

ACCESS TO CREDIT: IMPLICATION FOR SUSTAINABLE RICE PRODUCTION IN NIGERIA

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ABSTRACT

Nigeria spends huge sums of money annually on the importation of rice. Rice production requires some level of capital outlay. Most of the Nigerian farmers have no take-off capital and access to credit is usually very limited. This study investigated the effect of access to credit on rice production in Nigeria. A total of 208 rice farmers were sampled in Niger State, North-central Nigeria. Data collected were analyzed with the aid of descriptive statistics, t-test of difference of two means, Logit regression model, the Ordinary Least Square Regression model and the Chow test. Male within the economically active age dominated rice production enterprise in the study area. They kept large household size of about 16 people. Few of the farmers belong to cooperative societies and relied more on family labour to carry out farm activities. Farmers who had access to credit recorded higher yield and higher profit which may support economic sustainability of the enterprise. The Logit model result showed that age, education, gender and contact with extension services were the significant factors affecting the likelihood to have access to credit for rice production. Majority of the farmers got loans from microfinance bank and cooperative societies. The study recommended among others that disbursement of loan meant for agricultural sectors should be monitored and its uses properly supervised while more of such loans were made available to genuine rice farmers in order to achieve economically sustainable rice production in the country.

Keywords: Rice, Credit, Access, Production, Sustainability, Nigeria.

INTRODUCTION

Among the major problems facing mankind is the predicament of rapidly increasing human population and decreasing availability of food required to feed them. Nigeria is not exempted from this. Food production in Nigeria has not been able to meet the demand of the populace. In reaction to the worrisome performance of the agricultural sector, the federal government had made various attempts aimed at reforming the sector and put it back to its enviable position in the Nigerian economy. Thus, various agricultural development programmes have been introduced at one time or the other in the country. In all these programmes, the issue of access to and availability of credit were given little attention. Some of the few government policy programmes which focused on credit were the Agricultural Credit Guarantee Scheme Fund (ACGSF) which was a policy instrument of the Federal Government of Nigeria on Agricultural Credit. The Scheme was established by Decree Number 20 of 1977 but started effectively in 1978. Others were the Nigerian Agricultural Insurance Corporation (NAIC), the World Bank Assisted FADAMA project and very recently, the Commercial Agriculture Credit Scheme.

Presently, Nigerian banks give an average of 2 percent of their total loan portfolio to the agricultural sector despite the fact that the sector employs over 50 percent of the total labour force and contributes about 42 percent of the gross domestic product of the country. In reaction to this, the Central Bank of Nigeria (CBN) sometimes in year 2011 through the Bankers committee meeting advised commercial banks in the country to increase lending to the agricultural sector to about 10 percent. This instrument referred to as “*moral suasion*” in the banking industry is not expected to have much effect as no penalty is attached to non-compliance. The smaller community-based banks otherwise called “Microfinance Banks” are however closer to the grassroots. They are usually owned by groups of individuals and development / trade associations in the community. These banks are expected to be of more importance to rural and less educated farmers. According to CBN (2011), as at January 2011, there were 807 microfinance banks in Nigeria.

Meanwhile, informal sources of credit abound in the rural areas and these may be more readily available to farmers. According to Zeller, Schrieder, Von-Braun and Heidhues (1997), access to credit reduces the opportunity cost of capital intensive assets relative to family labour, thus encouraging labour-saving technologies and raising labour productivity, a crucial factor for agricultural development, especially in many African countries. Furthermore, Aliou, Manfred and Manohar (2000) opined that access to credit affects household welfare by increasing its risk bearing ability and alters its risk-coping strategy and that households may therefore be willing to adopt new and more risky technologies. These risky technologies and coping strategies are most times very productive and profitable.

Among all the staple crops, rice has risen to a position of eminence in Nigeria. Rice is the most important staple food for about half of the human race (Hawksworth, 1985). It ranks third after wheat and maize in terms of worldwide production. About three billion people eat rice everyday around the world while Nigerians presently consume over four and half million tonnes of rice annually (Anonymous, 2008). Domestic production has never been able to meet demand; leading to considerable imports which according to FAOSTAT (2008) stand at about 1,700,000 metric tons yearly. In year 2010, the country spent about ₦356billion (about \$2.4billion) on rice importation as the 500,000 metric tonnes produced in the country could not meet the local demand of 2.5million metric tonnes.

Ensuring sufficient and sustainable rice productions capable of meeting the national rice demand would go a long way in guaranteeing the nation's much desired self-sufficiency in food production considering the importance of rice in the food basket of an average Nigerian household. According to Jabareen (2008) The term sustainability belongs originally to the field of ecology, referring to an ecosystem's potential for subsisting over time, with almost no alteration. When the idea of development was added, the concept could no longer be looked at from the point of view of the environment, but from that of society (Reboratti, 1999) and the capital economy. This paradox is represented in the most frequently used definition of sustainable development prominent among which is that of Brundtland Report, which deemphasizes the environment while underlining human needs to be realized through development. Brundtland (1987) defined sustainability as the ability of humanity to ensure that it meets the needs of the present without compromising the ability of future generations to meet their own needs.

The small scale farmers have been identified as constituting the greatest force in food production in Nigeria and it should be noted that these farmers are faced with different constraints among which is access to credit. Most small scale farmers are poor and lack savings and investment culture besides having limited access to credit. According to Olomola (1990), credit is a major militating factor against agricultural production and development in the country. Lawal and Shittu (2006) posited that lack of access to credit causes setbacks to the productivity of farmers as a result of the fact that, these farmers do not have the resources to procure improved seedlings, chemicals and hired labour, as well as transport and market their produce which would have improved their productivity, welfare and ultimately help in achieving economically sustainable production. According to Adebayo and Adeola (2008), agricultural credit enhances productivity and promotes standard of living by breaking vicious cycle of poverty of small scale farmers. Adegeye and Ditto (1985), described agricultural credit as the process of obtaining control over the use of money, goods and services in the present in exchange for a promise to repay at a future date. Ogunfowora, Essang and Olayide (1972) reported that credit is not only needed for farming purposes, but also for family and consumption expenses; especially during the off season period. According to Adetiloye (2012), as most peasant farmers are uneducated and ageing, the introduction of sustainable credit and guarantee into agriculture will attract the youth and the educated. This would naturally affect the production of food output and the economy positively. Economic sustainability is basically about ensuring that organizations (and enterprises including agriculture) are built to last and are able to function efficiently over a long period of time and remain profitable. This work relates more to economic sustainability of rice production rather than environment and ecosystem.

Despite the importance of rice to an average Nigerian and the role credit can play in its production and availability, the issue of credit among rice farmers and its effects on their productivity have not been fully explored in the country. Therefore, this paper examined the various sources of credit available to small scale rice farmers in Niger state north-central Nigeria and the

effect of such credit on their productivity and farm profit while implication is drawn for economic sustainability of rice production in the country.

Specifically, the study:

- identified various sources of credit available to rice farmers
- determined factors affecting access to credit
- determined productivity of various inputs used in rice production and make comparison between credit constrained and non-credit constrained rice farmers
- determined factors affecting output and determine if such effects are the same across the two groups.

Findings and recommendation from this study is expected contribute to the body of knowledge which proffer solutions to the problem of low productivity bedeviling rice sector of Nigeria agriculture and contribute positively towards the achievement of self-sufficiency in rice production and consumption in the country.

METHODOLOGY

Study Areas: The study was carried out in Niger state located in the North-Central region of Nigeria (middle belt). It is located between latitudes 9^o18'N and 11^o30'N and longitudes 5^o03'E and 8^o30'E within the Northern Guinea savannah vegetation zone. The state covers a land area of about 76,363 sq km, the largest in the country. It is bounded in the west by Benin Republic; in the north by Kebbi, Zamfara and Kaduna States; in the east by the Federal Capital Territory and in the south by Kwara and Kogi states. The total population of the state is 3,950,249 (as revealed by the population census of 2006). It has a total of 25 Local Government areas. The state experiences distinct dry and wet seasons with annual rainfall varying from 1,100mm in the North to 1,600mm in the south. Duration of dry season commences in October and the humidity could be 140 percent in December and February. The state is reputed for high production of rice relative to any other state in Nigeria. The large land mass the state is endowed with among others may be a contributing factor in this regard.

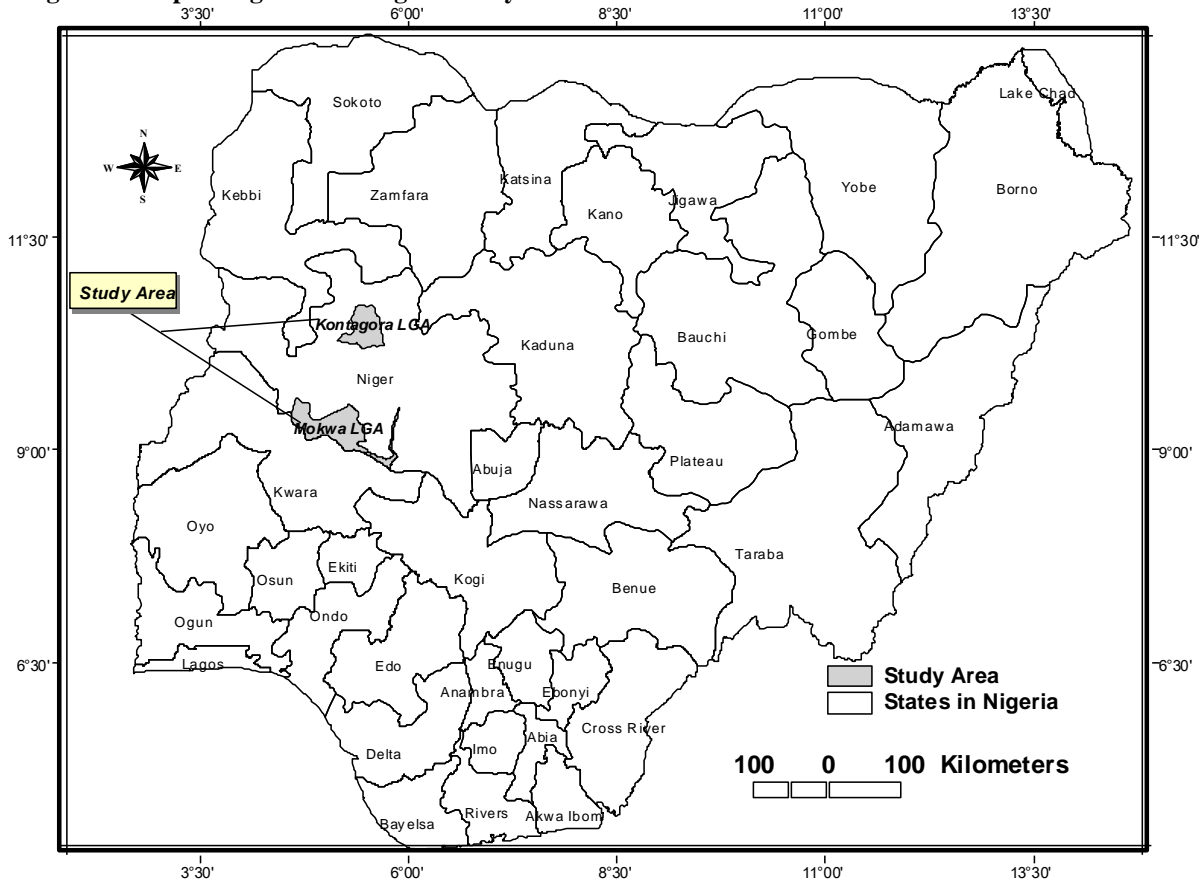
Sampling Technique and Sample Size

The study adopted a multi-stage sampling technique. Two agricultural zones (Bida and Kotangora) were randomly chosen from the three agricultural zones (Bida, Kuta and Kotangora zones) to which Niger state has been divided. Mokwa and Kotangora Local Government Areas were then selected in the second stage. The third stage involved the selection of twenty villages from each of the Local Government Areas (LGAs). The fourth stage was the selection of six farmers from each of the villages. This gave a total of one hundred and twenty (120) from each of the LGAs and 240 in all. Meanwhile, 208 questionnaires were use for the analyzes as others were discarded due to incomplete information and other deficiencies.

Method of Data Collection

The study utilized primary data collected by personal interviews with the aid of a structured questionnaire. Data collected included socioeconomic characteristics of responding rice farmers, rice production data (such as resources used, costs, returns, prices, access to credit, various credit sources available, constraints to credit assessment among others).

Figure 1: Map of Nigeria showing the study area



Analytical Techniques

Descriptive Statistics: This included the use of means, frequency and percentage tables. These were used to present information on farmers’ socioeconomic variables such as age, household size, rice farming experience, indigeneship, available credit sources, access to credit, constraints to credit acquisition e.t.c.

Test of difference of two means – This was used to test if there were significant differences in resource productivities between the two groups of farmers (credit constrained and unconstrained farmers) among other things.

$$T = \frac{\overline{X}_i - \overline{X}_j}{\sqrt{\frac{S_i^2}{n_i} + \frac{S_j^2}{n_j}}} \dots\dots\dots\text{equation (1)}$$

Where \overline{X}_i = mean variable for credit unconstrained rice farmers

\overline{X}_j = mean variable for credit constrained rice farmers

S_i^2 = sample variance for credit unconstrained rice farmers

S_j^2 = sample variance for credit constrained rice farmers

n_i = number of credit unconstrained rice farmers

n_j = number of credit constrained rice farmers.

Budgetary Analysis

Net Profit (π) = Total Revenue (TR) – Total Cost (TC)equation (2)

Gross Margin (GM) = Total Revenue – Total Variable Costequation (3)

Fixed cost items included were depreciations of Farm implements such as cutlasses, hoes, baskets, sickles and knives while the variable cost items included seeds, labour, fertilizer, cost of hiring tractor, costs of pesticides, and herbicides.

The Logit Regression Model

This was used to determine the socioeconomic factors affecting rice farmers' access to credit. This is mathematically stated thus:

$$L_i = \ln \left[\frac{P_i}{1-P_i} \right] = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 \dots\dots\dots \text{equation (4)}$$

Where $P_i = 1$ if respondent had access to credit

$P_i = 0$ if respondent had no access to credit

$X_1 =$ Age of farmers in years

$X_2 =$ Education in years spent in schools

$X_3 =$ Membership of cooperative society or farmers' association (1 if member, 0 if otherwise)

$X_4 =$ Indigeneship (1 if respondent is an indigene of the area, 0 if a settler)

$X_5 =$ Gender (1 for male, 0 if otherwise)

$X_6 =$ Ownership of tangible Asset (house, large areas of land, motorcycle, vehicle e.t.c)

$X_7 =$ Household size

$X_8 =$ Extension contact

Regression Analysis

This was used to obtain estimate of the Cob-Douglass production function. The model is implicitly stated thus:

$$Q = f(Fz, Lf, Lh, F, H, T, I, Sd) \dots\dots\dots \text{equation (5)}$$

Where Q = Quantity of paddy rice harvested

Fz = Farm Size (in hectares)

Lf = Family Labour in workdays (One workday is equivalent to 8 hours of an adult male work, for female and children appropriate conversion factors were used);

Lh = Hired Labour in workdays

F = Quantity of fertilizer used in Kg

H = Quantity of herbicides used in litres

T = Number of tractor-hours used (animal-drawn)

I = Quantity of insecticides used in litre

Sd = Quantity of Seed used in Kg

The model is explicitly stated thus:

$$\ln Q = \ln \beta_0 + \beta_1 \ln Fz + \beta_2 \ln Lf + \beta_3 \ln Lh + \beta_4 \ln F + \beta_5 \ln H + \beta_6 \ln T + \beta_7 \ln I + \beta_8 \ln Sd + U \dots \dots \dots \text{equation (6)}$$

A priori expectation: Each of the explanatory variables (i.e rice production inputs) included in the model is expected to impart positively on output. Therefore, the coefficients are expected to return positive signs.

The Chow Test: In order to check for significant difference in the effects of the explanatory variables across the two groups of rice farmers, the Chow test was carried out and the formula is presented as:

$$F = \frac{(RSS_c - (RSS_1 + RSS_2))/K}{(RSS_1 + RSS_2)/(N_1 + N_2 - 2k)} \dots \dots \dots \text{equation (7)}$$

Where RSS_c is the sum of squared residual for the combined (restricted) regression. RSS_1 is the sum of squared residual for the regression of the credit unconstrained group (group 1). RSS_2 is the sum of squared residual for the regression of the credit constrained group (group 2). N_1 is the number of unconstrained rice farmers. N_2 is the number of constrained rice farmers. The test statistic follows the F distribution with k and $N_1 + N_2 - 2k$ degrees of freedom.

RESULTS AND DISCUSSION

About 56 percent of sampled rice farmers had access to credit in one form or the other while the remaining 44 percent had no access to credit. According to Bolarinwa and Fakoya (2011), agricultural credit facilities influence farmers’ agricultural production, income level, and consequently rated beneficiaries higher in socioeconomic status. Therefore, socioeconomic status of the 44% of the sampled farmers who claimed not to have access to credit may be negatively affected. Table 1 shows that credit constrained farmers were older, with larger household size, had more years of rice farming experience and used more family labour than the non-credit constrained rice farmers in the study area. On the other hand, credit unconstrained farmers spent more years in acquiring formal education, had larger farms, used more hired labour, fertilizer, herbicide, insecticide and seed. The higher use of inorganic input sources such as fertilizer, insecticide and pesticides among a group of farmers potent negative implication on the ecological sustainability in rice producing areas in the long-run if not properly managed. About 7.7 percent of the sampled rice farmers were female while about 71 percent were native of the study area. About 46.6 percent of all the farmers sampled had contact with extension agent within the last two years. This may reflect the inadequacy of extension services in the area. Inadequate extension services may impede farmers’ access to modern production and management techniques including soil fertility management, conservation and environmental sustainability issues. About 30 percent of the rice farmers belong to cooperative society. The attitude of not belonging to a credit and thrift society like the cooperative association may impede farmers’ access to credit. About 50 percent of the farmers had asset which may be qualified as tangible, capable of serving as collateral for loan acquisition especially in formal settings. However, 47 percent of those who had tangible assets did not have access to credit. Farmers who had access to credit had average output of 8924.2 kg (2288.3 kg/ha) while those who had no access recorded a yield of 2251.5 kg/ha. In all, the average yield of 2,270 kg/ha recorded in this study fell short of about 4 tonnes per hectre known in literature. This however requires urgent intervention.

Among farmers who had access to credit, majority (62 percent) got loan from microfinance banks while about 40 percent got from cooperative societies (Table 2). These underlines the importance of microfinance banks in extending loan to small scale

farmers. It will be recalled that microfinance banks were initially called “community banks”. The main idea behind its establishment then was to extend banking services to communities hitherto not reached by the big commercial banks. They were expected to mobilize savings and aid capital formation in rural communities thereby helping them to grow economically on a sustainable basis. Meanwhile, the traditional problem of banks’ reluctance to give loan to the agricultural sector cannot be ruled out. Although, loan availability is a key but the issue of previous loan repayment performance is an important factor. Over time, farmers have always been encouraged to form or join cooperative societies but majority of farmers are still unable to see the advantages of joining such associations. This also limits farmers’ access to credit. Meanwhile, the 40 percent patronage of cooperative societies recorded in this study is far above 20 percent reported by Okwoche, Asogwa and Obinne (2012) for farmers in Benue state, north-central Nigeria.

Majority (about 84 percent) of farmers who were constrained stated that lack of acceptable collateral was a major factor militating against their quest to acquire loan. Others factors identified included cumbersome process of acquiring loans (59.3%), lack of the required exposure and boldness to approach financial institutions (23.1%) and high interest rate charged by banks and other lenders (71.4%) (Table 2).

Table 1: Summary of average socioeconomic characteristics and inputs of rice farmers

Variable	Credit Unconstrained	Credit Constrained	Pooled average
Age (in years)	47.6	48.1	47.8
Gender: Male	108	84	-
Female	9	7	-
Education (years)	4.1	3.8	4.0
Household size	14.8	15.2	15.0
Experience (years)	24	27	25.3
Indigenship: Native	98	50	-
Settler	19	41	-
Extension contact: Yes	61	36	-
No	56	55	-
Membership of coop: Yes	47	15	-
No	70	76	-
Tangible Asset: Yes	63	43	-
No	54	48	-
Labour (workdays): Family	225	238	230.7
Hired	119	93	108.8
Farm size (in hectares)	3.9	3.2	3.6
Fertilizer (in Kg)	482	301	402.8
Herbicide (in litres)	11.2	9.3	10.4
Insecticide (in litres)	1.91	1.75	1.84
Seed (in Kg)	192.3	190.1	191.3
Output (paddy) in Kg	8924.2	7204.9	8172

Table 2: Sources and constraints to Loan Acquisition

Sources	Frequency	Percentage
Friends	46	39.3
Relatives	21	17.9
Money Lender	33	28.2
Cooperative Societies	47	40.2
Non-Governmental Organizations	44	37.6
Microfinance Banks	73	62.4
Commercial Banks	13	11.1
Constraints to Loan Acquisition		
Lack of Collateral	76	83.9
Cumbersome procedure	54	59.3
Lack of Exposure and boldness	21	23.1
High interest rate	65	71.4

Test of difference of means of partial productivities among credit constrained and unconstrained rice farmers

The t-test for the difference of two means of partial productivities of production resources among the sampled farmers revealed that there were no significant difference in the labour and herbicide productivities among credit constrained and unconstrained rice farmers, hence, the null hypotheses were accepted. Meanwhile, significant differences existed between the productivities of land, seed, fertilizer and insecticide among farmers in the two groups, hence, the null hypotheses were rejected in favour of the alternative. It was therefore concluded that credit unconstrained rice farmers used land, seed and insecticide more productively than their credit constrained counterparts and this will aid food production in the country. Furthermore, credit constrained farmers' output per unit of fertilizer used was higher compared to unconstrained rice farmers. This may be due to possible higher level of prudence in the usage of fertilizer by farmers in this group as they may lack enough money to buy excess.

Table 3: Test of difference of two means between the average partial productivities of rice farmers

Productivity variable (Output per unit of input)	Credit unconstrained	Credit Constrained	t-values	Decision
Land (kg/ha)	2288.3	2251.5	2.41*	Reject Null
Labour Kg/workday)	25.9	21.8	1.07	Accept Null
Seed (Kg/kg)	46.4	37.9	2.21*	Reject Null
Fertilizer (kg/kg)	18.5	23.9	2.85**	Reject Null
Insecticide (kg/litre)	4672.4	4117.1	3.67**	Reject Null
Herbicide (kg/liter)	796.8	774.7	1.39	Accept Null

Source: Computed from field survey data, 2010. *significant at 5%, **significant at 1%

Costs and Returns Analyses

Table 4 shows the breakdown of the costs and returns to rice farms among the two groups of farmers considered in this study. It was revealed that among the credit unconstrained farmers, average farmer incurred a total variable cost (TVC) of ₦286,251.01 (two hundred and eight six thousand two hundred and fifty one naira one kobo) representing about 98 percent of the total cost (TC) while the remaining costs were due to depreciation of fixed items (such as cutlass, hoe, sacs, baskets, knives, sickle e.t.c) used in rice farming operations. Furthermore, the average farm was able to realize a net profit of ₦198,665.34 (₦50,939.83 per ha). The rate of return on investment (RRI) value of 0.68 implied that 68 percent of the amount invested in the rice farming enterprise was realized as net profit while the Profit Margin on Sale (PMS) value of 0.4 implies that 40 percent of total sales value was realized as net profit. These reveal the economic sustainability potential of rice farming enterprise in the study area. The cost structure showed that about 59 percent of the total cost was spent on labour which confirmed the labour intensive nature of rice farming in the country. This is more so, because substantial number of man-days of labour are always expended on rice planting, bird scaring and harvesting.

Among the credit-constrained rice farmers, about 97 percent of the total cost was variable cost similar to what was obtained among the unconstrained farmers. Also, about 56 percent of the total cost was expended on labour. The net profit per hectare was ₦59,045.34. This study reports a higher net profit per hectare for credit constrained farmers which is contrary to Ashaolu, Momoh, Phillip and Tijani (2011) which reported that profit per hectare of credit users farmer is greater (₦44,466.59) than that of non-credit users (₦27,833.03) among rural crop farmers in Ogun state, south-west Nigeria. The RRI value of 0.91 reported here revealed that average credit constrained farmer realized up to 91 percent of the amount of total cost as net profit. It should be noted that the profitability indicators included in this analysis revealed a higher profitability for the credit constrained, however, non-credit constrained farmers recorded higher profit because they cultivated larger areas of farmland.

Table 4: Costs and Returns for the Average Rice Farms in Niger State, Nigeria

Cost Items	Non-Credit Constrained Farm		Credit Constrained Farmers	
	Value (₦)	% of Total Cost	Value (₦)	% of Total Cost
Variable Costs				
Labour	172,000.00	58.87	115,500.00	55.71
Land	15,406.09	5.27	12,640.90	6.10
Fertilizer	44,344.00	15.18	27,692.00	13.36
Seed	11,538.72	3.95	11,406.00	5.50
Herbicide	13,837.60	4.74	11,490.15	5.54
Insecticides	1,874.09	0.64	1,717.10	0.83
Tractor (Ox-drawn)	16,481.20	5.64	12,560.45	6.06
Transportation	10,769.34	3.69	8,956.56	4.32
Total Variable Cost (TVC)	286,251.01	97.98	201,963.16	97.41
Fixed Cost (depreciation)				
Cutlass	1,387.12	0.47	1,253.89	0.60
Hoe	1,520.51	0.52	1,450.10	0.70
Basket	295.65	0.10	305.60	0.15
Sack	1,216.24	0.42	1,051.06	0.51
Sickle	494.43	0.17	460.56	0.22
Others	1,000.70	0.30	840.04	0.41
Total Fixed Cost (TFC)	5,914.65	2.02	5,361.25	2.59
Total Cost (TC)	292,165.66	100.00	207,324.41	100.00
Revenue	490,831.00		396,269.50	
Gross margin(R-TVC)	204,579.99		194,306.34	
Gross Margin/ha	52,456.41		60,720.73	
Net Profit (π)	198,665.34		188,945.09	
Net Profit /ha	50,939.83		59,045.34	
RRI	0.68		0.91	
PMS	0.40		0.48	

Source: Computed from field survey data, 2010. ₦150=\$1 at the time of data collection

Note: RRI= Rate of return on investment (π/TC); PMS=Profit margin on sales (π/R)

Table 5 shows the results of the Logit regression model. It was revealed that age (x_1), education (x_2), membership of cooperative (x_3), gender (x_5) and extension contact (x_8) significantly affected the likelihood of farmers having access to

credit. The negative sign of age which was against the *a priori* expectation implied that the older the farmer, the lower the likelihood of having access to credit. This may be due to complacency and conservative nature of older farmers. Younger farmers are still active, mobile and ready to take risk which may induce them into taking loans. The negative effect of age found in this study corroborates Adegbite and Adeleye (2011) findings among farmers in Oyo state, south-west Nigeria. The positive sign of the coefficient of education implied that more educated farmers are likely to have better access to credit compared with less educated farmers. Educated farmers are likely to have the required courage, boldness and the know-how required to approach financial institutions for loan. Henri-Ukoha *et al* (2011) reported that, the age of the farmers, level of education, farming experience, farm size and marital status significantly affect the amount of loan acquired by small scale farmers in Ohafia agricultural zone of Abia state, south-east Nigeria. If farmers have adequate access to credit, agricultural production can be carried out without disruption on an economically sustainable basis. Access to credit has been said to be able to break the vicious cycle of low productivity and poverty common among peasant farmers in developing countries such as Nigeria. Continuous and adequate food production on an economically sustainable basis is achievable if farmers are empowered and capable of acquiring the much needed modern agricultural inputs such as fertilizer, insecticides, herbicides and other implements for farm operations.

Table 5: Result of Logit Regression Model

Variables	Variable Symbol	Coefficient	t- value
Constant		1.418	1.27
Age	X ₁	-0.0313***	-3.05
Education	X ₂	0.0612***	3.81
Membership of cooperative	X ₃	0.5082*	1.83
Indigeneship	X ₄	0.0185	1.46
Gender	X ₅	0.335***	2.93
Ownership of tangible Asset	X ₆	0.175	0.09
Household size	X ₇	0.087	0.29
Extension contact	X ₈	0.045**	2.46
LR Chi-Square Value		52.41	
Log likelihood		-24.12	
Pseudo R ²		0.622	

Source: Computed from field survey data, 2010. ***Significant at 1% ($\alpha_{0.01}$), **Significant at 5% ($\alpha_{0.05}$), *Significant at 10% ($\alpha_{0.1}$)

Factors Affecting output of Rice

The Cobb-Douglass production model estimation using the ordinary least square procedure is presented in Table 6. The results revealed that all the independent variables came out with the expected positive sign except family labour among the unconstrained group. Farm size, hired labour, fertilizer, herbicide, tractor-hour, insecticides and seed returned positive signs

which means increases in the concerned variables resulted in increase in output and vice versa. Meanwhile, the effect of family labour and insecticide were found to be statistically not significantly different from zero. The implication of this is that changes in these variables do not significantly affect output at the prevailing situation of the farmers.

Among the credit constrained farmers, all the variables came out with the expected positive sign. Meanwhile, family labour, herbicides and insecticide were not significantly different from zero. These imply that changes in the magnitude of these variables may not result in significant change in output of rice among the credit constrained farmers in the study area.

In terms of Return to Scale (RTS), the unconstrained farmers have a value of 0.901 which means that they were operating on the stage II of the production surface. This is a stage of decreasing positive return to scale and it is the stage where rational farmers should produce. On the other hand, the RTS value for the constrained farmers was 1.321 which implies that farmers in this group were operating in the stage I of the production surface. This stage is a stage of increasing positive return to scale. Producers at this stage are encouraged to expand their scope of production by making use of more inputs in order to maximize benefits. The RTS value reported for this group is close to 1.29 reported by Akinbode, Dipeolu and Ayinde (2011) for *Ofada* rice farmers in Ogun state, southwest, Nigeria. However, farmers in this group have no access to credit which may limit their potential to expand and this calls for urgent intervention.

Table 6: Results of the Cobb-Douglass Production Model Estimation

Variables	Credit Unconstrained		Credit constrained		Pooled	
	Coefficient	t- value	Coefficient	t- value	Coefficien t	t-value
Constant	0.041**	3.34	0.094**	2.66	0.061**	3.16
Farm size (in hectares)	0.241*	2.15	0.171*	2.22	0.220*	2.21
Family labour (in work-days)	-0.315	-1.54	0.011	0.94	-0.131	0.95
Hired labour (in work-days)	0.162*	2.33	0.212**	3.15	0.141**	2.76
Fertilizer (in kilogramme)	0.201**	4.13	0.273**	3.03	0.191**	3.15
Herbicides (in litres)	0.094*	2.11	0.036	1.31	0.056	1.41
Tractor-hours (ox-driven)	0.185**	2.61	0.075**	3.75	0.121*	2.53
Insecticide (in litres)	0.041	0.85	0.104	1.41	0.027	1.23
Seed (in Kilogramme)	0.251**	2.71	0.345**	4.75	0.118**	2.85
R-squared	0.542		0.521		0.501	
Residual Sum of Square (RSS)	941.211		844.512		2140.253	

** Significant at 1 percent level, *Significant at 5percent level

The Chow test: The result of the Chow test revealed that the calculated F-statistic value of 4.15 was greater than the table value of 2.41 at $\alpha=0.01$. Therefore, the null hypothesis was rejected in favour of the alternative. This implied that the impacts of the explanatory variables were not the same across the two groups. This could be corroborated by higher yield of the unconstrained group.

CONCLUSION AND RECOMMENDATION

Access to credit among rice farmers in the study area is still very limited as only about half of the sampled rice farmers had access to credit. This is a potent danger for continuous and uninterrupted rice production in the country. Formation and /or participation in cooperative, credit and thrift societies is a communal means of obtaining credit to run a business concern. Unfortunately, majority of the sampled rice farmers did not participate in such associations thereby denying themselves benefits derivable from such. Furthermore, the use of family labour is still very common as this category of labour constituted about 67 percent of the total labour use by rice farmers in the study area. Meanwhile, the need for children to acquire western education usually takes them away from the farm and this may impart negatively on continuous rice production. Land clearing and other tillage operations are better and efficiently carried out with the use tractors but sampled farmers used camel, cattle and ox-driven implements to till the land. Although efficiency and output were low, the soil and entire ecosystem are better for it because little destruction/ compaction are done to the soil structure and the droppings from the farm animal also fertilize the soil. This has implication for environmental sustainability.

Profit level (especially the higher value recorded for farmers who were not credit constrained) and the favourable rate of return on investment found in this study revealed the economic viability of rice farming in the study area. The profitability index showed that rice farming enterprise is economically sustainable in the study area especially with adequate access to credit. This is true as analyses has revealed that the enterprise can last for long period and continue to return profit to the farmers. Youths and other unemployed people can be mobilized into rice farming thereby breaking the vicious cycle of poverty, hunger and crime; and project the country's hitherto poor people into sustainable development through economically sustainable rice farming. In conclusion, farmers who had access to credit were producing more and realizing more profit compared with those who had no access to credit. This has serious implication on the rice self-sufficiency drive of the Federal Government of Nigeria. The country is capable of producing the quantity of rice needed for domestic consumption on an economically sustainable basis and still have enough left for export if farmers are made to have access to credit. Given the huge amount of money spent on the importation of rice annually, attention should be given to the issue of provision and disbursement of agricultural loans. Such scheme should be properly monitored and adequate punishment attached to round-tripping common in such government schemes in the country. These may lead to reduction in the huge capital flight as a result of importation which could be used to improve the economy directly or indirectly. Furthermore, soft and revolving loans (which may not require collateral) should be made available to rice farmers in order to enhance sustainable rice production in Nigeria.

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