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Rural Credit Use and Comparative Allocative Efficiency among Yam Based Farmers in Abia State, Nigeria

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ABSTRACT

This study evaluated the Rural Credit use and comparative Allocative Efficiency among Yam based farmers in Abia state, Nigeria. Cost route approach using two sets of structured questionnaires were administered to a purposively sampled 120 yam based farmers (six credit users and six non credit users from ten major yam producing villages in the state) constituting 60 credit users and 60 non credit users. Data analysis consisted of statistical and econometric tools. The result revealed that farmers within the age range of 46- 74 and above were engage in yam production in the area of study with majority (80.0%) of the non credit users and (80.0%) credit user. A good number (86% for non credit users and 83% for credit users) of them had formal education with large household size of 5 - 15 family members. The two groups of farmers operated under the same existing technology; both farmers were factor biased or non - neutral in their production function i.e the two groups of farmers differ significantly in more than one slope coefficient. Credit users were found to use labour intensively in line with *apriori* expectations. For Allocative efficiency , the linear form fitted the data(R^2 = 0.66) for credit users, the value of output of credit users were significantly influenced by labour, farm size and other production inputs, while farm size, value of fertilizer and depreciated asset were significant at 5% probability level for non credit users. A comparative Allocative efficiency revealed that both groups of farmers may not have achieved optimum or absolute Allocative efficiency in their production period. It is therefore important that government agricultural policy should encourage the increase of credit supply to yam base farmers to encourage yam production in the state.

INTRODUCTION

Inadequate credit facilities have been identified as one of the major constraints to agricultural production in Nigeria [14]. Currently, a number of Agricultural policy measures have been adopted in an effort to provide credit facilities to farmers. These government policies emphasize the need to make credit available to farmers through formal and non- formal credit institutions so as to boost agricultural production. Prominent among these policies are: Agricultural Credit Guarantee Scheme (ACGS) (1977), Nigerian Agricultural and Co-operative Bank (NACB) (1973), Agricultural Development Projects (ADP) (1976), Directorate of Food, Road and Rural Infrastructure (DFRRI).More so, Decree 4, of 1987, gave right to the establishment of Rural Banking Programmes (Community Banks), the raising of bank loans and advances to agricultural sector from 6% to 8% in 1980 and the establishment of Nigerian Agricultural and Rural Development Bank in 2001 amongst others. The rural banking programme according to Ojo and Adewunmi [15] is one of the measures adopted by the Central Bank of Nigeria to assist in the transformation of the rural economy including agriculture.

The effect of the non - establishment of rural bank branches in the country was the consequent lack of access to credit by the rural dwellers where a larger proportion(70.0%) of Nigerian population reside. In fact the rural dwellers keep their stock of money in

liquid form and sometimes formed 'Esusu' or thrift organisations [1]. Experience has shown that despite heavy subsidies on farm inputs such as seeds, feeds, fertilizers and chemicals; Farmers still need credit (FAO, 1981). The need for credit is in fact more compelling now than ever in view of the current reduction of farm input subsidy and the government commitment to phase it out in the nearest future. For small holders such as yam based crop farmers, this short term or medium term self liquidating seasonal credit are necessary mainly to pay hired labour and to purchase other essential inputs such as seed yams, fertilizers, staking materials, herbicides etc.

The greatest constraint to increased yam production in Nigeria is scarcity or high cost of seed yam which constitute 30 – 35% of the total production cost [5]. Yams and all vegetative propagated plants have low multiplication ratio of 1:5 unlike cereals and legumes that have multiplication ratios of between 1:5 and 1:8 [20]. Nevertheless, Yam is the preferred staple when considering its taste and role in the culture of the Abia people. The high cost of production makes the per calorie cost of Yam almost four times that of maize (IITA, 1988). Studies have shown that food crops in Nigeria particularly have low productivity because of inefficiency in resource use [16,22]. For Yam specifically, Diehl [3], noted that the reason for the reduced growth rate in yam production are mainly production oriented problems that is of economic and agronomic nature. Low productivity amongst food crop farmers in developing countries including Nigeria has led to the introduction of improved technologies on crop farming. This in turn has generated the interest of researchers in assessing the impact of the adoption of these technologies on productivity [24]. Findings revealed low usage of the technologies introduced. Olayide and Heady [17] had asserted that optimal productivity of farmers implies efficient utilization of resources in the production process. Hence, improving farmer's efficiency and allocative efficiency in yam production can be a cost effective means of increasing Yam farmer's productivity in the country. Most studies carried out to determine the resource use efficiency of farmers made use of the Ordinary Least Square (OLS) estimation technique. These include Onyeweaku et *al.* [21], Modey [12] and Ermie and Akinwumi [4]. More studies from Amaza, and Olayemi [2], Udoh and Akintola [25], and Ajibefun and Aderimola [1], all estimated technical efficiency of farmers in developing countries including Nigeria. Research that focused on the influence of credit on allocative efficiency of Yam production is however still scarce.

Impact studies of agricultural credit programmes in many parts of the world have focused on the capability of supervised credit to improve total production on small farms and its useful role in resource allocation, utilization and productivity. Considerable research in Asia , Latin America and few African countries have been directed towards analyzing the effects of credit programmes on capital formation, productivity and efficiency of traditional farming [18].Opinion from empirical literature vary from time to time, location to location and according to the methodology employed by analyst. In impact studies of credit scheme in Nigeria, attention is more often than not focused on the problem of defaulters rather than the changes on allocative efficiency and resource use patterns. Oni [19] studied the supervised credit scheme for the farm settlers in the defunct western states of Nigeria to find out the relationship between the settlers' net farm income and the rate of loan repayment he found a positive relationship but then 80% of those who defaulted did so for lack of funds to meet their repayment schedules. There was no indication as regards the productive efficiency of this high percentage of defaulters. This impact of credit on farmer's income was not directly and quantitatively considered. It is therefore necessary to understand the socio economic behaviour of theses farmers in relation to Yam production and to know the extent of Allocative efficiency among beneficiaries and non beneficiaries of credit this is necessary for empirical evaluation of rural credit in Nigeria.

MATERIAL AND METHOD

The study area is Isuikwuato Local Government Area of Abia state, Nigeria. Isuikwuato is located between latitudes 5^0 41′ N and 5^0 55′ N and between longitudes 7^0 22′ E and 7^0 34′ E [13]. The local government area is made up of Isuikwuato (Imenyi, Isuamawom and Oguduasa) and Uturu communities (Ikeagha and Ihite). The former is located on a divide forming the eastward extension of the Enugu-Okigwe Cuestas, along the Okigwe –Ahaba road. While the later situates partly on the adjoining plain that extends to the road of "cross rivers". The relief of many parts of the area is undulating with many precipitous slopes, except in low lands of Uturu, Ovim, Acha, Ezere and Umuasua which forms the northern and western inception of the "river cross" plains. Isuikwuato lies within the tropical rain forest zone, with luxuriant growth of trees in the area. In some parts, due to high human interference, what one sees is derived-savannah- like vegetation except where population density is low, as the rugged terrains, and the stream courses where regeneration is rapid. In such places, secondary forest abound [13]. Rainfall in the area is seasonal starting in March/April and stopping in October. The annual rainfall ranged between 1600mm and 2000mm [13]. Farming constitutes the major occupation of the rural people. Food crops commonly grown are yam, cassava, rice, cocoyam, potato, maize, pumpkin, melon and okoro. The major yam producing areas in the Local Government Area are the swampy and the low lands of Acha, Ezere,Ozara and Ovim in Imenyi, Ndundu, Akpukpa, Nvurunvu, Isunabo, Achara and Ugwuele in Uturu.

A purposive sampling method was adopted in choosing ten yam producing villages from the Local Government Area. A list of yam based farmers who obtained credit from the two main banks in the area (Afribank PLC and Uturu Microfinance Bank PLC) was obtained. Another list of non beneficiaries of formal credit sources was also obtained from cooperative societies and other non-formal association. Six credit users and another six credit non users were randomly selected from the list of yam producers supplied by ADP from the ten villages. This gave a total of sixty (60) yam producers who use credit and another sixty (60) yam producers who do not use credit. This brought the total number of respondents to 120.

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The data for the research was obtained through a pre tested and structured questionnaire and administered to the respondents (credit users and non credit users). The data collected include socio economic variables, hectares of farm land cultivated, labour input on yam such as cost of fertilizer applied etc. Descriptive statistics such as tables and percentages were used to determine the socioeconomic variables of the yam farmers.

In order to examine the Allocative efficiency of the two groups of yam farmers, the production function approach was followed based on similar studies in the past by Onyeweaku *et al.* [21], Mbanasor and Chidebelu [11] and Olagoke [16].

The implicit functional form for the equation is given as follows

$$Y = f(X_1, X_2, X_3, X_4, X_5, D, X_1D, X_2D, X_3D, X_4D, e_i) \quad \text{...eqn 1}$$

Explicitly, the log linear cobb – douglas functional form is

$$\ln Y = \ln A_0 + B_0D + A_1 1nX_1 + B_1D\ln X_1 + A_2\ln X_2 + B_2D\ln X_2 + A_3\ln X_3 + B_3D\ln X_3 + A_4\ln X_4 + B_4D\ln X_4 + A_5\ln X_5 + B_5D\ln X_5 + ei \quad \text{...eqn 2}$$

Where,
ln = The natural logarithm
Y = Value of harvested yam (₦)
A_0 = The intercept or constant term
B_0 = Coefficient of the intercept shift dummy or neutral technical efficiency parameter.
D = Dummy variables
X_1D, X_2D, X_3D, X_4D, X_5D, are the slopes shift dummies for S
X_1 = Labour input (mandays)
X_2 = Farm size (Hectares)
X_3 = Value of fertilizer used (₦)
X_4 = Variable cost input of other production inputs like yam seeds, cost of agrochemicals, other planting materials and miscellaneous expenses (₦).
X_5 = Depreciation Value of capital services used with the production period such as farm machinery, implements and tools.
e_i = Error term assumed to fulfil all the assumptions of the classical linear regression model
Allocative efficiency is determined by equating the Marginal Value Product of the ith variable to its price or Marginal Factor Cost (MFC).

$$MVPX_1 = PX_1 \quad \text{... eqn 3}$$

$$MVPxiPy = Pxi \quad \text{...eqn 4}$$

$MVPx_1$(i = 1,2,3,.....5) = the marginal value product of the ith input Mp.py
Pxi = (i =1,2,3.....5) = Unit price or marginal factor cost of the ith input
MPP = dy/dxi = Marginal physical product (MPP) of the ith input
Py = Unit output price for all the resources measured in physical units, the Allocative Efficiency index (ij) for each group of yam farmers

$$MVPxi/Pxi = MPP/Pxi = Kij \quad \text{...eqn5}$$

Where,

i = a particular resources type,
j = the farm group

In this study Y is measured in monetary terms and MP becomes MPVP, therefore the output unit price Py becomes irrelevant making the equation to be thus:

$$MVPxi/Pxi = MP/Px = (Kij) \quad \text{(Ajibefun \&Aderimola [1])}$$

Note: This equation is for credit users because the lead equation was linear MP or marginal revenue product was bi for each resource as specified in the model. But for non – credit users, because cobb – douglas was the lead equation MP or marginal revenue product for each resource was calculated thus

$$MP = biy/x$$

Maximum or absolute Allocative efficiency for a particular group of yam farmers is the Allocative efficiency index (Kij)

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If Kij = 1 (Maximum allocative efficiency)
Kij < 1 (over utilized)
Kij > 1 (under utilized)

The two groups of yam farmers will be compared based on the Allocative efficiency index.

RESULTS AND DISCUSSION

Table 1 indicates that the age ranges of 46 – 74 YEARS and above constituted active majority (about 80% each for non credit and credit users) of farmers who engage in yam production. This could be because younger people prefer migrating to urban centres and also yam cultivation requires a lot of experience and patience. This agrees with Mbah [10]. The Educational level of the farmers showed that a higher percentage of 86.7% of the non credit users and 83.3% of the credit users had formal education of varying degrees. This shows that if other factors are held constant, the farmers have potentials of adopting new innovations which might increase the chances of enhancing productivity. The table also showed that the farmers were all married and that the household profile of the farmers showed that majority(76.0% for non credit users and 78.0% for credit users) of the farmers have a household size of about 5– 8 members in their families. The implication is that this household could serve as a source of cheap labour for yam production and may positively influence efficiency of yam production in the area of study, this is in agreement with Udoh and Akintola [25] who observed that large household size could serve as a source of cheap labour for crop production in south eastern Nigeria. Meanwhile the farming experience of the farmers showed that 83.3% of the non credit users had cultivated yam based crops for more than five years while about 96.7% of the credit users have cultivated yam based crops for more than five years. This has enabled them to acquire much experience in yam based crop farming. This is in line with Hesmati and Mulagata [7], who observed that farming experience has a positive effect on production and overall productivity among small and medium scale yam enterprise. The farm size of the farmers reveals that majority (63.3%) of the non credit users cultivated yam in ≤ 1 hectare and 31.7% cultivated yam in land size of 1.1 – 2.0 hectares, while the credit users cultivated yam in land size above 2 hectares and 21.7% of credit users cultivated yam in ≤ 1 hectare. This showed that generally most of the respondents cultivated yam in fragmented piece of land areas. However, the credit users cultivated yams in more hectares than non credit users. This small areas of land used for yam cultivation particularly in the study area do not encourage mechanised farming. This may have introduced potentials for low productivity in the area.

Table 1.0: The socio-economic profile of yam based farmers in Abia state, Nigeria.

Farmers Profile	NonCredit Users		Credit Users	
Age (Years)	Fequency	percentage	Frequency	Percentage
26 – 45	7.0	11.7	2.0	3.3
46 – 55	5.0	8.3	10.0	16.7
56 – 60	10.0	16.7	28.0	46.7
61 – 65	17.0	28.3	8.0	13.3
66 – 74	10.0	16.7	5.0	8.3
Above 74	11.0	18.3	7.0	11.7
Total	60	100	60	100
Educational Level				
No formal education	8.0	13.3	10.0	16.7
Primary Education	35.0	58.3	15.0	25.0
Secondary Education	10.0	16.7	7.0	11.7
Tertiary Education	7.0	11.7	28.0	46.6
Total	60	100	60	100
Marital Status				
Married	60	100	60	100
Single	–	–	–	–
Divorced	–	–	–	–
Total	100	100	60	100
Household size				
Less than 5	6.0	10.0	3.0	5.0
5 – 8	46.0	76.7	47.0	78.0
9 – 12	6.0	10.0	8.0	13.3
13 – 15	2.0	3.3	2.0	3.3
Above 15	–	–	–	–
Total	60	100	60	100
Farming Experience (years)				
Less than 5	10.0	16.7	2.0	3.3
5 – 15	16.0	26.7	25.0	41.7

ISSN: 2319-9857

16 – 25	10.0	16.7	11.0	18.3
26 – 35	5.0	8.3	6.0	10.0
36 – 50	14.0	23.3	14.0	23.3
Above 50	5.0	8.3	2.0	3.3
Total	60	100	60	100
Size of Land(ha)				
0.1 – 1.0	41.0	63.3	13.0	21.7
1.1 – 2.0	19.0	31.7	32.0	53.3
2.1 – 3.0	–	–	7.0	11.7
3.1 – 4.0	–	–	8.0	13.7
Total	60	100	60	100

Source: *Field Survey Data 2004*

Table 2.0 reveals that the estimated model for credit users in yam based cropping system showed that the linear functional form fitted the data for credit users with R^2= 0.66. This implies that 66.0% of the total variation in the value of harvested yam crops was accounted for by the explanatory variables. The value of harvested yam crop was significantly influenced by labour, farm size and other production input at 1% probability level. A negative relationship exists between labour (mandays) and the value of harvested yam crops. This implies that one additional unit of labour will reduce the value of harvested yam crops by N326.50. This however, is in conformity with *apriori* expectation and agrees with Jonathan [9], study of economic analysis of labour use in small scale yam farming which postulated that extra labour used in yam production is associated with low value of harvested yam crops. A positive relationship existed between farm size and value of harvested yam crops, implying that one hectare increase in farm size will increase the value of harvested yam crops by N55, 781.24. This conforms to *apriori* expectation and agrees with Jonathan [9], which stated that large scale yam farmers are more efficient economically. Other productive input e.g pesticides, insecticides, planting materials etc had positive relationship with value of harvested yam crop which implies that one additional unit of other productive input will lead to N1,229.0 increase in the value of harvested yam crops. All the explanatory variables together accounted for about 66.0% variation in the value of harvested of yam crops.

Table 2.0: Estimated Model for Credit Users in Yam based Crop in Abia State, Nigeria

Variable	Linear	Exponential	Double log	Semi-log
Constant	8899.88***	10.47***	7.82***	-46532.1*
	(0.844)	(82.94)	(7.15)	(-1.565)
X_1 Labour (Mandays)	-326.50***	-3.774-03**	-0.177**	-13814.804**
	(2.95)	(-2.84)	(-2.26)	(-2.06)
X_2 Farm size (ha)	55781.24***	0.545**	0.733***	75666.02***
	(7.77)	(6.33)	(5.86)	(7.07)
X_3 Value of fertilizer (N)	-1.10	-1.110E-05	-4.625E-03	-296.28
	(-0.563)	(-0.477)	(-0.368)	(-0.275)
X_4 Other productive input	1.229***	1.618E-05***	0.343***	5412.33
	(3.02)	(3.318)	(3.186)	(0.780)
X_5 Depreciated asset (N)	2.288	4.012E -05	9.480E -02	5412.33
	(0.17)	(0.904)	(0.816)	(0.780)
R^2	0.66	0.59	0.60	0.65
F- ratio	20.89***	15.74***	16.28***	19.96***

Source: *Field survey Data 2004*

Figures in parenthesis = t statistic computed

****, **, * = Statistics significant a @ 1%, 5%, 10% respectively.*

The results of the estimated function for non- credit users shown in Table 3.0 indicate that the double log functional form was the fitted with a better explanation for the variation in the value of output with R^2=0.55. Two of the regression coefficients were significant at1% and 5% probability level respectively; these are value of fertilizer(X_3) and other productive input(X_4). The result showed that one unit increase in fertilizer will negatively affect the value of harvested yam crops by ₦4858.02. The implication of this is that fertilizer is underutilized. Also a unit increase in other productive input will increase the value of harvested yam crop by N470.00. This implies that other productive input is might be essential in efficient production of yam crops in the study area.

Table 4.0 shows the comparative Allocative efficiency among credit users and non credit users where a decision rule for computing the ratio of marginal value product and marginal factor cost (Allocative efficiency indices) according to Singh [25], states that if the ratio is equal to unity the resource is utilized efficiently, less than unity implies that the resources are over utilized, when the ratio is greater than unity that indicates an under- utilization of resources. The table shows that credit users underutilized resources in the use of their farmland (37.19), depreciated capital assets (2.16), and other production inputs (1.16), and non credit users also underutilized resources in the use of farm size (1.17), other productive inputs (1.73), and depreciated value of capital asset

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(1.89). However, non credit users, over utilized labour (0.04) in the study area. Both farmers were not productive in the use of fertilizer. These figures were based on the value of Allocative efficiency indices which show that both credit users and non credit users may not have been able to achieve optimum or absolute Allocative efficiency in the use of resources in the production period covered by this study, this could be as a result of inefficient allocation of resources [10].

Table 3.0: Estimated model for non credit users in yam based crop in Abia State, Nigeria

Variable	Linear	Exponential	Double-log	Semi -log
Constant	-103.95	10.971***	4.565***	-1214542**
	(-0.001)	(43.39)	(2.89)	(91.60)
X_1 Labour (Mandays)	933.53*	2.6896.03*	0.512	153925.73*
	(1.50)	(1.94)	(1.39)	(1.50)
X_2 Farm Size (ha)	40401.70	0.154	-3.437E-02	2364.35
	(0.56)	(0.960)	(-0.12)	(0.02)
X_3 Value of fertilizer (N)	-7.614	-1.174E-05	-4.858E-02**	-16411.002*
	(-0.86)	(0.60)	(-2.51)	(-1.77)
X_4 Other Production input	0.285	2.972	0.470***	69866.26
	(0.18)	(0.82)	(2.74)	(0.85)
X_5 Depreciated assets	17.209	9.774E-05	4.081E-02	9048.536
	(0.49)	(1.25)	(0.250	(0.12)
R^2	0.21	0.47	0.55	0.22
F- ratio	2.83***	9.72***	13.29***	3.12**

Source: *Field survey Data 2004*

Figures in parenthesis = t statistic computed

****, **, * = Statistics significant a @ 1%, 5%, 10% respectively*

Table 4.0: Estimation of Allocative Efficiency Indices for Both Credit Users and Non Users

Indices	Credit users	Non credit users
Average value of Inputs & Output		
Value of Output (N)	91561.33	11.94
Labour(Mandays)	54.63	4.57
Farm size(ha)	1.23	0.62
Value of fertilizer(N)	400.90	5.39
Other productive Input(N)	22680.00	10.65
Value of capital asset	1866.43	7.30
Marginal Value Product		
Labour(mandays)	22680.00	10.65
Farm size (ha)	55781.24	2558.51
Value of fertilizer(N)	1.10	11.10
Other production input(N)	1.23	1.83
Value of capital assets	2.29	2.00
Marginal Factor Cost		
Labour(Mandays)	300	300
Farm size(ha)	1500	1500
Value of fertilizer(N)	1.06	1.06
Other production input(N)	1.06	1.06
Depreciated assets(N)	1.06	1.06
Allocative Efficiency Indices		
Labour	75.60	0.04
Farm size	37.19	1.71
Value of Fertilizer	1.04	10.47
Other production input	1.16	1.73
Value of assets	2.16	1.89

Source: *Field Survey Data, 2004*

CONCLUSION AND RECOMMENDATION

This study investigated rural credit use and Allocative efficiency among yam based farmers in Abia State Nigeria. The study showed that older farmers were more involved in yam cultivation in both cases of credit users and non users. These farmers were

literate with at least a household size of 5-8 members in the family, cultivating fragmented piece of land on the average of 1.0 hectares for non credit users and 1.45 hectares for credit users. More so, Linear functional form fitted the data for credit users with R^2 = 0.66. The following coefficients significantly influence the value of harvested yam crops for credit users; labour(X_1), farm size (X_2) and other productive input (X_4). While double functional form was the best fit for non-credit users with an explanatory variation of R^2 = 0.55 having two regression coefficient significantly influencing the value of harvested yam crops at varying signs.

Furthermore, the following variables for credit users were underutilized i.e farmland, depreciated capital asset and other production inputs. While non credit users underutilized farm size and other production input but over utilized labour.

- The result showed that married farmers within the ages of 46- 75 and above, with family size of at least 5-8 and a formal education participated more in yam farming. Government incentives should target this kind of farmers with their programmes in encouraging yam production.

- The result highlighted that credit users in yam farming underutilized most of their resources. Therefore appropriate policies and programme that can encourage and further strengthen the existing credit and poverty alleviation efforts in the area should be initiated. This policy will ensure that government provides agricultural credit facilities and incentives to yam based farmers, this could help the farmers increase their scale of operation.

- The comparative Allocative efficiency of the two groups of farmers showed that credit users were not productive in the use of land, capital assets and other production inputs, while non credit users were not productive in the use of labour and other production inputs. Both groups did not achieve optimum or absolute efficiency in the use of resources. Government policy intervention can capitalise on this to strengthen the efforts of extension agents in addressing this problems

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