SOCIO-ECONOMIC DETERMINANTS OF PRODUCTIVITY AND INCOME OF RICE FARMERS IN UDENU LOCAL GOVERNMENT AREAS, ENUGU STATE, NIGERIA

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ABSTRACT

The study sought to verify the major socio-economic determinants of farm income and rice productivity among rice farmers in the study area. A multi-stage stratified random sampling was used to select the respondents. Two major blocks of agricultural communities were delineated in the study area constituting of twelve (12) communities. Out of these, four (4) communities were randomly selected. Fifteen (15) rice farmers were then selected from each of them giving a sample size of sixty. Primary and secondary data were employed for this research. The primary data were collected using structured questionnaires. Multiple regression models with three functional forms were used to determine the production and income functions. Results showed that the influence of land and years of education on the farmers' rice output were statistically significant at 5% level. Test for multicollinearity ruled out interaction between years of formal education and extension contact. Generally, it was proved that education and other socio-economic factors had significant effect on rice farmers' output as well as their incomes. Extension contact had no significant effect on the rice farmers' output in the study area. However, only two explanatory variables, labour and farming experience showed significant effects on farmers' incomes indicating high labour intensity among the farmers. Four recommendations, including the need for adult education plus improvement of the subsidy delivery system and mechanization; retraining of extension staff and development of rural infrastructure were made.

Key Words: rice, farm income, farm productivity, farmer education and extension contact.

INTRODUCTION

The cultivated rice plant, African and Asian rice (*Oryza glaberrima L and oryza sativa L)*, are annual grasses. According to International Rice Research Institute (IRRI, 2008), world rice production in 2007 was approximately 645 million tonnes. At least 114 countries grow rice and more than 50 have an annual production of 100,000 tonne or more. Asian farmers produce about 90% of the total, with two countries, China and India, growing more than half the total crop. Nigeria ranks among the 64 top rice producers in the world but could not make it to the top 10 list. In Nigeria and many countries of the world, rice has become a staple food. Nigeria is West Africa's largest producer of rice, producing an average of 3.2 million tons of paddy rice (~ 2million tons of milled rice) for the more than 7-years (WARDA, 2001). Generally, rice production is primarily by small-scale producers, with low yield per hectare averaging about 1.47 tonnes/ha from farm sizes of between 0.5 and 2 ha many of who are very poor, living on very low level of income of about $1 per day (WARDA, 2004 & FAO, 2004).

Nigeria has experienced rapid growth in per capita rice consumption during the last three decades, from 5 kg in the 1960s to 25 kg in the late 1990s (Tijani, 2006). The successive programmes launched to increase rice production have not been able to reduce the resulting rice deficit (Onoja & Achike, 2008). The imposition of a ban on rice imports from 1985 to 1995, and the ensuing increase in the relative price against other major staples, boosted rice production mainly through area increase. Yields reached its peak in the 1990s, and there is now some evidence that they are actually declining, maintained Tijani (2006). In spite of the relative

increase in the price of rice per capita consumption has maintained its upward trend, showing that rice has become a structural component of Nigerian diet with a low price elasticity of demand. Rice is now regarded as an 'ordinary good' (WARDA, 2003). The current global food crisis which made grains more expensive is also having its toll on rice though a good omen for rice farmers. Past policies did not help local rice producers secure a significant market share and imports have increased rapidly since the lifting of the ban and in spite of successive increases in the import tariff from 50% to 100%. Imported rice represents more than 20% of agricultural imports and half of the total rice consumption. Thus there was an increasing gulf between the supply and demand of rice in Nigeria with a supply shortfall of two million metric tones to be imported. This scenario was the reason why Nigeria became a major rice importer, second only to Indonesia over the period 1998-2002 (Tijani, 2006).

Akinbode (1980) in Unaeze (1994) asserted that the basic problem with improving agricultural productivity and income of farmers was the development of the farmers themselves (i.e. education and improved extension service). Shapiro (1983) observed that the problem of low productivity of rice farmers could be solved if government can enhance productivity among efficient farmers by emphasizing new investment or technologies, rather than extension and education efforts that were directed at less efficient farmers. Shapiro (1983), Tadesse and Krishnamoorthy (1997), and Obwona (2000) whose studies exposed inefficiency among farmers in developing countries including Nigeria recommended that government efforts would have to be directed to education, extension, social change and support. According to Tijani (2006) emphasis on these activities would improve the allocation and the use of available resources so that more farmers could come closer to the efficiency level achieved by their counterparts and thus get a guarantee for improved income, reduced poverty and a better welfare. If efficiency is improved the demand and supply gap will hopefully become a thing of the past thus freeing scarce foreign exchange to develop other sectors of the economy.

Empirical research findings have shown that socioeconomic characteristics of farmers could play very vital role in determining farm efficiency (both technical and economic). For instance, Okoruwa, Ogundele and Oyewusi (2006) in their study of some rice farms noted that "the clearest pattern that emerges is that, all the socio-economic characteristics were positively related to efficiency. However, four of these characteristics- experience, household size, farm size and sex, had four out of the six cases statistically significant at various levels with marked influence on all efficiency measures under lowland production system except for experience." Not much study investigating thoroughly into the socioeconomic dimension of rice productivity and farmers' income, to the best knowledge of these researchers have been carried out in Isi-Uzo local Government Area, an important rice producing axis of Enugu State.

Given the above background, it becomes timely to embark on a study of this nature which was designed to, *inter alia*; determine the socio-economic factors influencing farm income and levels of productivity among small-scale rice farmers of Udenu North and South Local Government Areas of Enugu State, Nigeria.

Hypotheses of the study:
Two null hypotheses were derived to guide the attainment of the research objectives. These included:
Ho1: Selected socio-economic factors have no significant effect on rice farmers' output in the study area.
Ho2: Socio-economic factors have no significant effect on rice farmers' income in the study area.

METHODOLOGY
Area of Study
The old Isi-Uzo Local Government Area is one of the former 19 LGAs in Enugu State now made up of Udenu North and South LGAs. It lies on Nsukka low lands and situated between latitudes 6° and 7° North of the Equator. It is made up of 14 communities. To the east, it is bounded by Ishielu LGA and to the north by Benue State. It had a population of 209,725 in 1993 (National Population Commission, Enugu, 1993). The occupation of the inhabitants is varied. However, greater proportions of them are small peasant farmers while others engage in petty trading and civil service.

Sampling Plan
A list of rice farmers in the study area was obtained from Enugu State Agricultural Development Project (ENADEP). The rice farmers on this list constituted the population of the study. This population totaled two hundred and fourty (240). A multi-stage stratified random sampling was used for this study. The former Isi-Uzo LGA (now Udenu L.G.A.) was divided into two agricultural zones, namely Uzo-Agu and Udenu. Uzo-Agu comprises of communities like Ikem, Mbu, Ehamufu and Neke, while Udenu is made of Obollo, Amalla, Imilike, Orba, Umundu, Ezimo, Igugu and Ogbodu-Aba. Four (4) communities were randomly selected and they included: Ezimo, Imilike, Eha-Amufu and Ikem. Fifteen (15) rice farmers were selected from each of these communities giving a total sample size of sixty rural rice farmers.

Data Collection
Primary and secondary sources of data were employed for this research. The primary data were collected using structured questionnaires which were administered to randomly selected respondents in the study area. Oral interviews and personal observation were also used as source of primary data. The secondary data were obtained using textbooks, journals, textbooks and online materials.

Data Analysis
A multiple regression model with three functional forms, namely, linear, semi-log and double-log were employed in estimating the coefficients of the socioeconomic variables which influenced the income and productivity of the rice farmers in the study area. The functional form that gave the best fit in terms of value of the R^2 as well as better F-ratio was finally chosen and used for the analysis.

It was assumed that total production Y, is a function of land size, labour (family and hired), fixed capital, years of education, farming experience and extension contact following Tadesse & Krishnamoorthy (1997), Tijani (2006) and Onoja & Achike (2008).
Thus the implicit model is:
$Y = f(X_1, X_2, X_3, X_4, X_5, X_6$ and U).
Where Y = Output of rice (in Kgs); and for the Income function, I = Farm Income (Naira)
        But in both functions,

X_1 = land (ha)
X_2 = labour (mandays)
X_3 = fixed capital (Naira)
X_4 = years of formal education (years)
X_5 = farming experience (in years)
X_6 = frequency of extension contacts
U = stochastic error term.

RESULTS AND DISCUSSION

The results of the first production function used to attain objective (i) and to test the first null hypothesis are as follows:

$$LogY = 5.8 + 0.48*logX_1 - 0.099 \log X_2 + 0.428logX_3 + 0.352 \log X_4 - 0.44*\log X_5 -$$
$$(0.20) \quad\quad (0.15) \quad\quad (0.28) \quad\quad (0.12) \quad\quad (0.18)$$
$$0.30 \log X_6$$
$$(0.23)$$

F ratio = 14.28
$R^2 = 0.62$ (i.e. 62%)

NB: Figures in parenthesis are standard errors of the respective coefficients.

Using the standard error test, we observed that ½b estimate is greater than the standard errors for X1 and X5 (i.e. land and education respectively) indicating that the coefficients are significant at 5% level. It could therefore be inferred that the influence of land and years of education on the farmers' rice output were found to be statistically significant. This is so because as the size of land increases the output produced will equally increase. In addition to this land is regarded as a very vital factor in farm production. When land is scarce, the output from such small available land is expected to be small too. The positive sign noticed for the years of education could be attributed to the fact that educated farmers, *ceteris paribus*, are in a position to increase their output by adopting newly learnt technologies acquired from agricultural extension agents more than their counterparts who are illiterate. The negative sign exhibited by the variable, farming experience could be explained by lack of expertise among many of these rural rice farmers. Some farmers, despite long years of farming experience may remain conservative in adopting new methods from the perceived "small boys" going by the name extension agents. Such attitude could render years of service an irrelevant variable in determining rice farm output. Even though some of the variables individually did not show any significant effect on the output, judging from the R^2 (0.62), it can be inferred here that the sixty two percent (62%) of the variation of the dependent variable (output of rice) which was explained by the variation of the independent variables cannot be ignored as not significant. Since the calculated F-Ratio of 14.28 is > 2.26 (critical f-ratio) at 5% alpha level, we have no choice than to reject the first null hypothesis which held that "selected socio-economic factors have no significant effect on rice farmers' output in the study area."

For the second objective, the results of the model estimates are as follows:

$$I = 31547.3 - 7.33.16 \log X_1 + 2563.15*\log X_2 - 1213.5 logX_3 + 868.57 \log X_4 -$$
$$(1066.63) \quad\quad (1058.08) \quad\quad (1593.35) \quad\quad (717.40)$$
$$2524.23*\log X_5 - 220.96 \log X_6$$
$$(987.29) \quad\quad (1245.39)$$

F-Ratio = 21.07
$R^2 = 0.575$ (i.e. 57.5%)

The interaction between years of formal education and extension contact had a coefficient of 0.22507. Applying standard error test, only two explanatory variables, labour and farming experience showed significant effects with coefficients and standard errors of 2563.15 (S.E.

1058.08) and -2524.23 (S.E. 987.29) at 5% level. The positive sign of labour indicates that as the input of labour increases per unit of production, farmers income tend to increase giving a scenario of likely high labour intensity on the rice farms as farmers may try to add more labour in order to gain more income. This is an affirmation that mechanization is not very common on most rice farms in the study area. Paradoxically, farming experience indicated a negative sign. This could be the symptom of adverse effect of conservatism of the rice farmers who thought they already knew the technology of rice farming more than what the extension agents had to offer them. Those with little experience probably were more receptive to changes or adoption of new methods of rice farming unlike their experienced counterparts. Thus it appeared from the sign that the more the farming experiences the lower the farm income.

The rest variables, including extension contact, farm size and fixed capital were found to have negative signs and considered as influencing the income of the rice farmers negatively. The negative contribution of the extension contact variable could be attributed to ineffectiveness of extension agents visiting the farmers. In the same vein, the negative influence of land could be as a result of poor or lack of education among the rice farmers, a condition necessary to bring out the efficiency of land use and other resources normally employed in rice farming.

Fixed capital had a negative relationship with income. This could be due to the fact that, all things being equal, application of more fixed capital is expected to generate more output. However, poor pricing of the product could distort the effect of the resulting output rise from more fixed capital. However, a positive correlation coefficient of 0.51 was recorded. Assessing the model one can deduce that the explanatory variables affect the variation of the income (the dependent variable) with an R^2 of 0.575 implying that 57.5% of the variation in income was explained by the variation of the six variables stipulated in the model. The rest 42.5% variation of income was explained by other factors not considered in this work. This calls for further research into the major determinants of profitability of rice farmers in this area of study. Evaluating the F-ratio calculated, it was noticed that the value (21.07) was greater than the critical value (2.26) at 5% level of significance. We therefore reject the second null hypothesis which held that "socio-economic factors have no significant effect on rice farmers' income in the study area."

The interaction effect of years of formal education and extension contact in rice income function indicated a positive, but insignificant coefficient at 5% probability level (r = 0.23). In other words, years of formal education was insignificantly correlated with farmers' income but positive. This could mean that as level of education increases, ceteris paribus, income to farmers should increase. This positive relationship is consistent with *a priori* expectation.

CONCLUSION
This research report has tried to analyze the extent to which some socio-economic variables could impact on rice farmers' productivity and income on Udenu North and South LGAs' (formerly Isi-Uzo LGA) rice farmers in Enugu State of Nigeria. The influence of the socioeconomic variables on rice productivity and farmers' incomes tested in this research were quite significant. So far the findings have a lot of implications for policy making. Rice's productivity must be enhanced to abate hunger in the face of the teething global food crisis, improvement of farmers' income to abate poverty and in the interest of conserving the hard earned foreign exchange of Nigeria on imports of rice. If this challenge has to be met, the following recommendations must be taken seriously.

RECOMMENDATIONS
- ✓ Rural rice farmers in Nigeria and Enugu State in particular need to be motivated by State and Federal governments to establish adult education centres especially for rural farmers so as to boost their productivity.

✓ The need to retrain agricultural extension agents who are trainers of farmers must be made a priority step on the part of state and Federal government through the Agricultural Development Projects in Nigeria, and particularly, Enugu Agricultural Development Authority (ENADEP) must heed to this call.

✓ Nigerian government need to put down an effective framework for ensuring that agricultural input subsidies are enjoyed by the target audience in the distribution of improved seedlings, fertilizer, loans or credits.

✓ The need to expedite rapid construction and improvement of rural infrastructure to improve the rice farmers' efficiency in the study area and in Nigeria at large must be taken as a matter of emergency by Nigerian government.

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