THE ANALYSIS OF SMALLHOLDER FARMING SYSTEMS IN ABOH LOCAL GOVERNMENT AREA OF IMO STATE.

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ABSTRACT
The study was conducted to analyze the smallholder farming systems in Aboh L.G.A. of Imo State. The objectives of the study were to describe the various farming systems, cropping patterns, agricultural innovations, productivity and the level of land intensification that has occurred in the area and make recommendations based on the findings. A simple random sampling technique was used in selection of the respondents while data were obtained with the aid of structured questionnaire, and interview schedule. Data were analyzed using descriptive and inferential statistics. The result shows that majority (64.50%) of the farmers in the study area adopted the bush fallow systems. The average total output of the farmers was 4159 kg, and the average cultivated land area was 0.252 hectares per farmer. The result equally revealed that the fallow period in the area was between 0 and 1 year and about four types of agricultural innovations were being used by the farmers in the area. These include; inorganic fertilizer (NPK), use of modern farm tools such as weeding hoe made of steel, rake, use of improved varieties of crops (mainly cassava and yam), and also use of pesticides like aldrin dust, used mainly for yam and cassava production. Land use intensification in the area fall between 50% and 100% and there was no evidence of more than one cropping occurring in a season. From the regression analysis, it was found out that the correlation between the total output and the number of innovations used showed a negative effect. However, the result shows that only the total area cultivated and the fallow years has significant influence on the total output of the crops grown in the study area.
Key words: Smallholder, farming systems, cropping pattern, agricultural innovations,

INTRODUCTION

The need to increase agricultural production so as to meet the ever-growing food and agro-industrial demand of an expanding population is an issue of consensus in Nigeria. Sustainable agriculture therefore has emerged as the key issue in the recent past in Nigeria. The concept sustainability includes the efficient use of resources, resource conservation, and enhancement of environmental quality. Agriculture has to be dynamic to be able to response to the continuous changes in internal and external circumstances under which it operates. Such circumstances include changes in land resources, soil vegetation and climate and the needs of the farming families and the growing population. In order to meet the ever-growing food demand of the growing population, it is vital to analyze the farming systems employed by the smallholder farmers. However, according to Toluyemi (1990), smallholder farmers constitute about 60% of the Nigerian population, and produces about 90% of Nigeria's food. These smallholder farmers have problems compounded by unfavourable environmental factors and complicated land tenure systems which results in a wide gap between food production and steady increase in population growth.

Due to the rapid growth rates of the population in Nigeria, smallholder farmers are obliged to produce their food, energy and income from less land. This often leads to land intensification, soil degradation, or even environmental destruction in rural areas, sometimes to the point of complete impoverishment. However, traditional farming systems in Nigeria have evolved over many centuries. These farming systems are usually associated with primitive agricultural systems (Thinston, 1997). It is worth noting that combining the best of traditional agricultural methods with best of modern agricultural methods should be a long way towards sustaining agriculture in Nigeria.

Despite the fact that a large number of persons are involved in agricultural production, the sector is still unable to meet its expected roles of ensuring food security to the ever-growing population, therefore, there is need to review and analyze the farming systems practiced by the smallholder farmers in the study area, and suggest appropriate practices and options to enable agricultural sustainability in Nigeria. There is also the need to identify the levels of agricultural land intensification, innovations and productivity that have occurred in the area.

METHODOLOGY

The study area is Aboh Local Government Area of Imo State. The soil of the area is deep, well acidic and mostly prone to soil erosion and leaching. The agricultural soil is rich and suitable for cultivation of a variety of tropical crops, including the oil palm (*Elais guinensis*). A simple random sampling technique was used for the study. Data for the study were obtained from primary source, with the aid of structured questionnaire, and interview schedule. Forty (40) household heads were sampled and administered with questionnaire. A total of 31 questionnaires were retrieved. The general information of the respondents, socioeconomic

characteristics, land tenure and production problems are some of the information the questionnaire solicited for. Data obtained were analyzed, using descriptive and inferential statistics..

Two hypotheses were tested, and they were stated in the null form.

i. Ho: Agricultural innovations have not resulted to increased crop output in the area.

ii. H1: Smallholder farmers in the area do not produce surplus for the market.

Hypothesis I was committed to regression analysis, using the model specified below:

$Y = f(X_1, X_2, X_3……..X_6)$

Where

Y = Total farm output (kg)

X_1 = total area cultivated (ha)

X_2 = Agricultural innovations adopted (score)

X_3 = fallow years

X_4 = Gender

X_5 = Educational level

X_6 = Household size

Thus;

$Y = b_0 + b_1x_1 + b_2x_2 + b_3x_3 + b_4x_4 + b_5x_5 + b_5x_5 + b_6x_6 + \mu$

Where

Y = dependent variable

b_o, b_1, b_2, b_3…….b_6 = Parameter estimates of multiple regression analysis.

x_1, x_2, x_3……x_6 = Independent or explanatory variables

μ = Error term

RESULTS AND DISCUSSION

Socio-economic characteristics of the small holder farmer are shown in table 1.

Table 1: Socio-economic characteristics of the smallholder farmers

Age in years	**Frequency**	**Percentage**
21-30	4	12.9
31.40	7	22.5
41-50	10	32.2
>50	10	32.2
Total	**31**	**100**
Sex		
Male	20	63.5
Female	11	36.5
Total	**31**	**100**
House hold size		
2-5	6	19.3
6-10	21	67.8
11-14	4	12.9
Total	**31**	**100**
Level of Education		
No formal education	2	6.4
FSLC	18	58.3
SSCE	6	19.3
OND/NCE	2	6.4
B.SC/HND & Above	3	9.6
Total	**31**	**100**

Source: Field Survey, 2014

The result in table 1 above shows that the middle age group and the older age group engaged more in farming in the area, while the young people who can do more work and can readily adopt innovations to increase farm output are less involved in farming. The average age from the sample is 50 years. The result also shows that the average family size in the study area is 8 persons per family. This has a negative effect since the level of food consumption is affected by the family size and there is increased pressure on land for production, which in turn results to decrease in soil fertility. The result equally reveals that, about 58% of the respondents attended primary school and majority of them were from the older and middle age groups. Only 6.4% of the respondents had no formal education. This means that most of the farmers are literate and can accept and adopt certain agricultural innovations to increase farm productivity, since education removes the impediments to change. Also, the result shows that 64.5% of the respondents were male, while 35.4% were female. This means that in the study area, more men than women are engaged in farming.

Table 2: Frequency distribution of respondents according to innovation adopted

Soil fertility Management System	Frequency	Percentage
Bush fallow	20	64.5
Continuous cropping	9	29.0
Shifting cultivation	2	6.5
Total	**31**	**100**
Cropping Pattern		
Mixed cropping	29	93.5
Sole cropping	2	6.5
Total	**31**	**100**
Units of land owned		
1-3	17	54.8
4-6	12	38.7
> 6	2	6.5
Total	**31**	**100**
Fallow Period		
0-1	28	90.4
2-3	3	9.6
Total	**31**	**100**
No of innovations adopted		
1	0	
2	13	41.9
3	14	45.2
4	4	12.9
Total	**31**	**100**
Innovations identified		
Modern farm tools	31	100
Inorganic fertilizer	24	77.4
Pesticide	4	12.9
Improved varieties	3	9.7
Total	**31**	**100**

Source: field survey, 2014

Table 2 reveals that in Aboh Mbaise, bush fallow system is the prevalent soil fertility management system. About 64.5% of the respondents practiced bush fallow, 29% and 6.4% practiced continuous cropping and shifting cultivation respectively. The result also shows that mixed cropping was practiced by 93.5% of the farmers in the area, while about 90.3% of the farmers leave their farmlands to fallow for only one year. This is because the number of farmlands owned by a farmer is minimal. From the result gotten also, majority of the farmers made use of about 3 innovations, constituting about 45%. About 41.9% made use of at least 2 innovations. 100% of the farmers made use of modern farm tools (Indian hoe, shovel, wheel barrow and weeding hoe), 77.4% made use of inorganic fertilizer (NPK), and 9.7% made use of improved varieties of crop inputs especially in cassava (TMS 505034, TMS 30572, TMS 50395 etc). These are the three major agricultural innovations identified to be in use by farmers in Aboh Mbaise. Pesticides were also used, though by very few farmers about 12.9%. The result also revealed that majority of the farmers 54.8% owned about 1-3 plots of land, about 38.7% owned about 4-6 plots while 6.4% of the farmers owned more than 6 plots of land in the area.

Table 3a: Distribution of Farmers in Aboh Mbaise by Quantity of Cassava Output (n = 31) Total

Quantity of output (000)kg	No of respondents	Percentage
< 1	6	19.3
1 – 2	18	58.0
3 – 4	5	16.1
5 – 6	2	6.4

Source: Field survey data, 2014.

Table 3b: Distribution of Farmers in Aboh Mbaise by Quantity of yam output (n = 31)

Quantity of output (000)kg	No of respondents	Percentage
< 1	20	64.5
1 – 2	9	29.0
3 – 4	2	6.4
5 – 6	0	0
Total	**31**	**100**

Source: Field survey data, 2014.

Table 3c: Distribution of farmers in Aboh Mbaise by Quantity of Maize Output (n = 31)

Quantity of output (00)kg	No of respondents	Percentage
< 1	7	22.5
1 – 2	5	16.1
3 – 4	9	29.0
> 7	10	32.2
Total	**31**	**100**

Source: Field survey data, 2014.

The result in table 3a-c, reveals that majority of the farmers in Aboh Mbaise produce more of cassava (1000-2000kg) than yam (1000kg) and maize (700-1000kg). This constitutes about 58.0%, 45% and 32.2% of the total output respectively. However, these outputs are inadequate for the population of the area. .

Table 4: Distribution of farmers in Aboh Mbaise by market orientation

Purpose of farming	No of Respondent	Percentage
Market	1	3.2
Family	21	67.7
Both	9	29.0
Total	**31**	**100**

Source: Field survey data, 2014.

Table 4 shows that most of the farmers in Aboh Mbaise produce mainly for family consumption. This constitutes about 67.70%. Only about 3.2% produce majority for meat, while 29.0% of the respondents produce for both market and family consumption. Nevertheless, the volume of output offered to market depends on the size of the surplus of food crops produced.

Table 5: Regression Estimates of the Determinants of Farm Output

	Coefficient	Std. error	T-value
Intercept	-3881.88	1244.192	
Total area cultivated ($x_{1)}$	12426.97	3900.913	3.120***
Number of Agricultural Innovations Adopted ($x_{2)}$	-403.6312	1037.611	-0.389
Number of fallow years($x_{3)}$	4022.218	988.746	4.068***
Gender($x_{4)}$	245.9513	526.662	0.467
Educational level($x_{5)}$	-1190.597	1503.279	-0.792
Household size($x_{6)}$	495.6781	265.494	1.867*
R^2	0.55229		
Adjusted R^2	0.440363		
Slope Fcal	4.9344***		

Source: Results from STATA 4A

* and *** is significant at 10% and 1% level of probability respectively

Table 5 shows the result of the regression analysis. It contains the OLS regression equation.

The figures in parenthesis immediately under the parameter estimates are the corresponding T-ratios of the estimates. The coefficient of multiple determinations R^2 measures the degree of variation in the regression and jointly explained by the regressors. R^2 is the multiple correlation coefficients adjusted for degrees of freedom. It is a measure of the goodness of fit of the estimated equation. F is the variance ratio. This is used to test the statistical significance of the joint impact of the repressor on

the degrees and D.W. is the Durbin-Watson statistic. This is used to test for the presence of autocorrelation.

In our study, the relationship between total output of certain crops Y (yam, cassava, and maize) and area cultivated (X_1), innovation adopted (X_2) fallow period (X_3), educational level (X_4), gender (X_5) and household size (X_6) were regressed and the result of the regression analysis is presented in a compact form as shown below:

$$Y = -388.89 + 12426.97\ x_1 - 403.63\ x_2 + 4022.22\ x_3 + 245.95\ x4 - 1190.60\ x_5 + 495.68\ x_6$$
(4.07) (0.47) (-0.79) (1.87)

R_2 = 0.55
R_2 = 0.44
F* = 4.93
D.W = 2.03

The F-test is performed to assess the overall significance of the regression, using the variance ratio. The result shows that the joint influence of all the explanatory variables on the total output of some selected crops is significant.

From the economic test, we deduced that the coefficient for farm area cultivated X_1 is positive and highly significant at 1% level of probability, suggesting that the higher the area of land cultivated, the higher the output of the selected crops. The coefficient for the variable X_2 is negative and did not however make any significant impact on the production of the crops selected. The coefficient for X_3 has the expected sign and highly significant at 1% level of probability. This implies that the higher the number of years the land was left to fallow, the more productive it will become, hence leading to higher output of the selected food crops. The coefficient for X_4 has positive sign, but not significant. The coefficient for X_5 did not have the expected sign, it emerged with negative sign. The coefficient X_6 emerged with the expected sign and is significant at 10% level of probability. This indicates that the more the number of people in a household, the more hands required to produce more of the selected food crops.

From our statistical tests, the t-test of significance for each of these variables showed as follows; the three variables X_1, X_3 and X_6 has signnificant influence on the total output of the selected crops, while the other variables X_2, X_4, and X_5 were not significant. This means that significant relationship exists between crop output and some of the variable while some were not and therefore emerged non-significant.

CONCLUSION

The results of this study have shown that the area of land cultivated for the selected food crops positively and significantly influenced the total output of these selected food crops. Also, the years of fallow was found to have affected crop production positively in the study area. We can also conclude from our analysis that innovation, gender and household size have no positive influence on the total output of the selected crops.

The results therefore call for policies and programs that would improve the effectiveness of extension services to educate and train farmers on how best to apply the innovations, and also to adopt soil conservation measures, as matching crops closely to soil types, using farming methods appropriate to the terrain and also enhancing the soil with organic matter.

REFERENCES

Asawalam, D. (2002). "Soil and Food Production" in Nwajiuba C.U. (Ed*). Perspective on food security in Eastern Nigeria*. Margrat Verlag, Germany. Pp. 53-57.

Allan, W. (1965). The African husbandman. Oliver and Boyd, Echinburgh, UK. Pp. 503.

Bennett, H.H. (1939). Soil conservation. McGraw-Hill, New York, NY USA. Pp. 993.

Boserup, E. (1993). (First Published 1965). Conditions of Agricultural growth: The Economics of Agrarian change under population pressure. Earthsean Publication Ltd, London.

Curzon, L.B. (1971). O'level Economics. The M and E handbook series. MacDonald and Evans Ltd. London.

Doppler, W. (1991). Landwritschaffliche Betrieebssysbeme in den Tropen and Subtropen. Verlag Eugen Ulmer, Stuttgart, Germany.

Doppler, W. (1991). In Nwajiuba C.U. (1997). "Agricultural finance and accounting" unpublished Lecture Mimeograph. Imo State University, Owerr.

Food and Agricultural Organization (1998). The Right to food in theory and practice. Rome.

Food and Agricultural Organization (1984). Land, food and people. FAO Economic and social development series, No. 30 Rome.

Greenland, D.J. (1976). Bringing the revolution to the shifting cultivators. Science. 190: 841-844.

Grove, A.T. (1961). Population densities and agriculture in Northern Nigeria: In Barber, K.M., R.M Prothero (eds). Essay on African Population.

Haswell, M.R. (1953). Economics and Agriculture in a savanna village. London, UK, Colonial research study 8.