

PROFITABILITY ANALYSIS OF RICE PRODUCTION ENTERPRISE IN OHAOZARA LOCAL GOVERNMENT AREA OF EBONYI STATE, NIGERIA.

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ABSTRACT

The study was carried out in Ohaozara Local Government Area of Ebonyi State, to estimate the profitability analysis of rice production enterprise. Data were collected by means of structured questionnaire and interview schedule administered to the respondents. A multistage sampling technique was adopted in selecting one hundred and twenty (120) respondents. Data collected were analyzed using descriptive and inferential statistics. Results showed that both married men and women were involved in rice production in the study area; but the males predominate the female. Most (95%) of them were still in their economic active ages of between 21 – 60 years; and also have one form of formal education or the other. Furthermore, 96.67% of the respondents had long years of experience in rice production; while 93.33% of them had farm sizes of between 1 – 3 hectares. Majority (56.67%) of the respondents adopted nursery and transplanting method. The coefficients for marital status, education and farm size had direct relationship with the output of rice; while the coefficients for gender and farming experience had inverse relationship with the output of rice, but they were all significant at varied probability levels. The costs and returns analysis revealed that rice production is a very rewarding and profitable enterprise in the area, it well managed. The major constraints identified include, late and poor access to credit, high cost and unavailability of herbicides, high cost and unavailability of insecticides, land tenure system and high cost of land, shortage and high cost of labour, lack of good quality seeds, poor access to improved inputs, decline in soil fertility, bad and poor road networks; among others. It is recommended that the constraints limiting the respondents from achieving their heart desires be addressed so as to encourage them to increase their rice production potentials and capabilities.

Keywords: Profitability analysis, Rice production, Ohaozara L.G.A, Ebonyi State, Nigeria.

INTRODUCTION

Rice is one of the major crops cultivated globally, alongside with wheat and corn (RIFAN, 2017). Rice is grown in more than a hundred countries with estimated total harvested area of 158 million hectares in 2018 growing season with more than 700 million tonnes of milled rice produced annually from wide-ranging ecologies (USAD, 2019).

Rice is a staple food for over 50% of the human population, as well as provides over 19% of global human per capita energy (Tijiani & Bakari, 2014). FAO (2019) and Hesse (2020) reported that 78% of global rice production is for human consumption, while the balance serves other uses, such as animal feed. According to Food and Agricultural Policy Research (FAPR), the global rice demand is expected to rise up to 496 million tonnes in 2022, and up to 555 million tonnes in 2035; hence the need to boost production by all and sundries; thereby help in promoting the growth of this important world staple food (Udemezue, 2019).

Rice has become a staple food in Nigeria such that every household; both the rich and the poor consume a great quantity (Godwin, 2012). Its significance as a subsistent and cash crop is growing rapidly, both regionally and nationally. Infact, it is one of the most popular cereal crop of high nutritive value grown and consumed in all the ecological zones of the country (Ohaka, Adiaha and Amanze, 2013; Omotosho, Adewumi and Fadimula, 2010; Ohajianya and Onyenweaku, 2003).

Yuguda (2003) and Ohaka et al (2013) were of the view that before the advent of crude oil, Nigeria produced almost enough rice for local consumption. However, with the discovery of petroleum in the 70's, its production declined steadily over the years in relation to consumption with the result that takes away huge sums of money from country's hard earned foreign exchange as a result of importation. Ume et al (2017) reported that Nigeria is the highest producer of rice in Africa, with estimated output of 3.7 million tonnes in 2017 rice growing season. Similarly, International Rice Research Institute (IRRI, 2010) postulated that Nigeria is the largest rice producer in West Africa and its production made remarkable gains from 1980 to 1989. In the same vein, the area under cultivation grew from about 400,000 hectares in 1980 to about 700,000 hectares in 1989 (WARDA, 2013).

A combination of various factors seem to have triggered the structural increase in rice consumption over the years, with consumption broadening across all socio-economic classes, including the poor. Rising demand is as a result of increasing population growth and income level, coupled with the ease of its preparation and storage. Rice is also critical for food security throughout Africa, especially in Nigeria. For many decades, rice had the fastest growing consumption rate among all other staple crops, which is determined in large part by huge growth in demand

in Urban centres (African Rice, 2011). These have made consumers exhibiting a shift in preference from traditional staples (such as Maize, Yams, and Cassava) to rice (Nigerian National Food Reserve Agency, 2009). Rice has changed from being a luxury to a necessity whose consumption will continue to increase with per capita GDP growth; thus which implies that its importance in Nigerian diet as a major food item for food security will increase as economic growth continues (Ojogho&Alufohai, 2010).

Globally, Nigeria is the 11th largest consumer of rice and has the lowest annual consumer per capita of the top 11 consuming countries with a value of 35kg/year (FMARD/NBS, 2010). It however, has one of the highest domestic prices for a kilogram of rice, for both locally produced and imported variants in the market. The high domestic prices for rice in Nigeria could be associated to high inflation, cost of importation (high tariffs and excise duties) and cost of production (for the locally produced variety) (Ingabire, Bizozza&Mutware, 2013). For decades in Nigeria, the problem of nation's rice consumption exceeding the local production, and the surpluses being balanced through imports are well documented (Tijiani and Bakari, 2014).

Despite the relative importance of rice as Nigerian major food crop and industrial raw material, the domestic supply is still considered insufficient to match the consumption demand. According to Ekeleme et al (2008) and USAID (2013), Nigeria consumes 5.4 million metric tonnes of rice annually, of this value, annual domestic output of rice still hovers around 3.2 million metric tonnes; thereby leaving a huge gap of about 2.2 million metric tonnes to importation. This inability to meet rice consumption need through local production makes the country import dependent (Okereke, 2012 and FMARD 2011). It is to be noted that relying on the import of expensive food in global market not only stimulates domestic inflation, but also hurts Nigerian farmers, by displacing local production and fuelling rising unemployment (FMARD, 2012). In 2016, the price of rice doubled over that of 2015 prices, owing largely to foreign exchange rates and fluctuations in government policy on rice production. Live Rice Index (LRI, 2016) had reported that annual rice importation alone in Nigeria is around \$2.2 billion, which is to the detriment of the scarce foreign exchange reserve. This is an unfortunate scenario for a country that is presumed to be depending on imports from countries like Thailand, India and USA. Rice is cultivated in virtually all agro-ecological zones of the country as it constitutes one major cereal crop produced by Nigerian farmers. It covers both the upland and the swamps, depending on the variety (KNARDA, 2007). Traditionally, domestic paddy rice production was limited to flooded system until irrigated rice production was introduced with the development of pump irrigation schemes which

began in the mid-1990s; and this has permitted rice area and production to expand at par with population growth in recent years (WARDA, 2007). Given the crucial role of rice in the food security of urban and rural households alike, development of rice growing has long been considered a priority in Nigeria. The country has adopted a range of instruments designed to protect and increase local production. The Nigerian National Rice Development Strategy (NNRDS) set up in 2009 aims to make the country self-sufficient in rice by raising production of paddy rice from 3.4 million tonnes in 2007 to 12.8 million tonnes in 2018.

Nigeria is ecologically endowed to attain self-sufficiency in paddy rice production with the potential land area for rice production of between 4.6 million and 4.9 million hectares (Ezedinma, 2005; FMARD, 2012). However, inspite of the immense untapped potential of rice production in Nigeria, only 1.8 million hectares of Nigeria's total land mass suitable for rice production is cropped in rice (Coalition for African Rice Development (CARD), 2009). Notwithstanding the fact that Nigeria has favourable ecologies for rice production, production of paddy rice remains low. Oyinbo, Damisa and Rekwot (2013) reported that less than 10% of the potential 3.4 million hectares are currently irrigated. The choice of a balanced approach to the use of rice production methods presents an opportunity to be exploited (Macauley, 2015).

This falling in yield of rice led to supply deficit situation in the country and in response to the situation, successive Nigerian governments have to intervene in the rice sub-sector by increasing tariff on rice importation so that local production could be encouraged by expanding the market for the local rice (Bamidele et al, 2010). Nigerian government over the years invested huge amounts of money towards the improvement of rice varieties. This is evidenced by the establishment of Research Institutes in different parts of the country. These institutes were saddled with the responsibility of harnessing the potential of the rice crop and with the objective of achieving a comparative advantage status for the country. This initiative has led to the development of several varieties, which include Faro 44, 52, 54 and 57. However, this investment by the government in developing the cultivation of rice in Nigeria will be in vain if the farmers fell to adopt these improved varieties.

It is a known fact that rice production in Nigeria is characterized by small-scale farmers scattered all over the country who carry out their operations with rudimentary tools (Oyeyinka and Bolarinwa, 2009). Furthermore, lack of capital and poor yield per hectare are the challenges they have to contend with (Kolawale and Ojo, 2007). Being a staple food crop consumed by many households, it may become a scarce commodity due to the fact that production is relatively low considering the large population of the

country. The current production capacity of the farmers is quiet inadequate to meet the consumption demand of the nation (Bamidele et al, 2010). This inadequacy of the rice harvest to meet consumption demand provides an income enhancing opportunity for the farmers, as well as the unemployed youths to strive for the promotion and cultivation of the crops.

Previous and current government in the country made desperate efforts to increase rice production and hence reverse the importation trend. The various programmes and policies, although well intentioned, but were dogged with implementation flaws and instability. Another major drawback to the policies was the poor attention given to the farmers level of resource use and return to scale. This is pertinent considering the fact that majority of the rice farmers in the state are small-scale operators adopting traditional production methods and also grappling with poor return to scale (Yuguda, 2003).

It is worthy of note that many related studies have been carried out on the profitability of rice production in Nigeria and the world as a whole, among them are that of Ekpe and Alimba (2013) who worked on Economics of Rice Production in Ebonyi State, Nigeria; Ohaka, Adiaha and Amanze (2013) who researched on Economic Analysis of Small-Holder Rice Production in IhiteUboma L.G.A of Imo State, Nigeria. Abudulahi (2012) whose work centered on Comparative Economic Analysis of Rice Production by Adopter and Non-Adopter of Improved Varieties of Rice among Farmers in Paikoro L.G.A of Niger State, Nigeria. It is worthy to note that none of the aforementioned work were able to estimate the profitability of rice production in Ohaozara L.G.A of Ebonyi state.

Ohaozara L.G.A in Ebonyi State is one of the major rice population areas and which also offers market for locally produced rice. This makes it a reference point for rice production in Nigeria. There is prevalence of rice farmers adopting different methods in the state. However, there is also inadequate information on the profit margins in different rice production methods in the state, and constrains limiting farmers from investing more in rice production. Moreover, with the economic downturn experienced by the nation in recent years; there is a need to guide rice farmers on best production method to adopt for optimum yield, increased income and food security for their families, as well as higher output for the market. This situation is further aggravated by the fact that most of the farmers hardly estimate their enterprise profitability or otherwise. This study therefore sought to empirically fill this gap by specifically estimating the profitability of rice production in Ohaozara L.G.A of Ebonyi state.

The objectives of the study were to: describe the socio-economic characteristics of small-holder rice farmers; identify the production methods employed by the small-holder rice farmers; estimate the costs

and returns of rice production; determine the effects of the socio-economic characteristics of the farmers on the rice output; and identify the constraints limiting rice production in the study area.

METHODOLOGY:

Study Area:

The study was carried out in Ohaozara Local Government Area, which is located in the southern senatorial district of Ebonyi state. It has a land area of 312 km² and a population of 148,626 people (NPC, 2006). The topography is relatively flat and with a vegetation which can be said to be grassy, with predominant tree plant as palm tree and cashew. The soil is mainly loamy-clay in nature, and creates room for swamp land which is suitable for the growing of swamp rice. Its inhabitants are mostly farmers, craftsmen and petty traders. Among the crops grown in the area include: local beans, yam, maize, cassava and vegetables. They also raise animals like poultry, sheep and goats, but all these are on a small scale.

Sampling Procedure:

Multi-stage sampling technique was used in selecting the respondents for the study. In stage I, five (5) communities were randomly selected out of eight (8) communities that make up the study area. In stage II, four (4) villages were randomly selected from each of the communities already selected in stage I. In the third stage, six (6) rice farmers were also randomly selected from each of the twenty (20) villages already selected in stage II; thereby bringing the total respondents to one hundred and twenty (120). This also represent the sample size. Data were collected with the aid of structured questionnaire.

Analytical Techniques:

Data collected were analysed using descriptive statistics, gross margin analysis, multiple regression analysis and mean score analysis. Descriptive statistics such as frequencies, means and percentages were used to achieve objectives (i) & (ii). Gross margin analysis was used to achieve objective (iii); objective (iv) was achieved using multiple regression analysis. However, objective (v) was realized using mean score derived from five-point Likert scale rating.

Model Specification:

Gross Margin Analysis using budgetary technique:

This was employed to estimate the profitability of rice production. Gross margin is the difference between the Gross Farm Income (GFI) and the Total Variable Cost (TVC). It is a useful planning tool in situations where fixed capital is negligible of the farm enterprises, and especially in the case of small-scale subsistence agriculture (Olukosi and Erhabor, 2005). The model is expressed as thus:

$$\pi = TVP - TVC - TFC \quad -1$$

$$\pi = \sum_{j=1}^m P1Q1 - \sum_{i=1}^n P1X1 - \sum PKCK \quad -2$$

where:

$$\pi = \text{Net Farm Profit}$$

TVP	=	Total Value of Production	Otherwise = 0)
TVC	=	Total Variable Cost	X ₄ = Household size (Number)
TFC	=	Total Fixed Cost	X ₅ = Educational qualification (years)
Q _j	=	Quantity of j th Variable output	X ₆ = Farming experience (Years)
P _j	=	Unit Price of j th output	X ₇ = Farm size (Hectares)
X _i	=	Quantity of i th variable inputs (i = 1,2,3, ... n)	X ₈ = Membership of cooperatives (Member = 1; Non-Member = 0)
P _i	=	Unit price of i th variable inputs	X ₉ = Sources of labour
n	=	Number of inputs used in production	b ₁ – b ₉ = Coefficient to be estimated
m	=	Number of enterprises	b ₀ = Constant term
P _K	=	Unit price of K th fixed inputs (K = 1, 2, 3, ... n)	E _i = Error term
C _K	=	Quantity of K th fixed inputs	
r	=	Number of fixed inputs	
∑	=	Summation	

Multiple Regression Model:

This was used to determine the effects of inputs on outputs in rice production enterprise. Linear, semi-log, double-log and exponential functional forms were employed, fitted and tried; and on the basis of economic theory, statistical and econometric criteria, double-log functional form was chosen as the lead equation. The explicit form of the model is presented below:

$$\ln Y = \ln b_0 + b_1 \ln X_1 + b_2 \ln X_2 + b_3 \ln X_3 + b_4 \ln X_4 + b_n \ln X_n + e_i$$

Where:

Y	=	Output of rice in Kg/Ha
X ₁	=	Gender (Dummy variable: Male = 1 Female = 0)
X ₂	=	Age of the respondents (years)
X ₃	=	Marital status (Married = 1,

Mean Score Analysis on a 5-Point Likert Scale

The Likert Scale score is a method of ascribing quantitative values to qualitative perception to make them amenable to statistical analysis. The values of the responses were added up and divided by 5 to obtain a mean score of 3.0 ($\frac{5+4+3+2+1}{5} = \frac{15}{5} = 3.0$) which is regarded as the mean level of acceptance; while those with a mean score of less than 3.0, were rejected. The mean acceptable score was determined as follows: Mean of each value item was computed by multiplying the frequency of positive response with its appropriate Likert nominal value and the sum of the number of the respondents. Then, from the formula:

$$\bar{X} = \frac{\sum fx}{N}$$

Where:

\bar{X}	=	Mean score
∑	=	Summation
fx	=	Likert nominal value of responses
N	=	Number of observations

Table 1: Socio-economic characteristics of the rice farmers in the area

Age (Years)	Frequency	Percentage (%)
0 – 20	6	5.00
21 – 30	65	54.17
31 – 40	29	24.17
41 – 50	17	14.17
51 – 60	3	2.50
Total	120	100.00
Gender		
Male	70	58.33
Female	50	41.67
Total	120	100.00
Marital Status		
Single	37	30.83
Married	51	42.50
Separated	20	16.67
Widowed	12	10.00

Total	120	100.00
Educational Level (Years)		
No formal education	18	15.00
Primary education	50	41.67
Secondary education	40	33.33
Tertiary education	12	10.00
Total	120	100.00
Household size(NO)		
1 – 4	29	24.17
5 – 8	60	50.00
9 – 12	30	25.00
13 – 16	1	0.83
Total	120	100.00
Farming Experience (Years)		
1 – 5	4	3.33
6 – 10	42	35.00
11 – 15	16	13.33
16 – 20	58	48.33
Total	120	100.00
Farm Size (ha)		
Marginal farm (0.01 – 0.99 ha)	8	6.67
Small farm (1 – 2 ha)	73	60.83
Semi-Medium farm (2 – 4 ha)	39	32.50
Medium farm (4 – 10 ha)	---	---
Total	120	100.00
Membership of Cooperatives		
Member	41	34.17
Non-Member	79	65.83
Total	120	100.00
Source of Labour		
Family labour	30	25.00
Hired labour	72	60.00
Communal labour	18	15.00
Total	120	100.00
Annual Farm Income (₦)		
50,000 – 100,000	32	26.67
100,000 – 150,000	66	55.00
150,000 – 200,000	18	15.00
200,000 – 250,000	4	3.33
Total	120	100.00

Source: computed from field survey data, 2019.

Socio-Economic Characteristics of Respondents

Table I revealed that majority (95%) of the respondents were within the age bracket of 21 – 60 years. This shows that most of them are still in their active economic years, which could mean bumper harvest for the rice farmers. This result agrees with the findings of Adewumi&Ometesho (2012) who opined that productivity and output of the farmer is affected by his age. Similarly, Nwaru (2007) reported that young farmers are more likely to take risks by adopting better agricultural practices than the old farmers who are more conservative to modern agricultural practices.

The table also disclosed that both men and women were involved in rice production, but with 58.33% of the farmers being male, while 41.67% of them were female. This result implies that rice farming in the study area is male-dominated, and this is in consonance with the finding of Chukwu &Umeh (2015) who stated that males dominate in rice production in Ebonyi state.

The table above equally showed that 69.17% of the married couples were involved in rice production in the area. This indicates that most of the rice farmers in the study area were faced with many responsibilities, which can push them into off-farm activities to earn extra income for the family. This result is inline with the findings of Ajala&Gana (2015) who reported that instability of income and its consequences were felt more by married farmers than the single farmers in such areas like provision of food, shelter and clothing for the family; unlike the single farmers who have fewer responsibilities.

The above Table revealed that most (85%) of rice farmers sampled had one form of formal education or the other. Amaechina&Eboh (2017) reported on the ease of educated farmers in having access to information, which could assist in enhancing their innovativeness and in making the good use of the improved technological packages.

Table I also revealed that greater number (96.67%) of the respondents in the area had long years of experience in rice production for about 5 – 20 years. This means that most of the rice farmers in the study area are well experienced in rice production enterprise.

The same Table I depicted that 93.33% of the respondents had farm sizes of between 1 – 3

hectares, which portrayed their small-scale nature. This is inline with the popular axiom that farmers in many developing countries of the world operate in a small-scale (Adeoti, 2006).

Furthermore, rice farmers in the area have household sizes of between 4 – 16 members; especially with a mean of 10 members. Nevertheless, under the peasant agriculture, much reliance is often placed on the strength of the household to supply the much needed farm labour in the absence of mechanical equipment. Thus, the larger the household size, the greater the supply of family labour. This is inline with the findings of Ezeh and Nwachukwu (2010) who reported that family size has major implications on the provision of labour for farm work.

Cooperative membership lends credence to the apriori expectation because membership of farmers' groups has many advantages in terms of reduction of risks and uncertainties, and to have cheaper source of credit and other important inputs needed in the production process as recorded by Babatunde et al (2008). Hence, cooperative membership creates access to networks and opportunity to diversify income through boosting of output which will eventually lead to the profitability of the farm business.

Labour is very critical in all agricultural activities, especially among the peasant farmers in developing countries. Nwaru (2006) postulated that married couples who have children in their homes, invariably use them as a source of family labour in their farm operations; thereby reducing the costs of production to the bearest minimum. Hence, the use of family labour is a cash saving device which would add to both the output and profitability of rice production.

The table above also revealed that the respondents have different sums accrued to them for rice production. However, the capital intensive nature of rice production could be responsible for the low financial returns as shown in the table I.

FAO (2018) reported that credit helps farmers in payment of labour and procurement of farm inputs in order to boost their productivity. It could be deduced from the result that the farmers did not earn enough, possibly for the fact that they engaged in small-scale rice production.

Table 2: Production Methods Adopted by the Rice Farmers in Ohaozara Local Government Area.

Production Methods	Frequency	Percentage (%)
Broadcasting	40	33.33
Nursery and Transplanting	68	56.67
Hole dropping	12	10.00
Total	120	100.00

Source: computed from field survey data, 2019

Table 2 above reveals that majority (56.67%) of the respondents adopted nursery and transplanting method in rice production, while minority (10%)

adopted hole dropping method. However, it might interest you to note that 33.33% used broadcasting method in rice production. Majority carried the vote

because it was believed that this particular method (i.e Nursey & Transplanting) will automatically help to increase yield, as well as boost output. Imolehin and Wada (2000) had reported that planting by dibbling and in rows of 20cm x 20cm, or 25cm x 25cm requires nursery practices that is done for about 3 – 4 weeks, depending on the specie and the required spacing which will result in high yield and good quality seeds.

Gross Margin Analysis

The result of costs and returns analysis (Table 3) revealed that rice production enterprise is very

lucrative; as an average of 3,800 kg of rice grains were realized per farmer per hectare of land; or a gross farm income of ₦760,000.00 with a total cost of production amounting to ₦220,100; thereby giving a net farm income of ₦539,900.00 and a benefit-cost-ratio of 3.45 or Return par Naira invested of 2.45. This implies that for every naira invested on rice production in the study area, there is a profit of ₦2.45. This confirms with the findings of Chukwu and Umeh (2015) who stated that rice production is profitable enterprise in not just the L.G.A but also in the state a whole.

Table 3: Costs and returns analysis for rice production enterprise per hectare in Ohaozara L.G.A of Ebonyi state

Budget Item	Units	Quantity	Price/Unit(₦)	Total Value(₦)
Rice output	kg	3,800kg	200	760,000
Gross farm income				760,000
Variable Costs				
a) Operating Inputs:				
Rice seeds	Kg	70	350	24,500
Selective herbicide	Litre	2	1,600	3,200
Non-selective herbicide	Litre	4	1,600	6,400
Insecticides	Litre	2	2,500	5,000
Fertilizer	Bag	6	6,500	39,000
Empty jute bags	No	30	150	4,500
Tusine	Roll	2	250	500
Total cost of operating inputs				83,100
b) Labour Inputs (M/Days):				
Land preparation (including nursery)	MD	30	2,000	60,000
Planting (including transplanting)	MD	20	1,000	20,000
Herbicide application	MD	3	1,000	3,000
Insecticide application	MD	2	1,000	2,000
Fertilizer application	MD	10	1,000	10,000
Bird scaring	MD	2	1,000	2,000
Harvesting (including conveyance)	MD	20	1,000	20,000
Processing (including parboiling, threshing, winnowing & bagging)	MD	10	1,000	10,000
Total Labour Costs				127,000
c) Total Variable Costs (TVC) = (a + b)				210,100
Gross Margin (GM) = (GFI – TVC)				549,900
Fixed Costs:				
Land Rent				5,500
Depreciation of fixed assets (excluding land)				4,500
d) Total Fixed Costs (TFC)				10,000
Total Costs (TC) = (TVC + TFC)				220,100
e) Net Farm Income (NFI) = (GFI – TC)				539,900
Benefit-Cost-Ratio (BCR) = GFI/TC				3.45
Return-Per-Naira Invested = NFI/TC				2.45

Table 4: Multiple regression results on the effects of socio-economic characteristics of rice farmers on output.

Variables	Linear	Semi-Log	Double-Log	Exponential
Constant	1.348804 (4.12) ***	-1.18499 (-2.21) **	0.5703335 (6.61) ***	4.999146 (63.34) ***
X ₁ – Age	0.0209502 (0.69)	(- 0.07775 (0.66)	-0.0009857 (-0.05)	0.0000662 (0.68)
X ₂ – Gender	-0.0537574 (-1.61)	-0.0342704 (-0.27)	-0.0370628 (-1.82) *	-0.00095 (-10.92) ***
X ₃ – Marital Status	0.7747488 (23.36) ***	3.884242 (15.77) ***	0.6601584 (16.65) ***	0.0005148 (26.76) ***
X ₄ – Household Size	0.0443124 (0.73)	0.0380222 (0.22)	-0.0142234 (-0.51)	0.0020365 (0.25)
X ₅ – Educational Level	0.0913305 (2.81) ***	0.0347084 (2.97) ***	0.0740839 (3.93) ***	0.0039314 (11.77) ***
X ₆ – Farming Experience	-0.104546 (-2.12) **	-0.4739966 (-2.29) **	-0.0834126 (-2.50) **	-0.0018992 (-0.94)
X ₇ – Farm Size	0.0363733 (0.58)	0.1285832 (2.23) **	0.0221479 (2.38) **	-0.0019755 (-0.24)
X ₈ – Cooperative	-0.0139918 (-0.40)	-0.1155771 (-0.94)	-0.0131472 (-0.66)	-0.0001123 (-0.87)
X ₉ – Sources of Labour	-0.0145933 (-0.5)	-0.0607137 (-0.61)	0.0061421 (0.38)	0.0002712 (0.38)
R ₂	0.9148	0.8291	0.8547	0.9195
F – Ratio	131.17 ***	59.31 ***	71.92 ***	139.58 ***

Source: Computed from field survey data, 2019.

Note: *** implies significant at 1% level; ** implies significant at 5% level; and * implies significant at 10% level. The figures in parentheses are t-values.

Results of the Multiple Regression Analysis

The multiple regression analysis results are presented in Table 4 and it shows that the double-log functional form emerged as the lead equation based on the economic, statistical and econometric criteria.

The coefficients for marital status, education and farm size had direct relationship with the output of rice; while the coefficients for gender and farming experience had inverse relationship with the output of rice. However, they were all significant at varied probability levels.

Marital status had a positive coefficient and significant at 1% risk level; implying that rice production involves more of married people than their other counterparts. This is probably predicted on the need to cushion the pressure arising from the family responsibilities. This is inline with the findings of Ekwunwa and Alufohuai (2009) who reported that over 88% of egg marketers in Benin city, Nigeria were married, while Mohammed et al (2012) posited that 95% of egg marketers in FCT, Abuja were married.

The coefficient of education was positively signed and significant at 1% level of probability. Thus, as the number of educated rice farmers increase, the output of rice will also increase. However, farmers with low level of education would be less receptive to improved techniques (Okoye et al, 2004). The

coefficient of farm size was positively signed and significant at 5% level of probability. This implies that any increase in farm size will lead to a corresponding increase in rice output; which invariably will lead to high level of output maximization, ceteris paribus (Onyenweaku and Agwu, 2003).

The coefficient of gender was negatively signed, indicating that there was no gender discrimination between male and female in agriculture and rice production in particular. Though it has a negative relationship with productivity, but its effect was rather significant at 10% level. The negative coefficient of gender is however, in agreement with apriori expectation.

The coefficient of farming experience was negatively signed, but was rather significant at 5% probability level. This implies that rice production requires the very active labour force to reckon with. In which case, it is not a thing of the very old people or even little children in its cultivation.

Constraints to rice production in the study area.

The constraints to rice production in this context imply the problems and challenges prohibiting rice producers from realizing the expected profits in the course of transforming inputs used in rice production into output.

Table 5: Constraints of rice production in the study area

Constraints	Mean Scores (X)	Decision Point
High cost of land and Land tenure system	3.1	Accepted
Late and Poor access to credit	3.3	Accepted
Shortage and High cost of labour	3.1	Accepted
Unpredictable weather and Climate change	3.0	Accepted
High cost and unavailability of fertilizers	3.0	Accepted
Pests and diseases infestation	3.0	Accepted
High cost and unavailability of herbicides	3.2	Accepted
High cost and unavailability of insecticides	3.2	Accepted
Poor access to extension services	2.9	Rejected
Lack of good quality rice seeds	3.1	Accepted
Poor access to improved inputs	3.1	Accepted
Decline in soil fertility	3.1	Accepted
Poor access to market	2.8	Rejected
Poor and Inadequate storage facilities	2.6	Rejected
Bad and Poor road network	3.1	Accepted
High interest rate on credit	2.9	Rejected
Inadequate processing facilities	2.7	Rejected
Lack of technical know-how	2.3	Rejected
Weed infestation problem	3.0	Accepted
Low productivity	3.0	Accepted

Decision Rule: ≥ 3.0 is Accepted; ≤ 3.0 is Rejected

Source: Computed from field survey data, 2019.

Keys: VGE = Very Great Extent; GE = Great Extent; NE = No Extent; LE = Low Extent and VLE = Very Low Extent.

Table 5 showed the main constraints highlighted by the rice producers in the study area. The constraint that scores 3.0 and above was regarded as the major challenges that needs to be addressed in order to increase profit and as well as make the enterprise more attractive and conducive for the producers. The remaining problems that score less than 3.0 were regarded as minor or as non-effective challenges to rice production in the study area. However, of the twenty (20) variables being analysed, fourteen (14) were accepted as being among the major challenges having scored 3.0 and above, while the remaining six (6) were regarded as minor or not been serious challenges and these include: poor access to extension services and high interest rate on credit with a decision point of 2.9 respectively, poor market access with a decision point of 2.8, inadequate processing facilities with a decision point of 2.7, poor and inadequate storage facilities with a decision point of 2.6 and lack of technical know how with a decision point of 2.3.

It is to be noted that late and poor access to credit and high cost and unavailability of herbicides and pesticides were reported to be the worst major challenges encountered as both had a decision point of 3.3 and 3.2 for the agro-chemicals respectively. Financial resource is a major constraint to rice production as farmers are poor, they suffer from limited access to credit facilities; thereby hindering higher productivity and output (Izekor and Olumese, 2010). Hence, lack of adequate provision for agricultural loans from the financial institutions to

producers has constrained sustainability of rice cultivation in Nigeria.

These were closely followed by shortage and high cost of labour, lack of good quality rice seeds, poor access to improved inputs, decline in soil fertility, land tenure system and high cost of land, bad and poor road network which had their decision points at 3.1 respectively. Okoye et al, 2010; FAO, 2014; Kadiri et al, 2015 and Ume et al, 2018 reported that the shortage and high cost of labour in most countries in Sub-Saharan Africa. However, Nigerian situation could be linked to among otherthings; economic recession as labourers charge exorbitantly to survive and as well as rural-urban migration of able-bodied youths in search of greener pastures; thereby leaving farming to the feeble and the aged parents and their little children.

The last group were those that scored 3.0 decision points; and they include: high cost and unavailability of fertilizers, unpredictable weather or climate change, pests and diseases infestation, weed infestation problem and low productivity. The high cost and unavailability of fertilizers in Nigeria, especially inorganic fertilizers as variously reported among literatures (IRRI, 2015; Ume et al, 2018; and Udemezue, 2019) could be correlated to the removal of "Fertilizer Subsidy Programme" by the Federal Government; thereby exposing the farmers to procure all this important resource from black market to the detriment of their farm profits.

Climate change or unpredictable weather as posited by Tijani and Bakari (2014) is a natural climate cycle and human activities, which have a negative impact

on agricultural productivity in the form of unpredicted yield through global warming, shift in rainfall patterns, and more frequent occurrence of extreme events, such as drought, flood and forest fires.

CONCLUSION:

Rice is a staple food for over 50% of the human population, as well as provides over 19% of the global per capital energy. In fact, it is one of the major crops cultivated globally, alongside with corn and wheat. Analysis of the socio-economic variables of the respondents revealed that greater proportion (95%) of them were within their active productive ages (21 – 60 years).

The result also showed that both married men and women were involved in rice production in the study area; even though males predominate the females. Most of them (96.67%) had long years of experience in rice production and also have one form of formal education or the other. Majority (56.67%) of the respondents adopted nursery and transplanting method because it not just only increases yield, as well as boost output; but also give good quality seeds. The result of costs and returns analysis revealed that rice production is a very rewarding and profitable enterprise, if well managed.

The coefficient for marital status, education and farm size have direct relationship with the output of rice; while the coefficients for gender and farming experience have inverse relationship with the output of rice. All of them were however, significant at varied probability levels. The major constraints encountered by these rice farmers in the area include: late and poor access to credit, high cost and unavailability of herbicides, high cost and unavailability of insecticides, land tenure system and high cost of land, shortage and high cost of labour, lack of good quality seeds, poor access to improved inputs, decline in soil fertility, bad and poor road networks; among others. It is recommended that the constraints limiting the respondents from achieving their heart desires in rice production be addressed as a means of encouraging them to increase their rice production potentials and capabilities.

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