AGRICULTURAL FARMING SYSTEM OPTIONS FOR ALLEVIATING POVERTY IN NIGERIA. A CASE STUDY OF NIGER STATE.

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ABSTRACT

The study examined the types of farming system adopted as well as the effect of farming systems on poverty alleviation among farmers in Niger State, Nigeria. The primary data for the study were obtained using structured questionnaire administered to eighty randomly sampled farmers from two Local Government Areas. Descriptive statistics and production function using regression model were used to analyze the data. The results revealed that young farmers of working age dominated the farming process. The regression model estimated revealed double log (Cobb Douglas) as the lead equation with the value of coefficient of determination (R^2) 0.8440, indicating that 84.44% of the variation in farm output was explained by the inputs included in regression model. The F-ratio estimated as 36.28 was significant at 1% level of probability. The result also showed that labour, other input costs, access to credit and farming system adopted were significant at 1.0%, while farm size was significant at 5% level of probability. It was therefore recommended that extension workers should educate the farmers to enable them understand the different techniques of different farming systems in order to increase their level of productivity. Moreso, Government should make agricultural inputs available at subsidized rates so that they can afford them.

Keywords: Farming systems, poverty alleviation and farmers' productivity.

INTRODUCTION

A farming system is defined as a population of individual farm family that have broadly similar resource base, enterprise patterns, household livelihood and constraints for which similar development strategies and intervention would be appropriate (Dillion *et al.*, 1978 and Shaner *et al.*, 1982). Farmers typically view their farms (whether small unit or large corporations) as systems in their own right. Farming systems are not only found in rural area, significant level of urban agriculture exists in many cities and towns in a wide range of developing countries (Collision, 2000). The resource endowment of any particular farm depends on population density, the distribution of resources among households and the effectiveness of institutions in determining access to resources. Regardless of their size, individual farm systems are organized to produce food and to meet other household goals through management of available resources, whether owned, rented or jointly managed within the existing social, economic and institutional environment. Based on the criteria of available resource base, dominant farm activities and household livelihood pattern, farming system is categorized into: irrigated farming system, wetland rice-based farming system, rain-fed system in humid areas of high resource potential,

integrated farming system, dualistic (mixed large commerce and small holder) farming system, coastal-artisanal fishing, often mixed farming system and urban-based farming system, typically focused on horticultural and livestock production (Dixon *et al.*, 2001).

The rapid increase in the Nigeria's population from about 60 million in 1963, to a figure of about 140 million in 2006 coupled with increase in the standard of living and other economic and political factors have greatly raised the demand for food (Ojo *et al.*, 2008). This population explosion and the low rate of food production can lead to the problems of food insecurity and poverty. In Nigeria, poverty and its excruciating impact are pervasive and palpable on the people especially the rural dwellers. In order to raise the standard of living of the people and instill in the poor people some sense of belonging, the government had adopted and implemented various poverty alleviation programmes dating back to the oil boom era of 1970s and spanning up to the late 2002. Some examples include: National Agricultural Land Development Authority (NALDA), Agricultural Development Project (ADP), Structural Adjustment Programme (SAP), Community Action Programme for Poverty Alleviation (CAPPA). These programmes have contributed immensely to reduction in poverty level of the beneficiaries, but reports are still showing that the poverty level is very high in the country. With the increase in poverty level in the country, a good and well-managed agricultural farming system that will lead to increase in sustainable food production without destroying the resource base has been identified as good way of alleviating poverty. According to Price (2000) and Groenfeldt (2005), the primary objective of the farming system is to maintain production of food and other goods and services that contribute to food security and income generation. Other functions are achieving environmental sustainability and contributing to ecosystem services. This would imply that these systems are entrusted with performing four main functions in the society, namely, food security, environmental, economic and social functions. In general, increasing the number of functions tends to increase the stability of agriculture and land use (Price, 2000). The subject of poverty alleviation in Nigeria has received considerable attention in the literature; however, few of such studies from the study area had evaluated the roles of agricultural farming system in poverty alleviation. Given this backdrop this study sets out to examine agricultural farming system as a way of alleviating poverty in Nigeria using Niger State as a case study. The specific objectives are to: (i). describe the socioeconomic characteristics of the farmers; (ii). identify the different agricultural farming systems adopted by farmers ; and (iii) examine the effects of farming systems adopted by farmers on their output in the study area

METHODOLOGY

The Study Area: The study was conducted in Niger State of Nigeria. The State is located within latitudes $8^{o} - 10^{o}$ north and longitudes $3^{o} - 8^{o}$ east of the prime meridian with land area of 76,363 square kilometers and a population of 4,082,558 people (Wikipedia, 2008). The State is agrarian and well suited for production of arable crops such as cowpea, yam, cassava and maize because of favourable climatic conditions. The annual rainfall is between 1100mm – 1600mm with average monthly temperature ranges from $23^{o}C$ and $37^{o}C$ (NSADP, 1994). The vegetation consists mainly of short grasses, shrubs and scattered trees.

Population and Sampling Techniques: The population of this study consisted of all arable farmers in Niger State. Due to the enormity of this population, 80 respondents were selected as sample size using simple random sampling technique. A total of two LGAs such as Bosso and Chanchaga LGAs were selected and in each of these 40 farmers were randomly selected.

Method of Data Collection: Data were collected with the use of structured questionnaire administered in the sampled farms to collect data relating to the types of farming systems adopted, farm output (kg), unit of labour per man day, land area under cultivation (ha), fertilizer (kg), seeds (kg), and agro-chemical (litres)

Analytical Technique

Data collected were analyzed with the aid of descriptive statistical tools such as frequency distribution tables, percentage distribution. Data were also analyzed using the ordinary least square regression analysis.

Model specification: The ordinary least square (OLS) multiple regression used is specified in the implicit form as follows:

$Y = f(X_1, X_2, X_3, X_4, X_5, X_6 U_i)$ (1)

Where:

Y = Output measured by output in Kg.

X_1 = Farm size in hectares

X_2 = Labour in man days

X_3 = Input (depreciated fixed cost items)

X_4 = Access to agricultural credit

X_5 = Access to extension agents

X_6 = Farming systems adopted (where 1=Irrigated farming system, 2=Cereals/root crop mixed farming system and 3=Root crop farming system)

The explicit form of this function takes the following forms:

$$Y = a + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + U_i \ (linear) \quad (2)$$

$$Y = a + b_1 \ln X_1 + b_2 \ln X_2 + b_3 \ln X_3 + b_4 \ln X_4 + b_5 \ln X_5 + b_6 \ln X_6 + U_i \ (semi\log) \quad (3)$$

$$\ln Y = a + b_1 \ln X_1 + b_2 \ln X_2 + b_3 \ln X_3 + b_4 \ln X_4 + b_5 \ln X_5 + b_6 \ln X_6 + U_i \ (double\log) \quad (4)$$

$$\ln Y = a + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + U_i \ (exponential) \quad (5)$$

RESULTS AND DISCUSSION

Socio-Economic Characteristics of the Respondents

Some socio-economic characteristics may influence crop production in the area. The variables analyzed in this study include age, sex, marital status, level of education, household size and land size.

Table 1 shows that majority of farmers were young with 37.50% in the age range of 31-40 years while respondents within the age range of above 50 years had the lowest percentage and this may be due to the effects of age on the farmers that is, the older they get the less involved they are in farming.

Table1: Socio-economic Characteristics of Sampled Farmers.

Variable	Frequency	Percentage
Age (years)		
21-30	21	26.20
31-40	30	37.50
41-50	23	28.75
Above 50	6	7.50

Sex		
Male	69	86.25
Female	11	13.75
Marital status		
Single	16	20.00
Married	59	73.75
Widower	4	5.00
Widowed	1	1.25
Separated	0	0.00
Level of education		
Quranic	16	20.00
Primary	14	17.50
Secondary	43	53.75
Tertiary	7	8.75
Number of household		
1-5	29	36.25
6-10	27	33.75
11-15	15	18.75
16-20	6	7.50
Above 20	3	3.75
Farm size (ha)		
Less than 1	41	51.25
1-2	32	40.00
3-4	1	1.25
Above 5	6	7.50

Source: Field survey, 2007.

Table1 also reveals that 86.25% are male while 13.75 % are female. This low female percentage is due to the fact that most women engage in domestic chores while their husbands engage in farming activities to provide income to meet family needs. From Table1, it could also be observed that 73.75% of the respondents were married, representing the majority and this high percentage suggests that they have to feed their families and generate income to cater for other needs of their household. Table1 also shows that 20.00% of the respondents had Quaranic education, 17.50% had primary education, 53.75% had secondary education and 8.75% had tertiary education.

Types of Farming Systems Adopted

Table2 showed that 8.75% of the respondents are engaged in irrigated farming systems, 73.75% which is the majority are engaged in cereal/root crop mixed system which is the dominant farming system in the study area. Also it was shown in the table that 12.50% engaged solely in root crop systems.

Table2 : Distribution of Respondent According to Farming Systems Adopted

Farming System	Frequency	Percentage
Irrigated	7	8.75
Cereal/ root crop mixed	63	78.75
Root crop	10	12.50
Total	80	100.00

Source: Field survey, 2007.

Effect of Farming Systems Adopted on General Productivity and Income of the Farmers.

In order to examine the effect of farming systems on the productivity and income of the respondents, an econometric model was estimated. The observed data were fitted into linear, double-log (Cob-Douglas), semi-logarithmic and exponential forms. The results of the estimated functional forms are summarized in table3.

Table 3: Regression Estimate of Effect of Farming Systems on Productivity of Farmers in Niger State

Variables	Linear	Double-log	Exponential	Semi-log
Constant	-2.833	1.078	1.449	-6.703
	(-1.082)	(0.891)	(9.627)***	(-0.263)
Farm Size(X_1)	0.0059	-0.986	-0.001	-10.034
	(0.072)	(-2.306)**	(-0.183)	(-1.111)
Labour (X_2)	0.384	0.307	-0.032	1.550
	(2.685)***	(2.102)***	(4.001)	(0.502)
Other Inputs cost(X_3)	-0.0248	0.607	0.001	8.750
	(8.953)***	(6.388)***	(5.827)***	(6.636)***
Access to Credit (X_4)	-0.034	0.707	-0.002	8.750
	(0.637)	(2.996)***	(0.647)	(1.755)*
Access to Extension Agent (X_5)	-0.019	0.167	-0.431	1.258
	(2.166)**	(1.537)	(-2.893)***	(0.539)
Farming System adopted (X_6)	0.491	0.380	-0.084	5.645
	(1.610)	(2.910)***	(2.195)**	(2.047)**
R^2	77.70	84.40	74.40	81.20
R^2 Adjusted	0.755	0.812	0.719	0.774
F-Statistics	345.811***	36.282***	29.878***	21.033***

* = Significant at 10% level; ** = Significant at 5% level; *** = Significant at 1% level.
Source: Field Survey, 2007

Figures in parenthesis are the respective t-ratios

Table3 indicates that the double-logarithmic functional form is the lead equation. The value of coefficient of determinations (R^2) implies that 84.40% of the variation in the output is explained by variables was explained by the inputs indicated in the regression model (Table 3). The model also has an F-value of 26.282 which is statistically significant at 1% indicating that the variables

significantly explained variations in the gross income. The regression coefficients of labour (X_2), other inputs (depreciated fixed cost items, seeds and agro-chemicals costs) (X_3), access to credit (X_4) and access to extension agents (X_5) were positive indicating that an increase in these inputs, holding others constant, will lead to an increase in the gross output. Farming systems adopted X_6 was statistically significant at 1% with an estimated co-efficient of 0.380. This showed that the farming adopted by majority of the farmers in the study area. i.e. irrigated farming system, cereals/root crop mixed farming system and root crop farming system increased the levels of output significantly thereby increasing and raising income and raising the standard of living above poverty level. The result also shows that labour (X_2), other inputs(X_3) and access to extension agents (X_5) were significant at 1%, level of probability while land (X_1) and Seed (X_3) were significant at 5% level of probability

CONCLUSION AND RECOMMENDATIONS

Conclusion

The study examined the types of farming system adopted as well as the effect of farming systems on poverty alleviation among farmers in Niger State, Nigeria. The study showed that young farmers of working age dominated the farming process. The farm sizes of majority of the farmer were below one hectare due to its fragmented nature. Also the farming system adopted by most of the farmers is cereal/root crop mixed system as this increased their level of production and income. The regression analysis results showed that labour, other inputs cost, access to credit and farming system adopted were significant at 1.0%, while farm size was significant at 5% level of probability. The results of the findings of this study has shown that the type of farming system adopted by majority of the farmers in the study has a significant effect in increasing productivity as well as income thus alleviating poverty.

Recommendations

In view of the findings in this study, it is therefore recommended that extension workers should educate the farmers to enable them understand the different techniques on different farming system in order to increase their level of productivity. Moreso, Government should make agricultural inputs available at subsidized rates so that they can afford them

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