FUDMA Journal of Agriculture and Agricultural Technology
ISSN: 2504-9496
Vol. 10 No. 3, September 2024: Pp.120-130

https://doi.org/10.33003/jaat.2024.1003.15

IMPACT EVALUATION OF ANCHOR BORROWERS' PROGRAMME AMONG RICE FARMERS IN EKITI STATE, NIGERIA

Ojo, Olaniyi Oluwatosin (PhD)
Bamidele Olumilua University of Education, Science and Technology, Ikere-Ekiti, Ekiti State, Nigeria

ABSTRACT

In a bid to achieve rice self-sufficiency in Nigeria, the Central Bank of Nigeria initiated the Anchor Borrowers' Programme (ABP), aimed at enhancing rice production in the country. To boost rice output and processing capacity, the ABP seeks to facilitate input provision and economic connections between smallholder farmers and reputable large-scale processors. Consequently, this research assessed the impact of the Anchor Borrowers' Programme on small-scale rice farmers in Ekiti state, Nigeria, utilizing structured questionnaires to gather data from 384 farmers. Analysis of the data involved Descriptive statistics, Gross Margin analysis, and application of the Endogenous Switching Regression (ESR) model. The results showed that majority of the rice farmers were economically active and have fairly large household size regardless of their ABP participation status. However, the ABP participants' average farm size is larger than the ABP non-participants. Similarly, the ABP participants' average yield/ha and gross margin is higher than those of the ABP non-participants. The actual and counterfactual scenarios estimates revealed that ABP increased the yield/ha and the gross margin of the participants by 33.3% and 20.6% respectively, while the potential increase in the yield/ton and the gross margin of the ABP non-participants would have been 47.9% and 38.7% respectively if they had participated in ABP. The ESR results showed that awareness of ABP, education, household size and availability of land influenced participation in ABP. Similarly, the size of farm cultivated, farming experience and use of improved rice seed variety increased gross margin while marital status and upland production ecology reduced gross margin of the ABP participants. On the other hand, household size and size of land cultivated increased the gross margin while use of old rice variety and upland production ecology reduced the gross margin of the ABP non-participants. The study concludes that programmes that will give more publicity to ABP, educational programmes for farmers, and policy that will give farmers access to land for cultivation to enable more farmers to participate in ABP. Additionally, government through the extension agents should organize refresher capacity building training for rice farmers particularly ABP upland rice farmers on the optimum use of production inputs in order to avoid incurring unnecessary cost that can reduce their gross margin.

Keyword: Anchor Borrowers' Programme, Endogenous switching regression, Gross margin, Rice farmers, Ekiti state.

INTRODUCTION

Rice (Oryza sativa L.) ranks among the most valuable food crops for more than 50% of the global population (Atera *et al*., 2018). Rice cultivation is the mainstay and source of income for many homes across the globe. Rice is an important food and cash crop in many developing economies including Nigeria. Its importance cannot be over-emphasized as its value chain has the potential to provide employment and food for many people, income to escape poverty as well as foreign exchange when exported. Rice is a major component of Nigerian diet (Okunola & Bamgboye, 2016) and a food item that a rice-consuming family expends about 21-25% of his food budget on. Rice is generally accepted in Nigeria as a staple food, to the extent that Nigeria is the largest consumer of rice in Africa (Obih & Baiyegunhi, 2018). For some years now, demand for rice in Nigeria ranks higher than in any of the West Africa countries (Tondel *et al*., 2020; Okpiaifo *et al*., 2020). According to FAO (2017), Nigeria holds the position as the primary producer and consumer of rice in Africa and is among the largest importers of rice globally. Between 2011 and 2019, Nigeria increased her consumption of rice from 5.6million to 6.9millions tonnes (Morse, 2019). On the other hand, rice production in Nigeria increased from 3.7milion metric tons in 2017 to 4milion metric tons in 2018 (USDA, 2022). However, the demand for rice outpaces supply in Nigeria, hence the reason for making up the balance through import. Nneka *et al*., (2019) reported that the annual national demand for rice was 5 million tons while the annual production stood at only 3.78 million tons in 2019. It was estimated that out of about 6.7million metric tons of rice that Nigeria consumes annually, only 57% of this figure is produced locally while the balance (about 3million metric tons) is imported (Obayelu *et al*., 2022). Recently, Akinbile (2023) reported that Nigeria produced 5.4million metric tons of rice in year 2022 and consumed about 7million metric tons in the same year by importing the excess (2miliion metric tons) of consumption over production.

Even with the ban imposed on rice importation by Nigerian government, yet, a review of domestic production of rice in Nigeria showed that rice output increased from 4.9million metric tons in year 2010 to 5million metric tons in year 2021, (USDA, 2022) leaving a shortfall of about 2 million metric tons which is supplied through import. Nigeria has not been able to attain rice self-sufficiency production hence her resort to import gulping millions of dollar to make up for the demand-supply gap. Nigeria is running a wasteful consumption pattern as a result of the billions of Naira she spends on rice import from Thailand and India despite her comparative advantage in rice production (Ayinde et al., 2018) as

majority of the Nigerian states have favourable agro-ecology for the cultivation of rice. A number of factors influence Nigeria's lack of self-sufficiency in rice production. Smallholder farmers predominantly drive rice production in Nigeria, employing traditional techniques known for their low productivity (Tsado et al., 2014). Other factors include; defective production systems, dearth of vital inputs and poor marketing channels (FAO, 2016); lack of access to improved inputs, credit and market resulting in low productivity, low income and poverty (Okeke *etal*., 2019). Several efforts have been geared towards food self-sufficiency generally and rice in particular in Nigeria by successive Nigerian government. Among such efforts were special programme for food security (SPFS), Fadama Development projects, Multinational New Rice for Africa (NERICA) Rice Dissemination Project (MRDP) (2000); The Presidential Rice Initiative (1999) (Emodi & Madueke, 2008). However, Badejo and Adekeye (2018) posited that the programmes were characterised by unintended beneficiaries reaping the benefits and having as a result a defeat of the objectives of the programmes. However, a renewed effort at self-sufficiency in rice production in Nigeria informed the launch of ABP.

Anchor Borrowers Programme (ABP) was instituted with the specific aim of enhancing domestic production of agricultural goods such as rice, wheat, maize, and sugar, thereby reducing the extensive reliance on imported food items that could otherwise be cultivated domestically. Its overarching goals include job creation, preservation of foreign reserves, and poverty alleviation among small-scale farmers by facilitating their transition from subsistence to commercial farming. To achieve these objectives, the program is structured to establish a network connecting smallholder farmers with local large-scale processors, known as anchor companies, to bolster their capacity and promote institutional lending to the agricultural sector while facilitating financial inclusion for smallholder farmers.

Several studies have been conducted on Anchor Borrowers' programme in Nigeria (Okeke,*etal*., 2019; Badejo & Adekeye, 2018; Akighir, *etal*., 2021; Akinbile *etal*., 2023; Salisu *et al*., 2022; Shidali, 2022; Belewu,*etal*., 2023; Agboola, *etal*., 2021). These studies were carried out in various states of Nigeria and examined issues such as farmers' output, productivity, gross margin and poverty reduction of the programme. However, these studies except (Okeke *et al*., 2019) did not account for endogeneity problem in their studies which has a potential to bias their results. Therefore, this study examined the effects of participation in the Anchor Borrowers' Programme on rice farmers in Ekiti state, Nigeria.

METHODOLOGY

Study Area: the study was carried out in Ekiti-state, Nigeria. The state is one of the six states that made up the south western Nigeria. Ekiti state has sixteen local government areas and three geo-political zones. It has a population of 2,384,212 according to NPC, (2006) and a population of 3,592,200 was estimated for Ekiti in 2022 (NPC, 2023). Land area of 5,435sqkm (EKSG, 2006). The state is located within the tropics and also located between longitude and east of the Greenwich meridian and latitude and north of the equator. The state is bound in the south by Kwara and Kogi states and Ondo state in the south (EKSG, 2006). Ekiti-state is an upland zone having tropical climate with two distinct seasons. The state was chosen as the study area for this work because rice is cultivated in nearly all its local government areas mostly through rainfed upland mode of rice farming (Basorun, & Fasakin, 2013). Majority of the people in the state engage in agriculture and related activities to generate their primary income (NBS, 2006).

Sampling Technique and Method of Data Collection: a multi-stage sampling procedure was used to select samples for the study. The first stage involved a random selection of 3 Local Government Areas (LGAs) from the 5LGAs in the in the agricultural development projects (ADPs) zone 1, 3LGAs out of the %LGAs in the ADP zone 2 and 4LGAs out of the 6LGAs in the ADP zone 3. At the second stage, a simple random sampling of 3 communities per LGA was done which eneded in the seclection of 30 communities. At the third stage, a snowball sampling (due to non-availability of sampling frame of 13 rice farmers (including 7ABP beneficiaries and 6 ABP non-beneficiaries) per community was carried out. At the end of the sampling, 210 ABP beneficiaries and 180 ABP non-beneficiaries were selected for the study. However, 384 questionnaires were useful for the study. The selected LGAs and communities are shown in table 1:

Table 1: Selected LGAs and Communities

ADP ZONE/ HEAD QUARTER	LGAs	COMMUNITY
Zone 1- Aramoko	Ekiti west	Erio
		Oke imesi
		Erijiyan
	Ijero	Ikoro
		Iloro
		Ijero
	Irepodun/ Ifelodun	Igbimo
		Igede
		Iropora
Zone 2 – Ikere	Ekiti south west	Igbara-odo
		Ilawe
		Ogotun
	Gboyin	Ode
		Aisegba
		Agbado
	Ise	Eporo
		Kajola
		Ogbese
Zone 3 – Isan	Moba	Erinmope
		Igogo
		Ikosun
	Ido-osi	Aaye
		Ifaki
		Usi
	Ikole	Ikole
		Ipao
		Oke-ako
	Oye	Ayede
		Ayegbaju
		Ire

Analytical Techniques: the data collected were analysed using descriptive statistics such as percentage, mean, gross margin analysis and Endogenous Switching Regression (ESR) model to assess the impact of Anchor Borrowers' Programme (ABP) participation on rice farming households' gross margin

Gross margin analysis: gross margin analysis is a budgetary technique employed to estimate the difference between returns and variable costs. The gross margin for rice production can be calculated by deducting the total revenue (total production value) from the variable production costs, which fluctuate with the output level. This margin can be determined by multiplying the unit price of paddy rice by the quantity sold. Following Nwaobiala and Adesope (2013), gross margin is computed thus using equation 1.

GM = $(\varepsilon P_i Q_i - \varepsilon P_i X_i)$ ---------- 1

where GM = Gross Margin; Pi = price per unit of output; Qi = Quantity of output; Pj = price per unit of input; Xi = Quantity of input.

Endogenous Switching Regression (ESR) Model*:* In this study ESR model was preferred to other regression models and used because it is able to overcome the weakness (inconsistent estimates) of models like Ordinary Least Square (OLS) regression, Instrumental Variable (IV) and Heckman selection bias models. Although, Heckman (1979) formulated a model that employed inverse mill ratios derived from the initial stage of his two-stage estimation process to address selectivity bias. However, Lokshin & Sajaia (2004) contended that a drawback of the two-stage approach is its production of heteroskedastic residuals, rendering them unsuitable for obtaining consistent standard errors without cumbersome adjustments. Consequently, this study utilized the Endogenous Switching Regression (ESR) model to address both endogeneity and sample selection bias. In the ESR model, a two-stage estimation process was conducted concurrently, with the initial stage involving the estimation of an equation known as the selection equation (equation 2), typically used to identify the factors influencing participation in the Anchor Borrowers' Programme (ABP).

A probit model is specified for ABP participation as:

$B_i^* = \alpha^i X_i + u_i$ with $B_i = \sum \begin{pmatrix} 1\ if B_i^* > 1 \\ 0\ otherwise \end{pmatrix}$ ---------- 2

Where B_i^* is the unobservable or latent variable for ABP participation, B_i is the observable counterpart (i.e. equals 1, if the rice farming household has participated in ABP and zero otherwise)

X_i is a vector of observed farm and non-farm characteristics influencing ABP participation, α is the coefficient estimates and u_i is random disturbances associated with the ABP participation. At the second stage of ESR estimation, the impact of ABP participation on gross margin (the outcome variable) is specified for two regimes of participants and non-participants of ABP as: Regime 1 (participants): $y_{ip} and\ y_{in}$ are outcome variables for ABP participants respectively; W is a vector of exogenous variables of household I, expected to influence gross margin, B is the coefficient vector to be estimated; μ is the error term and p is dummy for ABP participation.

The ESR model is structured such that an overlap of X in equation (2) and W in equations 3a and 3b is permitted. However, in estimating the outcome equation, all the variables in the selection equation except one (called the identifying instrument) are good candidates. This is done for the identification purpose. A valid instrument should affect participation but not outcome (gross margin). In this study for instance, phone ownership which affects access to market information but not the outcome (gross margin) was considered to be a valid instrument. Further to estimating factors affecting ABP participation, the ESR model can equally be used to assess the effect of ABP participation on gross margin. The impact of ABP involvement is evaluated by contrasting the anticipated results of hypothetical scenarios where participants did not engage. The anticipated outcomes of the variable y under participation and non-participation scenarios can be represented as shown in equations (3a) and (3b).

$E(y_{ip}|p = 1) = W'^{\beta_{ip}} - \sigma_{p\varepsilon}\lambda_p$ ---------- 3a
$E(y_{in}|p = 1) = W'^{\beta_{iN}} - \sigma_{N\varepsilon}\lambda_p$ ---------- 3a
The alteration in the outcome attributed to participation, known as the average treatment effect on the treated (ATT), is represented in equation (4) as the disparity between the anticipated outcomes derived from equations (3a) and (3b) (Lokshin & Sajaia, 2004).
ATT = $E(y_{ip}|p = 1)$ - $E(y_{in}|p = 1)$ = 1-------4
Where r is the covariance of error terms and λ, the inverse mills ratios. Therefore, the effect of ABP participation on gross margin can be estimated using ESR model.

Table 2: Effect of Participation in Anchor Borrowers' Programme on Gross Margin of Rice farmers.

	Treatment and heterogeneity effects		
Sub-samples	Decisions Stage		Treatment Effects
	ABP	Not ABP	
Farm households that participated in ABP	(4) $E(Y_{JABP}\|D = 1)$	(5) $E(Y_{JNABP}\|D = 1)$	TT
Farm households that did not participate ABP	(6) $E(Y_{JABP}\|D = 0)$	(7) $E(Y_{JNABP}\|D = 1)$	TU
Heterogeneity effects	BH_{ABP}	BH_{NABP}	TH

Source: Author's compilation

RESULT AND DISCUSSION

Table 3 presents the distribution of rice farmers by socio-economic characteristics. The results showed that the farmers were in economically productive ages and their average age were about 47 years for the ABP participants and about 48 years for the non-participants implying that they were able to withstand the rigours associated with rice production. Table 2 also presents a result that revealed that the ABP participating farmers were a little more educated than their non-participant counterparts as an average ABP rice farmer is about 2 years more educated than his non-participant counterpart implying that the ABP farmers would be able to complete ABP credit registration formalities, process production, and marketing information for profit. Furthermore, the distribution of the farmers by household size on Table 2 showed that about half of the rice farmers had household composition of 5-8 members irrespective of their ABP status. The composition of an average rice farming household in the study area wre about 7 members. This suggests that rice farmers could use their household members as addition to hired labour to carry out the management practices on the rice farm. Moreover, size of rice farm cultivated is were similarly presented on table 2, the result reveals that none of the ABP rice farmers cultivated less than 1 ha of farmland and their average farm size is 2.23 ha

while more than half of their counterparts who were ABP non-participants cultivated less than 1 ha and had on the average a farm size of 1.29ha. The result that showed that none of the ABP rice farmers cultivated less than 1 ha. This was linked to the condition that ABP participants cultivated at least 1ha of land. The average farm size for both ABP participants and the ABP non-participants shows that they are smallholder farmers (Agboola *et al*., 2021; Olanrewaju, 2019). This underscores the important role that ABP seeks to play in increasing locally produced quantity of rice in Nigeria.

Table 3: Socio-Economic of ABP partcipants and ABP non-participants

	ABP Participants	%	ABP non-Participants	%
AGE				
<30	25	12	12	7
31-40	37	18	21	12
41-50	62	30	68	38
51-60	55	27	61	34
>60	27	13	16	9
Mean	46.9		48.4	
SEX				
MALE	136	66	146	82
FEMALE	70	34	32	18
HOUSEHOLD SIZE				
1-4	59	28.64	52	29.21
5-8	108	52.43	87	48.88
9-12	39	18.93	39	21.91
Mean	6.8		6.9	
EDUCATION				
0		0	11	6
1-6	25	12	23	13
7-12	88	43	110	62
13-18	68	33	34	19
>18	25	12	0	0
Mean	12.9		10.7	
FARM SIZE				
<1	0	0	95	53.37
1-1.99	92	44.66	61	34.27
2-2.99	78	37.86	14	7.87
3-3.99	20	9.71	8	4.49
>3.99	16	7.77	0	0
Mean	2.28		1.29	

Source: Author's compilation

Table 4 revealed that ABP rice farmers enjoyed a number of benefits by virture of their participation in the programme. The benefits include: access to credit, technical advice, training and market linkage. Access of the ABP rice farmers to these benefits suggests that they leveraged on them to record improved farm outcome.

Table 4: Benefits of ABP participation

Benefits	F	Percentages (%)
Access to credit	185	89.81
Technical advice	168	81.55
Training	201	97.57
Market linkage	124	60.19

Source: Author's compilation

Table 5 presents the analysis of cost and return of rice production in the study area. The results showed that ABP rice farmers cultivated more hectares of land than their ABP non-participants counterparts. This may be connected to the pre-qualification condition of having one hectare land. Furthermore, the table revealed that the average production inputs used by ABP rice farmers islower than those used by their counterparts who are not ABP participants. Thus, ABP rice farmers incured less cost of production than their ABP non-participants counterparts. This could be possible because of their access to technical advice/training. However, the ABP rice farmers used more mandays of labour in their production activities.

Their use of more mandays of labour is as a result of the fact that they cultivated larger farm (2.28ha) on the average than non ABP rice farmers whose average farm size is 1.29ha. Similarly, the table revealed that ABP rice farmers obtained higer yield/ha and gross margin than their ABP non-participants counterparts. This result could be due to ABP rice farmers' access to credit, training and technical advice. The result corroborates Agboola *etal*., (2021) who reported that ABP rice farmers had access to production inputs, training and technical advice.

Table 5: Cost and returns analysis of rice production

	ABP Participants			**ABP Non-Participants**		
Average farm size	2.28			1.29		
Variable input	Average quantity	Price/unit ₦	Amount N	Average quantity	Price /unit ₦	Amount ₦
Average kg/ha of Rice seeds	74.7	300	41,040	93.73	300	28,119
Labour in man-day	82	2500	353,400	71	2500	142,000
Average litre / ha herbicides	6.62	4000	22,800	9.52	4000	38080
Average litre/ ha insecticides	4.38	2800	12,264	4.97	2800	13,916
Average bag/ ha organic fertilizer	48.61	1000	48,000	69.13	1000	69,130
Average bag/ha inorganic fertilizers:				5.67 4.09	15,500 12,500	87,885 51,125
NPK	4.87	15,000	136,800			
UREA	2.91	12,000	68,400			
Farm tools purchased	-	1,500	22500	-	1,500	27,000
Total cost (TC)	-	-	404,165	-	-	457,255
Average rice output tonnes/ha	5.42	-	-	4.68	-	-
Total revenue (TR)	-	215,000	1165300	-	215,000	1,006,200
Gross margin (TR-TC)	-	-	761,135	-	-	548,945

Source: Author's compilation

Table 6 presents the estimates for the average treatment effects on the treated (ATT), average treatment effect on the untreated (ATU) and the heterogeneity effect (HE) which indicate the impact of ABP on rice yield and gross margin. The results show that the causal effect of ABP for participants is about 1.8 tons/ha implying 33.3% increase in yield of ABP participants. On the other hand, the potential causal effect of ABP on the non-participants is about 2.227 tons/ha implying 47.9% increase in yield. Similarly, ABP increased participants' gross margin by 20.6% while its potential increase for the gross margin of ABP non-participants is 38.7%. The results support previous studies by Olanrewaju *etal*., (2020); Agboola *etal*., (2021).

Table 5: Estimates for the average treatment effects on the treated (ATT), average treatment effect on the untreated (ATU) and the heterogeneity effect (HE)

Farm outcome	Participation Status	Predictions		Treatment effects	t-value
		ABP	NABP		
(1) Yield/ha	ATT(ABP)	7.225	54.2	1.805***	4.3
	ATU(NABP)	6.907	4.68	2.227***	5.1
	Heterogeneity effect	0.318	0.740		
Gross Margins/ha	ATT(ABP)	918228.6	761135	157093.6***	4.41
	ATU(NABP)	822290.2	548945	212190***	12.7
	Heterogeneity effect	95938.4	273345.2		

Source: Author's compilation

Table 6 displays the impacts of rice farmers' participation in the Anchor Borrowers' Programme (ABP) within the study region. The likelihood ratio test reveals that the equations in the ESR specification are interrelated, signifying dependence between them. Significant correlation coefficients (p) in the ESR specifications suggest the presence of selection bias due to unobservable factors in participation. Thus, employing the ESR model in this study is justified, as indicated by Lokshin & Sajaia (2004), given the negative and significant signs for p indicating positive selection bias, suggesting that farmers with higher-than-average participation requirements are more likely to engage in the ABP. Further to the foregoing statistic, the results show that awareness of ABP positively and significantly influenced participation in ABP at 10% level of significance. This implies that farmers who are aware of ABP are more likely to participate in the programme. This is due to the possibility that being aware of ABP would acquaint the farmers with the gains inherent in it which would inform their decision to participate in it. The results agrees with (Agboola *etal.,* 2021). Similarly, education positively and significantly influenced participation in ABP at 5% level of significance. This suggests that educated farmers are more likely to participate in ABP. This could be ascribed to the need for farmers to possess reading and writing skills which would be required for ABP registration formalities, agrochemical applications and financial transactions. The result is consistent with Agboola *etal*., (2021). Also, household size positively and significantly influenced participation in ABP at 5% level of significance. This implies that farmers having large households are more likely to participate in ABP than their counterparts having small households. This may be as a result of the need to have quite a number of people to take care of the labour-intensive nature of rice farm management. The result supports Okeke *etal*., (2019) who found that household size positively and significantly affected participation in ABP. Furthermore, availability of land positively and significantly influenced participation in ABP at 5% level of significance. This suggests that farmers who have access to land through any of the ownership modes are more likely to participate in ABP. The result may be attributed to the fact that land availability is one of the requirements to satisfy before a farmer can participate in ABP. The result supports earlier study by Badejo &Adekeye (2018) who reported that land availability influenced participation in ABP. In examining the factors influencing the gross margin of ABP rice farmers, marital status negatively and significantly influenced gross margin at 10% level of significance. This implies that ABP participants who are married are more likely to get lower gross margin than similar participants who are unmarried. This finding could be possible because the married participants are more likely to consume larger proportion of their output than their unmarried counterparts thereby reducing the level of output to offer for sale which translates to low revenue (gross margin). The finding agrees with Dayyabu *etal.,* (2021) who found that married rice farmers in their study realized less profit than their counterparts who were single. Moreover, size of land cultivated for rice positively and significantly influenced gross margin at 1% level of significance. This implies that ABP farmers who cultivated larger land for rice are more likely to obtain higher gross margin. This is possible because the larger the area of land cultivated, the more the output that will be obtained, *ceteri paribus.* The result is consistent with (Mesfin *etal.,* 2017) who reported that total land cultivated positively and significantly influenced gross margin. Similarly, seed variety positively and significantly influenced gross margin at 1% level of significance. This suggests that farmers who planted the improved seed variety are more likely to obtain higher gross margin. The reason for this may be due to the fact that the improved seed variety produces higher output in terms of tonnes/ hectare than the old variety and this translates to revenue (gross margin). Similar finding was reported by Akanbi *eta*l., (2022) that lower gross margin was obtained from farmers' seed (old variety) than certified seed (improved seed). Also, farming experience positively and significantly influenced gross margin at 5% level of significance. This suggests that farmers who have longer years of experience in rice production are more likely to obtain higher gross margin than their similar counterparts who are not as experienced as them. The result suggests that to obtain a worthwhile gross margin, farmers must have practised for a reasonable length of time to acquire experience in terms of rice production and marketing. A similar finding was reported by Djokoto & Zigar (2021) that gross margin of processed crude palm oil increased with additional year of experience. However, for ABP non-participants, household size positively and significantly influenced the gross margin obtained at 1% level of

significance. This implies that large household farmers are more likely to obtain higher gross margin than small household farmers. This may be because a large household is a potential source of labour supply for the labour-demanding nature of rice farm management. The result contradicts Mesfin *etal*., (2017) and Bidzakin etal., (2019) who found that farmers with larger household size obtain lower gross margin. Again, seed variety negatively and significantly influenced gross margin at 1% level of significance. This implies that ABP non-participants who do not grow improved rice variety are more likely to get lower gross margin than their counterparts who grow improved variety. The finding suggests that old rice variety is associated with low yield and, consequently low gross margin. The result corroborates Tesfay and Woundiferaw (2024), who reported that the adoption of improved rice varieties has a positive effect on the gross farm income of smallholder rice farmers. Moreover, size of land cultivated positively and significantly influenced gross margin at 5% level of significance. This implies that farmers who cultivate larger size of land are more likely to obtain higher gross margin. This is possible because the larger the size of land cultivated, the more the output obtainable, holding all other things else constant. The result agrees with Mesfin *etal*., (2017) who found that total land cultivated positively and significantly affected gross margin. However, regardless of ABP participation status, production ecology negatively and significantly influenced gross margin. This implies that rice farmers who practised upland production ecology system obtained lower gross margin than their counterparts who practised lowland production ecology system. This could be due to the possibility that the lowland rice farmers incurred lower cost of production than the upland rice farmers perhaps as a result of substandard farm management practices. The finding is consistent with Akanbi *et al*., (2024) who reported that upland rice farmers incurred higher cost than their lowland rice farmers.

Table 6: Maximum Likelihood Estimates of Endogenous Switching Regression (ESR) for Examining Effect of Anchors borrowers' programme Participation on gross margin among Rice Farming Households.

Variable	Participation in ABP (1/0)		ABP Participants		ABP non-participants	
	Coefficient	**t-value**	**Coefficient**	**t-value**	**Coefficient**	**t-value**
Awareness of ABP	2.75E-03**	-2.696078431	1.74E-03	-1.43	1.71E-03	-1.47
	(1.02E-03)		(1.22E-03)		(1.16E-03)	
Age	0.608	-1.493857494	0.401	-1.28	0.422	-1.43
	(0.407)		(0.314)		(0.296)	
Marital status	0.797	-0.524687294	0.083*	-1.93	0.028	-0.32
	(1.519)		(0.043)		(0.087)	
Education	0.291**	-22.38461538	0.007	-0.54	0.006	-0.86
	(0.013)		(0.013)		(0.007)	
Household size	1.301**	-2.001538462	1.045	-1.21	1.295***	-3.22
	(0.650)		(0.861)		(0.402)	
Farming experience	3.26E-05	-1.43E+00	1.16E-06**	-2.40	5.61E-05	-0.49
	(2.28E-05)		(4.83E-07)		(1.14E-06)	
Production ecology	-2.78E-04	1.579545455	-2.84E-04**	2.04	2.58E-05**	-2.02
	(-1.76E-04)		(1.39E-04)		(1.28E-05)	
Mobile phone	3.812*	-1.757491932				
	(2.169)					
Availability of land	0.294**	-2.773584906	0.175	-1.43	0.271	-1.55
	(0.106)		(0.122)		(0.175)	
Seed variety	0.956	-0.50210084	0.396***	-3.88	0.377***	-3.12
	(1.904)		(0.102)		(0.121)	
Size of cultivated land	0.057	-0.863636364	0.367***	-7.06	0.202**	-2.97
	(0.066)		(0.052)		(0.068)	
Sex	1.22E-04	-1.26E+00	1.37E-06	-0.47	1.68E-05	-1.04
	(9.69E-05)		(2.94E-06)		(1.62E-05)	
Constant	131.879**	-2.273383899	1.5134***	-2.04	0.069**	-2.88
	(58.010)		(0.743)		(0.024)	
σ_{ei}*			0.112***	-0.63	0.259***	-0.38
			(0.178)		(0.689)	
φ_j			-0.301***	23.15	-0.253***	18.07
			(0.013)		(0.014)	
Log likelihood	-2176.513					
Likelihood ratio of independence $x^2(1)$13.02***						

* Significant at 1%, ** significant at 5%, *** significant at 10%

Table 7 presents the distribution of the ABP rice farmers by their comments on the implementation of the programme. The farmers' remarks revealed that the implementation of the ABP programme is fraught with issues such as: displacement of real farmers, inclusion of absentee farmers, inadequate amount of disbursed credit and inability of some farmers to access the credit. Other remarks are: inability to meet up with farm size requirement and non-revolving nature of the credit contrary to the blueprint.. The remarks of the rice farmers suggests a review of the implementation of the ABP programme.

Table 7: Challenges of ABP

Challenges	Frequency (F)	Percentages (%)
Displacement of the real farmers	119	57.78
Delayed disbursement of funds	66	32.04
Inclusion of absentee farmers	119	57.78
Deviation from MOU	61	29.61
Inadequate credit in terms of amount	141	68.45
Some farmers could not access the credit	157	76.21
Haphazard distribution of crop-input	54	26.21
Inability to meet up with farm size requirement	151	73.30
Non-revolving nature of the credit	167	81.07
Use of inexperienced resource persons for the train the trainers component of the programme	58	

Note: Multiple responses

SUMMARY AND CONCLUSION

This study adds to the existing literature on the Anchor Borrowers' programme (ABP) by examining the impact of the programme on rice farmers in Ekiti-state, Nigeria. The study used structured questionnaire and interview schedule to collect data from the rice farmers in the study area. The results from the descriptive statistics showed that rice farmers are in their economically productive ages, they have fairly large household size regardless of their ABP status. However, the ABP rice farmers are a little more educated and cultivated larger size of farm their counterparts who did not participate in ABP. On the other hand, the result from the endogenous switching regression (ESR) model showed that awareness of the ABP, being educated, having land and large household size increased the probability of participating in ABP.

Similarly, the ESR revealed that the size of land cultivated, farming experience and planting improved rice variety increased the probability of obtaining high gross margin for ABP rice farmers. However, being married and adopting upland rice production ecology system reduced the probability of obtaining high gross margin for ABP rice farmers. But for the ABP non-participating rice farmers, household size and size of land cultivated increased the probability obtaining high gross margin. Furthermore, planting old rice variety reduced the probability of obtaining high gross margin.

Moreover, the result of the impact analysis indicated that the causal effect of ABP for participants is about 33.3% and 20.6% increase in yield and gross margin of ABP participants respectively. The results further showed that the potential increase in the yield and gross margin of the ABP non-participant is 47.9% and 38.7% respectively. Therefore, the study recommends programmes that will give more publicity to ABP, educational programmes for farmers as well as policy that will make farmers have access to land for cultivation to enable more farmers participate in ABP. Additionally, government through the extension agents should organize refresher capacity building training for rice farmers particularly ABP upland rice farmers on the optimum use of production inputs in order to avoid incurring unnecessary cost that can reduce their gross margin.

REFERENCES

Agboola, T. O., Kamila, A.O., Balogun, O. L., Olatunbosun, J.L. & Apata, M. O. (2021). Effects of Anchor Borrowers' Programme on Rice Production in Irepodun/Ifelodun Local Government Area, Ekiti State acta SATECH 13 (1):13 – 25, https://www.actasatech.com.

Akanbi, O.N., Adepoju, A.A., Olawuyi, S.O., & Olarinde, L.O. (2024). Cost and Returns Analysis of Upland and Lowland Rice Production among Farmers in North Central Nigeria. *International Journal of Research in Business and Social Science.* 13(11): 288-302, https://doi.org.10.20525/ijrbs.vizi.2989

Akanbi, S.O., Mukaila, R. & Adebisi, A. (2022). Analysis of Rice Production and the Impacts of the Usage of Certified Seeds on Yield and Income in Cote d'Ivoire. *Journal of Agribusiness in Developing and Emerging Economies*, 14(2): 234-250, https://doi.org/ 10.1108/JADEE-04-2022-0066.

Akighir, D.T., Akegh, E., & Ebele, E. (2021). Anchors Borrowers' Programme and Poverty level among smallholder farmers in Benue State, Nigeria: Implications for Economic Recovery and Growth Plan' *The Nigerian Journal of Economic and Social Studies,* 63 (2): 241-269

Akinbile, C.O. (2023). Nigeria is Africa's Leading Rice Producer, but still needs more-reusing Waste Water for Irrigation would Boost Farming. *The Conversation*, https://theconversation.com/nigeria-is-africas-leading-rice-producer-but-still-needs-more-reusing-wastewater-for-irrigation-would-boost-farming-206787

Akinbile, L. A., Akingbade, M., Salaudeen, A.O. (2023). Contributions of Anchor Borrowers Programme to Rice Farmers' Productivity in Ekiti State. Journal of Agricultural Extension 27(1) 49-60. https://dx.doi.org/10.4314/jae.v27i1.5

Atera, E.A., Onyancha, F.N. & Majiwa, E.B.O. (2018). Production and marketing of rice in Kenya : Challenges and opportunities. *Journal of Development and Agricultural Economics*,10: 64-70

Ayinde, O.E., Fatigun, O., Ogunbiyi, K., Ayinde, K. & Ambali, Y.O. (2018). Assessment of Central Bank Intervention on Rice Production in Kwara State, Nigeria: A Case-study of Anchor Borrower's Program, 30th International Conference of Agricultural Economists, July 28-August 2,Vancouver

Badejo, B.T., & Adekeye, A.J. (2018). The Impact of Anchor Borrowers' Programme on Poverty Alleviation in Argungun Local Government Area of Kebbi state, Nigeria. *Journal of Public Administration and Governance*, 8 (4):1-11, https://doi.org/10.5296/jpag.v8i4.14049.

Basorun, J.O, & Fasakin, J.O. (2013): Assessing the Significant Factors Influencing the Location of Rice Marketers in Igbemo Region, Nigeria. British *Journal of Arts and Social Sciences*. 12(1).

Bidzakin, J.K., Fialor,S.C., Awunyo-Vitor, D. & Yahaya, I. (2019). Impact of contract farming on rice farm performance: Endogenous switching regression, Cogent Economics and Finance, 7:1, 1618229, https://doi.org/10.1080/23322039.2019.1618229

Dayyabu, L. M., Murtala, N. & Shu'aib, A. U. (2021). Gross Margin Analysis of Marketing Paddy Rice (Oryza Sativa) In Selected Markets in Bauchi State, Nigeria. *Journal of Agripreneurship and Sustainable Development*, 4(1): 180-186.

Ekiti State Government, (2006). "Ekiti State in Brief" Ekiti State Diary, https://www.ekitistate.gov.ng.

Emodi A. I. & Madukwe, M.C. (2009). A Review of Policies, Acts and Initiatives in Rice Innovation System in Nigeria. *Journal of Agricultural Extension* 12(2) 76-83, https://doi.org/10.4314/jae.v12i2.47052

Food & Agricultural Organisation (2017). Nigeria at a Glance, https://www.fao.org/nigeria/fao-in-nigeria/nigeria-at-a-glance/en/

Food and Agriculture Organisation (FAO) (2016). Production year book, Trade, Rome, Italy

Belewu, K.Y., Ajao, O.A. & Babatunde, R.O. (2023) Effect of Anchor Borrowers' Programme on poverty status of rice farmers in Nigeria *Agricultura Tropica et Subtropica*, 56, 177–188, 2023. https://doi.org 10.2478/ats-2023-0020

Mesfin , M., Demeke, L.B. & Birhanu, A. (2017). Analysis of Factors Affecting Potato Farmers Gross Margin in Central Ethiopia: The Case of Holeta District. MPRA Paper, 39 pp, https://mpra.ub.uni-muenchen.de/92829/MPRA Paper No. 92829, posted 23 Mar 2019 03:45 UTC.

Morse M. (2019). Rising rice consumption in Nigeria: farming and the value of a value chain. Global economies & markets and business, ethics & society, https://ideas.darden.virginia.edu/rising-rice-consumption-in-nigeria.

National Bureau of Statistics (NBS), (2006). Population Census. Federal Republic of Nigeria, Abuja.

Nneka C., Donatus O., Polycarp, O. & Steve O. (2019). Profitability of rice production in different production systems in Ebonyi State, Nigeria. Open Agriculture, 4(1): 237-246.

NPC (2006). Nigerian population census report 2006. National Population Commission Abuja

NPC (2023). City population, Maps and Charts. National Population Commission Abuja

Nwaobiala C.U. & Adesope O.M. (2013). Economic Analysis of Small holder Rice Production Systems in Ebonyi State South East, Nigeria. Russian *Journal of Agricultural and Socio-Economic Sciences*, 11(23):3-10. https://doi.org/10.18551/rjoas.2013-11.01

Obayelu, E. A., Wintola, A.O., & Oluwalana, E.O.A. (2022) Households' Rice Demand Response to Changes in Price, Income and Coping Strategies during Food Inflation in Nigeria: Evidence from Oyo State. *Italian Review of*

Agricultural Economics 77(2): 61-75. https://doi.org/10.36253/rea-13602.

Obih, U. & Baiyegunhi, L. (2018). Financing Smallholder Rice Farmers: A Field-Based Evidence Review of Anchor Borrowers' Programme (ABP) Model in Nigeria. *Journal of Economics and Behavioral Studies* 10(6): 229-239.

Okeke, A.M., Mbanasor, J.A. & Nto, P.O. (2019). Effect of Anchor Borrowers' Programme Access among Rice Farmers in Benue State, Nigeria: Application of Endogenous Switching Regression Model. *International Journal of Agriculture and Earth Science*, 5 (3): 31-47.

Okpiaifo G., Okpiaifo A.D., Grant H.W., Lawton L.N., Rodolfo M.N., & Eric J.W. (2020). Consumers' preferences for Sustainable Rice Practices in Nigeria. *Global Food Security*, 24(10): 1-11, https://doi.org/10.1016/j.gfs.2019.1003 45

Okunola A.A., & Bamgboye I.A. (2016). Performance Evaluation of Local and High Yield Varieties of Milled Rice in a Cleaning/Grading Machine. A Paper Presented at *Commission Internationale du Génie Rural* (CIGR)-Agricultural Engineering Conference, held at Aarhus, Denmark, from June 26-29, 2016.

Olanrewaju, O. (2019). Assessment of Awareness and Determinants of Anchor Borrowers Program's Adoption among Rice Farmers in Kaduna State, Nigeria. *International Journal of Creative and Innovative Research in All Studies*, (2)1: 35-45

Salisu, J., Adebayo, C.O., Jirgi, A.J., & Ojo, A.O. (2022). Effects of Anchor Borrowers' Programme Credit on the Productivity of Beneficiary Rice Farmers in Kebbi-state, Nigeria. *Journal of Agricultural Technology*, 8(1), 329-338, https://doi.org/10.33003/jaat.2022.0801.101

Shidali, N. (2022). A Policy evaluation of the Anchor Borrowers' Programme and Smallholder Farmers in the Federal Capital Territory, Abuja, *Global Journal of Political Science and Administration*, 10(3), 27-41. https://doi.org/10.37745/gjpsa.2013vol10n32741

Tesfay, W., Belete Woundiferaw, B. (2024). Impact of Improved Rice Variety Adoption on Smallholder Farmers Rice Productivity and Gross Farm Income Enhancement in North Western Ethiopia International Journal of Agricultural Economics, 9 (2): 110-119 available online at https://doi.org/10.11648/j.ijae.20240902.17

United States Department of Agriculture [USDA], (2022). Nigeria Rice Production Outlook. Economic Research Service Report, 19pp USA.

United States Department of Agriculture [USDA], (2016). Rice Outlook: USDA Economic Research Service Report, 24pp USA.