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Analysis of the Allocative Efficiency of Rice Farming in Kano State: A Case Study of Beneficiaries of Commercial Agriculture Credit Scheme

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Abstract

The purpose of this study is to empirically investigate the influence of commercial agriculture credit scheme on efficiency of rice farming in Kano State, Nigeria. Cross sectional Survey was used and primary data was sourced from 394 beneficiary farmers of commercial agriculture credit scheme (CACS) through survey method in the period 2009–2020. Multi-stage sampling technique was used for the study across the existing agricultural zones. The study employed the stochastic frontier model by using the stochastic cost finction. The model specified was estimated by likelihood estimates of stochastic frontier cost function of rice farming using STATA 14. The findings revealed that before CACS, the regression of the stochastic cost function estimates of allocative efficiency revealed that 93.3% of the farmers had allocative efficiency (AE) between 0.75 and 1.00. The mean allocative efficiency of farmers is 95%. After CACS The findings reveal that 92.1% of the farmers had allocative efficiency level was between 0.75 and 1.00. while the mean allocative efficiency indicate a 93% level of price efficiency in rice production of farmers. This means that most of the farmers were allocative efficient. The implication is that, after accessing CACS, the loan contributed to efficiency of rice farmers. There is need to have sustained and improved allocative efficiency of rice farming systems in the study area. The paper recommends that monitoring of rice farmers that benefitted from the credit and measures should be put in place towards mitigating the factors that affect efficiency The findings was able to establish that commercial agriculture credit scheme enabled rice farmers to be price efficient in the study area.

Keywords: Commercial Agriculture Credit Scheme, Efficiency, Allocative Efficiency, Stochastic Frontier Model, Stochastic Cost Function

1. Introduction

Commercial agriculture credit has the capacity to improve efficiency in rice farming output if adequately harnessed, which can lead to efficiency and positive yield. In Nigeria, like other third world countries, agriculture is the dominant economic activity. Even though dominant, it is characterized by small scale farming and low productivity. The total production output is hardly enough to meet domestic needs, and so exporting becomes difficult. Rather, food import bills have always been increasing. It has always been the prerogative of the government to develop the agricultural sector so as to diverse the economy away from the monocultural syndrome, which has plunged the economy to various shocks in the time past (Gyong & Ahmed, 2024; Ikuemonisan, Olaoba &Akinbola (2023).

Rice is an important food consumed in Nigeria that has in recent years become the major staple food. Because of its importance, rice farming is a common practice, which is a predominant occupation in most states including Kano State. But the farming of rice has been characterized by traditional practice of small holdings, broadcasting planting system, rain fed, low level of mechanization etc, and the end result is low productivity. In Nigeria, the yield of rice on the average is 1.51ton/ha. However, the low yield in Nigeria translates to rice shortage. Therefore the shortage in production creates the demand and supply gap. It has been observed that the local milled rice produced in Nigeria is estimated to be 5.8 million metric tonnes on the average annually while the demand needs is estimated to be7 million tonnes annually. This gives a supply gap of estimated to be 1.2 million metric tons (Cadoni & Angelucci, 2013). To make up for the shortfall, in 2014, Nigeria incurred a bill of N1 billion daily for rice importation. Also in the year 2012 and 2015 (between January and May respectively) the Government of Nigerian had an expenditure on rice importation of $2.41 billion (Emefiele, 2015). The national rice demand for rice in 2016 was estimated to be 6.3 million metric tons, the supply in the domestic economy was estimated to be 2.3 million tons (FMARD, 2016). And so the import was expected to complement the shortfall of 4 million metric tons. This further show that the consumption needs and demand is high and supply low. The expectation is that the high import of the rice is to fill the shortage in supply instead of producing the rice domestically. This means that import of rice is expected to fill the shortage in the Nigerian economy in o other to meet up with the consumption needs of Nigerians. The implication is that rice importation can have negative effect in the economy which can cause serious danger on the earnings of Nigeria. The high importation is further aggravated by increase in high import bills. This has a negative effect on the terms of trade and balance of payment of Nigeria. Kano State is one of the States in Nigeria that is known for rice production. Most of the production areas are in the fadama and the Kano River Basin areas.

1.2 Objectives of the Study

i. To examine the influence of Commercial Agriculture Credit on price efficiency of rice farming in Kano State

2. Literature Review

2.1 Conceptual Literature

Credit is an important component to boost investment in rice production so as to bridge the domestic deficit of rice production. And so Adejoh (2021), Bello et al. (2021), and Okhankhuele (2021) described credit as an important component that is adequate to finance any investment. It is in this regards that successive governments in Nigeria came up with different programmes and policies over the years among which include commercial agriculture credit scheme (CACS). The CACS was established in 2009 as an intervention policy and new initiative to position the economy towards improving rice farming production. The policy is to provide finance for the country's agricultural value chain.

Credit: Credit is a situation arranged to get cash, goods immediately in payment of the items in the future. Secondly it is an expectation of money that can be used to purchase goods and services. It is an advance of goods and services in exchange for a promise to pay at a later date. It is the use of money for future income.

Commercial Credit: This refers to preapproved money that is made available by a bank or an institution saddled with the role of lending to company, group and coopeartives. And so these entities can obtain money in form of commercial credit based on their discretion so as to meet up with its financial obligations. This type of credit is a revolving loan offered to a company, group or cooperatives.

Commercial Agriculture: Commercial agriculture involves a large scale of production where various types of farming are involved. Commercial agriculture refers to any form of agricultural production that is on a large scale with the major aim of producing for local, regional, national or international markets. It therefore means that commercial agriculture produces crops, animals and food mainly for sale. Commercial agriculture involves large scale farming intended for profit maximization. It can be intensive or extensive commercial agriculture.

Commercial Agriculture Credit: Commercial agriculture credit refers commercial credit that is arranged and disbursed to individual households, groups, cooperatives or companies in form of cash for large agricultural production activities with the sole aim of paying at a later date. Commercial agriculture credit is intended to improve small scale production for large scale production in agriculture which is intended for the market. Therefore the use of commercial agriculture credit is intended to shift agriculture production from a small scale level to a large scale level.

Commercial Agriculture Credit Scheme (CACS): The CACS is a policy introduced and launched by Nigerian government in 2009. The CACS is a strategy of achieving one of the Central Bank of Nigeria development policy aimed at ensuring improved agricultural production which can translate to higher income and food security.

Efficiency: This concept of efficiency is used in production analysis and rice farming is one of such. Efficiency is the ability to produce a given set of output at the lowest possible average total cost. The efficient use of resources can eliminate waste which can lead to productivity.

Allocative efficiency: Allocative efficiency refers to the ability of the farmer to utilize inputs in an optimal way given their various prices. Asogwa et al., (2007) opined it is the ability of the farmer to use the inputs in optimal proportion given their respective prices. In this case allocative efficiency originates from the output level in which the price is equal to marginal cost (P=MC) in production. This implies that a farmer is willing to consume (buy) is equal to the marginal utility that they get or derive from consumption. And so the optimal distribution can be attained in a situation marginal utility of the goods bought is equals to the marginal cost. Therefore allocative efficiency can occur in a situation consumers pay price at the market which reflects the private marginal cost of production. We should note that allocative efficiency is a technique of welfare analysis that is used measure the impact of markets and public policy on various categories of people in the society on whether they are better or worse off.

2.2. Theoretical Literature

Utility Maximization Models

Consumer theory and utility are models of consumer decision making behavior. These models tell us how perfectly, economically rational consumer ought to reason in order to guarantee maximum total benefit for themselves.

2.2.1 Utility Maximization Theory

The utility maximization developed by Jeremy Bentham (1748-1832) and John Stuart Mill and incorporated into Economics by Alfred Marshall (1890). Utility maximization theory is an important concept in classical economics. Utility is a concept that measures the satisfaction derived by humans. Utility is affected by the consumption of different goods, services and the same time if one possesses wealth in a particular period of time. And so a farmers' household can cultivate their land so as to meet his needs and to increase wealth by engaging in different activities, i.e participating on commercialization of his product and participation in the market. Therefore utility can be measured based on the production leading to achieving wealth and desired outcome or result. However it is expected that these farmers' household can make decisions towards their crop cultivation with the intention to take it to the market for sale so as to yield or achieve maximum satisfaction from the sale of this goods.

Following this, the decision of participating in the rice production and market or not is a binary choice. This is because of the nature of the dependent variables (they are dichotomous) that is to participate or not to participate in rice production and rice market. So therefore the decision to participate or not can considered within the general framework of utility or the framework of profit maximization (Norris and Batie, 1987; Pryamishnikov and Katrina, 2003). Within this framework, economic agents are small scale farmers that are given commercial credit to go into large scale rice farming and whose decisions are going to be measured by utility that is perceived. Therefore the actions of the economic agents are going to be observed through the choices they make. (This is because utility may not be directly observed).

The transmission mechanism is determined by the role of credit in production. In this study credit serves as a link for purchase of farm inputs and production output. Credit has the ability to boost investors' confidence and can be an increasing function of rice production output of farmers in the economy.

So therefore the use of credit allows farmers to participate in commercial farming by giving them the opportunity to produce rice in commercial quantity. Where the role of commercial credit can determine the intensive and extensive form of agriculture farming. And so the transmission channel of access to credit can have effect on farmers directly and indirectly. The direct effect such as improved income, status, agricultural revenue, boost production, increase farm productivity and income, enable food sufficiency effect, reduction in rural poverty etc. while the indirect effect is on household in terms attitude (behavior), marital status, income i.e farm income, consumption expenditure, improved consumption, and improved household well-being

2.3 Theoretical Framework

The framework for this study is the Utility maximization theory and commercial loan theory of liquidity. The theoretical framework shows credit and production relationship (rice production) which is focused largely on the positive effects of access to commercial agriculture credit. The accumulation of a credit has the potentials of self liquidation within the shortest possible time as long as it is used for production transmitting to various stages of production.

Accessing commercial credit can finance rice product because it can increase quick turn over. Rice product is liquid in the short term because of its high consumption demand. And so if credit resources are adequately utilized it can increase production and sold within the shortest possible time. The quick turn over can enable the rice farmer pay back commercial credit. It is also expected that rice production can move quickly from the producers through the retail outlets, and purchased by the ultimate cash paying consumer. The reason is that there is high demand for rice in the market. Farmers' access to commercial credit for rice farming will enable farmers to utilize credit so as to improve successive phases of rice farming. Utilizing commercial credit can improve rice farming. Utilization of commercial credit by the rice farmer to cultivate on land can meet the needs of the rice farmer, by engaging in different activities to create wealth and increase wealth through engaging himself in different activities (i.e. off farm and on farm activities). And can as well sell his product in the market. Efficient utilization of commercial credit can transform into increased wealth and desired outcome.

2.4 Empirical Literature

The growing body of literature indicating possible linkage between commercial agriculture credit, agricultural credit and rice farming in Nigerian economy notwithstanding reveal that there is still paucity of empirical evidence as to the magnitude of the contribution of commercial agriculture credit to commercial rice farming. Previous research and literature over the years have been growing rapidly. But the studies of Rahaman Shajedur *et.al.* (2021), Cahyad, Iskandarini, Rahmanta (2021), Okwera, Okello, and Mugonola (2021), Okoh et.al. (2021), Adewuyi and Amurtiya (2021), Abiola, Omhonlehin and Sani (2021), Olubunmi and Nma (2021), Chikezie et.al. (2020), Njogu, Oluweny and Njeru (2018); Ajah, Igiri and Ekpenyong (2017); Agba (2014), Abarshi (2014), Ataboh et al., (2014); Agbo et al., (2014); empirically limited their scope only to agriculture credit on farm productivity, the relationship between credit access from commercial banks and production capacity, also studies on agricultural credit accessibility and rice production, use of credit in rice farming productivity and income; agricultural production, technical efficiency and technical inefficiency.

Omoregie, Ikpesu and Okpe (2018); Olorunsola, Adeyemi, Valli, Kufre and Ochocha (2017); Orok and Ayim (2017) carried out their studies on agriculture credit and with its impact on agriculture sector performance, share and GDP of different economies, agriculture credit supply and rice output, bank credit on output and agriculture sector development.

Overall, it was observed that most of the literature limited their scope only to technical efficiency, productivity and determinants of access to credit, increase in income as a result of access to credit. In my assessment, only few were concerned with commercial agriculture credit on production and productivity, determinants of commercialization such as Iheke, Onu and Egem (2021), Abdullah et.al. (2019), Osuafor, Azubugwu and Nwankwo (2018), Agbo et al., (2013), Obilor (2013); and Ayegha and Ikami (2013).

3. Methodology

3.1 Cross-Sectional Survey

The cross sectional survey only was adopted for this study.

3.2.1 Selection Criteria of Study Areas

The study area has three (3) agricultural zones comprising of all the local government areas of the Kano State. The research study made use of the three (3) agricultural zones comprising of agricultural zone 1, 2, and 3 in Kano State. The justification of selecting these agricultural zones is based on the fact that farming activities have taken over the control of farm land and the rate of rice farming is very high and has taken control of farming activities. Hence the rate of farming activities is on the increase.

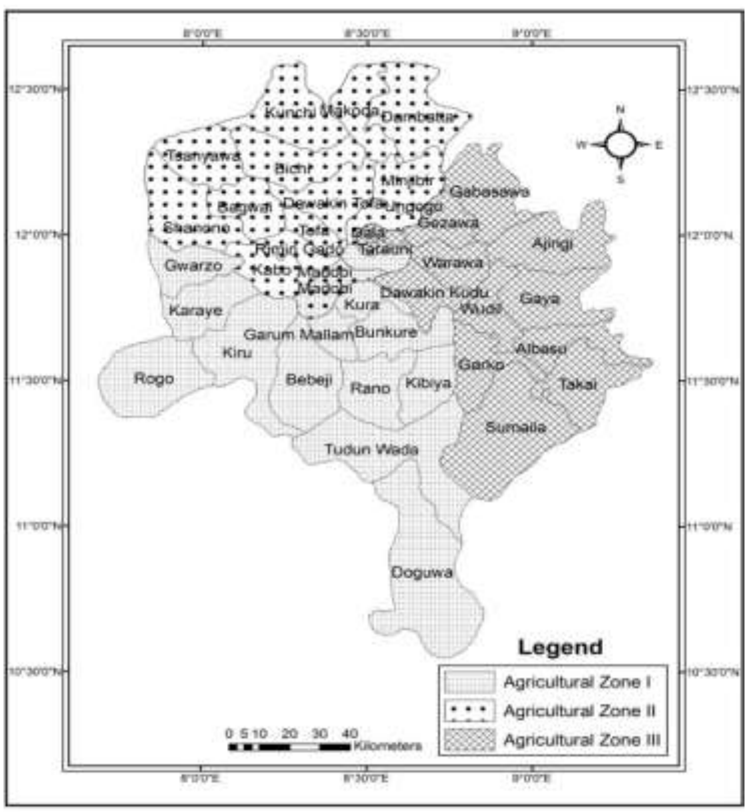

Figure 1: Map of Kano State showing various Agricultural Zones

Kano State has forty four local government areas. And the distribution of agriculture cuts across three (3) agricultural zones. These zones serve as the basis for this analysis.

3.3 Sample Size of the Study

3.4 Study Population

The study population is made up of farmers in the productive age of 18 – 60 years in the selected agricultural zones of Kano State. The population of rice farmers in Kano State is 358120 (KIPA, 2018). Comprising of both wet season and dry season farmers. The computation below is a representation of the sample size taken for this research from the population using the Taro Yamane's formula:

$$n = \frac{N}{1 + N(e)^2}$$

Where:

n = sample size

N = Total Population e = Level of Significance $(0.05)^2$

$$n = \frac{358120}{1 + 358120(0.05)^2}$$

$$n = \frac{358120}{1 + 358120(0.0025)}$$

$$n = \frac{358120}{1 + 895.3}$$

$$n = \frac{358120}{896.3} \quad n = 399.55; \; n = 400$$

Therefore the sample size for the study is 400. Four hundred questionnaires were distributed but 394 questionnaires were returned. The sample size is the portion of the population which the researcher intends to use to represent the total population.

3.5 Sampling Techniques

Multi-stage sampling technique was used for the study because Kano State has a widely disperse population of farmers. The existing agricultural zones, which are Zone 1, Zone 2 and Zone 3, form a cluster each. The farmers in the three agricultural zones are all in cooperative societies. Therefore the target population of this study comprised of all farmers that have benefitted from the commercial agriculture credit scheme involved in rice farming.

3.6 Model Specification

The study employed production efficiency model i.e stochastic frontier model.

i. Stochastic Frontier Model

The Stochastic Frontier Analysis is a form of economic modeling, which has its starting point in the Stochastic Production Frontier Models that was introduced by Aigner, Lovell and Schmidt (1977) and Meeusen and Van den Broeck (1977).

Empirical model

The Cobb-Douglas functional forms will be used in estimating the physical relationship between inputs and output. It is preferable because the independent variables are more than four in the model. The empirical model of Cobb-Douglas production function shows the functional relationship between the quantity of a specific product that can be produced within a time and a set of inputs used, given the existing technology in a socio-cultural environment. The production function could be applied as a catalyst for finding out what magnitude of increase in output over time is attributable to increases in the inputs of production, the existence of returns to scale and technical progress.

Hence, Cobb-Douglas production function with five input independent variables will be applied in this study. The five input independent variables are farm size in hectares, inorganic fertilizer in kg, human labour in man-hours, and quantity of seed in kg while the dependent variable output is rice in kg.

It is assumed that $f(X_i\ ;\beta)$ takes the log-linear Cobb-Douglas form.

Allocative Efficiency Model
The allocative efficiency is also known as the Price efficiency. Therefore in this paper adopt and adapt the stochastic cost function (allocative efficiency) model of Batese and Coelli (1995). This model is expressed as:

$$ln\mathrm{C_i} = \beta_0 \sum_n \beta_n\, lnX_{ni} + v_i + u_i - (3.1)$$

Stated differently:

$$ln\mathrm{C_i} = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta X_5 + \beta X_6 + v_i + u_i - - - - - - - - - (3.2)$$

Where
Ci = Total cost of rice production (N); X_1 = the cost of seed (N)
a priori expectation: the cost of seed is positively related to cost of rice production
X_2 = the cost of fertilizer (N); X_3 = the cost of agrochemicals (N); X_4 = the cost of labor (N)
X_5 = the cost of technology; X_6 = the cost of mechanization; β_o = intercept or constant
β_1-β_4 = Parameters to be estimated; v_i = Error term which are random variables
u_i = Error term which are non-random variables or technical inefficiency effect

3.7. Data Analysis Technique
This study used regression analysis to analyze the stochastic frontier cost functions. The data used for the stochastic frontier cost analysis was sourced through the quantitative data gotten fromm the field through survey. The stochastic frontier technique used was to enable the research establish the relationship between among the variables used. That is to say to analyze and examine the effect of the cost of inputs on the output level of rice farming. Therefore the stochastic frontier technique of analysis is used to examine farmers to access sustainable land management practices which intends to reduce cost of productivity of rice production. The stochastic frontier cost production have been used for the analysis and the reason for using the stochastic frontier cost is to measure the extent in which the cost of inputs such as seed, herbicides, fertilizer, hired labour, house labour and use of tractor influences the output of rice production.

4. Results and Discussion of Findings
4.1 Estimated Stochastic Frontier Cost Functions
The stochastic frontier cost parameters production function is presented in table 4.1. The expectation is that, the loan would assist farmers to access sustainable land management practices which intends to reduce cost of productivity of rice production. The stochastic frontier cost production have been used for the analysis. The estimated result is presented in table 4.1.

The table reveals the result of both before and after access to commercial agriculture credit scheme. The allocative efficiency model is in equation 3.1 and 3.2.

Table 4.1: Results of Maximum Likelihood Estimates of Frontier Cost Function for Rice Production.

	Before CACS					**After CACS**			
Variables	**Parameters**	**Coefficient**	**Standard error**	**Z-value**	**Prob.**	**Coefficient**	**Standard error**	**Z-value**	**Prob.**
Production function									
Constant	β_0	2.0484	1.0775	1.90	0.057*	2.9889	0.9491	3.15	0.002**
*l*nCostSeed	β_1	-0.1445	0.0746	-1.94	0.053**	-0.0072	0.0655	-0.11	0.912
*l*nCostHerbicides	β_2	0.1746	0.0531	3.28	0.001**	0.2864	0.0671	4.27	0.000**
*l*nCostFertilizer	β_3	0.2103	0.0696	3.02	0.003**	0.0483	0.0541	0.89	0.371
*l*nCostHired Labour	β_4	-0.1263	0.0469	-2.69	0.007*	-0.2308	0.0461	-5.01	0.000**
*l*nCostHouse labour	β_5	0.0355	0.0624	0.57	0.569	-0.0191	0.0518	-0.37	0.712
*l*nCostHired Tractor	β_6	0.0087	0.0691	0.13	0.899	-0.0311	0.0393	-0.79	0.430
Diagnostic Statistics									
Sigma-squared	(σ^2)	0.5532	0.0713	-8.62	0.000**	3.2025	0.000	28.06	0.000**
Gamma	(γ)	0.1537	0.087	1.77	0.077*	0.3042	0.0617	0.49	0.622
Log likelihood function	L/*f*	-439.521				-443.055			
LR test		3.30				3.19			
Total number of observation		394				394			
Mean efficiency		0.9576				0.9342			

Field work (2021 – 2022). **Level of significance: **=5%, *=1**

The result in table 4.1 reveals the estimates of the frontier cost function. Before CACS, the cost function, the mean allocative efficiency is 95%, the sigma-squared (σ^2) 0.5532 and the gamma (γ) is 0.1537 fairly high and significant at 10% level of probability. The value of sigma squared (σ^2) is high indicating the goodness of fit and correctness of the specified assumption of the composite error terms distribution (Idiong, 2005).

The gamma (γ) which is 0.1537 accounts for variation in output that is unexplained. This implies that there exist 15.3% variation or variability in rice output that are unexplained by the function as a result of the allocative inefficiency.

The estimated coefficients of the parameters of the cost function that are positive include herbicides, fertilizer, house labour and tractor.

The estimated coefficient of cost of seed is -0.1445 is negative and statistically significant at 5% level of probability. This implies that 1% increase in the cost of seeds will improve output yield of rice farming production.

The coefficient of cost variables of herbicides is 0.1746 is positive and statistically significant at 5% level. This implies that 1% increase in the cost of herbicides will increase the cost of rice farming by 17.4%. The coefficient of cost of fertilizer is 0.2103 is positive and significant at 5% level of probability. This implies that a 1% increase in the cost of fertilizer will give rise to the cost of rice farming production by 17.4%.

The coefficient of cost of fertilizer is 0.2103 and it is significant at 5%. This implies that 1% increase in in the cost of fertilizer will increase the cost of production in rice farming.

In addition, the findings reveal that the coefficient of cost of hired labour is -0.1263 is negative and statistically significant at 5% level. This implies that 1% increase in the cost of hired labour will reduce the cost of rice farming production by 12.6%. This further shows that the cost of hiring labour will reduce rice farming cost of production. But is not in line with the findings of Yusuf et. al. (2021), Adewuyi and Amurtya (2021), Omoregie, Ikpesu and Okpe (2018), Olubunmi and Nma (2021).

The overall mean allocative efficiency indicate a 95% level of price efficiency in rice production of farmers. This implies that farmers operated at an optimal production with lower cost.

After CACS, the cost function, the mean allocative efficiency is 93%, the sigma-squared (σ^2) 3.2025 and the gamma (γ) is 0.3042 fairly high and significant at 10% level of probability. The value of sigma squared (σ^2) is high indicating the goodness of fit and correctness of the specified assumption of the composite error terms distribution (Idiong, 2005).

The gamma (γ) which is 0.3042 accounts for variation in output that is unexplained. This implies that there exist 30.4% variation or variability in rice output that are unexplained by the function as a result of the allocative inefficiency.

The estimated coefficients of the parameters of the cost function that are positive include herbicides and fertilizer. The estimated coefficient of cost of herbicide is 0.2864 and statistically significant at 5% level of probability. This implies that 1% increase in the cost of herbicide will be an additional cost to rice production by 28.6%.

In addition, the findings reveal that the coefficient of cost of hired labour is 0.0461 and statistically significant at 5% level. This implies that 1% increase in the cost of hired labour will increase the cost of rice farming production by 4.6%.

The overall mean allocative efficiency indicate a 93% level of price efficiency in rice production of farmers. This implies that farmers operated at an optimal production with lower cost.

The findings is not line with the study of This is in line with the findings of Adejoh (2021), Bello et. al. (2021) and Agba (2014).

4.2. Frequency Distribution of Allocative Efficiency

The frequency distribution of the technical efficiency estimates for rice farmers in the study area as obtained from the stochastic frontier model is presented in table 4.16.

Table 4.2: Frequency Distribution of Allocative Efficiency of the Estimates from Stochastic Frontier Model

	Before CACS		**After CACS**	
Efficiency level	Allocative Efficiency		Allocative Efficiency	
	Number of households	%	Number of households	%
0.00 – 0.24	0	0	02	0.51
0.25 – 0.49	4	1.02	03	0.76
0.50 – 0.74	22	5.6	26	6.62
0.75 – 1	367	93.38	362	92.11
Total	394		394	
Min	0.1769		0.194	
Max	0.9769		0.9994	
Mean	0.9576		0.9342	

Field Work (2021 – 2022)

4.3 Allocative Efficiency Estimates of Rice Framers
From Table 4.2, the findings show the frequency distribution of the allocative efficiency estimates of rice farmers in the study area. The equation for allocative efficiency is derived in equation (3.5). Before access to CACS, the result revealed in that 93.3% of the farmers had allocative efficiency (AE) of between 0.75 and 1.00 while about 6.6% of the farmers operate at less than 0.74 allocative efficiency levels. This implies that the greater majority of rice farmers were allocative efficient. And only 6.6% of them did not attain allocative efficiency level greater than 0.74. this implies that farmers were efficient in producing rice at a given the level of output using cost minimizing input ration for about 93.3% of the rice farmers have allocative efficiencies of 0.75 and above. High values of allocative efficiencies represent less efficiency or more inefficiency among rice the rice farmers during the process of production in the study area. The estimated allocative efficiencies differ substantially among the rice farmers ranging between 0.97 minimum value and maximum value of 0.97. This means that the most allocative inefficient rice farmers operated closer to their cost frontier or minimum cost of 1.00. The mean allocative efficiency was 0.97. The study revealed that for the average rice farmer in the study area to become most allocative efficient farmer, he will need to realize about 0.021% cost savings for example [1-(0.95/0.97)*100]. Also on the other hand, the least technically efficient rice farmer will need about 82% [1-(0.17/0.97)*100] cost savings to become the most allocative rice farmer.

Secondly, table 4.2 reveals the allocative efficiency frequency distribution after accessing CACS loan. The findings reveal that 92.1% of the farmers had allocative efficiency between 0.75 and 1.00. While about 7.9% of the rice farmers operate less than 0.74 allocative efficiency levels. This implies that majority of the rice farmers were allocative efficient because only 7.9% did not attain efficiency level greater than 0.74. this is to that farmers were efficient in producing rice at a given level of output using the cost minimizing input ratio of about 79% who have allocative efficiencies of about 0.75 and above. And so high levels of allocative efficiencies represent less efficiency or more inefficiency among rice farmers in during the process of production in the study area. The estimated allocative efficiencies differ to some extent among the rice farmers ranging between the minimum value of 0.19 and maximum value of 0.99. This means that the most allocative inefficient rice farmer farmers operated closer to their cost frontier or minimum cost of 1.00. The mean allocative efficiency was 0.93. Therefore the study revealed that for the average rice farmer in the study area to become the most allocative efficient farmer, the farmer will need to realize about 6.06% [1-(0.93/0.99)*100] cost savings to be the most efficient rice farmer, while on the other hand., the least technically efficient rice farmer will need 80.8% [1-(0.19/0.99)*100] cost savings to become most allocative efficient rice farmer in the study area respectively.

Note: the formula [1-(mean/max)*100] most allocative efficient farmer;

[1-(min/max)*100] least technically efficient farmer;

5. Conclusion and Policy Recommendations
From the findings there is the need for improved and sustained cost allocative efficiency in rice farming in the study area. To attain self-sufficiency there is need for farmers to be price efficient. Before CACS, there factors that can improve on price efficiency of households especially on the use of inputs such as seed and hired labour that reduces cost of production by 14.4% and 12.6% respectively. This implies that it can lead to higher optimal output. while the use of herbicides increases the cost of production by 17.4%. While after CACS it is the cost of hired labour that can reduce cost of rice farming production by 23.1%. This is in line with the findings of Adejoh (2021), Bello et. al. (2021) and Agba (2014).

Based on the findings of the study, there is need to have a sustained and improved allocative efficiency of rice farming systems in the study area the study recommends that monitoring of rice farmers that benefitted from the credit and measures should be put in place towards mitigating the factors that affect efficiency. For instance human and physical resources can be a priority and should be targeted as a form of public investment so as to improve rice farming. The cost of herbicides should be able to improve efficiency. The use of herbicides can be given at a subsidized rate to reduce cost of production in farming. Therefore deliberate policies such as training of farmers on the technique of farming through adoption of technologies to improve efficiency in farming. Also they can be trained on the utilization of inputs to reduce cost.

Secondly, there should be a sincere approach by the Central Bank of Nigeria towards allocating funds to real farmers in the study area without interest rate and provision of farm inputs at no cost. This can facilitate efficiency in rice production and reduce risk in production.

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