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Economic Analysis of Rice Production in Bende Local Government Area of Abia State, Nigeria

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Abstract

The study analyzed the economics of rice production in Bende Local Government area of Abia State, Nigeria. Specifically, the study addressed the following objectives: examine the socio economic characteristics of rice farmers, identify source of input to farmers, estimate cost and return of rice production, estimate determinants of rice production and identify problems that militates against rice production in the study area. The study used primary data source for the analysis. A multistage sampling techniques was used to sample for respondents. Data were analyzed using descriptive statistic, cost and return formulae and regression model. The result on socio-economics shows that the farmers were in their active stage with a mean age of 44 years, female farmers dominated rice farming, the farmers were literate with majority of the farmers attaining secondary education. On sources of input farmer association and personal sources were the major source of input for farmers in the study. On cost and return, the result shows that rice enterprise was viable. Among the factor that positively influenced rice production were farm size, chemical fertilizer, amount of credit and initial capital. Farmers identified pest and disease, and lack of access to credit as the major constrains to rice production in the study area. The study therefore recommends more farmers should join rice production since it is viable business and there is high demand for rice all over the country. More so, farmers should form cooperative society to increase their access to finances.

Key word: Economics, staple, food, rice, production

Introduction

Rice *oryza sativa* is a grass that grows and produces grains that is consumed by a large population of people. It belongs to the family of gramineae. Rice is a staple food for most people of the world today. Ohen and Ajah (2015) posited that it is the most important staple food for a larger part of the world's human population especially in Asia, the Middle East, Latin America, West Indies and Africa. It is ranked the world second cereal crop after wheat in terms of production, due to a recent decline in maize production (Selbut, 2003). It is widely

cultivated throughout the tropics. Nigeria is the largest producer of rice in the West Africa sub-region, West Africa Rice Development Association (WARDA, 2008). Rice is cultivated in all the geopolitical zone of Nigeria. This is because it has different variety that adapt to different soil texture. Some varieties such as the NERICA up land variety thrive well in the upland while the swap water varieties do very well either in a natural swamp environment or in an irrigated farm land.

Nigeria has the potential and suitable agro-ecologies (upland, rain-fed lowland, irrigated lowland, deep water and mangrove swamp) to attain self-sufficiency in rice production (WARDA, 2008).

In recent times, rice is no longer regarded as food for the rich millions of Nigerians but has become the cereal that constitutes a major source of calories for the rural and urban poor with demand growing at an annual rate of 5% (WARDA 2008). Thus it is one of the crops being considered under the Federal Government of Nigerian Agricultural Transformation Agenda (FGN's ATA) given its importance and prominent role among staple food crops in Nigeria (Osabuohien *et al.*, 2018). It is use to curb the problem of food insecurity in most parts of the world. Due to its economic importance to both producers and consumers, its demand has increased in all parts of the country. The increase in domestic demand for rice in Nigeria has been attributed to its general acceptability and consumer preferences, rising population among others.

Rice Production in Nigeria has increased but not at the same pace with consumption. Its production is estimated at 4.6 to 4.9 million hectares. But only about 1.7million hectares of this land is presently being cropped to rice. The rain-fed upland rice ecology represents 25% of the 1.7 million hectares. There is recent breakthrough in the development of the New Rice for Africa (NERICA). This NERICA 6-10 are highly resistant to insect infestation for upland production systems; more so, high demand for rice, has also increased farmers' interest in growing upland rice (WARDA, 2008). Food and Agricultural Organization (FAO) (2016) stated that Nigerian government had pursued and implemented various agricultural policies at the State and Federal levels on the rice transformation agenda to boost Nigeria's rice production over the years. Among these is the Agricultural transformation agenda (ATA) with the success recorded in local rice production of 4.8 million tonnes per annum.

In recent times, government has put in concerted effort through policy and private partnership programmes to increase rice production in Nigeria, yet, there is the issue of demand –supply gap. One may ask

what could be the cause, one of the reason could be attributed to the factor of input source and supply. Input here refers to factors of production that ranges from planting materials in terms of varieties or cultivar, capital, agro- chemical such as fertilizer, pesticides, herbicides, labour and entrepreneur involved in the production process. The use of modern inputs such as improved varieties alone without adequate and timely release of capital to farmers may also affect the expected yield negatively. More so, there is need for government and private partners to increase their effort on aspect of timely delivery of finances and monitor the activities of farmers to ensure proper usage of released fund in order to accomplish the set goal of attaining self-sufficiency in rice production in the country. Asiru *et al.* (2018) affirmed that Poor resource farmers accounted for a greater percentage or quantity of local rice production therefore, timely access to farm inputs such as fertilizer, pesticides, improved quality seeds, credit and irrigation can raise the level of production to a large extent. Research has shown that there is supply -demand gap that is remedied through importation of rice. In 2017 government spent $5million a day on rice importation. This lead to the decision of the government to ban rice importation. Despite the ban of rice importation, Nigerians' preference for foreign rice created a market gap for about three million metric tons between rice demand and local supply Global Agricultural Information Network (GAIN), 2019). Hence the study set out to investigate into economic analysis of rice production in Bende Local Government Area of Abia State, Nigeria. Specifically, the study addressed the following objectives: (i)examine the socio economic characteristics of rice farmers in the study area, (ii) identify source of input to farmers (iii) estimate cost and return of rice production (iv) estimate determinants of rice production (v) and identify problems that militates against rice production in the study area.

Methodology

The study was conducted in Bende Local Government Area of Abia State, Nigeria. Bende Local Government Area lies on latitude 5.56^0 N and $5^0 43^/ 48^{//}$ N and longitude $7.63^/$ and $7^{\ 0}\ 37^/ 10^/$ E. The Local Government Area has a population of 52,300 (NBS 2016). The LGA is bounded in the North by Cross River State, Afikpo and Ohazara LGAs of Ebonyi State, in the West by Isukwuato, in the East by Ohafia and Arochukwu LGAs, in the South -West Umuahia North and South LGAs; in the South - South by Ikwuano LGA. Agriculture is the major occupation of the people in the local government area. The people produce food crops like rice, maize, cassava, plantain, banana also small ruminant animals are reared. Some of the people engage in craft making, carpentry,

trading and others. The LGA is made up of eleven communities, these include Ozuitem, Ugwueke, Okporoenyi, Itumbuzo, Umuju-ezechi, Umu-menyi, Igbere, Item, Alaye, Nkpa and Uzuakoli Primary data were used for the study. Data were sourced through the use of structured questionnaire. A three stage sampling procedure was use for the study. Stage one involved a purposive selection of three communities were rice production activities is high. Stage two involved a random selection of villages in the communities selected. Twenty-five villages were randomly selected out of thirty – five villages that the three communities comprise of. The three communities selected were Bende District, Ugwueke and Uzuakoli. The study selected twelves villages from Bende District out of seventeen villages, nine villages from Ugwueke community out of thirteen villages and four villages from Uzuakoli out of five villages. Stage three involved proportionate and random selection of rice farmers based on the number of people or the population of farmers involved in rice production in the study area. In Bende district, a total of 45 respondents were randomly selected as follows, Bende 4, Agbamazu 4, Agbomiri 5, Okpotongumuokoro 3, Okporoenyi 6, Onuinyan 3, Ndiokorukwu 4, Isimkpu,2, Nditoli 4, Umuorie 3, Ukpom 4 and Ukputong 3. In Ugwueke communities, twenty five rice farmers were randomly selected as follow: Amaba, 4, Amabanta 2, Camakwu 3, Amaokayi 2, Amauta 3, Amiyi 4, Ezeukwu 2, Ndielu 2 , Amagu 3. Finally, the study randomly selected ten respondents from Uzuakoli as follows, Agbozu 3, Amamba 2, Amankwo 3 and Eluama 2. These gave a total of 80 respondents for the study. Objective one, two and five on socioeconomics characteristic, sources of inputs and problems of rice production were realized through descriptive statistics, objective three on cost and returns of rice faming was achieved through the use of net farm income analysis. More so, the objective four that dealt on factors influencing rice production was achieved by regression model. The formulea for net farm income and regression analysis are stated in equation 1 and 2 respectively.

Net Farm Income (NFI) = Total Revenue from Sales (TRS) - Total cost (TC) .....(1)

Where

TRS= Total quantity of rice produced (X kg) multiplied by price of rice (kg) sold (X× P)

TC = Total Variable Cost (TVC) + Total Fixed Cost (TFC)

The regression model is stated in its explicit form thus:

$$Y = f(X_1, X_2, X_3, X_4, X_5, X_6, X_7, X_8, X_9 + e \ldots..(2)$$

Where
Y= output of rice (kg)

X_1= Age of respondent in years
X_2 = Level of education in years
X_3 = Farming experience (years)
X_4 = Fam size (ha)
X_5 = Extension contact (number of visit)
X_6 = Household size (number of person)
X_7 = Planting materials (quantity in kg)
X_8= Chemical fertilizer in (kg)
X_9= Labour in (man days)
X_{10} = Amount of credit in (naira)
X_{11} = Capital (Naira)
ei = Error term
b_o = Constant

Result and Discussions

Socio-economic characteristics of rice farmer

The Socio-economic characteristics of rice farmers in the study area is presented in Table 1. The result in Table 1: shows that majority of rice farmers in the study area fell within the age bracket of (41-60) years with a mean age of 44.5years. This implies that rice farmers were in their active age and they can cope with the rigorous activities involved in rice production. The study is in tandem with the work of Ben-Chendo *et al.,* (2017) who reported a mean age of 49 of rice farmer in their study area. On sex the result in Table 1 also showed that female dominate rice farming. Majority of the respondents sampled were females representing 55.00 % of the total rice farmers in the study area. This is contrary to the findings of Ben-Chendo *et al.,* (2017) who reported that men dominated the enterprise of rice farming in the study due to their culture and religion that confirm women at home. From the study, the result on marital status showed that 95% of the respondents were married, while just a few of the rice farmers were single representing 5% of the total population sampled for the study. More so, majority of the respondents were privileged to attain one form of education or the other with majority attaining secondary education. This group represents 80% of the total respondents sampled for the study.

Table 1: Socio economic characteristics of rice farmers

Age of rice farmers	Frequency	Percentage of rice famers
21-40	30	37.5
41-60	44	55.00
61-80	6	7.50
Total	80	100
Mean	44.5	
Sex		
Male	36	45.00
Female	44	55.00
Total	80	100
Marital status		
Single	4	5.00
Married	76	95.00
Total	80	100
Educational level		
Primary	7	8.75
Secondary	64	80.00
Tertiary	9	11.25
Total	80	100
Farming experience		
1-20	42	52.50
21-40	34	42.50
41-60	4	5.0
Total	80	100
Mean	21.00	
Household size		
1-4	50	62.5
5-8	26	32.5
9-12	4	5.0
Total	80	100
Mean	4.2	
Farm size		
0.1-1.0	18	22.50
1.1-2.0	46	57.50
2.1-3.0	14	17.50
3.1-4.0	2	2.50
Total	80	100
Mean	1.6	
Method of land acquisition		
Inheritance	40	50.00
Lease /rent	23	28.75
Purchase	17	21.25
Total	80	100
Extension contact		
Had contact	56	70.00
Had no contact	24	30.00
Total	80	100
Membership of farm association		
Member	61	76.25
Non member	19	23.75
Total	80	100

Field Survey (2017)

While the remaining 20% of the respondent had primary and tertiary education.This implies that all respondents were literate and can quickly accept and adopt new technological innovation that could be introduced in recent time of federal government's rice transformation agenda. The result also indicated that most of the farmers in the study area have reasonable years of farming experience with a mean farming experience of 21 years. The findings is similar to the work of Igboji *et al.,*(2015) who reported that rice farmers had farming experience of above 20 years. On household size the study shows that rice farmers had a mean household size of 4.2. This is quite a small household size compared to Igboji *et al.,* (2015) and Ben – Chendo *et al.,* (2017) who reported household sizes of 12 and 10 persons respectively .This is could be attributed to the fact that most of the respondents are still in their reproductive age and could still give birth. The result on farm size indicated that majority of the respondents had farm sizes range of 1.1- 2.0 hectares representing 60 % of the total population sampled for the study. A mean farm size of 1.6 hectares was obtained. This implies that the rice farmers in the study area are small holder farmers; nevertheless, their farm size is not too small. Furthermore, the result shows that 50 % of the respondents acquire land for cultivation through inheritance while the 28.75% and 21.25% acquire trough lease and purchase respectively. In addition, the result on Table 1 shows that 70% of the respondents had extension contact while the 30% had no extension contact. This is a good development because the extension workers are change agents that transfer new technologies on rice production to farmers. On membership of association, 76.25 of the respondents belong to farmers' association while 23.75% were non - member of the association. This implies that rice farmers in the study area had the knowledge of the benefit of belonging to an association. The respondents said that they enjoy the benefit of obtaining inputs from their association at lower price. It served as a source of input to them. The study is line with the work of Sunday *et al.,* (2014) who reported that farmers who belong to farmers' association obtained inputs such as chemical fertilizers, insecticides, pest and other inputs that helped them in fertilizer availability.

Source of Production Related Inputs to Rice Farmers in the Study Area

The sources of input used by the farmers is presented in Table: 2

Table 2: Source of Production Related Inputs to Rice Farmers in the study area

Input Source	Frequency	Percentage
Personal	40	50.00
Farmers' association	48	60.00
Local government	5	6..25

Source: Field survey 2017

*Multiple responses were taken

Table 2: shows that 60.00% of rice farmers in the study area obtained their inputs from their farmers' association. This implies that belonging to farmers' association benefited rice farmers in the study area. Also, person source of input supply was another major source. This source represents 50% of the sampled farmers for the study. This is not surprising since most of the farmers are subsistence and self-sponsored. A situation where farmers would reserve inputs for next planting season from their previous harvest. Only 6.25% of the farmers obtained productive input from the local government council. This implies that government has not done enough to enhance rice production in the study area despite the policy of rice transformation agenda that is currently in place.

Cost and Return on Rice Production in the Study Area

The cost and returns from rice production is presented in Table :3

Table 3: Cost and return on rice production in the study area

Items	Average value
A:Cost	
Variable costs (VC)	
Cost of seedlings	4,000
Fertilizer cost	15,500
Cost of labour	22,576
Cost of pesticides	3,500
Processing cost	150,500
Transportation cost	6,012
Packaging cost (bag)	2,452.70
B: Total variable cost (TVC)	204,540.70
Fixed cost (FC)	
Depreciation on assets	7,710.50
Rent (land)	8,000
Total fixed cost	15710.50
C:Total cost (TVC+TFC)	220251.20
D: Returns	
Selling price per (bag 50kg)	7,907.22
Average bags sold	51
E: Revenue sold	403268.22
F: Net return	183,017.02
ROI	1.8

Source: Field survey 2017

Table: 3 shows the result of cost and returns from rice production in the study area. The result showed that the farmers incurred an average variable cost of ₦ 204,540.70. The selling price of rice for the production season was ₦ 7,907.22; an average quantity of 51 bags of rice of 50kg each per bag were sold. The rice farmers realized average revenue of ₦ 403268.22 and recorded a net return of ₦ 183,017.02. This implies that rice farming is a viable enterprise. The finding is similar to the work of Ben-Chendo *et al.*, (2017) who reported that rice farmers in the study area had a net farm income of ₦152,600 and concluded that rice production was profitable. On return on investment, a ratio of 1.8 was obtained this implies that for every one naira invested on rice production a benefit of ₦1.8 accrues to the rice farmers in the study area.

Determinants of rice production

The determinants of rice production is presented in Table:4.

Table 4: shows the result of the determinants of rice production in the study areas. The exponential functional form was chosen as the lead equation based on the number of significant variable and conformation to a *priori* expectation. The coefficient of multiple determination R^2 was 0.8831. This implies that 88.31 percent of total variation in the dependent variable output of rice was explained by the explanatory variables. The factors that influenced rice production significantly were age, farm size, planting materials, chemical fertilizer, labour input, amount of credit, and initial capital. The F-ratio of 32.95 was significant. This implies the goodness of fit of the model. The coefficient of age (X_1) was negatively signed but statistically significant. This implies that as the age of the farmers increases the output of rice farmers reduces in the study area. This could be due to the fact that aged farmers found it difficult to adopt new technological innovation that could increase the output of rice production.

Table 4: Determinants of rice production in the study area

Variables	Linear	Exponential +	Double log	Semi log
Intercept	7.50362	2.068511	10.2882	114.1228
	(3.30)***	(9.07)***	(4.17)***	(7.48)
Age (X_1)	-0.0930635	-0.0096985	-0.5133557	-0.252295
	(-1.60)	- (2.12)**	(1.18)	(0.09)
Level of education	0.13	0.0154075	0.0382046	-0.0578525
	90801			
(X_2)	(1.26)	1.40	(0.20)	-(0.05)
Farming Experience	0.0682489	0.0054259	0.3309999	0.6476747
(X_3)	(1.19)	(0.94)	(1.82)*	(0.57)
Farm size (X_4)	9.739126	0.7041328	1.059304	14.35702
	(11.77)***	(8.49)***	(5.15)***	(11.27)***
Extension contact	0.2245916	0.0119509	-0.0785899	0.0776246
(X_5)	(1.36)	(0.72)	-(0.79)	(0.13)
Household size (X_6)	0.40971908	0.0406526	0.0320902	0.5031913
	(0.67)	(0.66)	(0.32)	(0.81)
Planting materials	-0.0001302	-0.0001302	-0.2262184	-2.563028
(X_7)	-(2.87)***	-(2.73)***	-(1.36)	-(2.48)**
Chemical fertilizer	0.0004968	0.0000539	0.1371656	-0.8818281
(X_8)	(1.41)	(3.50)***	(1.07)	-(1.11)
Labour input	-0.001444	-0.0000763	-0.4522211	-8.905037
(X_9)	-(1.82)*	-(3.59)***	-(2.12)**	-(6.75)***
Amount of credit	0.0000102	1.13e-06	0.0005674	0.0027495
(X_{10})	(1.82)	(2.01)**	(0.06)	(0.05)
Capital (X_{11})	-0.0000531	-0.0000152	-0.1009443	-0.8617625
	-(4.00)**	-(11.44)***	-(3.86)***	-(5.32)***
R^2	0.8574	0.8831	0.6920	0.8555
R^{-2}	0.8247	0.8563	0.6214	0.8224
F- ratio	26.24***	32.95***	9.80***	25.84***

Source: Field survey 2017.

Note: + = lead equation, ***significant at 1%, ** significant at 5% *significant at 10 %.

The coefficient of farm size (X_4) was positively signed and statistically insignificant at 1% level of significance. It conforms to *a priori* expectation. This means that there is a positive relationship between farm size (X_4) and output of rice farmers. This implies that as the farm size increases, output of rice production increases. The study is in agreement with the findings of Ohen and Ajah (2015) who reported that farm size had positive relationship with rice production in the study area; and as such, increase in farm size increased the output of rice production. The coefficient of planting materials (X_7) was positively signed and was statistically significant at 1% level of significant. This indicated that as more quality material are used for production, the higher the output of rice in the study area increases. The coefficient of chemical fertilizer was positive and significant at 1% level of significance. This implies that as farmers increases the use of chemical fertilizers, the higher the output of rice in the study area.

The coefficient of labour input (X_9) was negative but statistically significant at 1% level of significance. This indicates that as more labour input is used in the production of rice, the output of rice reduces. This is against *a priori* expectation. It is expected that as more labour inputs are involved in rice production the output of rice should increase. This could be attributed to the fact that labour input was over utilized and the farmers were operating at the irrational stage of production using labour input as a factor of production such that a unit increase of labour input leads to a greater decrease in the output of rice production in the study area. The coefficient of amount of credit and initial capital were positive and statistically significant at 5% and 1% respectively. This implies that as farmers increase the use of these variables, the output of rice increases all things being equal. These agree with *a priori* expectation that as a farmer has access to credit, the output of the farmer increases because farmers will be able to acquire productive inputs and timely address some financial challenges associated with rice production.

Constraints to Rice Production

The constraints that militated against rice production is presented in Table :5

Table 5: Constraints of rice production in the study area

Variables	Frequency	percentage	Rank
High incidence of pest and diseases	44	73.33	1st
Lack of access to credit facilities	38	63.33	2nd
Inadequate social facilities (road and market)	22	36.66	3rd
Lack of technical knowledge	18	30.00	4th
High interest rate on loan	16	26.66	5th
High cost of fertilizer	15	25.00	6th
Scarcity of land	14	23.33	7th
High cost of agrochemical	14	23.33	8th
Poor harvest	8		9th

Source: Field survey 2017
*Multiple responses taken

The result in Table 5: showed the constraint to rice production in the study area. The result indicates that constraints were ranked according to their severity as identified by the farmers. It was found that high incidence of pest and diseases was the major constraint that militated against rice production in the study area. They had similar result with Osabuohien, *et al., (*2018) who reported that rice farmers in Ogun State reported pest infestation (bird) as a major challenge associated with rice production. This was followed by lack of access to credit. Other constraints identified by the farmers were inadequate social facilities, lack of technical knowledge and others. While the least constraint identified by rice farmer was poor harvest. This implies that the rice farmer recorded high yield. Little wonder, the enterprise is viable and the farmers made good profit that enable them to remain in business**.**

Conclusion

The study dealt on economics of rice production in the study area. The result shows that the farmers were in their active age, female dominated rice enterprise, the business was profitable. Farm size and chemical fertilizer were the factors that positively influenced rice production. The farmers identified pest and diseases and lack of access to credit as the major constraints to rice production in the study area. The study therefore recommends that farmers should form cooperative that could increase their access to finance either at individual or cooperate level through intervention and grants.

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