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Economic Analysis of Paddy Rice Production in Niger Delta Region of Nigeria

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Abstract

The study examined economic analysis of paddy rice production in Niger Delta Region of Nigeria in view to determine how profitable the crop is in the study area and how inputs or resources used in paddy rice production significantly affect the crop's production. The data for the study was collected from 300 rice farmers in three out of nine states in the region based on their intensity in rice production in the study area using multistage and simple random sampling technique. Data analysis was carried out using descriptive statistics, multiple regression model and profitability model. Rice production was found to be profitable as farmers realized ₦300,071.84 as Net farm Income. It was also found that resources used in paddy rice production significantly affect paddy rice production. The result indicated that mean age of paddy rice farmers was 49 years, the mean farming experience was 17 years while mean cultivated land was 2.32 hectares It was recommended that Reviewing the Land Use Act of 1990 is critical so that most of the fertile land held by government will be released to rice farmers, also providing skilled labour required in rice production and easy evacuation of farm produce will go a long way in increasing the production of paddy rice in the study area.

Keywords: Economic, analysis, paddy rice, production and Niger delta

Introduction

Rice is in the grass family *Gramineae* (Kuldeep, 2006). Rice cultivation is the principal activity and source of income for millions of households around the globe and several countries of Asia and Africa are highly dependent on rice as source of foreign exchange earnings and government revenue. (Rice Trade, 2011). According to Rice Trade 2011, rice is the second largest produced cereal in the World; it is a crop that cuts across regional, religious, cultural, national and international boundaries, apart from wheat; with very high demand. China and India, supply over half of the world's rice. Brazil is the most important non-Asian producer, followed by North and Central America, United States of America ranks third in North America continent after Brazil and North and Central America. Nigeria ranks second in Africa after Egypt. (United States Development Agency, 2009). Today, rice is grown and harvested on every continent except Antarctica, (Rice Trade, 2011), where conditions make its growth impossible.

Rice is a strategic and political crop in many African countries. The Africa Rice Center, originally the West Africa Rice Development Association (WARDA), developed a new Upland rice cultivar known as New Rice for Africa (NERICA) among others. A NERICA rice variety was developed from the hybridization between *Oryza sativa* and *Oryza glaberrima* (Onyishi *et al*., 2010). NERICA have long grains and yield potentials of 4.0 t/ha (Africa Rice Center, 2006). Rice is an increasingly important crop in Nigeria. It is relatively easy to produce and it is grown for sale and

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for home consumption. In some areas there is a long tradition of rice growing, but for many, it is considered a luxury food for special occasion only. With the increased availability of rice, it has become part of the everyday diet of many in Nigeria. There are many varieties of rice grown in Nigeria; some of these are traditional varieties while others have been introduced into the country. Rice is grown virtually in all the agro-ecological zones in Nigeria (Akande, 2003). This is because, Nigeria have ideal climatic conditions which is akin to that of South East Asia where the crop is produced for export.

According to Onyishi *et al*. (2010), the main production ecologies of rice are rain-fed lowland, rain-fed upland, irrigated lowland, deep water floating, and mangrove swamp. They noted that, land area for rice production under rain-fed upland is 25%, rain-fed lowland 50%, irrigated lowland 16%, deep water and mangrove 9%, and their share of production is 17%, 35%, 27%, and 3% for rain-fed upland, rain-fed lowland, irrigated lowland, and deep water mangrove respectively. The deep water mangrove is not fully developed in Nigeria because; there is lack of appropriate technology (Singh *et al.*, 1997). Nigeria has a land area of 923,768 square kilometres with a total of 71.2 million hectares of cultivable land, an estimated 4.6 million hectares is suitable for rice production but only about 1.8 million hectares or 39% is currently developed for rice cultivation. (Federal Republic of Nigeria, 2009), despite that its production is labour intensive and labour represents major production costs (Kadiri, 2014). Although there is increase in rice production, consumption is also increasing annually average yearly per capita consumption was 3kg in 1961-1975, and by 2005 it estimated at 33kg. During this period, self - reliance has decreased from 99.0% to 64% (Kadiri, 2014). Nigerian policy in relation to the rice sector appears to be motivated by a whole range of factors including the; desire to curtail unfair competition from imported rice, quest for self - sufficiency and national food security, challenge of reducing poverty and raising farmers' incomes, need to generate increased employment by encouraging school leavers to go into rice production, desire to reverse the heavy outflows of foreign exchange for rice imports, and desire to raise the nutritional level of the average Nigerian by making domestic rice available at affordable prices. In recent time, Nigerians have increased their level of foreign rice consumption irrespective of their relative prices simply because they are polished, stone free and easy to cook. Yet nutritionally, the local varieties produced in Nigeria are far better than those imported. Rice production is very essential in Nigeria as a whole and in Niger Delta in particular because, it guarantees food production; creates employment opportunities; reduce poverty; and create capacity building at both individual and institutional levels. The Nigerian rice sector has a lot of potentials for increased rice productivity as the country is blessed with abundant rice growing environment (Nwaobiala and Adesope, 2013). However, WARDA (2004) noted that rice policy in Nigeria is characterized by inconsistency, shifting between open and protectionist trade policy and such changes hinder the ability of stakeholders to develop long term strategies for the growth of the sector. FAO (2004) identified rice as a very important primary food source and this is drawn from the understanding that rice-based systems are essential for food security, poverty alleviation and improved livelihoods by enhancing the socio-economic profile / status of the farmer. Rice is grown in paddies or on upland fields depending on the requirements of the particular variety, there is also limited mangrove cultivation. Nigeria is the largest producer of rice in West Africa producing over 40% of the regions' total production (Singh *et al.*, 1997 and FAOSTAT, 2007). In the past 30 years, production has increased six folds with Nigeria producing 3.3 and 3.6 million tons of paddy rice in 2000 and 2005 respectively (FAOSTAT, 2004 and 2007). Africa accounts for only about 2% of the Worlds output of rice. Current production stands at 2.8 million tons

with a deficit of 1.6million tons excluding the quantity smuggled through the porous borders (USAID, 2008). The successive programmes launched to increase rice production have not been able to reduce the resulting rice deficit. The imposition of a ban on rice import from 1985 to 1995 and ensuring increase in the relative price against other major staples boosted rice production mainly through area increase. Past policies did not help local rice producers to secure significant market share and imports have increased since the lifting of the ban and successive increase in the import tariff from 50% to 100%. Imported rice represents more than 20% of agricultural imports and half of total rice consumption (WARDA, 2003; Nwaobiala and Adesope, 2013). In spite of the relative increase in the price of rice per capita consumption has maintained the upward trend showing that rice has become a structural component of Nigeria diet with a low price elasticity of demand (WARDA, 2003). Massive importation of food especially rice in recent years is an indicator of poor state of nations agricultural and technologies development, occasioned by poor productive propensity of the farmers. Increase in agricultural import is a disincentive to local farmers to produce and may cause reduction in farming population which can subsequently lead to a reduction in agricultural output. The production process involving costs and the magnitude of costs influence the magnitude of profit (Anuebunwa, 2004 and 2007). Many studies on rice production were geared towards maximizing profit, ignoring socio- economic factors of the farmers which influence and contribute to rice production. Problems of rice production are identified as relatively high production costs, relatively poor producer prices and marketing systems, this results to low returns and subsequently decline in rice production (FAO, 2008; Ugwugwu, 2008). In view of the above, this study tends to analyse the economies of paddy rice production in Niger Delta region of Nigeria. The specific objectives of the study are to

i. Assess the socio-economic characteristics of rice farmers in the region;
ii. Estimate the production function for rice in the study area;
iii. Determine the costs and return associated with rice production systems.

The hypothesis of the study which stated that, "Resource inputs (Land, seed input, family Labor, hired labor, fertilizer application and herbicide application) are positively and significantly related to paddy rice yield in the study area was tested".

The Niger Delta of Nigeria is the 3rd largest wetland in the world. The delta is a vast flood plain built up by the accumulation of sedimentary deposits washed down the Niger and Benue rivers. It is composed of four ecological zones: coastal barrier islands, mangroves, fresh-water swamp forests and lowland rainforests. The region consists of nine (9) states of the Federal Republic of Nigeria which are Abia, Akwa-Ibom, Bayelsa, Cross River, Delta, Edo, Imo, Ondo and Rivers States, and occupies an area of over 74000sq.Km with a population of over 35 million people (Niger Delta Development Commission, 2010). Niger Delta Region of Nigeria, like all Delta Regions all over the world, is very fertile and suitable for rice cultivation. According to National Bureau of Statistics (2009), in considering only the Niger Delta States, Ondo state came 1st in Areas Planted to Rice by States, followed by Abia state, Edo and Delta States came 3rd and 4th respectively, Cross River State came 5th, Imo State came 6th, while Akwa-Ibom, Rivers and Bayelsa States came 7th, 8th and 9th respectively (Kadiri, 2014).

Materials and methods

The study was carried out in the Niger Delta Region of Nigeria. This Region is a densely populated region sometimes called the Oil Rivers because it was once a major producer of palm oil. The Niger Delta, as defined by the Nigerian Government, covers over

70,000km^2 and makes up 7.5% of Nigeria's land mass (Wikipedia, 2010). Historically and cartographically, it consists of present day Akwa-Ibom, Abia, Bayelsa, Cross-River, Delta, Edo, Imo Ondo and Rivers states. The South-South Niger Delta includes Akwa-Ibom, Bayelsa, Cross River, Delta, Edo and Rivers States; South-East includes Imo and Abia states while Ondo state constitutes the South West Niger Delta State.

A representative sample was selected for the study using a multistage sampling technique. Three states, Abia, Ondo and Imo States were purposively selected because of their relative strengt in rice production. Two Local Government Areas from each of the state, Abia (Arochukwu and Bende LGAs), Imo (Okigwe and Ihitte-Uboma LGAs), Ondo (Akoko North and Odigbo LGAs) were purposively selected based on their rice production intensity making a total of six Local Government Areas (LGAs). In each LGA selected, a list of rice producing communities was compiled through the assistance of ADP staff. From this list, five communities were selected randomly giving a total of thirty communities. In each of the selected communities ten rice farming households were randomly selected giving a total of fifty (50) farmers per LGA and hence a total of three hundred rice farmers. This technique gave every rice farmer in each community an equal opportunity of being part of the study data for this study were collected from both primary and secondary sources. Primary sources include information that was obtained from oral interview, observations and interview schedule. Two sets of interview schedule were used: the village level and farmer's household level. Structured interview schedule was utilized in gathering primary data.

Secondary source of data include information from journals, text books, internet search, websites, published and unpublished materials relevant to the study.

Models used in the study were two thus:

Multiple regression models

This model was used to achieve objective ii which is required to run the production function of rice in the study area. This is an aggregate rice production function to be employed in generating the rice production coefficients needed to access the effect of resource inputs on the output of paddy rice in the study area. Four functional forms of the regression model were used so as to get the best of the model that will represent the result. These are the Linear, Semi log, double log and exponential functional forms. The one that gave the best fit was chosen on the following statistical criteria:

1) The magnitude of the coefficient of multiple determination R^2
2) The number of variables that are significant at 5% level of significance
3) The signs and magnitudes of the regression coefficients as they conform to the a-priori expectations, that independent variables are positively related to the dependent variables.

In the implicit form, the model was expressed thus,

$$Y = f(X_1, X_2, X_3, X_4, X_5, X_6, e) \text{ ---------- (1)}$$

In explicit form, the models were stated thus:

Linear function

$$Y = b_0 + b_1 X_1 + b_2 X_2 + b_3 X_3 b_4 X_4 + b_5 X_5 + b_6 X_6 + \text{ ---------- (2)}$$

Semi log function

$$Y = Inb_0 + b_1 InX_1 + b_2 InX_2 + b_3 InX_3 + b_4 InX_4 + b_5 InX_5 + b_6 InX_6 \text{ ---------- (3)}$$

Double log function

$$InY = Inb_0 + b_1 InX_1 + b_2 InX_2 + b_3 InX_3 + b_4 InX_4 + b_5 InX_5 + b_6 InX_6 \text{ ---------- (4)}$$

Exponential function

$$InY = b_0 + b_1 X_1 + b_2 X_2 + b_3 X_3 b_4 X_4 + b_5 X_5 + b_6 X_6 \text{ ---------- (5)}$$

Where $X_1 – X_6$ = Independent variables
And Y = Dependent variable.
Y = Paddy rice output (Kg/hec).
X_1 = Farm size (hectare)
X_2 = Seed input cost (₦)
X_3 = Family labor cost (₦/ man day)
X_4 = Hired labor cost (₦ /man day)
X_5 = Cost of fertilizer (₦)
X_6 = Cost of herbicide (₦)
e = Error term

It is expected a *priori* that farm size (X_1), seed input (X_2), family labor cost (X_3) hired labor cost (X_4), fertilizer application cost (X_5), and herbicide application costs (X_6) would have a direct relationship with gross revenue or value of aggregate output per farm (Y). The production coefficients for these input factors were therefore expected to be positive, *ceteris paribus.*

Profitability model

The profitability model used in the analysis of profitability in rice production in the study area as given by Odii (1998): is given as:-

GM = TR – TVC ---------- (6)

NFI = TR – ((TFC + TVC) + Inventory Adjustment (IA)) ---------- (7)

Return on Investment = Net Income/ Total Cost ---------- (8)

% rate of return on investment (% RRI) = (Net Income/ Total Cost) x 100 ---------- (9)

Where:
GM = Gross margin
TR = Total revenue
TVC = Total variable cost
NFI = Net farm income
TFC = Total fixed cost
TC = Total cost = (TFC + TVC) and
I.A = Inventory adjustment

Results and discussion

Socio–economic characteristics of the respondents

Table 1: Presents the socio-economic characteristics of the respondents

Socio-economic characteristics of respondents		Percentage (%)	Mean
Age	25 – 35	10.33%	49years
	36 – 45	27.67%	
	46 – 55	35.00%	
	56 – 65	17.33%	
	66 – 75	9.69%	
Marital status	Single	9.33%	
	Married	70.00%	
	Divorced	10.00%	
	Separated	1.00%	
	Widowed	9.67%	
Gender	Male	64.33%	
	Female	33.67%	
Participation	Part time farming	61.00%	
	Full time farming	39.00%	
Educational attainment			6- 10 years
Years of experience in rice farming			17 years
Farm size			
2.32 (ha)			
Farmers household size			6

Source: Field survey data, 2012

Table 1 presents the mean of the socio economic characteristics of rice farmers in the study area. The table showed that most of the respondents fell within the age group 36 – 55years which was about 62.66% of the total sample, with a mean of 49years. This implied that rice farming is being practised by middle age farmers. This finding is consistent with the findings of Ibitoye *et al.* (2012), who found that the mean age of rice farmers in their study area, was 45years. This showed that rice farmers belong to the middle age classes, who are physically fit to withstand the stress and risks involved in rice production, and are more mentally alert to embrace new techniques of rice production. Also, rice production in the study area was dominated by male farmers who comprised of 64.33% of sampled farmers. This is in contrast with Ibitoye *et al.* (2012) who found out that there were more female rice farmers than males in their study area. The result also showed that 69% of rice farmers were part time farmers and 70.00% were married, this implied that rice farmers were people with high responsibility who needed income from other sources to meet up with their financial obligations. The table also showed that rice farming has been a long time practice amongst the farmers in the study area which on the average was 17 years. The level of education attained was (6 – 10 years) on the average and the experience attained over the years will assist the farmers to be able to adopt new technologies. Lastly, the result showed that farmers in the study area were small – scale farmers (2.32 hectare) and this small farm size make mechanization difficult thereby limiting output of rice to subsistence level leaving little for commercial. Also, Ibitoye *et al.* (2012) confirmed that (53.00%) of rice farmers in Ibaji cultivated between 1-3 hectares.

Production function paddy rice in the study area

Table 2 presents the parameters from different production functions of paddy rice production in the study area.

Table 2: Parameters from different production functions of paddy rice production

Variables	Linear Form	Double log Form	Semi log Form	Exponential Form
Constant	1584.32 (4.013)**	4.703 (19.419)**	-22568.407 (-6.291)**	7.613 (149.382)**
X_1	3012.93 (3.307)**	-0.032 (-0.906)	-109.500 (-0.209)	0.604 (5.142)**
X_2	56.47 (15.84)**	0.675 (18.236)**	2293.763 (4.185)**	0.004 (9.211)**
X_3	25.61 (2.16)**	0.523 (4.238)**	4021.781 (2.200)**	0.000 (-0.158)
X_4	-45.81 (-2.50)**	-0.262 (-2.618)**	-5112.874 (-3.455)**	-0.003 (-0.158)
X_5	-45.08 (-3.09)**	-0.250 (-2.141)*	3620.003 (2.092)**	-0.009 (-1.399)
X_6	-185.38 (-0.88)	0.103 (1.270)*	4724.771 (3.915)**	-0.028 (-4.604)**
R	0.892	0.909	0.833	0.761
R^2	0.795	0.827	0.694	0.580
SSE	2944.085	0.24318	3602.019	0.37921
f – value	189.751**	232.895**	110.50**	67.084**

Figures in parenthesis are t values, * mean significant at 5%: ** mean significant at 1%
Source: Field survey data, 2012

In this study, it was hypothesized that the yield or output of rice is dependent on the following, land, seed, family labor, hired labor, fertilizer application, and herbicide application. Therefore, a multiple regression model was used to analyse the effect of

these variables on the yield or output of rice in the study area. Regression analysis was carried out to ascertain the effect of each of the explanatory variables land (X_1), seed input (X_2), family labor (X_3), hired labor (X_4), fertilizer application (X_5), herbicide application (X_6) on the explained variable yield (Y). The regression models together with their dependent and independent variables have already been specified in model 1. The coefficients of the four functional forms were presented in Table 3.2. Of all the aforementioned functional forms involved in the analysis, the double log functional form has the highest values of multiple determination (R^2) and F-value, it has five variables which were significant at both 5% and 1% levels of significance. Owing to the above reasons, the double log functional form was chosen as best fit for the analysis.

The double log functional form had three variables (X_2 X_3, X_6,) positively related to the output while three variables (X_1, X_4 and X_5) were negatively related to the output. Three of the variables (X_2, X_3, and X_4) were significant at both 1% and 5% levels of significance, while variables X_5 and X_6 were significant at only 5% level of significance. The coefficient of multiple determinations (R^2) was 82.7% while the F- value which was 232.895 was also significant at both 1% and 5% levels of significance.

On evaluation of the effects of independent variables on the yield (dependent variable) of paddy rice in the study area, the lead model performed relatively well based on the values of R^2 (0.827) and f- value (234.877). The R^2 value showed that approximately 83% was due to the variables captured in the model while 17% was not captured possibly due to error. The high values of R^2 and F- statistics gave reliable measure of the overall explanatory power of the regression model for the test of significance of the parameter estimates of the lead equation by means of t- statistics at the chosen level of significance.

The lead equation is thus:

Linearized double log function

$$Y = 4.703 - 0.032X_1 + 0.675X_2 + 0.523X_3$$
$$(19.42)^{**} \quad (0.091) \quad (18.24)^{**} \quad (4.24)^{**}$$
$$- 0.262X_4 - 0.250X_5 + 0.103X_6$$
$$(-2.62)^{**} \quad (-2.14)^{*} \quad (1.27)$$

From the lead equation, seed (X_2), family labor (X_3) and herbicide application. (X_6) have a direct relationship with rice yield due to their positive coefficients (0.675), (0.523) and (0.103) respectively. Land input X_1, hired labor (X_4) and fertilizer application (X_5) had an inverse relationship with rice yield due to their negative coefficients of (-0.032), (-0.262) and (-0.250) respectively.

The production coefficients in the linearized double log function represent the partial regression coefficient or marginal productivity of the variables used in the production of (paddy) rice in the study area. The figures in parentheses represent the t values of the coefficients. A partial regression coefficient measures the change in the mean value of dependent variable (Y) per unit change in one independent variable keeping other independent variables constant. In this case, it means that, holding land input (X_1), family labor (X_3), hired labor (X_4), fertilizer application (X_5) and herbicide application (X_6) constant, a one percent (1%) increase in seed input (X_2) led on the average to 0.7 % increase in yield. The same increase happened to X_3 and X_6 when others were held constant. An increase of 0.5 %, 0.1% happened to the yield respectively. Conversely, a decrease of 0.03% happened to the yield for variables X_1 and 0.3% each for variables X_4 and X_5 when others X_2, X_3, and X_6 were held constant. This implied that, addition of a unit man-day of hired labor to the land will decrease the yield by 0.3% and also, if a unit (Kg) of fertilizer is applied to the land, there will be 0.3% decrease in the yield.

Hypothesis of the study

This hypothesis stated that, Resource inputs (Land, seed input, family labor, hired labor,

fertilizer application and herbicide application) are positively and significantly related to rice yield in the study area.

All the variables were significant at either 1% or 5% levels of significance except variable X_1 which was not significant at any level from the adopted functional form (Double Log Form), also three of the variables (X_2, X_3 and X_6) were positively related to dependent variable (yield of paddy rice) while variables X_1, X_4 and X_5 were negatively related to yield of (paddy) rice, we hereby reject the null hypothesis while the alternative hypothesis was accepted since there is significant positive effect in the use of resources for rice production.

Costs and return analysis of (paddy) rice production in the study area

Table 3 presents the costs and return of (paddy) rice production in the study area.

Table 3: Analysis of costs and return of (paddy) rice production / ha in the study area

Item	Unit price (₦)	Total Unit/ha	Value (₦)/ ha
1. Rice revenue (TR)	138.75/kg	4713.25kg	₦653,963.44
2. Variable costs			
a. cost of seed	60.00/kg	63.45kg	₦3,807.00
b. Fertilizer cost	120.00/kg	48.68kg	₦5,841.60
c. Herbicide cost	250.00/kg	2.42kg	₦ 605.00
d. Labor costs			
i. Family labor cost	2000.00/MD	107.22MD	₦214,433.00
ii. Hired labor cost	2000.00/MD	55.12MD	₦110,230.00
Total labor cost (TLC)			₦324,663.00
Total Variable Cost (TVC) = a + b + c + d			₦334,916.60
Gross Margin (GM) = TR – TVC			₦319,046.84
4. Fixed cost			
a. Investment cost			₦6,975.00
b. Land rent			₦10,000.00
Total Fixed Cost (TFC)			₦16,975.00
Total cost (TC) = TFC + TVC			₦351,891.60
5. Inventory Adjustment (I.A) (Assumed)	200/kg	10kg	₦2,000.00
Net Farm Income (NFI) = TR – (TC + I.A)			₦300,071.84
Return to Management (RTM)			₦36,008.62
Net Return (NR) = NFI – RTM	12% of NFI		₦264,063.22
Rate of Return (RoR) = (NR/TC) X 100			80%

Source: Field Survey Data, 2012

The planting periods of (paddy) rice according to the rice farmers was 103 – 120 days. Table 3 showed the production costs and return per hectare of rice produced in the study area for the year 2012 planting season. Average total value of output (paddy rice) was ₦653, 963.44K per hectare obtained from 4713.25kg of paddy rice. Total operating cost amounted to ₦334,916.60 or 95.18% of the total cost of production, out of which labor cost was ₦324,663.00 or 96.93% of total production cost while fixed cost (₦16,975.00) accounted for 5.07% of the total cost of production. According to Olayide and Heady (1982) labor is the second most important resource in farm production and constitutes a serious limiting input in the production process. When variable inputs were disaggregated, it was observed that labor cost constituted the highest cost component (₦324,663.00) while fixed cost was identified as the least (₦16,975.00) cost component. The net farm income of rice farmers in the study area was ₦300,071.84 which indicated that rice production is profitable. Rice farmers on the average made a net return of ₦264,063.22 per

hectare that resulted in a return of ₦0.80k for every one naira invested. This result is in conformity with the findings of Ibitoye *et al*. (2012) who found that benefit/cost ratio of rice enterprise in Ibaji was 1.95 which implied that everyone naira invested in rice farming generated revenue of ₦1.95k, indicating that rice farming in that area was viable. The average gross margin of rice enterprise as found in the study was ₦319,046.84; this positive gross margin showed that rice enterprise is profitable. This result showed that rice production is viable and highly profitable if the farm is well managed. The economic implication of these findings is that loans granted to farmers for rice production were of benefit to both lenders and borrowers since returns were high enough to repay such loans and the accrued interest.

Conclusion and policy recommendations

Rice production is one of the major sources of livelihood for farmers in Niger Delta Region of Nigeria. The study has examined the socio- economic characteristics of respondents in the study area and also determined the significance of resource inputs in paddy rice production. The net profit of the farmers were also estimated which showed that paddy rice production is profitable in the study area. Based on these findings the following recommendations were made; Reviewing the Land Use Act of 1990 is critical so that most of the fertile land held by government will be released to rice farmers, also providing skilled labour required in rice production and easy evacuation of farm produce will go a long way in increasing the production of paddy rice in the study area Farmers should be encouraged to form co – operatives amongst themselves so that it would be easy for them to have access to larger land and funds in form of credit facility so as to assist each other in expansion of their production. Farmers should be taught, encouraged and empowered to source for high yielding seeds for use in their production. This will make the seeds easily accessible and affordable to farmers in the communities. Government should provide basic infrastructure, such as motor-able roads for rice farmers, to enable them get to the market to sell their goods.

Reference

Africa Rice Center (WARDA), (2006). *Africa rice trends: overview of recent developments in the sub-sahara Africa*. African rice center brief, cotonou, Benin. http://www.warda.cgiar.org/publication/rice%20Trend%2023-10-07.pdf.

Akande, T. (2003). *An overview of Nigerian rice economy*. Monography published by the Nigerian institution of social and economic research (NISER), Ibadan.

Anuebunwa, F. O. (2004). *The structure conduct and performance of the marketing system for Garri in Abia State, Nigeria*. Ph. D Thesis Federal University of Technology, Owerri, Imo State Nigeria.

Anuebunwa, F. O. (2007). Analysis of seller concentration and market performance in rice systems in Ebonyi State, Nigeria. *Journal of Sustainable Tropical Agriculture Research*, 22(1), 46-50.

Federal Republic of Nigeria (2009). *National rice development strategy (NRDS).* For the coalition of African rice development (CARD).

Food and Agricultural Organization (FAO) (2004). Concept paper-The International Year of Rice, 2004.

Food and Agricultural Organization (FAO) (2008). Regional conference for Asia and the Pacific Beijing China, 17-21May, 2008.

FAOSTAT (2004). Food and agricultural organization statistics division http://faostat.fa.org.

FAOSTAT (2007). *Food and agricultural organization statistics division*. http:faostat.fao.org/site/336/default.aspx.

Ibitoye, S. J., Orebiyi, J. S., & Shaibu, U. M. (2012). Economic effect of inorganic pesticide use on Fadama II Rice Farming in Ibaji local government

Area, Kogi State, Nigeria. *International Journal of Agric. and Rural Development*, 15(2), 1063 – 1070.

Kadiri, F. A. (2014). *Evaluation of paddy rice production in Niger Delta Region of Nigeria: A strategy for sustainable rural development*. An unpublished Ph. D Thesis submitted to the post graduate school, Federal University of Technology Owerri.

Kuldeep, S. (2006). *A Handbook of Agriculture.* Directorate of information and publications of Agriculture, Indian Council of Agricultural Research, New Delhi, 110012, Pg 818.

Niger Delta Development Commission (2010). *Massive Rice Production and Processing Programme*. A paper presented to NDDC for massive rice production in Niger delta, by Deen Construction Nig. Ltd.

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), 1-8.

National Bureau of Statistics (2009). *Rice Data Systems in Nigeria*.

Onyishi, G. C., Ajagu, C. O., Onuoha, E. R., Okporie, E. O., & Sialoke, S. A. (2010). Evaluation of the performance of upland rice cultivars as affected by fertilizer levels in a clay loam ultisols. *The Nigerian Agricultural Journal*, 41(1), 7-76.

Odii, M. A. C. A. (1998). *Modern farm management techniques*. Alphabet Nigeria publishers, Owerri, Nigeria.

Olayide, S. O., & Heady, E. O. (1982). *Introduction to agricultural production economic: principles and application.* AGITAB publishers Ltd. Zaria, Nigeria.

Rice Trade (2011). Rice production (*http://www.ricetrade.com/articles/riceproduction.html;1-03-11,11.00am).*

Singh, B. N., Fagade, S., Ukwungwu, M. N., Williams, C., Jagtap, S. S., Oladimeji, O., Efisue, A., & Okhidievbie, O. (1997). Rice growing environment and biophysical constraints in different agro ecological zones of Nigeria. *Met. Journal*, 2(1), 35-44.

Ugwugwu, C. S. (2008). *Improved rice varieties*. National cereals research institute, Badeggi. A paper presented at trainer's workshop on rice production held at Abia State Agricultural Development Programme 16-19th June.

United States Agency for International Development (USAID), (2008). *Improved package practices for rice production USAID markets.* Maximizing in targeted sites, Abuja Nigeria.

United States Development Agency (USDA), (2009). *Rough rice (000, t) production in major producing countries in each continent of the World*. PSD On line June 10th 2009.

West Africa Rice Development Association (WARDA), (2003). *Strategy for rice sector revitalization in Nigeria*. Project report WARDA, Abidjan Cote d'Ivoire Pp 14.

West African Rice Development Association (WARDA), (2004). *Strategic plan*. 2001 -2002. Buoake, Cote d'Ivorie.

Wikipedia (2010). Niger Delta (*www.en.wikipedia.org/wiki/Niger_Delta).*