Int. j. adv. multidisc. res. stud. 2023; 3(5):667-673

Received: 09-08-2023
Accepted: 19-09-2023

International Journal of Advanced Multidisciplinary Research and Studies

ISSN: 2583-049X

Comparative Analysis of Formal Credit Access and Technical Efficiency among Rural Farmers in South-South Nigeria

[1] Edaba MIE, [2] Onoja AO, [3] Elum ZA

[1, 2, 3] Department of Agricultural Economics and Agribusiness Management, University of Port Harcourt, Choba, Port Harcourt, Nigeria

Corresponding Author: **Edaba MIE**

Abstract

Nigeria's economy is largely agrarian in nature, with agriculture playing a dominant role through its contribution of 41% to GDP and employment of more than 70% of the working population. The catalytic role this sector plays in enabling economic development is being threatened by low productivity due to poor access to farm credit, especially among smallholder rural farmers. To investigate this phenomenon, this study is intended to assess rural credit access and resource use efficiency among cassava-based farmers in South-South Nigeria. The study counts on a field survey that was conducted in 2023, using a well-designed questionnaire. The survey sampled 284 respondents covering Rivers, Bayelsa and Akwa-Ibom States of Nigeria, which were selected through a multi-stage random sampling technique. The Cob Douglas stochastic production frontier was used to analyse the data collected. Results of the study revealed that the mean formal credit accessed by each of the three States amounted to ₦252,520 for Akwa-Ibom State, ₦240,687 for Rivers State and ₦228,818 for Bayelsa State. Results from the stochastic production frontier showed an average technical efficiency of 0.790 for Akwa-Ibom State, 0.694 for Bayelsa State, and 0.822 for Rivers State. The major determinants of the efficiency of the crop farmers were identified as farm size (0.827, 1.006 and 0.1.009 for Akwa-Ibom, Bayelsa, and Rivers States respectively), at $p > 0.01$; labour (0.448 and 0.079 for Akwa-Ibom and Bayelsa States respectively), at $p > 0.10$; and planting materials (0.209, 0.038 and 0.195 for Akwa-Ibom, Bayelsa, and Rivers States respectively), at $p > 0.10$, $p > 0.05$, and $p > 0.10$. Furthermore, the major factors that determined technical inefficiency were age (0.224, -0.478 and -0.470 for Akwa-Ibom, Bayelsa, and Rivers States respectively),), at $p > 0.05$, $p > 0.10$ and $p > 0.01$; marital status (-0.201 and -0.653 for Akwa-Ibom and Rivers States respectively), at $p > 0.05$, and $p > 0.01$; years of farming experience (-0.105 and -0.031 for Bayelsa, and Rivers States respectively), at $p > 0.05$; $p > 0.10$, extension visit (-0.012 for Akwa-Ibom State only) at $p > 0.10$, and household size (-0.033 for Rivers State only), at $p > 0.10$. There is an urgent need to monitor and offer technical knowledge on how to effectively integrate the restricted but essential components of farm production in order to harness and utilize the limited financing facilities and production resources extended to farmers.

Keywords: Efficiency, Comparative, Credit, Farmers, Food, Production, Resources

Introduction

Increasing support for the agricultural sector is one of the greatest ways to achieve the Sustainable Development Goals (SDGs), which include reducing poverty, improving food security, ensuring gender equality, etc. It is agreed that the implementation of credit schemes would have a significant positive impact on smallholder farmers' agricultural productivity and profitability because credit is essential for acquiring resources and adopting new technologies. Credit therefore acts as a strategic tool in the fight against poverty. In several African nations, where agriculture accounts for a large portion of the gross domestic product (GDP) and is continuously growing its contribution to the national economy, it is the main source of employment for the majority of rural poor people (Food and Agriculture Organisation, 2020). For instance, in Nigeria, agriculture made up 21.66% of the first quarter of 2018 and 21.91% of the first quarter of 2019, respectively. Additionally, according to data from the National Bureau of Statistics for 2019 and 2018's first halves, it increased by 2.46 percent and 3.17 percent, respectively. Agriculture not only feeds the world's expanding population but also provides the majority of the raw materials for industry, generates foreign exchange for the majority of agriculturally dependent nations, and creates over 70% of all jobs worldwide, and is a source of income for many young people, women and men (Osundare *et al*. 2020) [17]. Nigeria's primary source of foreign exchange earnings at the present is crude oil, also known as the "Black Gold" of the country. However, this is non-renewable and could run out in the future. In addition, variations in the price of oil on the international market and the internal search for alternative energy sources among the developed world could mean that there won't be any need for oil in the future, which could have a significant impact on Nigeria's economy. This underlines the significant role that agriculture continues to play in Nigeria's economy (Osundare *et al*. 2020) [17].

Despite the significant human and material resources invested in the cultivation of arable food crops, Osabohien, (2020) [16] claim that farmers' production efficiency is still below 60%, suggesting that something is wrong with their methods. The inefficient use of scarce resources, which leads to low farm productivity, is one of the main sources of agricultural risk in Nigeria. The adoption and application of low-input technologies, restricted credit availability, insufficient agricultural extension services, a lack of technical input knowledge regarding the use of technologies, and insufficient farm management abilities are typical manifestations of the obvious problem of underutilization of resources, as listed by Nzeakor *et al.* (2020), a lack of input, high costs, a lengthy distance to the market, and violence between groups, and the impact of climate change on the overall farming culture are additional obstacles. Poor extension service delivery is another. Other issues include how to investigate the numerous aspects that explain efficiency in order to increase the nation's output of food crops.

Production has been low as a result of small-scale farmers' inadequate adoption of better agriculture inputs. According to Osanyinlusi and Adenegan (2016), the land tenure system and all of its implications, extremely high and unaffordable input costs, diversion of subsidised farm inputs intended for rural farmers, soil fertility loss and degradation, annual bush burning that reduces the organic matter in the soil, a lack of funding, disregard for the agricultural sector, a shortage of extension agents, market failures, and a lack of government support are all thought to be related to this. The end result of all of this is a low yield of arable crops and low farmer income. Already, this condition makes it exceedingly difficult for the nation to create enough food that will be adequate to feed the growing population and meet the first two goals of the United Nations Sustainable Development Goals (SDGs) which is to end extreme poverty and hunger by 2030. Nigeria is known to be blessed with large untapped land and other natural resources which is suitable for producing enough arable crop for her population, the low productivity of the Nigerian arable crop farmers despite the large number of the population engaged in farming activities calls for concerns by all stakeholders (Osanyinlusi and Adenegan, 2016).

The question of how effectively and efficiently rural farmers use and apply their scarce farm resources in connection to the sizes of their available farms is one that agricultural economists are particularly interested in (Osundare, *et al*. 2020) [17]. Farms that are productive and lucrative use as many resources as possible to produce their goods while spending the least amount of money possible. Sadly, where land, labour, money, and managerial resources are used effectively, farm productivity and agricultural output are diminished (Sadique *et al*., 2022). In order to fulfil the needs of the nation's constantly expanding human population, which is expected to reach a total projected value of roughly 216 million people as of 2022, the agriculture industry's declining production has forced continuing food importation (World Bank, 2022) [20]. In reality, essential basic farm inputs such as fertilizers, pesticides, insecticides and capital have not been made available to these farmers for their farming activities. Consequently, despite its potential for increased land productivity, Nigeria has not been able to meet its food consumption needs. As a result, we are forced to rely on food importation to supplement the woefully insufficient local supply. The primary obstacle to the rapid expansion of food production appears to be low crop yields brought on by the poor use of limited farm resources. The question of how effectively rural farmers use their farm resources given the size of their individual farms is a topic of great interest in agricultural economics. Thus, the paper aims to analyze and compare the technical efficiencies of cassava farmers who had access to formal credit in South-South Nigeria.

Materials and Methods

Study Area

The study was carried out in South-South Nigeria. Nigeria's South-South geopolitical zone includes the following states: Akwa Ibom, Bayelsa, Cross River, Delta, Edo, and Rivers States. The selection of three States (Rivers, Akwa Ibom, and Bayelsa States) for this study was made based on the prevalence of cassava farming and the proximity of the three states. With a projected population of 26,551,327 for 2019, the entire South-South region makes up slightly less than one-third of Nigeria's overall land area. The area is situated between Latitude 6.2059° North of the Equator and Longitude 6.6959° East of the Greenwich Meridian in Nigeria's humid tropical agroecological zone.

Residents of the area are mostly small-scale farmers. The major occupations of these farmers include raising animals like sheep, goats, and poultry as well as arable food crops. Cassava, maize, sweet potatoes, yams, plantains, bananas, and vegetables are some of the main food crops grown.

Sampling Techniques and Sample Size

Cassava (*Manhiot esculatum*) farmers in the selected States were chosen using a multi-stage sampling technique from the specified population. The first stage featured the selection of two (2) Local Government Areas (LGA) and the second stage required the selection of two (2) Agricultural Zones from each of the States (Rivers, Akwa Ibom, and Bayelsa). Four (4) communities from each LGA were also randomly chosen at the third stage, and six (6) farmers who grow cassava (*Manhiot esculatum)* were then chosen at random from each community, which gave a total of two hundred and eighty-eight (288) respondents, of which two hundred and eighty-four (284) questionnaires were retrieved.

Data Collection

In addition to primary data, an interview schedule was used. Farmers in the research area provided information using a well-structured questionnaire. The socioeconomic make-up of the respondents and activities related to cassava crop cultivation are among the data gathered. Secondary data were also utilised, taken from books, journals, etc.

Analytical Technique

Both descriptive and inferential statistics were used to analyse the data. While inferential statistics like the Stochastic Frontier Production Function (SFPF) were used to assess the technical efficiency of the cassava-based farmers, descriptive statistics like frequency and percentage tables were employed to describe the socioeconomic characteristics of the respondents. The usage of stochastic frontier modelling has grown in popularity among academics due to its adaptability and capacity to directly connect economic principles with modelling reality. The Battese and Coelli (1995) model is the basis for the model employed in this work by Oluwatusin (2020) [12], in which the stochastic frontier specification includes models for the effects of technical inefficiency and simultaneously estimates all the parameters. The farm-level estimate was made using the technical efficiency of arable crop farmers with and without access to farm credit.

Model specification

The technical efficiencies of cassava-based farmers in the area was analyzed using the Cob-douglas frontier production function as defined by Ochi *et al*., (2015) is expressed as follows:

$$\text{Log } \Upsilon = b_0 + b_1 \log E_1 + b_2 \log E_2 + b_3 \log E_3 + b_4 \log E_4 + b_5 \log E_5 + (V_i - U_i) \quad (1)$$

Where:

Log = Natural logarithm
Υ = crop output (Kg)
E_1 = farm size (Hectares, ha)
E_2 = labour (number of man-days)
E_3 = amount of fertilizer (kg)
E_4 = quantity of herbicide (litre)
E_5 = planting materials (bundles)
$B_1 - b_5$ = regression coefficients
V_I = random variables which are assumed to be independent of U_i identical and normally distributed With zero mean and constant variance N $(0, \delta v^2)$
U_i = non-negative random variables which are assumed to account for technical inefficiency in Production and are often assumed to be independent of V_i such that U is the non-negative Truncated (at zero) of half-normal distribution with N $(0, \delta_u^2)$

The inefficiency of production, U_i was modelled in terms of the factors that are assumed to affect the efficiency of production of the farmers. Such factors are related to the socio-economic variables of the farmers. The determinants of technical inefficiency are defined by Ochi *et al*., (2015);

$$U = \delta_0 + \delta_1 L_{1i} + \delta_2 L_{2i} + \delta_3 L_{3i} + \delta_4 L_{4i} + \delta_5 L_{5I} + \delta_6 L_{6I} + \delta_7 L_{7I} \quad (2)$$

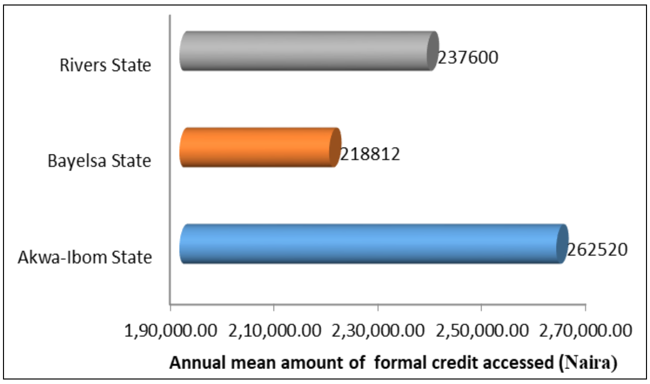
Where:

U = technical inefficiency of the i^{th} farmer
L_1 = age of farmer (number of years)
L_2 = size of household (number of persons in the household)
L_3 = years of farming experience (number of years in farming)
L_4 = extension visits (dummy, 1 if there was an extension visit, 0 if no extension visits.
L_5 = credit credit (dummy, able to access credit =1, unable to access credit = 0);
L_6 =cooperative membership (dummy, 1 for membership, 0 if non-membership))
L_7 = years spent in school (number of years spent in school)
$\delta_1 - \delta_7$ = unknown parameters to be estimated.

These variables are assumed to influence the technical efficiency of the farmers. The gamma ($\Upsilon = \delta_u^2/\delta^2$) which is the ratio of the variance of U (δ_u^2) to the sigma squared (δ^2) which is a summation of variances of U and V ($\delta_u^2 + \delta_v^2$) was also determined. The maximum likelihood estimate method using the computer frontier version 4.1 was used to estimate the parameters of the stochastic frontier production function.

Results and Discussions

The mean amount of formal credit obtained by the farmers in the study area is shown in Fig 1. Mitra, *et al.,* (2023) observed that smallholder farmers who cultivate on farmlands below 0.1 ha were unlikely to have access to formal agricultural credit. This finding is connected to some of the fundamental requirements for obtaining loans from certain financial organizations. For instance, Amurtiya *et al.*, (2018) [3] observed that land is still one of the most frequently requested types of collateral.



Source: field survey, 2023

Fig 1: Annual mean amount of formal credit accessed per State (Naira)

According to the bar chart, farmers from Akwa-Ibom State reportedly obtained more formal loan facilities (₦252,520) for their farms compared to the other two states during the last farming season. Rivers State (₦240,687) came next while the least credit-accessed State was Bayelsa State (₦228,818). The credit helps farmers to purchase tools and facilities that would make it easier for them to carry out their agricultural tasks effectively, embrace new technology, and buy better farm inputs, all of which would increase production and efficiency. For instance,

Table 1: Comparison of Maximum Likelihood Estimates (MLE) of the Stochastic Frontier Production Function for cassava Farmers who had Formal credit in the study area

Variables	Akwa-Ibom State	Bayelsa State	Rivers State
Production Function			
Constant (b_0)	4.998** (2.285)	9.077*** (2.158)	8.407*** (1.389)
Farm size (b_1)	0.827*** (0.139)	1.006*** (0.180)	1.009*** (0.146)
Labour (b_2)	0.448* (0.257)	0.079* (0.272)	0.317 (0.218)
Fertlizer (b_3)	−0.067 (0.058)	1.6e-05 (0.074)	0.126 (0.082)
Herbicides (b_4)	−0.036 (0.063)	0.040 (0.074)	0.064 (0.155)
PlantingMats (b_5)	0.209* (0.155)	0.038** (0.178)	0.195* (0.207)
Inefficiency			
Age (a_1)	0.224** (0.489)	−0.478* (0.575)	−0.470*** (0.409)
Gender (a_2)	−0.006 (0.020)	−0.025 (0.020)	−0.003 (0.017)
Marrital (a_3)	−0.201** (0.315)	0.189 (0.460)	−0.653*** (0.241)
Educatn (a_4)	0.178 (0.219)	0.284 (0.300)	−0.133 (0.214)
YrsFrming (a_5)	0.120 (0.165)	−0.105** (0.146)	−0.031* (0.161)
ExtVisit (a_6)	−0.012* (0.019)	0.001 (0.023)	0.009 (0.026)
Household size (a_7)	−0.004 (0.022)	0.010 (0.024)	−0.033* (0.019)
CoopMemb (a_8)	0.021 (0.021)	−0.004* (0.027)	0.011 (0.025)
Sigma squared (σ^2)	0.769** (0.081)	0.711* (0.072)	0.826** (0.894)
Gamma (γ)	0.037*** (0.022)	0.055*** (0.114)	0.046** (0.078)
Log-likelihood	−104.809	−121.157	−108.610
Mean efficiency	0.790	0.694	0.822

Source: field survey data, 2023, ***, ** and * are significant at 1%, 5% and 10% respectively
Note: parenthesis '()' are standard errors

A comparison of the Maximum Likelihood Estimates (MLE) of the Cobb-Douglas Frontier (for formal credit users across Akwa-Ibom, Bayelsa, and Rivers States) is presented in Table 1. From the results, we found the generalized log-likelihood function as -104.809, -121.157, and -108.610 for Akwa-Ibom, Bayelsa, and Rivers States Cassava-based farmers respectively. The log-likelihood function implies that inefficiency exists in the data set. The log-likelihood ratio value represents the value that maximizes the joint densities in the estimated model. The value of gamma (γ) is estimated to be 37 percent (for Akwa-Ibom State), 55 percent (for Bayelsa State), and 46 percent (for Rivers State) respectively. The values were also significant at 1 percent (for Akwa-Ibom and Bayelsa States) and 5 percent level of probability (for Rivers State). This is consistent with the notion that the true γ-value should be greater than zero. This outcome suggests that the random variation in the output of farmers who had access to formal credit was caused by the farmers' inefficiency at their respective sites and not by random variability, as was the case in 37%, 55% and 46% of the cases. Since the farmer has control over these elements, lowering the impact of it will considerably improve the farmers' technical efficiency and increase their production. The level of likelihood and the value of sigma squared ($\sigma 2$) differed significantly. The gamma shows a strong fit and validity of the distributional assumptions of the composite error terms, even though it includes systematic affects that are not taken into account by the production function and the main sources of random error. This shows that the effects of inefficiency have a substantial impact on the technical inefficiencies of the farmers. The sigma and gamma coefficients found in this inquiry are in line with a priori predictions and concur with those reported by Ndubueze-Ogaraku and Ogbonna (2016) [9].

Considering the efficiency model as shown in Table 1, the coefficients of farm size were 0.827, 1.006, and 1.009 and were all positive and significant at 1 percent level of significance in all the three States of the study. Similarly, the coefficients of labour was weak but positively significant at a 10 percent level of significance for the Akwa-Ibom and Bayelsa States. The strong correlation between farm size and crop productivity suggests that farm size is a crucial factor in the cultivation of cassava crops, and that cassava production would certainly increase with an increase in field cultivation and with good agronomic techniques. The results of (Johnson, 2021; Smith *et al.*, 2022) who showed that farmers with larger farm sizes are likely to attain more output by cultivating wider areas have validated the positive association between farm size and output. This finding is consistent with that of Tephee (2015) [19], who found a positive and substantial relationship between farm size and farmers' yields of arable crops.

The results of the findings further revealed a weak but positively significant level of significance for the coefficient of labour (0.448 and 0.079) and significant at 10 % level for the farm households in Akwa-Ibom and Bayelsa States. The implication of this outcome is that an increase in labour supply (for farmers with access to formal credit) will lead to a corresponding increase in the yield of cassava output. This result is consistent with findings from Iheke, *et al*. (2019), who found that, as long as farmers have not reached the point of diminishing returns, higher labour utilisation boosts farm productivity. These results support earlier research from Sanni (2015), Echebiri, and Nwaogu (2017) that demonstrated the value of labour, farm size, and fertilisers in agriculture, particularly in developing nations where mechanisation is uncommon on small-scale farms. Onyenweaku and Okoye's (2007) study, which found a negative link between the variables under consideration, and the results did not agree, though. Agriculture in rural areas depends significantly on manual labour, and given the high rate of migration to cities, labour for agriculture may become scarce and hence expensive to the point where an increase in production costs per unit of land could be justified.

The Cob Douglas Production function estimates the inefficiency parameters to show the effects of socioeconomic variables on the efficiency of the farm business. In Table 1, the findings of the study on the influence of socioeconomic traits on the technical inefficiency of farmers with access to formal finance in each of the States are also shown. According to the data, homes with formal credit were found to have a negative coefficient of age that was significant at a 5% level of significance, while households with informal credit were found to have a 1% level of significance. According to the negative coefficient, as people age, their production will become less inefficient, resulting in improved output efficiency. This may logically imply that younger farmers are less productive and less likely to adopt new technology than older farmers. However, it's thought that financial organisations would rather lend money to younger farmers than to older ones because, with the technologies available, a farmer gets less and less able to combine his resources properly as he ages. This outcome was anticipated since older farmers are supposedly weaker and less likely to accept new technology, especially in the context of Africa where farmers still rely on outdated agricultural equipment and use traditional farm tools for their farming practices. The conclusions of this study are consistent with those of Oluwatusin (2011), who noted that older farmers prefer to use their extensive experience to accept new technologies and better farming practices. Older farmers enjoy learning from their extensive farming history. In a similar vein, studies by Micah *et al*. (2020) and Bravo-Ureta and Pinheiro (1997) [4] revealed a positive and significant relationship between age and technical proficiency. This conclusion is supported by the findings of Ojo and Baiyegunhi (2020) [11], who found a similar relationship between household head age and agricultural productivity.

For both Akwa-Ibom and Rivers, the coefficients of married status were shown to be −0.201 and -0.653, negative and significant at 5 percent and at 1 percent level of significance. This means that marital couples are likely to have lesser inefficiencies and greater efficiencies in their farm operations in Akwa-Ibom and Bayelsa States. Similar to the situation in Africa, married households are expected to be more productive in agricultural cultivation operations because they are likely to have more hands to carry out farm operations, particularly in a situation where farming is still subsistence and heavily dependent on physical labour (Osabohien, 2020) [16]. As would be expected, the coefficient of farming experience was found to be -0.105 and significant at a 5% level of significance for Bayelsa and -0.031 and significant at a 10% level of significance for Rivers State, respectively. This indicates that for those in Bayelsa and Rivers States who have access to institutional finance, their technical efficiency will increase with each additional year of farming experience. In this sense, seasoned farmers with formal financial access in these States would be eager to adopt new technologies and take guidance since they think their current practices are effective and productive.

This result conforms with the findings of Micah *et al.*, (2014) [8], Onyeweaku and Nwaru (2005) [15], Onyenweaklu *et al.*, (2004), Onu *et al.*, (2000) [14], Amaza and Olayemi (2000) [14]. The interpretation is that farmers with more years of formal education tend to be less technically efficient. This outcome is expected in rural areas where farmers who are more educated seek to relocate to cities and townships in search of economically stable and viable employment opportunities, thus doing farming business on a part-time basis, thereby leading to inefficiency in their production. This result however contradicts the findings of Pius and Odjuvwuederhie (2006).

Only Akwa-Ibom State had a statistically significant coefficient value of -0.012 for extension visit and significant at 10% level of significance. By interpretation, the more interactions farmers have with extension agents, the lesser their technical inefficiency and the higher their technical efficiency in the study area. Elum and Obiajunwa (2022) [6] found that extension personnel who are creative thinkers, wise counsellors, and communicators make a great contribution to assisting farmers in raising the productivity and success of their agricultural enterprises. Similar to this, Micah *et al.*, (2014) [8] discovered a negative but significant relationship between output and technical inefficiency among pepper crop growers with access to institutional funding. Also, the coefficient of cooperative membership was −0.004, negative and statistically significant at 10% for only Bayelsa State. This result implies that membership of cooperatives reduces technical inefficiency and thus enhances technical efficiency. *A priori* expectations are in line with the negative association. Through the economics of scale in the purchase of farm inputs as well as in the selling of their goods, cooperative membership enables farmers to enjoy some benefits such as access to loans and subsidies, purchasing in bulk and at a reduced cost, and reduced transportation costs. A similar pattern was shown for household size, with only one State (Rivers State) having its significance verified at the 10% level of statistical difference. Taremwa (2022) asserts that family size is a critical element in the rural economy since it impacts the number of workers each farmer has access to. Similar findings were made by Onoja *et al*. in 2021, who discovered a link between larger households and higher agricultural yields.

The mean technical efficiency was found to be 0.790 for Akwa-Ibom State, 0.694 for Bayelsa State, and 0.822 for Rivers State among the cassava-based farmers who accessed formal credit for their farming operations in the selected States. This indicates that on average, the farmers were able to obtain 79 percent, 69 percent, and 82 percent of potential output from a given mixture of production inputs across the three States. The results are interpreted as showing that, in the short term, there is little potential to increase efficiency (21%, 31%, and 18%) by providing the best input combination by the most productive farmer.

Conclusion and Recommendations

The results of the study indicate that farmers from Akwa-Ibom State reportedly used more formal credit facilities amounting to (₦252,520) compared to Rivers State (₦240,687) and Bayelsa State (₦228,818) while the mean technical efficiency of the three states considered in the study were found to be 0.790 for Akwa-Ibom State, 0.694 for Bayelsa State, and 0.822 for Rivers States respectively. In addition, the factors that significantly influenced technical efficiency were farm size, labour and fertilizers. Similarly, age, marital status and years of experience were major factors that determined technical inefficiency in the study area.

The result shows that farmers who choose formal credit sources had higher efficiency levels. This suggests that access to credit has a strong impact on farm efficiency. Thus, access to credit is an essential factor in the quest to achieve greater agricultural productivity and therefore recommended that access to credit should be included in any agricultural development plans of the country. A special window should be opened in the agricultural input sector where access to credit facilities through Micro Finance Banks should be seriously considered. Part of this credit should be given to farmers in kind in the form of improved planting materials and fertilizers while training in proper agronomic practices should be vehemently pursued. In order to harness and utilize the available limited credit facilities extended to farmers wisely, there is an urgent need to monitor and provide technical information on how to combine the limited factors of production efficiently.

References

1. Adewale AT, Lawal OA, Aberu F, Toriola AK. Effect of Credit to Farmers and Agricultural Productvity in Nigeria. East Asian Journal of Multidisciplinary Research (EAJMR). 2022; 1(3):377-388.
2. Amaza PS, Maurice DC. Identification of factors that influence technical efficiency in rice- based production systems in Nigeria". In P. Kormawa and A.A. Toure (eds.) Proceedings of a workshop on Rice Policy and Food Security in Sub-Saharan Africa held inAfrica Rice Center (WARDA) Cotonou, Benin, 7th-9th November, 2005, 70-78.
3. Amurtiya M, Yuniyus G, Polycarp M, Zubairu A. Analysis of rural farm households' access to formal agricultural credit in Yola south local government area, Adamawa state, Nigeria. Acta Univ. Agric. ET Silvic. Mendelianae Brun. 2018; 66(4):947-954.
4. Bravo-Ureta BE, Pinheiro AE. Technical, Economic, and Allocative Efficiency in Peasant Farming: Evidence from the Dominican Republic". The Developing Economies. 1997; 35(1):48-67.
5. Danso-Abbeam G, Baiyegunhi LJS. Adoption of agrochemical management practice among smallholder cocoa farmers in Ghana. Afr J Sci Technol Innov Dev. 2018; 9(6):717-728.
6. Elum ZA, Obiajunwa U. Analysis of institutional credit accessibility among small-holder poultry farmers in Rivers State, Nigeria. Journal of Development and Agricultural Economics. 2022; 14(2):30-40.
7. FAO. The State of Food Security and Nutrition in the World 2022. Repurposing food and agricultural policies to make healthy diets more affordable. Rome, FAO, 2022. Doi: https://doi.org/10.4060/cc0639en
8. Micah B, Masuku1 MO, Raufu I, Nokwanda G, Malinga. The Impact of Credit on Technical Efficiency among Vegetable Farmers in Swaziland. Sustainable Agriculture Research. 2014; 4(1).
9. Ndubueze-Ogaraku ME, Ogbonna MC. Analysis of Technical Efficiency and its determinants in Rice Production: Evidence from Abia State, Nigeria Nigerian Agricultural Policy Research Journal. 2016; 1(1). http://aprnetworkng.org.
10. Nuani FO, Gido EO, Ingasia O. Consumer preference for selected roots and tubers among urban households. International Journal of Vegetable Science. 2022; 28(1):p114. Doi: 10.1080/19315260.2022.2070570
11. Ojo TO, Baiyegunhi JS. Determinants of credit constraints and its impact on the adoption of climate change adaptation and strategies among rice farmes in South-West Nigeria. Journal of Economic Structures. 2020; 28(9):1-15.
12. Oluwatusin FM, Ajiboye A, Osundare FO, Adekunmi AO, Toluwase SOW, Akokoh FE. Technical Efficiency Analysis of Arable Crop Farmers with and without Access to Credit in Nigeria. Life Science Journal, 2020. Available at: https://www.researchgate.net/publication/343749888
13. Onoja AO, Achike AI. Economic Analysis of Climate Change Effects on Arable Crop Production in Nigeria. Journal of Economics and Sustainable Development. 2014; 5(10). www.iiste.org ISSN 2222-1700.
14. Onu JK, Amaza PS, Okunmadewa FY. Determinants of Cotton Production and Economic Efficiency. African Journal of Business and Economic Research. 2000; 1:23-240.
15. Onyenweaku CE, Nwaru JC. Application of Stochastic Frontier Production Function to the Measurement of Technical Efficiency in Food Production in Imo State, Nigeria. Nigeria Agricultural Journal, 2005.
16. Osabohien RE, Osuagwu E, Osabuohien UE, Ekhator-Mobayode O, Matthew O, Gershon O. Household access to agricultural credit and agricultural production in Nigeria: a propensity score matching model S. Afr. J. Econ. Manag. Sci. 2020; 22(1):pa2688.
17. Osundare FO, Owoeye R. Efficiency differentials of farm size of cassava production in Ekiti State, Nigeria, 2020.
18. Sadiq MS, Markafi MA, Singh P. Labour-use efficiency of rice farmers. Siembra. 2022; 9(2):e3969.
19. Taphee BG. Resource productivity and efficiency of small-scale groundnut farmers in Taraba state, Nigeria. An unpublished PhD thesis submitted to the Department of Agricultural and Economics, University of Nigeria Nsukka, Nigeria, 2015.
20. World Bank. Innovation challenge for agriculture and

food security risk financing in southern Africa, 2022. Retrieved 05/06/2020 From: https://opportunitydesk.org/2020/03/18/world-bank-2020-innovation-challengefor-agriculture-and-food-security-risk-financing-insouthern-africa