve the desired result. That led to the emergence of microfinance banks which aimed at extending credits to micro enterprises and encouraging entrepreneurship. The development of agriculture through effective financing options has stemmed debate and growing interest among researchers, policy makers and entrepreneurs, recognizing the immense contribution of the sector to economic growth in Nigeria, (Akpan and Nneji, 2015).

Globally, finance has been recognized as an essential tool for promoting small and Micro Enterprises (SMEs). Across developing countries, SMEs are turning to Microfinance Banks (MFBs) for an array of financial and non financial services. The reason is because access to sustainable financial services enables owners of micro enterprises to finance investment, build assets, and reduce their vulnerability to external shocks (Ehigiamusoe, 2010). Furthermore, it has been shown that non-financial services of the MFBs like advisory and extension services and per-loan training also contribute their own quota to the development of agricultural cottage industries in India, Brazil and China.

According to the Central Bank of Nigeria, the Nigerian formal financial system, consisting largely of commercial banks, only carters to about 35percent of the economically active population, therefore leaving 65 percent of the population to be serviced through NGO's (MFIs), money lenders, friends, relations and credit unions which are unregulated and problematic.

The microfinance institutions available in Nigeria prior to 2005 were not able to adequately address the gap in terms of credit, savings and other financial services. As reported by the CBN, the share of micro credit as a percentage of total credit was 0.9%, while its contribution to GDP was a mere 0.2% (Central Bank of Nigeria CBN, 2010). The existing microfinance banks in Nigeria serves less than 1 million people out of 40 million potential people that need the service (Central Bank of Nigeria CBN, 2010). There is a growing recognition by the Nigerian farmers of the effects of improved inputs and new technologies on agricultural yield. The use of these inputs and the adoption of high yielding techniques have given rise to an increased need for agricultural credit since majority of Nigerian farmers are small-scale farmers and are often constraints by unfavorable economic, social, cultural and institutional conditions

1.1. Statement of the Problem

It is evident from the introduction to this study that micro financing and poverty reduction in Nigeria, and Plateau State in particular, have enormous challenges. . The rural population across Nigeria is vulnerable and in deer need of credits to support their livelihood activities. This explains the situation in Plateau State. The main problem of agricultural enterprises that motivated this study is the lack of adequate access to finance. Other problems emanating from the main problem are financial exclusion, unemployment, poverty, underutilization of capacity in the agricultural value chain and stunting growth. Many factors have been identified contributing to smallness of farm holdings and premature death of SMEs in Plateau State and Nigeria as a whole. Key among them include: insufficient capital, irregular power supply, infrastructural inadequacies (water, roads etc.), lack of focus, inadequate market research, poor inputs, over-concentration on one or two markets for finished products, lack of succession plan, inexperience, lack of proper book keeping, lack of proper records or lack of any records at all, inability to separate business and family or personal finances, lack of business strategy, inability to distinguish between revenue and profit, inability to procure the right plant and machinery, inability to engage or employ the right caliber of staff, and cut-throat competition with imported products. With the significant increase in the numbers of MFBs operating in Nigeria and Plateau State in particular, agricultural value chain has not significantly improved, poverty is mounting. Hence, there is the need to empirically investigate the impact of agricultural microfinance on rural poverty reduction in Plateau State.

1.2. Research Questions

This study shall be guided by the following research questions;

- Is there any significant causal relationship between agricultural microfinance and rural poverty reduction in Plateau State?
- Does MFBs have any significant impact on agricultural value chain in Plateau state?
- Has agricultural microfinance contributed significantly to agricultural productivity among rural farmers in Plateau State?

1.3. Objectives of the Study

The broad objective of this study is to investigate the impact of agricultural microfinance on the rural poverty reduction in Nigeria.

The specific objectives of this research are as follows:

- To examine the causal relationship between agricultural microfinance and rural poverty reduction in Nigeria.
- To evaluate the impact of Microfinance Banks on agricultural value chain in Plateau State.
- To evaluate any significant contribution of microfinance banks to agricultural productivity among rural farmers in Plateau State.

2. Literature Review and Hypotheses Development

There is a study that suggests that access to credit has the potential to significantly reduce poverty (Khandker, 2010). Khandker (2010), estimates that for every $100 lent to a woman, household consumption increases by $18 Moderate poverty falls by around 15% and ultra-poverty by 25% for households. On the other hand, there is also research which argues that micro-credit has minimal impact on poverty reduction (Morduch, 2011). The evidence on reducing vulnerability is somewhat clearer. The provision of micro-credit has been found to strengthen crisis coping mechanisms, diversify income-earning sources, build assets and improve the status of women (Morduch, 2011). Accordingly, (Morduch, 2011) points out a problem with this analysis. He notes that the assumption of perfect targeting which underlines Khandker's selectivity correction is flawed giving the fact that in the data set 30% of households were above the eligibility threshold. Using an alternative approach to correct for selectivity, Morduch finds no evidence of increase in consumption (and therefore reduction in poverty) using the same data. There is other work in Bangladesh supporting the hypothesis that micro-credit impact is more significant for vulnerability than for income-poverty.

Olowe *et al.* (2013), investigated the impact of microfinance on SMEs growth in Nigeria. The population of the study consists of the entire SMEs in Oyo State. Purposive sampling technique was used to select the participating SMEs. Simple random sampling technique was used to select a total of 82 SME operators that constituted our sample size. Pearson correlation coefficient and multiple regression analysis were used to analyze the data. The results from this study showed that financial services obtained from MFBs have positive significant impact on SMEs growth in Nigeria. The results also revealed that duration of loan has positive impact on SMEs growth but not statistically significant. The results also showed that high interest rate, collateral security and frequency of loan repayment can cripple the expansion of SMEs in Nigeria.

According to Mahajan (2010), microcredit is a necessary but not sufficient condition for micro-enterprise promotion. Other inputs are required, such as identification of livelihood opportunities, selection and motivation of the micro-entrepreneurs, business and technical training, establishing of market linkages for inputs and outputs, common infrastructure and sometimes regulatory approvals. In the absence of these, micro-credit by itself, works only for a limited familiar set of activities – small farming, livestock rearing and petty trading, and even those where market linkages are in place. Pollin (2017), have a similar view, and put it in the following words: micro enterprises run by poor people cannot be broadly successful simple because they have increased opportunities to borrow money. For large numbers of micro enterprises to be successful, they also need access to decent roads and affordable means of moving their products to markets. They need marketing support to reach customers.

Other similar studies have shown that microfinance may be relevant for poverty reduction, but does not reach the poorest as often claimed. The results from these studies have identified beneficial impacts to the "active poor" but argue that microfinance does not assist the poorest as it is often claimed mainly because it does not reach them Hulme and Mosley (2012), Sharma (2010), Kiiru and Kennia (2013). This group of studies often report mixed results suggesting the possibility of both positive and negative impacts for different households. Coleman (2011) found that microfinance programs have a positive impact on the richer households but the impact is insignificant to the other poorer households. In Coleman (2011) study, richer households were able to command large loans to them because they sat in influential positions in the village banks as committee members. Coleman (2011), argued that it is the size of loans that households were able to acquire that was very important in determining the impact of those loans in household incomes. In the same study, many poor women borrowers dropped out of the borrowing program citing the size of loans as too small to make any significant investments that can significantly improve their incomes. In his study of Bolivia's Bancosol, (Mosley, 1996) reports that in any given cohort roughly 25% showed spectacular gains to borrowing, 60 - 65% stayed about the same, and 10 – 15% went bankrupt (Mosley, 1996).

2.1. Theoretical Framework

Financial experts have stressed that when credit facility is made available then the poor can have access to it and break the cycle of poverty. The bottom line of this hypothesis is that the poor can use loans they obtain from Microfinance Institutions (MFIs) to better their lives. For instance, when a client of MFI obtains a loan, the loan is used to support business. As a result of this, the income from the expansion of the business can be used to support household. However, some critics have bemoaned the loans to MFIs clients because credit facility makes them to be indebted to the MFIs. The core aim of MFIs is to make the poor have access to credit facility, thereby increasing their economic power (Kiiru and Kennia, 2013). The theories reviewed under here are the bank capital channel model, the capital constraint model, the Lifecycle theory, Pecking order theory and the agency framework hypotheses.

2.1.1. Pecking Order Theory

The pecking order theory is one that was developed by Myers Sanders in 1984. It implies that the financing requirements of firms (usually SMEs) are catered for in a hierarchical order. The initial source of funds is internally generated. As the amount of funds required is increased, the next source is via the use of debt. Further increase in the need of funds leads to sourcing for external equity. Thus there tends to be a negative relationship between profitability and external borrowing by small firms. This further implies that the debt equity mix of a firm should be heavily dependent on the hierarchical financing decisions over time. This theory thus maintains that business organizations always prefer to use internal funds. If it is not available, the organization will prefer to use debt as an external source of fund before it considers equity financing. Therefore, by simply examining a firm's debt equity mix, one can have a general understanding on the health of that organization. When managers issue new shares, the public believe that the managers have concluded that the firm is valued more than its actual worth and as such they want to quickly utilize the opportunity. This leads to the investors valuing these new stocks lower than before. The theory also implies that older firms should have more funds available to promote growth since they have had more opportunities to accumulate internally generated funds i.e. retained earnings. Holmes and Kent (2010), found that SMEs observe strict adherence to the pecking order due to the fact that it is difficult for them to acquire externally generated finance. SMEs rely heavily on private markets thus limiting their financing sources. These restrictions on the type of finance available to SMEs coupled with the small firm‘s insistence on first using internal sources of capital (Holmes and Kent, 2010), creates a unique structure for small business.

2.1.2. Financial Growth Theory

This theory was developed by Berger and Udell (2010). According to them, as a business matures over the years, its financial obligations and financing options metamorphose having more information available to the public. According to them, firms that are smaller, younger and possess more ambiguous information must depend on initial internal funding, trade credit, or a type of financing called angel finance. (Angel finance is one that occurs when an individual or organization provides a limited amount of financial backing for a start up business with more favorable repayment plan). As the firm grows, it qualifies for acquiring both venture capital and midterm loans as sources of both intermediate equity and intermediate debt respectively. Further aging of the firm makes it to become bigger and less informationally murky. This thus qualifies the firm to have access to both public equity and long term loans as sources of both long term equity and long term debt respectively.

The capital structure of SMEs is thus very different from that of bigger firms because SMEs rely more on informal financial market which limits the type of financing they are able to secure. The SMEs initial use of internal financing leads to a peculiar state of affairs whereby capital structure decisions are heavily dependent on the limited financing options. Therefore, SMEs possess varying capital structures and are financed by various Sources at different stages of their development (Berger and Udell, 2010)

2.1.3. Bank Capital Channel Theory

This model implies that the lending behavior of banks to SMEs is heavily dependent on capital adequacy requirement. Obamuyi (2017), showed that a change in interest rate can influence banks lending to SMEs through bank's capital. This implies that increasing the value of interest rates raises the cost of banks' external funding, but reduces banks' profits and capital. The tendency is for the banks to reduce their supply of loans if the capital constraint becomes binding. On the other hand, the banks could also become more willing to lend during situations when the interest rate is favorable.

2.1.4. The Life Cycle Model

This model was developed by Weston and Brighan (2011). According to them, accelerated growth of a small firm could lead to the firm lacking capital. This was because; most of the time, small firms are created with just internal funds from the owners. As the firm grows, the amount of owners' equity is no longer capable of sustaining it and the firm would have to resort to external sources of funds in order to survive. Thus, accelerated growth could result in illiquidity and thus the firm would have a decision to make between reducing its growth rate and becoming illiquid and sourcing for external funds. Therefore Weston and Brighan (2011) concluded by showing that SMEs that grow in size are very likely to have an increase in its debt structure.

3. Research Methodology

This study adopts a survey research design; specifically both quantitative and qualitative mixed approach research design was employed. The study collected cross-sectional data from the study areas in order to describe and interpret what exists at present. Primary data were sourced via questionnaire instrument, informant interview, and focus group discussion on the contribution of Microfinance Banks to the growth and development of Small and Medium scale enterprises in Plateau State. While, secondary data were sourced from various publication of CBN on activities of MFBs. Thereafter, multiple regression analysis was employed to analyze both quantitative and qualitative data for better research results. The choice of the ordinary least square (OLS) technique of multiple regression analysis was to suit the time series secondary data. The primary data analysis and the secondary data methods complement each other to achieve the study objectives.

Sampling Technique and sample size

The sampling frame used in this study was extracted from National Population Commission of Nigeria (National Population Commission and ICF Macro, 2011). Using projected figure from 2011 to 2017, the projected population

figure of Plateau State is 4,000,000, and Jos metropolis stood at 1,817,063, (National Population Commission and ICF Macro, 2011) (NPC2016). The projection assumes 3.25% growth rate for all 17 LGAs within the state. However, for the purpose of realistic and thorough research, Yamane (2016) formula of sample size determination was adopted, and it is presented as follows:

$$S = \frac{N}{1 + N(ME^2)}$$

Where: 's' is the desired sample; 'N' is the population size; and 'ME' is the margin of error allowed in determine the sample size:

$$s = \frac{1{,}817{,}063}{1+1{,}817{,}063(0.05^2)} = s = \frac{1{,}817{,}063}{1+1{,}817{,}063(0.0025)} = 399.9$$

approximately, 400 respondents.

Stratified sampling technique was adopted for the study in selecting 400 respondents operating Small and Medium scale enterprises respondents spread across the Jos. The essence of stratified sampling technique is to allow every SME who falls under the scope of study to freely participate, also stratified sampling technique save time and money.

Model Specification

In this study, hypothesis has been stated in chapter one (1) with the view to examining the role of agricultural micro-financing on SMEs and poverty reduction in Plateau State. To analyze the role of agricultural micro-financing on SMEs and in poverty reduction, four (4) variables are considered as explanatory variables while poverty rate is the explained or dependent variable, (Eneji, 2016). Thus, the functional relationship of the model is represented as shown below:

PVR = f (LAD, TDP, INTR, ACGSF)….. …… (1)

The multiple regression equation involving Ordinary Least Square (OLS) is presented thus:

$$PVR = \alpha o + \alpha 1ACGSF + \alpha 2LDV + \alpha 3TD + \alpha 4INR + Ut \quad - \quad - \quad (2)$$

The Apriori Expectation is $\alpha o>0$, $\alpha 1<0$, $\alpha 2<0$, $\alpha 3<0$, $\alpha 4>0$

Where:

(PVR) = Poverty Rate

ACGSF= Agricultural Credit Guarantee Scheme Fund

TDP= Total Deposit

(LAD) = Loan and Advances

INT = Interest rate

Ut== The Error Term that captures the variables not included in the model.

αo- α4= are Parameters

The null hypothesis is stated as H0: $\alpha 1 = \alpha 2 = \alpha 3 = \alpha 4 = 0$ (all "α"s are simultaneously equal to zero), is tested against the alternative of H1: $\alpha 1 \neq \alpha 2 \neq \alpha 3 \neq \alpha 4 = 0$ (not all "α''s are simultaneously equal to zero),

4. Results and Discussions

The primary data analysis was carried out using descriptive analysis, simple percentages, mean, correlation and the Analysis of Variance (ANOVA) to investigate any significant statistical difference in agricultural productivity and rural poverty reduction with, and without microfinance. Selected crops of rice, maize, potatoes and vegetables were targeted, given the climatic advantages of the study areas. All the Local Government Areas engage in agriculture and have rural settlements, but have slight climatic differences, resulting to variations in major crops cultivated. In Bassa LGA for instance, the major crops are rice, maize and guinea corn while in Bokkos LGA are potatoes, sugar cane and maize.

4.1.1. Descriptive Analysis

Here, the questions in each section were assessed and analysed one after the other using tables, simple percentages and charts.

4.2. Section A

Table-1. Personal information of the respondents

Variable	Frequency	Percentage (%)
Sex		
Male	260	65
Female	140	35
Educational Qualification		
FSL/SSCE/GCE/NABTEB	200	50
BSc/HND	120	30
MSc/MBA	40	10
Ph.D	2	0.05
Others	38	9.5

Source: Field Survey, 2020.

Table 1 above shows that majority of the respondents 260 (65%) are males while females constitute 35% (140). The implication of this result is that majority of those who engaged in farming activities in the study area are males. Also, 200 (50%) and 120 (30%) of the respondents are SSCE/GCE/NABTEB and BSc/HND holders respectively. 10% (40) holds MSc/MBA while 0.05% (2) of the farmers holds PhD. Others constitute 9.5%. These are students out of school; some did not complete primary education. This shows that majority of the respondents in agriculture are people without degrees; SSCE/GCE/NATEP. This affects productivity, except with adequate extension services, which is absent at the moment in most parts of the study area. Agriculture is yet to be made attractive to graduates who room about the streets for white-collar jobs, including those that studied agriculture.

Table-2. Distribution of farmers according to socioeconomic status (n=400)

Educational Attainment	Frequency	Percentage
No of formal education	38	26.7
Primary Education	80	43.4
Vocational Education	20	3.3
Secondary Education	100	20
Higher Education	162	6.6
Total	400	100
Age Distribution (Years)		
25-30	20	6.6
31-36	45	15
37-42	100	33.3
43-50	160	36.7
51-60	75	8.4
Total	400	100
Gender:		
Male	260	60
Female	140	40
Total	400	100
Marital Status:		
Single	110	16.7
Married	200	50
Widow	50	26.7
Divorced	40	6.6
Total	400	100
Family Size:		
1-4	20	6.6
5-8	180	26.7
9-12	120	40
13-16	80	26.7
Total	400	100
Farming Experience(Years):		
1-4	100	33.3
5-8	120	40
9-12	150	16.7
13-16	30	10
Total	400	100

Source: Field Survey 2020.

The aging farming population dominates, and productivity is quite low. The youths are not engaged in agriculture as the aged, this is because agriculture is yet to be made attractive through adequate access to credits and markets.

Table-3. Distribution of Farmers according to Farm Size

Farm Size(ha)	Frequency	Percentage
0.25-1-00	180	26.7
1.01-1.76	120	40
1.77-2.52	50	16.7
2.53-3.28	30	10
3.29-4.05	20	6.6
Total	400	100

Mean Farm Size =1.99 hectares

Credits affect farm size, the use of inputs such as fertilizers, improved seeds, insecticides, herbicides, processing, storage and marketing. It affects the quality and quantity of inputs used.

Table-4. Computation of Allocative Efficiency

Inputs And Output Prices	Elasticity	APP	MPP	Marginal Value Product	Factor Costs	Allocative Efficiency Index
Land	0.0147	428.06	9.66	645.44	500/ha	0.46
Labor(Mandays)	0.0856	7.58	0.85	50.92	600manday	0.34
Seeds(kg)	0.0524	26	2.37	56.65	1500/kg	3.28
Fertilizer(50kg)	0.2163	10.42	0.960	80.86	300/kg	4.55
Financial Capital	0.1084	8.19	0.82	20.33	60.4%	0.18

Output price of rice was N2000/10kg during the Field Survey. The allocative efficiency index shows the resource utilization efficiency by the farmers. The results indicate that land and labor were over utilized, while improved seeds, fertilizers and financial capital were under-utilized, especially with the majority smallholders. Productivity is defined as the ratio of value of output over the value of all inputs used. Farm level data collected comprised of marginal physical quantities of inputs used in the production process, quantities of production and farm gate output prices. It is the adoption of innovation that leads to increased productivity and value-added. Farmers that access credits have the higher tendency to adopt agricultural technology innovation and value added production than farmers that do not access credits. The state of technology and agricultural entrepreneurship is seen as the prime mover of the Plateau State and Nigerian economy. Thus, technological progress and improvement come basically through innovations and inventions of agricultural inputs and outputs. Making low-interest short, medium and long-term credit resources available to the farmers without collateral is a necessary innovation for increased productivity.

Table-5. ANOVA Test showing variations in farmers without access to credits(X1) and farmers with access to credits (X2)

Group 1(X1)	Group2(X2)	X12	X22
12	15	144	225
16	12	256	144
26	18	676	324
15	10	225	100
14	6	196	36
25	14	625	196
30	11	900	121
138	86	3022	1146

Source: Field survey, 2020

The comparisons being made are two dimensional: the one with access to credits and the other without. The sources of variation as the bases for ANOVA recognize that differences exist between the two groups compared with the F-critical ratio which was used as the basis for establishing the acceptance or rejection of the following hypothesis:

H0: There is no statistically significant difference between farmers with access to credits and farmers without.

H1: There is statistically significant difference between farmers with access to credits and farmers without.

Table-6. Johansen Co-integration Test Result

Trace Test			Maximum Eigen value Test		
Null Hypothesis	Test statistic	Critical Value	Null Hypothesis	Test Statistic	Critical Value
None *	205.7583	95.75366	None *	47.02283	40.07746
At most 1 *	120.7355	69.81889	At most 1 *	35.86981	33.87651
At most 2 *	73.86566	47.85613	At most 2 *	30.15704	27.58446
At most 3 *	33.70860	29.79707	At most 3 *	19.48985	21.13153
At most 4	10.21871	15.49471	At most 4	7.950616	14.26468

At most 5	0.268108	3.841466	At most 5	0.368108	3.841455

*denotes rejection of the null hypothesis at the 0.05 significance level
Source: Result extracted from Statistical Package for Social Sciences (SPSS) 3.0

Both samples selection were drawn at random, independent and normally distributed in the population. Thus a significant F-ratio at 5% will suggest the rejection of the null hypothesis.

From table 4;
X1 =∑X1/n = 138/7 =20
X2 = ∑X2/n =86/7 =12
∑Xi =138 +86 =224
∑Xi 2 = 3022 +1146=4168
N= n1 +n2 =7+7=14
∑Xi2 total = 4168 – (224)2/14 =584= total sum of square
Between group sum of square;
∑X2 B= (138)2/7 + (86)2/7 – (224)2/14
= 3778-3587=194
Within group variation;
∑X2 W= [3022- (138)2/7] + [1146 – (86)2/7]
= 301+89=390
Also, within group sum of square is calculated as:
∑X2W = ∑X2 total - ∑X2 B =584-194=390
Between group variance estimates:
S2 B= 194/2=97
Degree of freedom =Df= k-1=2-1=1; N-k=14-2=12
Within group variance;
S2W =390/13=30
F-ratio = 97/30=3 df=1

Decision rule: Since the calculated F-statistics=3 exceeds the critical value of F (2.68) degrees of freedom, we found that the F-ratio of 2.68 or larger is required for significance at the 5% level of significance. Therefore, since the given critical value of 2.68 is less than the calculated F=3, the alternative hypothesis that there is a significant difference between the means of those group of farmers with access to credits and those group without is upheld.

Table-7. Summary of ANOVA Test Results

Source of Variation	Sum of Squares	Degree of freedom	Variance Estimates	F-Statistic	Prob	Remark
Between Group	194	1	97	3	0.05	H1 is accepted because F is significant
Within Group	390	13	30	3	0.05	"

Table-8. Analysis of the impact of credits

IMPACT	5	4	3	2	1	EVA
Impact of credit on costs of production	54%	26.8%	12.6%	9.6%	9.6%	4.06
Impact of credit on farm yield/productivity	44.8%	38%	20.5%	8.6%	8.6%	4.02
Impact of credit on farm size	38%	38%	8%	8%	8%	3.90
Impact of credit on inputs and outputs	7.6%	62.6%	7.6%	7.6%	14.4%	3.46
Impact of credit on agro-processing(value-added)	8.6%	54%	8,6%	14.4%	14.4%	3.28
Impact of credit on marketing	38%	38%	8%	8%	8%	3.90
Impact of credit on farmers' income	33%	33%	8.6%	16.8%	8.6%	3.66
Impact of credit on employment	7.8%	30%	30%	16.1%	16.1%	2.97
Impact of credit on sustainable poverty reduction	8%	15.4%	15.4%	53.2%	8%	2.42
Impact of credit on food security	7.8%	46%	7.8%	23%	15.4%	3.07
Impact of credit on the adoption of innovation	23%	44%	0.8%	16.1%	16.1%	3.42
Impact of credit on the use of capital equipment	15.4%	69%	7.8%	7.8%	-	3.99

Source: Field Survey, 2020.

5= most important reason. 1= remote reason. EVA= Evaluation of weighted mean score.

The framework for the development of micro, small and medium scale enterprises in agriculture is poor. The initiative of pro-poor financial services provision has not worked with the policy institutions in Plateau State. This is why the impact of credit evaluation seen in table 8 is low. In this connection, poverty reduction efforts have yielded very weak effects. There is also poor mobilization of savings and investment in the rural areas.

Table-9. Structure and Effectiveness of Credits

BANKS	LOAN RECOVERY	Category of Beneficiaries	Services Provided
NACRDB	Effective	Middle income segment	Double digit interest rate
Microfinance	Poor	Lower income segment	No interest rate
Commercial Banks	Effective	Middle income segment	High interest rate
Community Banks	Poor	Lower income segment	Low interest rate
Farmers' Bank	Poor	Lower income segment	Financial/investment training
NGO-MFIs	Effective	Lower income segment	Farmers' orientation

Table-10: Challenges of credit access by rural farmers

	5	4	3	2	1	EVA
High operating cost	45.2%	30.1%	12.4%	8.2%	4.1%	4.041
Poor loan recovery	52.3%	15.6%	12.8%	10.3%	9%	3.919
High interest charges	53.1%	20.5%	10.2%	10.1%	6.1%	4.044
Non-access to finance	40.4%	15.5%	20.4%	15.5%	8.2%	3.644
Difficult lending environment	30.5%	12.2%	20.1%	22%	15.2%	3.208
Training and capacity building	30.4%	40.3%	12.1%	10.2%	7%	3.769
Institutional sustainability	20.2%	18.8%	12.6%	10.3%	38.1%	2.727
Financial illiteracy	40.3%	20.5%	10.3%	18.5%	10.4%	3.618
Lack of effective targeting/monitoring	20.6%	30.4%	25.6%	12.8%	10.6%	3.376
Poverty and lack of collateral	15.3%	26.1%	30.2%	21.3%	7.1%	3.212

Source: Field Survey, 2020.

5= most important reason. 1= remote reason. EVA= Evaluation of weighted mean score.

Table-11. Major sources of credit to rural farmers

Sources	Percentages
Agricultural Credit Support Scheme (ACSS)	10
Agricultural Credit Guarantee Scheme Fund (ACGSF)	10
Agricultural Cooperatives (AC)	20
Community Bank (CB)	8
Commercial Bank	10
NACRDB	5
NGO-MFIs	5
Informal providers	32
Total	100

Source: Field Survey 2020

Table-12. Estimated Cost Recovery Rates for Sampled Institutions (Mean)

Costs(Mean Value of institutions)	Bassa	Bokkos	Mangu	Jos North
Cost of funds	6%	7%	5%	10%
Loan Loss Recovery	3%	3%	3%	20%
Operating Margin	5%	9%	5%	18%
Estimated Cost Recovery IR	13%	19%	13%	28%
Current Rate	19%	19%	19%	8%

1R= interest rate

The components of the sources of these high rates indicate that the various costs are at variance across LGAs and institutions. These costs of financial transactions make it extremely difficult for poor farmers in rural areas to access credit. The high cost-recovering interest rates also reflect institutional inefficiencies. Aggregate interest rates are between 40-50%, which is astronomically high. Meanwhile in principle, policy encourages single digit interest rate. This single digit interest rate in the blue print of the supervisory/regulatory institutions is hardly implemented. Prevailing government interest rate policies are not effective.

Table-13. Expected Rate of Returns on Selected Crop Production (2017)

Crops	Net Profit
Cabbage	113%
Carrot	80%
Maize	96%
Sugar Cane	83%
Rice	100%
Soybean	84%
Guinea Corn	63%
Potato	55%

Table-14. Inadequate Credit Facilities

Responses	Frequency	Percentage (%)
SA	126	65.0
A	68	35.0
U	0	0
D	0	0
SD	0	0

Source: Field Survey, 2020.

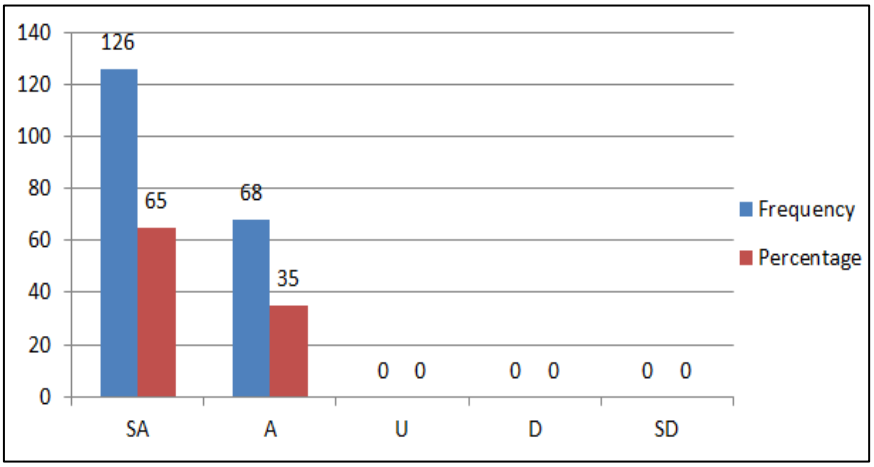

Figure-1. Inadequate Credit Facilities

Source: Field Survey, 2020.

Table 14 and figure 1 above, show that 65% (126) and 35% (68) of the respondents strongly agreed and agreed respectively that inadequate credit facilities are a major challenge facing small and medium scale enterprises in agriculture. No respondent was undecided and none disagreed or strongly disagreed to the statement. In all, 100% (194) of the respondents are of the view that inadequate credit facilities are a major challenge facing farmers and processors.

Table-15. Poor Infrastructure (Road, Water, Storage and Electricity)

Responses	Frequency	Percentage (%)
SA	93	48.0
A	98	50.5
U	3	1.5
D	0	0
SD	0	0

Source: Field Survey, 2020.

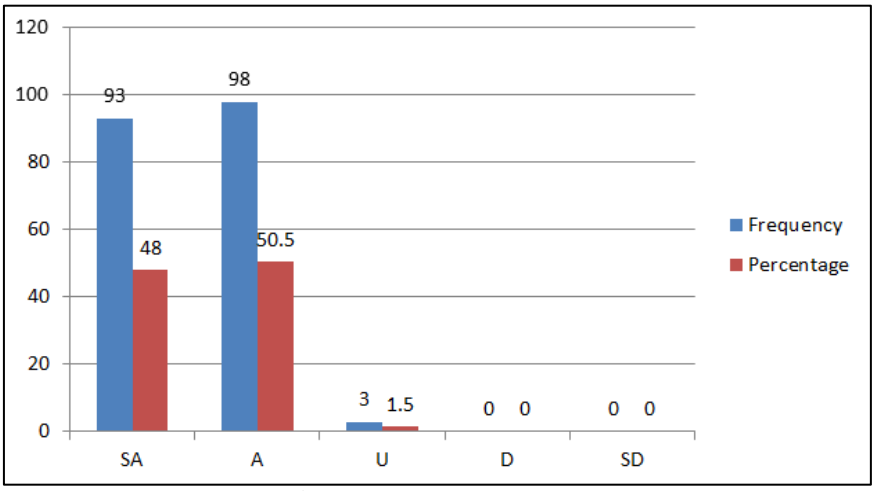

Figure-2. Poor Infrastructure (Road, Water, Storage and Electricity)

Source: Field Survey, 2020

Table 15 and figure 2 above, reveal that 48% (93) and 50.5% (98) of the respondents strongly agreed and agreed respectively that poor infrastructure negatively affects agricultural activities in Jos North. 3 (1.5%) respondents were undecided while none disagreed or strongly disagreed to the statement. Summarily, 98.5% (191) of the respondents are of the view that poor infrastructure negatively affects small scale enterprises in agriculture in the study areas.

The major sources of agricultural microfinance credits identified by this study are private (village) money lenders, the government, commercial banks and cooperatives. The last three are institutional agencies. Data show that there are a number of very profitable rural sector investment opportunities in Plateau State. However, there is financial illiteracy, lack of capital/credit, and insufficient attention to the sector. Where microfinance services are being provided, there is operational inefficiency that excludes the targeted farmers. In most of the small scale farms visited (producing mainly Irish potatoes, maize, tomatoes and other vegetables) in Jos North, Bokkos and Bassa in Plateau State, the demand for loan/credit is low due to financial illiteracy. Also the supply of loan is low due to the risk of lending to this low income segment of the population that has poor loan repayment status. Some lenders charge interest rate as high as 70% to recover unacceptably high costs of transaction. The demand for savings and investment is also low due to high poverty incidence.

In Plateau State, 85% of the farmers said they could not afford irrigated production. Only an insignificant 0.05 percent of the farmers are using irrigated production; imported Honda water pump and surface water supply. 0.025 percent of these farmers using irrigated production have additional sources of income (civil servants, traders, and pastors etc, who are into part time farming). The remaining 95 percent of farmers only rely on rain-fed production of vegetables, maize, groundnut, yam, maize and potatoes.

There is increasing effort by government and banks (institutional agencies) to make loans available to farmers to boost productivity. However, majority of the farmers, especially illiterate farmers, are still unaware of the various sources of affordable farm credits without collateral. Farmers in rural areas are left with the options of village money lenders at abnormally high interest rates, and forced sales of their harvested produce at cheap prices. Ninety percent (90%) of the farm holdings investigated were small in size(less than 2 hectares), and these small holdings were scattered and fragmented over space. Their activities are in the informal sector, and productivity is difficult to estimate, their market supply is low, unsteady, irregular and difficult to evaluate too. Innovation and marketing development are also difficult. For most of the poor, agriculture is their main occupation, is a source of livelihood and it is considered by this study as the proper channel for sustainable poverty reduction in Plateau State. The greater the development of agricultural microfinancing system in Plateau State, the more would be the involvement of middlemen and the better their welfare

4.2.1. Secondary Data Analysis

The details of the time series data used for this analysis are presented in the appendix.

4.2.2. Unit Root Test

The Augmented Dickey-Fuller (ADF) unit root test was carried out on all the variables for the enhancement of stationary series and for the avoidance of spurious parameters. The results of the test are presented in the table below.

Table-16. Unit Root Test Results

Variable	ADF statistic	Critical value (5%)	Probability	Order of Integration
LAD	-4.503205	-3.029970	0.0025	I(2)
POVR	-4.153660	-3.020686	0.0048	I(1)
TD	6.876869	3.040391	0.0000	I(2)
ACGSF	-14.41070	-3.012363	0.0000	I(1)
INTR	-4.846832	-3.029970	0.0012	I(1)

Source: Result extracted from E-views 9.0

The result in table 16 shows that LAD, POVR, TD, ACGSF and INTR are non-stationary at level. However, POVR, ACGSF and INTR became stationary at 1st difference while LAD and TD became stationary at 2nd difference. That is, they were integrated at first order and second order respectively.

4.2.3. Regression Result

The results from the ordinary least square linear Model estimation are presented below.

Table-17. Regression Result

Dependent Variable: (PVR)				
Method: Ordinary Least Squares				
Date: 07/24/2020 Time: 07:10				
Sample (adjusted): 1993 2018				
Included observations: 25 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.287593	0.606205	3.773631	0.0021
LAD	-0.292142	0.340687	-0.857509	0.4056
TD	-0.052204	0.048983	-1.065743	0.3046
ACGSF	-0.142073	0.074518	1.906552	0.0773
INTR	0.620804	0.198639	-3.125289	0.0074
ECM(-1)	-0.090147	0.062683	-1.438142	0.1724
R-squared	0.617306	Mean dependent var		0.206585

Adjusted R-squared	0.453294	S.D. dependent var	0.149044
S.E. of regression	0.110203	Akaike info criterion	-1.311792
Sum squared resid	0.170024	Schwarz criterion	-0.963618
Log likelihood	20.77382	Hannan-Quinn criter.	-1.236229
F-statistic	3.763792	Durbin-Watson stat	1.341181
Prob(F-statistic)	0.019224		

Source: Author's computation using E-views 9.0

From the estimated result shown in table 17 above, the coefficient of the constant term parameter is positive and statistically significant at 5% level. This indicates that if all the explanatory variables are held constant, PVR (proxy for poverty reduction) will be 2.287593 units. A further analysis of the result shows that all the explanatory variables have a negative relationship with the dependent variable (PVR) except the interest rate (INTR) which exhibits a positive relationship. The negative coefficient of LAD -0.292142 agrees with the a priori expectation but is statistically insignificant at 5% level of significant. A unit increase in loan and advances is consistent with 29% decrease in poverty rate and vice versa, all things being equal.

4.2.4. CUSUM Stability Test

In this section, the stability properties of the short-run dynamic model using the plots of the Cusum Sum of Recursive Residual (CUSUM) were examined. The CUSUM test is suitable for detecting systematic changes in the regression coefficients. The result is presented in the figure below.

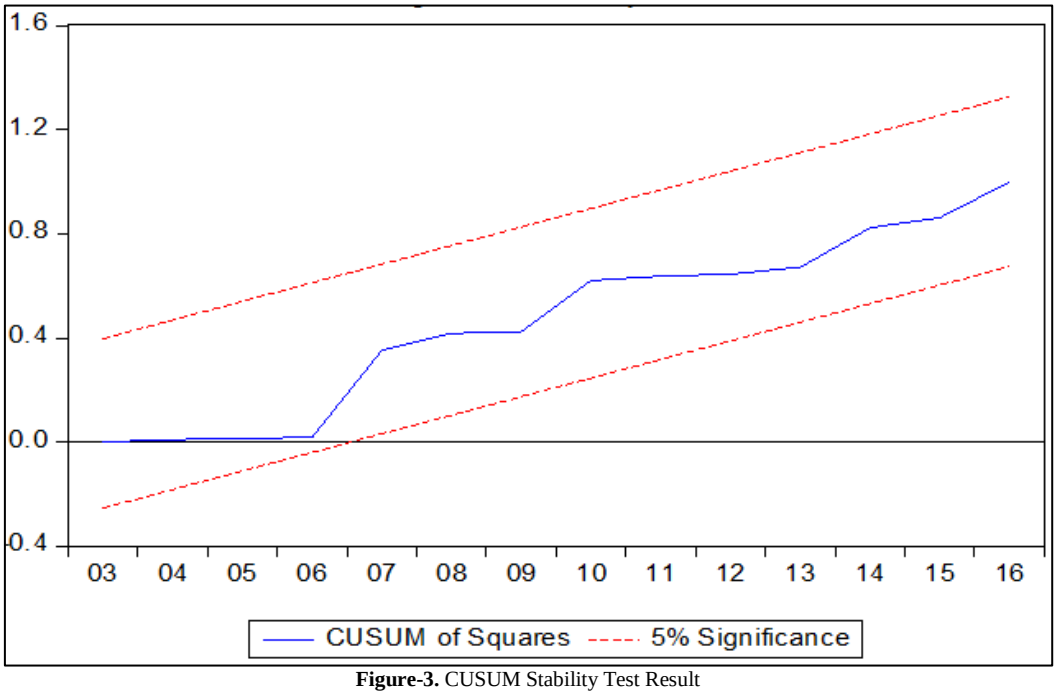

Figure-3. CUSUM Stability Test Result

Source: Author's computation using E-views 9.0

The figure above indicates that no cumulative sum went outside the area between the two critical lines. Therefore, the estimated ECM is stable and efficient in estimating the relationship between the variables under investigation. The blue line shows the behavior of poverty rate in its relationship with the explanatory variables. Poverty rate in Plateau State and Nigeria as a whole exhibits a non-stable or constant behavior; rather it has been subject to volatility at an increasing rate during the study period.

5. Recommendations and Conclusion

In Plateau State, 85% of the farmers said they could not afford irrigated production. Only an insignificant 0.05 percent of the farmers are using irrigated production; imported Honda water pump and surface water supply. All the accessories and spare parts for the irrigation machines are said to be imported from China. They are expensive, of very low quality, and require frequent replacement. This constrains the smooth running of the irrigated farms, resulting to huge losses of crops to drought and pests. There is need to check the ugly trend where Plateau State and Nigeria as a whole has become a dumping ground for sub-standard imported agricultural and industrial inputs. Policies should be implemented with emphasis on local contents and domestic manufacturing of inputs. 0.025 percent of these farmers using irrigated production have additional sources of income (civil servants, traders, and pastors etc, who are into part time farming). Another 0.025 percent are students, who are taking farming on part time.The remaining 95 percent of farmers only rely on rain-fed production of vegetables, maize, groundnut, yam, maize and potatoes.

There is increasing effort by government and microfinance banks to make loans available to farmers to boost productivity. However, majority of the farmers, especially illiterate farmers, are still unaware of the various sources

of affordable farm credits without collateral. Farmers in rural areas are left with the options of village money lenders at abnormally high interest rates, and forced sales of their harvested produce at cheap prices. Ninety percent (90%) of the farm holdings investigated were small holders (less than 2 hectares), and these small holdings were scattered and fragmented over space. Their activities are in the informal sector, and productivity is difficult to estimate, their market supply is low, unsteady, irregular and difficult to evaluate too. This difficulty also affected the evaluation of the rate and speed in poverty reduction. More or less, it is established by this study that instead of poverty reduction, rural poverty is on the increase.

This study recommends aggressive agro-processing in Plateau State in order to boost the local economy. Agro-processing in line with the natural endowments of the 17 local government areas in the state will reduce rural-urban divide, solve the problem of perishability, unemployment and over dependence on imported foods and inputs. Increased agricultural productivity and marketing will lead to increased revenue, non-oil exports, and proportionate increase in the level of consumption and real income in the economy. Plateau State must start now to make aggressive efforts to produce and export various processed agricultural products and minerals which are her natural endowments. Adoption of new technologies is needed to improve processing, handling and packaging of commodities throughout the various phases of marketing. A country like China for instance, produces packages and markets almost everything including Chinese tea. One imagines what stops Nigeria from adding value, packaging and marketing dry bitter leaf and Ugwu vegetables as Nigeria's tea to international market? After all, the rich medicinal contents of these vegetables have been confirmed.

Productivity has been constrained by lack of credit and market access. The rural socioeconomic status is quite backward, crippled by poverty, financial illiteracy, and low productivity. Access to microfinance can be improved through promotion of savings culture, with emphasis on quality and monitoring of group formation. Small but gradual savings will reduce vulnerability by providing some amount of own capital through rotating savings schemes. There is a need to assist the poor by providing loanable funds, and creating access to financial services. The peasant farmers in rural areas need sustainable financial services to boost productivity and increase market access. Access in terms of availability, lowering transaction costs, widening and deepening rural penetration is crucial. This study also recommends precision agriculture for development that uses capital, technology, data science and behavioural economics to provide targeted information to farmers across the 17 local government areas in Plateau State and Nigeria. Providing credits, the right information to the right people, in the right way and at the right time, increases productivity, raises incomes, reduces poverty, protects the environment and improves well-being.

In conclusion, agricultural microfinance is yet to have significant impact on productivity and poverty reduction amongst rural farmers in Plateau State. Majority of the rural farmers (88%) from the findings are unskilled, and have no access to capital (finance and machineries) which is a major constraint to productivity and rapid poverty reduction

The role of microfinance is expected to be making micro-credits available to the poor, to fill the gap created by traditional commercial banks, and the primary objective is that of poverty reduction, youths and women empowerment at the grassroots. However, rigorous quantitative evidence of the nature, magnitude and balance of microfinance impact is still lacking in our study area. We expected that microfinance is much better for the poor than any other form of finance, such as the high risk-informal money lenders or profit-oriented commercial banks. However, their approach to financial services (loan products) has not widely covered the very poor as the target group. The microfinance institutions need to put more focus on educating their potential borrowers on savings, remittances, modern agriculture and financial literacy. Both formal and informal credit market institutions should play complementary role of financial intermediation for agricultural productivity and poverty reduction in Plateau State.

Limitation and Study Forward

This study is limited by scope and dearth of accurate secondary data. Only available materials at the researchers' disposal on the subject matter were accessed with difficulties. There is also very scanty quantitative data on the explanatory variable as it relates to activities of non-financial operation of MFBs in Nigeria. Furthermore, other possible limitation to the research of this magnitude is the scope; the trending area of value chain development is not included. The coverage did not assess the entire 17 local government areas of Plateau state, but due diligence was applied to select a representative sample.

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Appendix

Table-15. Poverty Rate (%), Agricultural Credit Guarantee Scheme Fund (N), Total Deposit (N), Loan and Advances (N), Interest rate (%)

Year	PVR	LAD	INR	TD	ACGSF
1993	49	654.5	36.09	2188.2	8,814.7
1994	54	1220.6	21	3216.7	13,066.1
1995	60	1129.8	20.79	2834.6	26,858.1
1996	65.6	1400.2	20.86	2876.3	51,322.4
1997	69.2	1618.8	23.32	3181.9	53,008.6
1998	80	2526.8	21.34	4454.2	53,199.2
1999	70	2958.3	27.19	4140.3	50,877.5
2000	60	3666.6	21.55	7689.4	42,477.6
2001	60	1314	21.34	3294	172,005.5

2002	62.2	4310.9	30.19	9699.2	323,892.7
2003	54.4	9954.8	22.88	18075	393,906.2
2004	54.4	11535.8	20.82	21407.9	631,034.0
2005	70.8	28504.8	19.49	47523.7	724,760.8
2006	69.5	16450.2	18.7	34017.7	1,069,287.7
2007	70	22850.2	18.36	41217.7	1,108,258.7
2008	72.1	42753.1	18.7	61568.1	1,044,512.9
2009	69	58215.7	22.62	76662	983,539.9
2010	69	52867.5	22.51	75739.6	1,109,746.2
2011	71.5	50928.3	22.42	59375.9	1,275,908.3
2012	69.3	90422.2	23.79	98789.9	878,217.4
2013	67	94055.6	24.69	121787.6	1,463,293.4
2014	69	112110.1	25.74	110688.4	1,593,036.0
2015	64.7	187247.3	26.71	159453.5	1,638,503
2016	64.7	196195	26.71	149798.4	1,739,731.9
2017	68	184784	28.66	164353.2	1,846,652.4
2018	70.5	195227	28.57	178641.6	2,005,8736

Sources: Central Bank of Nigeria (CBN) Statistical Bulletin, Various Issues; National Bureau of Statistics (NBS).2008-2018

Table 15 shows the trend of Poverty Rate, Agricultural Credit Gurantee Scheme Fund, Loan and Advances and Total Deposit from 1993-2018. This represents the annual time series values of the variables for the period of twenty four years. A look at the values of the variables used in the study revealed various degrees of trending and fluctuations. The values of Total Deposit (TD), Loan and Advances (LAD) exhibited similar characteristics.