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RESEARCH ARTICLE

Impact of Anchor Borrowers Program (ABP) on Smallholder Rice Farmers in Kebbi State, Nigeria

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ABSTRACT

The study examined the impact of the Anchor Borrowers Programme on smallholder rice farmers in Kebbi State, Nigeria. A multi-stage sampling technique was used to select 500 beneficiary and non-beneficiary rice farmers, each giving a sample size of 1000 farmers for the study. Data collected were analyzed using descriptive statistics such as percentages, frequency distribution, performance indices computation, t-test, Chow-test, and production function analysis. The results of the analysis of the Chow F computation indicated that there is a significant difference in the production function of beneficiaries and non-beneficiaries, respectively, since the computed Chow F value of 21.128 was greater than that of the critical F-value at the 0.01 probability level. This is an indication that the anchor Borrowers Programme (ABP) performed well. The results further revealed that the two groups of rice farmers were not operating on the same production function. ABP significantly and positively affected the output and income of the beneficiary farmers in the study area. It is recommended that Policies should be tailored toward inclusiveness of more farmers into the ABP. The program should also be extended to cater for other sub-sectors of the Agricultural sectors, such as Livestock and Aquaculture.

Key words: Anchor borrowers program, farmers, impact, Kebbi State, rice

INTRODUCTION

Nigeria's economy took a hit from declining oil revenues in 2015, forcing the Government to seek economic diversification. It has set to pursue agricultural development as one of its key goals to address the country's dependence on food imports, which consume hundreds of dollars annually. It has also engaged in a campaign to redirect focus from oil to agriculture, manufacturing, and solid minerals development initiatives.

It is generally acknowledged that credit to farmers is the most important instrument in improving farm productivity. This applies especially to peasant smallholders whose lack of capital seems to be a crucial factor limiting farm development.

Over the years, Nigeria has been grappling with food insecurity and its attendant consequences, leading to hunger, massive importation, and social disorders, among others. To overcome the challenges posed by food insecurity, so many agricultural programs were introduced with the sole aim of boosting food production, and stemming the tide of food insecurity. According to Evbaomwan and Okoye (2017),[1] in an effort to solve the challenges facing the agricultural sector and help Nigeria overcome the problems of food insecurity that led to importation and over-dependence on oil revenue. The Nigerian government has implemented a broad range of policies in the rice sector aimed at rice self-sufficiency. These programs include among others, the Presidential Initiative on Increased Rice

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Production (2002–2007), the Nigerian National Rice Development Strategy (NRDS, 2009-2018), Rice Intervention Fund (RF, 2011), the Agricultural Transformation Agenda (ATA, 2011-2015), the Anchor Borrowers Program (ABP-2015).

The Central Bank of Nigeria (CBN) in line with its development function, established the ABP. The program which was launched by President Muhammadu Buhari (GCFR) on November 17, 2015, is intended to create a linkage between anchor companies involved in processing and smallholder farmers (SHFs) of the required key agricultural commodities. The program thrust of the ABP is the provision of farm inputs in kind and cash (for farm labor) to smallholders to boost the production of some crops such as rice, soybean, and other commodities, stabilize input supply to agro-processors and address country's negative balance of payment on food. At harvest, the SHF supplies his/her produce to the agro-processor (Anchor), who pays the cash equivalent to the farmer's account.

The program evolved from consultation with various stakeholders comprising the Federal Ministry of Agriculture and Rural Development, State Governors, millers of agricultural produce, and smallholder farmers to boost agricultural production and non-oil exports in the face of unpredictable crude oil prices and its resultant effect on the revenue profile of Nigeria. These interventions have made rice farming inputs (including credit) fairly available, but the impact, effect or Performance of such interventions are still scanty and non-documented with limited coordination.

A lot of studies have been carried out on the performance of government programs such as (Alston and Porde, 2001;[2] Alabi, 2003;[3] Alkire and Foster, 2007;[4] Ezeokeke *et al*., 2012[5] among others). Most studies examined the performance of government programs such as Fadama III, the International Fund for Agricultural Development, the National Programme for Food Security, Microfinance Banks, and the Bank of Agriculture. Consequently, there is a paucity of published work in Nigeria generally and Kebbi State in particular on the impact of ABP on the beneficiary rice farmers.

A study directed at evaluating the impact of ABP has become necessary to examine the success or otherwise of the program based on its goal. It is envisaged that proper implementation or execution of the program will engender food security, and poverty reduction, enhance the income of the farmers and revitalize the non-oil sector of the economy, particularly agriculture. The study hopes to analyze the success or otherwise of the ABP. Analyzing the impact of the program among the beneficiary rice farmers, might likely guide the policymakers on whether the program is successful or not. The study hopes to also provide information that would guide prospective investors on how to appropriate and use scarce resources in their investment drive on rice farming. The sustainability of the program in terms of its spread to other States that have not been implemented is also premised to depend on the information that might likely emanate from the study.

The ABP is meant to provide funding support to SHFs in the Agricultural sector who lack funds to keep their business going. It is to be repaid within a certain period. According to the CBN Governor, a total of 3, 107,890 farmers had been financed for the cultivation of 3,801,897 hectares across 21 commodities through participating financial institutions in the 31 States of the Federation and FCT, from the inception of the program till date. Incidentally, the Program was first launched in Kebbi State on the 17th November, 2015. It is envisaged that proper implementation or execution of the program will engender food security, and poverty reduction and revitalize the non-oil sector of the economy, particularly agriculture. The study hopes to evaluate the success or otherwise of the ABP. Analyzing the impact of the program on the income of rice producers might likely guide the policymakers on whether the program is successful or not.

The study will also provide information that would guide prospective investors on how to appropriate scarce resources in their investment drive toward rice farming. The sustainability of the program, in terms of its spread to other States that have not been implemented yet, is also premised on the information that might likely emanate from the study. Results from the study hope to provide early signals on what interventions are required to sustain the program to boost agricultural production and reverse Nigeria's negative balance of payments on food. Furthermore, information from this study might assist policymakers in determining the extent

to which the Anchor Borrowers Program is on track and to make any needed corrections where necessary.

It is against this backdrop that this study attempts to provide answers to the following research questions;

i. What is the performance of ABP in the achievement of predetermined objectives?
ii. What is the impact of ABP on the output of the beneficiary rice farmers?
iii. What specific benefits of ABP accrued to the beneficiary rice farmers?

Hypotheses of the Study

H_0: There is no significant impact of ABP on the output of the beneficiary rice farmers

H_1: There is a significant impact of ABP on the output of the beneficiary rice farmers.

MATERIALS AND METHODS

Study Area

The study was conducted in Kebbi State, Nigeria. The choice of Kebbi State was premised on the fact that it is the State where the ABP was first launched in Nigeria. Kebbi State is located in the north-western part of Nigeria and occupies a land area of about 37,699 square kilometers of which 36.46% is made of farmland (Kebbi State Government, 2018). The State has a population of about 3,630,931 (NPC, 2006).[6] Projecting this population to 2022 while increasing at an annual population growth rate of 2.38%, the State has a projected population of about 5,563,900 people. The State lies between latitudes 10°05[1] and 13°27[1]N of the equator and between longitudes 3°35[1] and 6°03[1]E of the Greenwich. This area is characteristic of the Sudan savannah sub-ecological zone with distinct wet and dry seasons. Soils are ferruginous on sandy parent materials, evolving from the sedentary weathering of sandstones.

Over two-thirds of the population are engaged in agricultural production, mainly arable crops alongside cash crops with animal husbandry. The major crops cultivated include rice sorghum, millet, maize, cowpea, sweet potato, rice, vegetables, and fruits. Cash crops grown here include soybeans, wheat, ginger, sugarcane, tobacco, and gum-arabic.

Sampling Procedure and Sample Size

A multistage sampling method was used to select the respondents for the study [Table 1]. Firstly, the purposive selection of seven (7) Local Government areas (LGA) with the highest concentration of Anchor Borrowers Programme beneficiary rice farmers in the State. The LGAs are; Suru, Brinin-Kebbi, Bunza, Argungu, Augie, Dandi and Jega). Second, the purposive selection of two villages/communities with the highest number of (ABP) beneficiary rice farmers from the seven (7) LGA giving a total of Fourteen villages/communities. Third, from each of the 14 villages/communities all together, 500 beneficiary and non-beneficiary rice farmers each were proportionately selected randomly, thus giving a sample size of 1000 rice farmers for the study.

Data Collection

A pretested semi-structured questionnaire was used to collect data for the study. Data were collected on socioeconomic characteristics of the beneficiary rice farmers in the study area. Input-output information was solicited on cost, returns on production, and the benefits of ABP accrued to the beneficiary rice farmers, among others.

Analytical Techniques

The specific objectives of this study were achieved using Descriptive Statistics, Performance Index Computation, and Chow F test.

Chow F Test

To assess the performance of the ABP, the Chow test was used to test for significant differences in the intercept of production function between the groups sampled. According to Dougherty (2007)[7], the Chow test statistic is often used in program evaluation to determine whether the program has impacts on different sub-group populations.

It is expressed mathematically as;

$$F = \frac{(RSS - RSS_1 + RSS_2)/k}{RSS_1 + RSS_2 / N_1 + N_2 - 2k}$$

where F = Chow F
RSS = Residual sum of squares for the pooled sample
RSS_1 = Residual sum of square for beneficiaries
RSS_2 = Residual sum of square for non-beneficiaries
N_1 = Number of beneficiaries sampled
N_2 = total number sampled
K = Number of parameters.

To compute the sum of squares, a four-production function was fitted to the data. The choice of this functional form was based on documented evidence of its wide application in production function estimation in Agriculture. Four production function equations were estimated for the ABP beneficiaries, non-beneficiaries, and the pooled samples as follows, respectively;

(1) Linear:

$$Q_b = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_5X_5 + e_1 \quad (1)$$
$$Q_n = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_5X_5 + e_2 \quad (2)$$
$$Q_{bn} = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_5X_5 + e_3 \quad (3)$$

(2) Semi-logarithmic:

$$Q_b = \ln\beta_0 + \beta_1\ln X_1 + \beta_2\ln X_2 + \beta_3\ln X_3 + \beta_4\ln X_4 + \beta_5\ln X_5 + e_1 \quad (4)$$
$$Q_n = \ln\beta_0 + \beta_1\ln X_1 + \beta_2\ln X_2 + \beta_3\ln X_3 + \beta_4\ln X_4 + \beta_5\ln X_5 + e_2 \quad (5)$$
$$Q_{bn} = \ln\beta_0 + \beta_1\ln X_1 + \beta_2\ln X_2 + \beta_3\ln X_3 + \beta_4\ln X_4 + \beta_5\ln X_5 + e_3 \quad (6)$$

(3) Cobb-Douglas:

$$\ln Q_b = \ln\beta_0 + \beta_1\ln X_1 + \beta_2\ln X_2 + \beta_3\ln X_3 + \beta_4\ln X_4 + \beta_5\ln X_5 + e_1 \quad (7)$$
$$\ln Q_n = \ln\beta_0 + \beta_1\ln X_1 + \beta_2\ln X_2 + \beta_3\ln X_3 + \beta_4\ln X_4 + \beta_5\ln X_5 + e_2 \quad (8)$$
$$\ln Q_{bn} = \ln\beta_0 + \beta_1\ln X_1 + \beta_2\ln X_2 + \beta_3\ln X_3 + \beta_4\ln X_4 + \beta_5\ln X_5 + e_3 \quad (9)$$

(4) Exponential:

$$\ln Q_b = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_5X_5 + e_1 \quad (10)$$
$$\ln Q_n = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_5X_5 + e_2 \quad (11)$$
$$\ln Q_{bn} = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_5X_5 + e_3 \quad (12)$$

where;

Q_b = Total value of production for beneficiaries (N)/ha
Q_b = Total value of production for nonbeneficiaries (N)/ha
Q_{bn} = Total value of production for pooled sample (N)/ha
X_1 is the seed input in kg/ha
X_2 is the fertilizer input in kg/ha
X_3 is the agrochemical in liters/ha
X_4 is the labor input in man-days/ha
X_5 is the capital input/ha/(comprising depreciation on agricultural tools and equipment, repairs and operating expenses of implements, rent, interest, payments, etc.),
ln = Natural logarithm,
β_o = constant term,
$\beta_1 - \beta_5$ = estimated regression coefficients and
e_1, e_2, e_3 = respective error terms for beneficiaries, non-beneficiaries and pooled samples, respectively.

RESULTS AND DISCUSSION

Chow Test

Chow F statistic was computed to ascertain the performance of ABP. Four different functional forms were fitted to the data, and the lead equation was chosen based on the normal economic, econometric, and statistical criteria. Regression analysis was carried out to obtain the error sum of squares to aid in the computation of Chow F. A summary of the estimated four production functions for the beneficiaries, non-beneficiaries, and pooled sample are presented in Tables 2-7.

The results obtained from the estimated coefficient of the regression analysis in Tables 2 and 3 showed that the lead equation for this category was the cobb-douglass functional form based on the magnitude of coefficient of multiple determination (R^2), the number of significant variables and the magnitude of the F-statistics. The (R^2), value of 0.621 showed that the independent variable accounted for 62% of variation in the rice output (y). The F-ratio of 10.212 was statistically significant at 1% level. Three inputs (seed, fertilizer, and capital) were significant in explaining the rice output of beneficiaries.

From Tables 4 and 5, the linear function was chosen as the lead equation following the normal statistical, economic and econometric criteria, magnitude of coefficient of multiple determination (R^2), number of significant variables, and the magnitude of F-Statistic. The (R^2) value of 0.612 showed that

Table 1: Sampling frame and sample size of anchor borrower's program beneficiary rice farmers in the state

Local government areas	Sampling frame	Villages/communities of the beneficiaries	Sample size
Argungu	7364	Argungu Gulma	74
Augie	5421	Augie Bayawa	54
Jega	3020	Jega Basaura	30
Bunza	8446	Bunza Raha	85
Birnin Kebbi	10,909	Makera Zauro	109
Suru	11,549	Suru Dakin Gari	115
Dandi	3347	Kamba Dole Kaina	33
Total	50,056		500

Source: Kebbi State Anchor Borrowers office, Birnin Kebbi, 2021

Table 2: Regression results for the anchor borrower's program beneficiaries

Variable	Functional forms			
	Linear	Cobb-Douglass	Semi-log	Exponential
Constant	6345.216 (8.817)***	9.738 (8.243)***	−154,705.652 (−1.735)*	12.024 (82.17)***
Seed	0.650 (1.197)	0.144 (1.907)**	12,108.180 (1.497)	6.3487007 (1.877)**
Fertilizer	0.120 (0.103)	0.316 (2.478)***	18,260.133 (2.574)***	−2.343E002 (−0.551)
Agrochemicals	0.100 (−0.043)	−0.032 (−0.314)	−7060.100 (−1.050)	6.966E-006 (−2.212)
Labour	135 (0.552)	−0.009 (−0.770)	−5341.105 (−1.008)	−2.341E-005 (−0.121)
Capital	6.187 (4.985)***	0.249 (6.032)***	16,342.122 (4.013)***	6.934E-004 (5.272)***
R^2	210	0.621	0.355	0.172
R^2 adjusted	0.087	0.546	0.310	0.104
F-statistics	3.0054	10.212	4.035	3.660

***, ** and *implies significance at 0.01, 0.05, and 0.10 probability levels, respectively. Figures in parentheses are the respective *t*-ratios. Survey data, 2023

Table 3: ANOVA table for the anchor borrower's program beneficiaries

Model	Sum of square	Degree of freedom	Means square	*F*	Significance
Regression	8.934	5	1.786	6.287***	0.000
Residual	7.057	42	0.153		
Total	15.991	47			

***Implies statistically significant at the 0.01 probability level. Source: Field survey data, 2023

Table 4: Regression result for the anchor borrower's program nonbeneficiaries

Variable	Functional forms			
	Linear	Cobb-Douglass	Semi-log	Exponential
Constant	10325.210 (6.124)***	10.454 (7.223)***	100271.014 (0.610)	10.886 (52.167)***
Seed	−0.549 (−0.342)	−0.018 (−0.673)	−2137.910 (−317)	−8.567E-004 (−1.024)
Fertilizer	−6.319 (−1.896)*	0.057 (0.477)	−505.156 (−0.018	4.006E-005 (−2.011)**
Agrochemicals	−7.188 (−0.610)	−0.176 (−1.551)	−16540.118 (−1.561)	−7.404E-005 (−0.564)
Labour	−0.766 (−0.318	−0.358 (−1.544)	−1656.103 (−1.553)	−8.035E-005 (−0556)
Capital	23.788 (4.019)***	0.437 (3.008)***	41321.034 (3.877)***	0.010 (2.984)***
R^2	0.612	0.311	0.315	0.255
R^2 adjusted	0.515	0.225	0.264	0.194
F-statistics	5.466	4.377	5.007	3.770

***, **and *implies significance at 0.01, 0.05, and 0.10 probability levels, respectively. Figures in parentheses are the respective *t*-ratios. Survey data, 2023

Table 5: ANOVA table for the anchor borrower's program nonbeneficiaries

Model	Sum of square	Degree of freedom	Means square	*F*	Significance
Regression	136,781,042,310.532	5	27,880,357,911.342	5.466***	0.000
Residual	302,243,668,740.346	46	5,101,432,990.108		
Total	439,024,711,050.878	51			

***Implies statistically significant at the 0.01 probability level. Source: Field survey data, 2023

Table 6: Regression results for the anchor borrower's program pooled sample

Variable	Functional forms			
	Linear	Cobb-Douglass	Semi-log	Exponential
Constant	1,211,380.410 (8.457)***	9.787 (6.445)***	20,639.405 (0.145)	10.557 (42.381)***
Seed	−11,346.002 (−3.214)***	−0.166 (−0.0427)	8431.253 (0.413	−0.112 (−2.720)***
Fertilizer	−0.031 (−0.448)	0.030 (0.329)	3284.010 (0.546)	−0.001 (−0.710)
Agrochemicals	−0.116 (−0.523)	−0.812 (−0578)	−6284.110 (−1.005)	−0.003 (−0.614)
Labour	0.221 (0.301)	−0.042 (−0.539)	−2.4420 (−0235)	−0.089 (−0.557)
Capital	8.624 (4.702)***	0.123 (3.418)***	13,047.105 (2.422)***	0.000 (4.661)***
R^2	0.566	0.186	0119	0.114
R^2 adjusted	0.510	0.128	0.064	0.100
F-statistics	6.287***	2.843	1.701	5.010

***Implies significance at 0.01, 0.05, and 0.10 probability levels, respectively. Figures in parentheses are the respective *t*-ratios. Survey data, 2023

Table 7: ANOVA table for the anchor borrower's programme pooled sample

Model	Sum of square	Degree of freedom	Means square	*F*	Significance
Regression	148,632,452,419.387	5	29,375,440,653.780	6.287***	0.000
Residual	729,833,543,810.450	171	4,651,077,321.086		
Total	878,465,996,229.837	176			

***Implies statistically significant at the 0.01 probability level. Source: Field survey data, 2023

the independent variable accounted for 61% of the variation in the rice output (y).

The F-ratio of 5.466 was statistically significant at 1% level. Two inputs (agro-chemical and capital) were significant in explaining the rice output of non-beneficiaries.

From Tables 6 and 7, the linear function was also chosen as the lead equation based on its favorable disposition in teams of statistical, economic, and econometric criteria. The linear functional form was chosen/selected based on the magnitude of coefficient of multiple determination (R^2), number of significant variables, and magnitude of the F-statistic. The (R^2) value of 0.566 showed that the independent variable accounted for 56.6% of variation in rice output (y). The F-ratio of 6.287 was statistically significant at a 1% level. Two inputs (improved seed and capital were significant in explaining the rice output of the pooled sample.

The chow F was computed to further investigate the performance of ABP. It was hypothesized that the two groups of farmers were operating on the same production function, and by implication, there is no shift in the intercepts of the production functions of beneficiary and non-beneficiary farmers. However, results showed that the computed chow F was 21.128, which is greater than the critical F value of 6.287 at the 0.01 probability level and 4° of freedom. The study concluded that the two groups of farmers were not operating on the same production function. ABP significantly and positively affected the output, income, and livelihood of the beneficiary rice farmers in the study area.

Benefits of Anchor Borrowers Programme

The study found that farmers under the Anchor Borrowers Programme benefitted from the in one way or the other. The results of the Benefits that accrued to the beneficiary farmers are presented in Table 8.

Results in Table 8 showed that majority (99.8%) of the beneficiary farmers had access to credit facilities. The implication is that, the respondents

Table 8: Accrued benefits of anchor borrower's programme to smallholder rice farmers

Benefits	Frequency (%)*	Ranking
Credit facilities	499 (99.8)	1
Improved seed	496 (99.2)	2
Agrochemicals	488 (97.6)	3
Fertilizer	437 (87.4)	4
Marketing services	385 (77.0)	5
Extension services	350 (70.0)	6
Pumping machine	315 (63.0)	7

*Multiple responses were recorded. Source: Survey data, 2023

will be able to expand their farm sizes, hire labour, purchase more agro-inputs and have enough capital bases that could improve their living conditions.

Results in Table 8 showed that majority (99.2%) of the beneficiary farmers obtained improved seed from the programme. Secured improved seed has a tendency to increase their yield and also improve their income. Furthermore, 7.6% of the total respondents benefitted from Agrochemicals such as herbicides, pesticides, among others. These agrochemicals enhance the productivity of the farmers.

Results further revealed that majority (87.4%) of the respondents benefitted from Fertilizer. This suggests that ABP beneficiary farmers received support of fertilizer in order to improved their performance.

Results further revealed that 77% of the beneficiary farmers benefitted from marketing services. These marketing services involve the anchor companies such as WACOT rice mill, Labana rice mill serving as a market for their paddy rice. The beneficiary farmers do not need to take their paddy to the market for sales as the companies automatically serve as market for their products. The implication of selling directly to the anchor companies reduces transportation cost and other charges in the market thus also leading to higher profit/income being realised.

Results further revealed that 70% of the respondents benefitted from extension services. These extension services include trainings in the form of capacity building particularly on new innovations and farming practices. This enhances the skill of the farmers leading to more expertise in farming.

Results also showed that 63% of the beneficiary farmers benefitted from pumping machines. These machines aided their farming operations particularly during the dry season, making it possible for many of the farmers to go into dry season farming.

CONCLUSION

Based on the findings, the study concludes that the performance of Anchor Borrowers Programme was high in the following component; ABP significantly improved the crop output of beneficiaries as compared with the non-beneficiaries. The study further revealed that ABP had significant impact on the output of the beneficiary rice farmers. Although there were benefits that accrued to the beneficiaries of the programme, which translated into increased outputs, certain problems were identified to be constraining the attainment of the overall objectives of the programme.

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