

ANALYSIS OF TECHNICAL EFFICIENCY OF SELECTED AGRICULTURAL LENDING SCHEMES IN RIVERS STATE, NIGERIA: AN APPLICATION OF STOCHASTIC FRONTIER APPROACH

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Abstract

The study analysed the technical efficiency of selected agricultural lending schemes in Rivers State, using stochastic frontier approach. The research questions were; are the agricultural lending schemes in Rivers State technically efficient? What are the factors that determine technical efficiency of the lending schemes? The study revealed that most of the loan beneficiaries of the lending schemes are males and that the Rivers State microfinance agency financed the highest number of beneficiaries in the study area within the years 2013 -2017. The study also revealed that majority of loan beneficiaries are educated, married and have large household size. The study further shows that majority of loan beneficiaries are small scale operators. Further findings show that all loan beneficiaries of the lending schemes were aware of the loan conditions before taking the loans and that the loan conditions are not stringent which implies that the lending schemes are accessible, On affordability, Commercial Agriculture Credit Scheme (CACS), Rivers State Micro-finance Agency (RIMA) and Rivers State micro finance bank (MFB) are the most affordable lending schemes. The study findings further revealed that funds are available to be disbursed by the selected lending schemes to loan beneficiaries who complete their loan application process and are successful. An examination of technical efficiency of the selected agricultural lending schemes shows that the schemes are operating below the stochastic frontier potential output or best practice frontier potential or full efficiency. The study also revealed that River State Microfinance agency is the most technically efficient scheme. The key determinants of technical efficiency are number of employees, operating expenses, Assets, Age, Financial sustainability, Borrower per staff and loan intensity.

Keywords: Technical efficiency, lending scheme, stochastic frontier analysis, Rivers State

1. Introduction

Nigeria's agriculture is facing many challenges like climate change (temperature fluctuations, water shortages, rainfall variations, flooding, etc.), natural resource

distortions, rising prices of inputs including seeds, fertilizers, pesticides, electricity and rising cost of fuel. The farmers, particularly the small-holder farmers are facing problems in adoption of new technologies because of financial shortages. Akpokodje and Olomola (2000) asserted that farmers like other rational producers need credit. Therefore, in order to improve agricultural productivity and income farmers should be supported to expand their scale of production through financial resources. They also explained that agricultural mechanization and the acquisition of agricultural inputs are also credit dependent. Agricultural credit is an important tool to improve the performance of farmers as it helps in getting inputs in time, to innovate and removes the financial constraints of the small-holder farmers thereby increasing the productivity of the farmers particularly small-holder ones. Several studies had shown a strong positive relationship between agricultural growth and access to credit, examples are Tasia and Ajie (2013) and Oyodele and Akintola (2012). Credit allows the Small-holder farmers to satisfy their cash needs, increase the size of their farms, increase productivity and income, facilitate adoption of innovation, become climate-smart, be green alternative compliant, encourage capital formation, improve marketing efficiency and smoothen farm family consumption expenses throughout the year (Olawuyi, *et al* (2010) and Lekhi and Singh (2011). Agricultural credits are however, important means for improving farm capital investment and adoption of technology in Nigeria without which there may be no progress in the agricultural sector to adequately fulfil its expected roles (Ayeomoni and Aladejana (2016).

Agricultural development is a process that involves adoption by farmers of new and better practices (Orebiyi, 2000). This is due to the fact that most of the recent practices or innovations have to be purchased but a few farmers have the financial resources to finance it. It was in recognition of this fact that the Federal Government of Nigeria at various times put in place credit policies and established lending schemes that could facilitate the flow of agricultural credit to farmers (Obasi, 2015). Despite the general

acceptance of the importance of credit, lending schemes for agriculture unfortunately had failed at various times and places to yield the expected results, perhaps due high interest rate, loan defaults, inadequate fund supply, corruption on the part of officials of lending institutions, etc.

Lending schemes are frameworks or systems or arrangements to facilitate the extension of credit to target groups (particularly small-scale farmers). Lending is done by both formal (institutional) and informal (non-institutional) organizations. This research work is focused on formal (institutional) lending organisations. Lending is an essential function of deposit taking banks or financial institutions. Through lending, institutions strive to satisfy the legitimate credit needs of the community that the institution serves. Lending is also done by specialized agencies and institutions established by the government and the ones owned privately.

Agricultural lending schemes emerged as an alternative financing source and a powerful instrument for poverty reduction among relatively poor people through the provision of broad range of financial services such as loan, deposits, payment services, money transfer and insurance services (Kipesha, 2012 and ADB, 2000). Major objective of agricultural lending scheme is to help poor farmers who are financially weak and vulnerable, with financial services to enable them to engage in productive activities or improve on their agricultural production (CGAP, 2009). With a primary purpose of social mission through outreach to the farmers, agricultural lending schemes were originally financed by grants, low-interest loans and donor subsidies (Zeller and Mayer, 2002) and offered financial services at low cost to ensure that the poor could access the services (Kipesha, 2012). This resulted into high dependence on subsidies and grants from the donors, governments and other development agents (Armendariz and Morduch, 2005).

In Nigeria, agricultural lending schemes emerged as a result of financial sector reforms, which started in the 60's with the provision of about six million naira (N6m) in the 1962 – 1968 Development plan aimed at developing sustainable, efficient and effective agricultural lending to farmers and non-farm rural enterprises (FMED, 1981). The agricultural lending schemes and institutions help to boost deposit mobilization, and encourage savings culture among rural dwellers who engaged in farming and non-farming enterprises. Among the major roles of agricultural lending schemes are to foster the provision of financial services to the people who could not be reached by the commercial and public banks lending programmes. As a result of this, agricultural lending schemes are established aimed at establishing the basis for efficient and effective credit delivery that will serve the low-income segment of the society and thereby contributing to economic growth and reduction of poverty (Kavura, 1992). Different types of agricultural lending schemes exist. These are Agricultural Development Trust Fund Credit, Agricultural Credit Guarantee Scheme Fund (ACGSF), Agricultural Produce Finance, Multi –channels Agricultural Financing Scheme, Commercial Agriculture Credit Scheme (CACs), Agricultural Credit Support Scheme (ACSS), Nigerian Incentive-Based Risk Sharing System for Agricultural Lending (NIRSAL), Anchor Borrowers Programme, Youth Entrepreneurship Loan Scheme, International Fund for Agricultural Development (IFAD) Credit Scheme, Niger Delta Development Commission (NDDC) Credit and Entrepreneurial Scheme, Bank of Agriculture Credit Scheme, Micro-finance Institutions Agricultural Scheme, etc., but the researcher is interested in five (5) of them. These are Commercial Agriculture Credit Scheme (CACs), Niger Delta Development Commission (NDDC) Credit and Entrepreneurial Scheme, Rivers State Micro-finance Agency Credit Scheme, Bank of Agriculture Loan Scheme and Rivers State Micro-finance Bank Credit Scheme. These agricultural lending schemes are involved in extending credit to agriculturists and farmers for the

purpose of farming and other agricultural activities.

For Commercial Agriculture Credit Scheme (CACS), according to (Agbola, 2014) and (CBN, 2017) the objectives are: to fast track development of the agricultural sector of the Nigerian economy by providing credit facilities to commercial agricultural enterprises at a single digit interest rate; enhance national food security by increasing food supply and effecting lower agricultural produce and product prices, thereby promoting low food inflation; reduce the cost of credit in agricultural production to enable farmers exploit the potentials of the sector; and increase output, generate employment, diversify the revenue base, increase foreign exchange earnings and provide input for the industrial sector on a sustainable basis. For Bank of Agriculture, Agbola (2014) and BOA (2017) said the key mandates are: Provision of credit to support all activities in the Agricultural Value Chain; provision of non-agricultural micro credit to the poor segment of the society comprising rural artisans, petty traders etc.; capacity development for the promotion of co-operatives and agricultural information systems; provision of technical support and extension services, boosting of opportunities for self-employment in the rural areas to stem rural-urban migration; Inculcation of banking habits at the grass-roots of Nigerian society. For NDDC credit and entrepreneurial scheme, the objectives are; extension of credit to support youths in all activities in the agricultural value chain; provision of entrepreneurial and vocational training and extension services; boosting agricultural opportunities for self-employment in the rural areas to stem rural-urban migration and to curb youth restiveness. As part of their responsibility to compliment government effort in poverty eradication, empowerment programmes and employment generation and to improve outreach, Rivers State micro-finance agency credit scheme reach out to the active poor, the under banked, small scale business owners and entrepreneurs etc in the provision of financial services, credit facilities, capacity building and other support services.

These lending schemes, in fulfilling their objectives, need to be technically efficient. This means that, they should allocate their resources efficiently so that resources such as labour, capital and other resources should be allocated in a way that maximises social and financial objectives. One major factor which has given serious concern to developing countries and indeed all economies is how to improve the technical efficiency of economic units. This had led to the adoption of various economic systems and policies. Therefore, agricultural lending schemes efficiency analysis is an important tool for government, regulatory agencies, management and agricultural investors. This study analyzed the technical efficiency and outreach of selected Agricultural Lending Schemes in Rivers State during the period of 2010-2015.

The Nigerian financial system consists of financial intermediaries with varying degrees of supervision and regulation by government agencies. This spectrum consists of entities ranging from those subject to very close supervision and regulation such as deposit taking banks to non – bank financial institutions and the professional money lenders who are totally unregulated and unsupervised. There are also entities that are not under the regulation of the Central Bank but registered with other government agencies. These include state owned credit schemes and non-government organizations engaged in lending.

Orebiyi (2000) opined that despite the wide expansion of the formal financial institutions in Nigeria, a high percentage of the population is still outside the coverage of their operations. He further said that most farmers still depend on informal credit sources for their credit requirement at exorbitant terms and conditions. Insufficiency of commercial banking system in providing credit to small-scale farmers and the exploitative terms and conditions of informal credit market paved the way for emergence of agricultural lending schemes in Nigeria. Lending to small- scale

farmers poses a special challenge due to the small size of loans, the frequency of repayment and the short maturity. In fact, high transaction costs of loans are frequently cited by financial institutions as one of their main reasons for not entering the market (Porcelli, 2009; Chua and Llanto, 1996; Owusu – Ansah, 2014).

Many agricultural lending schemes are offering financial services in Nigeria, especially Rivers State, but it is generally believed that only a few are performing well. This notion is supported by Obasi (2015) who opined that the only efficient lending schemes are Commercial Agriculture Credit Scheme (CACS) and Agricultural Credit Guarantee Scheme Fund (ACGSF) in terms of outreach and resource use efficiency of the farmer-borrowers of those schemes. Examining how efficient the lending schemes in Rivers State are has become more compelling bearing in mind the increasing number of the lending schemes. Knowing the operational procedures of these lending schemes is also very important and how they affect their efficiency and outreach. It is also imperative to know the socio-economic characteristics of the farmers' borrowers from the selected lending schemes and the factors that determine technical efficiency in the lending schemes. As a result of the implications of lending schemes' inefficiency, the regulatory authorities, the lending schemes operators and researchers are interested in assessing the differences in operational efficiencies.

Efficient functioning of these agricultural lending schemes is critical for long run sustainability. Sustainability implies that the institutions generate enough income to at least repay the opportunity cost of all inputs and assets. Olasupo and Afolami (2013), and Rhyme and Otero (1994) who worked on technical efficiency of micro-finance banks argue that future outreach critically depend on achieving financial sustainability of the lending schemes. Outreach accounts for the number of clients serviced and the quality of the products provided. Outreach is a function of the products and services offered by the lending schemes to their clients or farmers (Olasupo and Afolami, 2013).

Outreach also means accessibility, affordability and availability i.e. the lending scheme must be easily accessed by farmers', loans can be obtained under the scheme with minimal cost, and funds readily available under the scheme.

A firm's performance is judged using the concept of economic efficiency. Economic efficiency of any firm (agricultural lending scheme) has two components namely technical efficiency and allocative efficiency (Farrel, 1957). Technical efficiency refers to the ability and willingness of any firm to maximize output with a given set of inputs while allocative efficiency refers to the ability and willingness of a firm to use inputs optimally given the input prices (Farrel, 1957). Measurement of these components is useful in the following ways: They facilitate comparisons (relative efficiency) across similar economic units; if measurement reveals variations in efficiencies among firms further analysis can be undertaken to identify the factors responsible for the variations; identification of such factors is valuable for policy formulation for improvement of efficiencies.

In view of the above discussion, this research work intends to answer the following questions; Are the agricultural lending schemes in Rivers State technically efficient? What are the factors that determine technical efficiency of the lending schemes?

Methodology

The study was conducted in Rivers State. The State is made up of 23 Local Government Areas. Rivers State is bounded on the South by the Atlantic Ocean, to the North by Imo and Abia states, to the East by Akwa Ibom state and to the West by Bayelsa and Delta states. The inland part of the state consists of tropical rainforests and towards the coast the typical Niger Delta environment featuring many mangrove swamps (RSADP, 2014). Agriculture is the major occupation of the people of Rivers State.

A lot of financial institutions and agricultural lending institutions and schemes operate in Rivers State. These lending schemes range from Federal and State Government Agricultural Lending Schemes to Commercial and Micro-finance Banks Agricultural Lending Schemes and private and non – institutional lending schemes. Some of these schemes are: Agricultural Development Trust Fund Credit, Agricultural Credit Guarantee Scheme Fund (ACGSF), Agricultural Produce Finance, Multi- channels Agricultural Financing Scheme, Commercial Agricultural Credit Scheme (CACs), Agricultural Credit Support Scheme (ACSS), Micro-finance Institutions Agricultural Lending Scheme, Bank of Agriculture (BOA) Loan Scheme, Commercial Banks' Agricultural Lending Schemes, Rivers State Micro–finance Agency Agricultural Lending Scheme, Non–governmental Organisation Lending Scheme, Nigerian Incentive based Risk Sharing system for Agricultural Lending (NIRSAL), International Fund for Agricultural Development (IFAD) Credit Scheme, NDDC Credit and Entrepreneurial Scheme, Commercial Banks Agricultural lending Schemes, Etc.

A multistage sampling technique was used. In stage one; all formal lending schemes which extend credit to farmers were identified. The list of these lending schemes forms the sampling frame.

In stage two, five (5) agricultural lending schemes were selected purposely from the list of lending schemes. The study units shall be all the selected agricultural lending schemes operating in Rivers State. These lending schemes range from Federal and State Government Agricultural Lending Schemes to Commercial and Micro-finance Banks Agricultural Lending Schemes. A list of these agricultural lending schemes shall be gotten from Central Bank of Nigeria, the Federal and State Ministries of Agriculture and Rural Development and the Agricultural Development programme (ADP).

The researcher purposely selected five (5) of them because they were willing to divulge information about their operations and credit delivery activities, unlike

other institutions that are not willing to do so. These are Commercial Agriculture Credit Scheme (CACCS), Niger Delta Development Commission (NDDC) Credit and Entrepreneurial Scheme, Rivers State Micro-finance Agency Credit Scheme, Bank of Agriculture (BOA) Loan Scheme and Rivers State Micro-finance Bank Credit Scheme. Data sought were number of employees, operating expenses, assets, ownership, and age of institution, financial sustainability, loan intensity, and borrower per staff ratio.

The study used primary and secondary data. Primary data were generated through questionnaire administered to officials of the selected lending schemes. Secondary data were based on annual data covering the period from 2013 - 2017 for all the agricultural lending schemes chosen for this study in Rivers State, Nigeria. The data were extracted from the financial statements and annual reports of Central Bank, commercial banks, and all the lending schemes that were considered.

Data that were collected were analyzed using descriptive statistics (Tables, Mean etc.) and econometric techniques (parametric method - Stochastic Frontier Approach) and the parameters of the stochastic frontier function were accomplished by Maximum Likelihood Estimation (MLE) which has been used extensively by various authors in estimating technical efficiency of financial institutions and credit schemes and unions (Oteng-Abayie (2016), Owusu-Ansah (2014), Oteng-Abayie, Amanor and Magnus, (2011)).

The general version of the stochastic frontier function can be written as follows:

$$y_i = f(x_i; \beta) + \varepsilon_i \quad I = 1, 2, \dots, N \quad \dots \dots \dots (\text{eq. 1})$$

The error term ε_i is composed of two parts

$$\varepsilon_i = (v_i - \mu_i)$$

The model can be written explicitly as

$$y_i = f(x_i; \beta) \exp(v_i) \exp(-u_i) \quad I = 1, 2, \dots, N \quad \dots \dots \dots (\text{eq. 2})$$

Where:

- x_i is the input vector of i th lending scheme;
- y_i is the single output of the i th lending scheme
- $f(x_i; \beta)$ is the deterministic component of the functional form, where β is a vector of unknown parameters;
- $\exp(v_i)$ is the stochastic component of the functional form which accounts for the statistical noise in the intermediation process, and therefore we assume that it has a symmetric distribution with zero mean;
- finally the possibility of inefficiency is captured by the second error component u_i that is assumed to be distributed independently of v_i in such a way as to satisfy the restriction $u_i > 0$.

Index of Technical Efficiency: The technical efficiency of an individual agricultural lending scheme is defined in terms of the ratio of the observed output to the corresponding frontier output, given the available technology. Battese and Coelli (1995) showed that the best predictor of technical efficiency, $\exp(-\mu_i)$, that is, efficiency score is calculated using the equation below:

$$TE = Y_i^*/Y_i \quad \dots\dots\dots \text{(Equation 3a)}$$

TE = Technical Efficiency

Y_i^* = Frontier potential output

Y_i = Observed output

$$TE = f(X_i\beta) \exp(V_i - U_i) / f(X_i\beta) \exp(V_i) \quad \dots\dots\dots \text{(Equation 3b)}$$

$$TE = \exp(-U_i) \quad \dots\dots\dots \text{(Equation 3c)}$$

The efficiency score is the stochastic frontier potential output. A value of 1.0 indicates that a firm lies on the best practice frontier or full efficiency. A value of less than 1.0 indicates operations below the frontier or inefficient utilization of resources. The stochastic frontier function allows for the simultaneous estimation of technical efficiency of the agricultural lending schemes as well as determinants of technical efficiency and inefficiency using the maximum likelihood estimation (Battese and Coelli, 1995).

Model Specification

$$\ln(\text{GLP}_{it}) = \beta_0 + \beta_1 \ln \text{Employees}_{it} + \beta_2 \ln \text{Operating expenses}_{it} + v_{it} - u_{it}$$

GLP_{it} represents log of the total gross loan portfolio of i th lending scheme at time t , β_0 stands for constant term, Employees_{it} represents log of the total number of staff members of i th lending scheme at time t . $\text{Operating expenses}_{it}$ is log of the total operating expenses/administrative expenses. Other parameters to be estimated are v_{it} which is the random disturbance term and u_{it} is the inefficiency term.

Technical inefficiency effect model is

$$U_{it} = \alpha_0 + \alpha_1 \text{Assets}_{it} + \alpha_2 \text{Ownership}_{it} + \alpha_3 \text{Age}_{it} + \alpha_4 \text{OSS}_{it} + \alpha_5 \text{Bps}_{it} + \alpha_6 \text{LI}_{it} + \varepsilon_{it}$$

U_{it} represents level of inefficiency, α_0 means constant term, Assets_{it} represents total of all net asset account of the i -th lending scheme at time t . measured in naira. In financial institutions asset is usually taken as proxy for size. Larger size could result in scale efficiency and is expected to have positive effect on efficiency. Ownership_{it} is a dummy variable reflecting 1 if lending scheme is government affiliated, 0 otherwise. Age_{it} is age of the i -th lending scheme at time t , measured in number of years and shows the experience of the lending scheme. Mature and experienced institutions are expected to be more efficient than the young or new institutions. OSS_{it} measures finance sustainability and is achieved when the operating income of a lending scheme is sufficient enough to cover all operational costs, that is, the net interest income. The OSS is expected to have positive impact on efficiency as most efficient lending schemes generate higher returns and thereby sustainable. Bps means borrowers per staff measured as number of borrowers divided by number of employees and is expected to be positive. LI is the loan intensity measured as total volume of loans divided by total assets and is expected to be positive.

Results and Discussion

Analysis of the technical efficiency of agricultural lending schemes in Rivers State from 2013 to 2017

Table 1 Mean Technical efficiency of lending schemes 2013-2017

Lending Scheme	2013	2014	2015	2016	2017	Mean
CAC	0.851	0.860	0.875	0.887	0.896	0.874
NDDC CES	0.884	0.896	0.902	0.917	0.920	0.904
BOA	0.862	0.886	0.914	0.925	0.930	0.903
RIMA	0.921	0.936	0.945	0.960	0.967	0.946
R/S MFB	NA	NA	0.919	0.929	0.934	0.927

Note: NA denotes data not available Source: Field survey data, 2018

Table 1 shows the mean efficiency of the selected agricultural lending scheme in Rivers State. By comparison, the table shows that the Rivers State Microfinance Agency (RIMA) is the leading lending scheme in terms of efficiency performance with 94.6 percent, outperforming the other lending schemes. The Rivers State microfinance bank is ranked second with 92.7 percent, ranked third is NDDC CES with 90.4 percent, with BOA and CAC ranked 4th and 5th with 90.3 percent and 87.4 percent respectively. The table shows the lending schemes were operating below the best practice frontier or full efficiency, as a result of inefficient utilization of resources. This result is in agreement with Omankhanlen (2016) who worked on Nigerian banks' efficiency performance: A post 2004 banking reform evaluation. The period studied was 2005 – 2009. In his findings, he discovered that Nigerian Banks and financial institutions operated below full efficiency.

Technical efficiency of selected agricultural lending schemes.

Table 2 Summary of technical efficiency of selected lending schemes using stochastic frontier approach

	2013	2014	2015	2016	2017	Mean
Mean	0.880	0.895	0.911	0.924	0.929	0.908
Median	0.892	0.915	0.913	0.937	0.946	0.924
Maximum	0.921	0.936	0.945	0.960	0.967	0.946
Minimum	0.851	0.860	0.875	0.887	0.896	0.874
Std. Dev.	0.027	0.027	0.028	0.023	0.0230	0.026
Skewness	0.121	0.121	0.105	0.870	0.595	0.322
No. of LS	4	4	5	5	5	23

Source: Estimates from field survey, 2018. LS – Lending Schemes

Table 2 shows the mean technical efficiency score of selected agricultural lending schemes in Rivers State over the years 2013 to 2017. The mean efficiency of the selected lending scheme ranges from 88% to 92.9% and increased over the years, with an overall efficiency score of 90.8%. This implies that the selected lending schemes have wasted collectively 9.2% of their inputs. The table 2 reveals the presence of technical inefficiency (input wastage) among the agricultural lending schemes in Rivers State. This finding is in consonance with Obasi (2015) and Omankhanlen (2016), who in their separate studies discovered technical inefficiencies in lending schemes and financial institutions in Nigeria.

Maximum Likelihood Estimate of the Production Function

Table 3 Maximum likelihood estimate of the production function

Variable	Parameter	Coefficient	Std. error	T- ratio
Constant	β_0	0.586	0.169	3.467
No. of employees	β_1	0.762	0.153	4.980*
Operating expenses	β_2	0.495	0.132	3.750*
Technical inefficiency				
Constant	α_0	0.216	0.344	0.628
Assets	α_1	-0.784	0.205	-3.824*
Ownership	α_2	-0.162	0.168	-0.964
Age	α_3	0.647	0.195	3.318*
Financial Sustainability	α_4	-0.658	0.129	-5.101*
Borrower per staff	α_5	-0.416	0.121	-3.440*
Loan intensity	α_6	0.378	0.114	3.316*

Test statistics				
Sigma squared	α_2	1.204	0.358	3.363*
Gamma		0.752	0.165	4.56
Log likelihood		-21.583		
LR test		3.267		

Where * Significant at 1%

Source: Field Survey, 2018

The table 3 shows the maximum likelihood estimates for parameters of the stochastic frontier model. The result of the maximum likelihood estimates of the stochastic frontier indicates that the parameters are positive and significant at 1%. The input elasticity of number of employees (β_1) and operating expenses (β_2) indicate increasing returns to scale, because the sum of the estimated input coefficients from the stochastic frontier function is greater than one (1.257). This increasing return to scale is in conformity with the findings of Oteng-Abayie, Owusu-Ansah, Amanor (2016) and Esho (2001), which in their different studies discovered increase in the sum of elasticity of lending and credit institutions.

The elasticity of the number of employees as shown in Table 4 indicates that a one per cent increase in the labour input brings about a 0.762% increase in the output of a lending scheme. This positive contribution of labour shows its importance in the financial service delivery of lending schemes in particular and financial institutions in general. The operating expenses have a significant value of 0.495, which is also an indication of its importance as an input in the financial service delivery of lending schemes. The value of gamma (0.752) indicates a significant variation in technical inefficiencies. The value of gamma implies that a 75.2% total variation in the level of total output is as a result of the presence of inefficiency.

Further analysis of Table 3 shows that Assets, Age, financial sustainability, Borrower per staff and loan intensity are significant contributors of technical inefficiency. The result on Table 4 also shows that all explanatory variables conform to a prior expectation. The variables are important factors influencing technical efficiency of agricultural lending schemes. Assets usually taken as proxy for size could result in

scale efficiency or economics of scale. The positive sign of the coefficient of asset suggest that large lending schemes are more efficient than small ones.

Age is positive and significant showing that mature and experiences lending efficient that the younger ones.

Financial sustainability is significant and negative in the technical inefficiency model, which indicates that it has positive impact on technical efficiency. When the operating income of the lending scheme is sufficient enough to cover all operational costs, that is, the net interest income, the lending scheme is said to be efficient and sustainable, thereby generating higher returns. Borrower per staff have the expected sign and statistically significant also loan intensity is statistically significant and positively related to technical efficiency, service loans are the main source of profits to the lending scheme.

Conclusion and Recommendation

The study had empirically revealed the efficiency scores of selected agricultural lending schemes in Rivers State. It is a known fact that there is inefficiency in the agricultural lending schemes in the use of resource inputs as shown by the study. It is also an established fact that the Rivers State microfinance agency is more efficient that the other selected agricultural lending schemes according to the study. The study showed that Assets, Age, financial sustainability, borrower per staff and loan intensity are significant contributors of technical inefficiency in agricultural lending schemes. Since there was increasing returns on technical efficiency, with efficient use of inputs or input relocation, the lending schemes can achieve full efficiency. It is therefore, recommended that; the agricultural lending schemes should adopt elaborate and systematic plan of action that will improve employees' productivity. Well motivated and equipped staff is a positive factor in improving the efficiency of an organization. Lending schemes must invest resources and adequate time into staff training and retraining. The inefficiency experienced in the agricultural lending schemes should be seriously addressed by the management and input factors should be re-organized.

References

- Agbola, A. I. (2014). *Agricultural Finance: A practical guide for lenders and entrepreneurs*. Published by the Chartered Institute of Bankers of Nigeria Press Limited.
- Akpokodje, G. and Olomola, A.S (2000). *Summary and Policy Implication of Crop Production and Output Value in Nigeria*. NISER annual survey of crop production in Nigeria. Pp. 41-51.
- Armendariz and Morduch (2005). *The Economics Of Microfinance*, UK: Cambridge, MA, MIT Press.
- Asian Development Bank (2000). *Finance for the Poor: Microfinance Development Strategy*. Asian Development Bank.
- Ayeomoni, I.O. and Aladejana, S.A. (2016). Agricultural Credit and Economic Growth Nexus: Evidence from Nigeria: *International Journal of Academic Research in Accounting, Finance and Management Sciences*. 6(2):146 – 158.
- Battese, G.E. and Coelli T.J. (1995). A model for technical inefficiency effects in a stochastic frontier production function for panel data, *Empirical Economics*, (20):325-332.
- Central Bank of Nigeria (2017). *Development Financing*. Accessed online at www.cbn.gov.ng/devfin/asp on 12/11/2017.
- Chua R.T. and G.M. Llanto (1996). *Assessing the Efficiency and Outreach of Micro – Finance Schemes*. Working paper No. 15. Enterprise and Cooperative Development Department. Poverty – oriented Banking. International Labour Office, Geneva. Pp 1 – 80.
- Consultative Group to Assist the Poor (CGAP) (2009). *Efficiency Drivers of Microfinance Institutions: The Role of Age*, Consultative Group to assist the poor (CGAP) Brief.
- Farrell, M. J. (1957). The measurement of productive efficiency. *Journal of the Royal Statistical Society*, 120(3):253–281.
- Federal Ministry of Economic Development (FMED) (1981). *Third National Development plan 1975-1980, Vol. I*. Central Planning Office, Lagos.
- Jema, H. (2008). *Economic efficiency and marketing performance of vegetable production in eastern and central parts of Ethiopia*. Ph.D. Thesis,

-
- Department of Economics, Swedish University of Agricultural Science, pp: 1-178.
- Kavura, R. (1992). The Marketing of Financial Services in Tanzania: The Challenge of the 1990s. *The African Journal of Finance and Management*, 1 : 28- 55.
- Kipasha, E. (2012). Global Financial Crisis: Impact on Bank's Financial Intermediation Role, Evidence from Commercial Banks in Tanzania. *The Accountant Journal*, 26, 22-34.
- Kropp E. and Schmidt (1987). *Linking Self-help Groups and Banks in Developing Countries, Asian and Pacific regional Agricultural Credit Association*, Bangkok, Thailand, pp 31-33.
- Lekhi R. K. and J. Singh (2011). Agricultural Finance. In Agricultural Economics, an Indian perspective. a textbook on Agricultural Economics. Kalyani publishers. Pp. 248 – 260.
- Obasi, P.C. (2015). Efficiency of agricultural lending schemes in Nigeria. *European Journal of Agriculture and Forestry Research*.
- Olasupo, M. A., C. A. Afolami, A. M. Shittu (2014). *Outreach and financial sustainability of microfinance banks in Southwest, Nigeria. International Journal of Economics and Finance*.6(2):25 – 39.
- Olasupo, M.A. and Afolami, C.A. (2013). Technical efficiency of microfinance banks in South-west, Nigeria. Input and output oriented measures. *Net Journal of Business and Management*.1(1): 7 - 13.
- Olawuyi S. O, F. Olapade Ogunwole, Y. L Fabiyi and M. O. Ganiyu (2010). *Effects of Micro-Finance Bank Credit Scheme on Crop Farmers Revenue in Ogbomoso South L. G. A. of Oyo State*. Proceeding of 11th Annual National Conference of National Association of Agricultural Economists (NAAE).FUT Minna, Niger State.
- Omankhanlen, A. E.(2013). Nigerian Banks' efficiency Performance: post 2004 Banking Reforms Evaluation. An unpublished PhD thesis submitted to the department of Banking and Finance, Covenant University, Ota, Ogun State, Nigeria.
- Orebiyi, J.S. (2000). The performance of Rural Credit Markets in Imo State Nigeria. Unpublished. PhD thesis submitted to the Department of Agricultural Economics, Federal University of Technology, Owerri.

-
- Oteng-Abayie , E. F.; Owusu-Ansah, B.; Amanor K. (2016). Technical Efficiency of Credit Unions in Ghana. *Journal of Finance and Economics*, 2016, Vol. 4, No. 3, 88-96.
- Owusu-Ansah, B. (2014). Analysis of Technical and Cost Efficiency of Cooperative Financial Institutions in Ghana: An Application of Stochastic Frontier Approach. An unpublished thesis submitted to the Department of Economics, Kwame Nkrumah University of Science and Technology, Ghana.
- Oyedele, G. A. and Akintola, J. O. (2012). Determinants of access to credit in Nigerian agriculture. *Journal of Development and Agricultural Economics* Vol. 4(10), pp. 275- 286.
- Porcelli, F. (2009). Measurement of Technical Efficiency. A brief survey on parametric and non-parametric techniques.
- Rhyne, E. and Otero, M. (1994). The new world of microenterprise finance: building healthy financial institutions for the poor. Kumarian press Inc.
- RSADP (2014). Rivers State Agricultural Development Programme (RSADP), Report, 2014.
- Tasie,C.M.(2013). Effects of International Fund for Agricultural Development (IFAD) Credit Supply on Rural Farmers in Rivers State. *Journal of Development and Agricultural Economics*. 5(5): 186 -191.
- Tasie, C.M. and Ajie, E.N. (2013). Determinants of Loan acquisition from micro-finance institutions by small-holder food crop farmers in Rivers State. *Journal of National Association of Female Teachers (JONAFET)*. Vol. 4: 89 – 96.
- Zeller, M. and L. R. Meyer (2002). The Triangle of microfinance – financial sustainability, outreach and impact, IFPRI: Washinton, D.C.,USA and the John Hopkins University Press, Maryland.