LAND TENURE SYSTEM, FARM SIZE ,INNOVATION AND AGRICULTURAL PRODUCTIVITY IN SOUTH-EAST NIGERIA.

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ABSTRACT

This study examined land tenure systems, farm sizes, agricultural productivity and innovation in Imo State, Nigeria. Specifically the study examined the socio-economic characteristics of farmers, estimated the farm size of the farmers, identified reasons for not practicing mechanized farming, identified different innovations available to the farmers and identified the factors that affected agricultural productivity . Five communities were chosen randomly and from each of these communities, twenty farmers were randomly chosen. Data were collected, collated and analyzed using relevant techniques such as means, percentages, frequency distribution and multiple regression analysis. The results showed that 85% of the respondents practiced individual land tenure system alone. It was also revealed that the laws of inheritance and increase in population led to the subdivision and fragmentation of existing farmland in such a manner that the sizes of farm holdings discouraged agricultural commercialization. Also, it was found that fragmentation led to a great distance between the plot which increased the waste in man-hour and energy. It was also shown that mechanization of agriculture was impracticable under land fragmentation and adoption of modern innovation was reduced since just 35.0% of the respondents claimed to have adopted other forms of innovation. Lastly, the null hypothesis was rejected concluding that socio-economic factors affected the farmer's productivity in the area. It was recommended that formation of cooperatives by farmers is an imperative in farm land consolidation of the scattered farm holdings into economic size to encourage large scale operation and bulk input sourcing and procurement.

Keywords*: land Tenure system, farm size, Agricultural productivity, innovation.*

INTRODUCTION

Land and labour constitute the major inputs used in production by an overwhelming majority of small farmers who cultivate between 0.10 and 5.99 hectares of land in Nigeria (Falusi and Olayide 1980). Land continues to be the most important of these traditional farm inputs in production, since increases in farm output come primarily through bringing additional land into cultivation, also it is already estimated that, only about one-third of the cultivatable land in Nigeria is in actual cultivation. (Olayemi, 1980).

Land is usually taken to include not only the physical soil, but also everything beneath and everything extending up to the sky above it (Adedipe, *et al., 1991*). According to Odii (1998), land is the basic resource which supports the production of all agricultural commodities including livestock which depend on land to produce the forage and grain they consume. The concept of land has remained of considerable importance since the creation of man. Man has depended on the land for his food, raw materials for clothing and shelter. Famoriyo (1980) opined that, land is the fundamental basis or the social and economic existence of man and society. No nation, city or rural area can survive as an entity without land (Olayiwola and Adeleye, 2006).

Land tenure system can be defined as the rights and institution that governs access to and use of land (Adams, 2001). Tenure system of land involve a system of rights, duties and responsibilities concerning the use, transfer, alienation and ownership security of land and its resources. A comprehensive definition of land tenure was postulated by Malinowski (1935) as the relationship of man to soil in the widest sense; that is, in so far as it is laid down in native laws and customs and in the measure in which it controls political life, affects the performance of public

ceremonies and gives access to opportunities for recreation and sports. One can infer that, apart from producing a frame work for economic utilization of land in conformity with the native laws and customs, the land tenure system constitutes a means of administrative control of socio-political life of the community. Another operational definition of land tenure as conceived by Timmons (1943) is that land tenure is the relationship between individuals, and between individuals and society, growing out of the use of land. This includes relationships between mortgages (public and private) and mortgagors, landlords (public and private) and tenants, operators and labourers through the use of police, eminent domain and tax powers in all instances where these relationships impinge upon rights in land. Famoriyo (1980) asserted that most of the categories mentioned in the operational definition above exist in the Nigerian situation.

Various forms and arrangements of land tenure and land rights exist under customary land tenure. Ownership and rights to land may be permanent, semi-permanent or temporary and these are dependent on the mode of acquisition. According to Odii, (1998), there are several methods of land acquisition and prominently include; acquisition by inheritance, lease and purchase.

Land Tenure in Nigeria can broadly be classified into three main types namely; communal, individual (private) and public (state controlled). Communal land is such that is held under an arrangement that provides for joint or communal use of land. Under individual tenure, land is available to the individual owner for agricultural purpose, but may be given out to other farmers on a rental basis, especially for cultivation (Arua and Okorji, 1997). State-held (public) lands are usually made available to individuals or private investors, cooperative societies and other organizations or groups of individuals on request if approved by the state governor (Arua and Okorji, 1997; Land Use Act 1978). The general performance of land tenure in Nigeria is affected by socio-economic, sociological, cultural, traditional, religious and institutional factors.

Agricultural productivity can be defined as the index of the ratio of the value of total farm outputs to the value of inputs used in farm production (Olayide and Heady, 1982). Mundlak (2007) said that output is usually measured as market values of final output, which excludes the intermediate products such as corn-feed used in meat industry. This output value may be compared to many different types of input such as labour and land. He stated that agricultural productivity may also be measured by what is termed Total Factor Productivity (TFP). This

method of calculating agricultural productivity compares an index of agricultural inputs to an index of outputs. Productivity, which measures the increase in outputs not accounted for by the growth in production inputs, is a closely watched economic performance indicator because of its contribution to a healthy and thriving economy. Increased productivity can translate into increased farm income, at least in the short run. In the long run, additional farms adopt the more productive inputs and practices, leading to increased output supply and a possible lowering of farm output prices and farm income. Several factors have been identified in the literature as the most important sources of productivity change in agriculture research and development, extension, education, infrastructure, and government programs.

Farm size is greatly influenced by the system of land tenure prevalent in an area. Under the individual tenure system and inheritance method of land acquisition fallow length periods are either reduced or no more practiced. Large-scale cropping and animal production are difficult without sufficient land. With rapid population growth and enforcement of land tenure systems, fragmentation of land becomes rampant, which reduces farm size holdings and thus reduce agricultural productivity. Land tenure problems remain unsolved, and constrain the efforts of the farmers in adopting innovations.

Innovation is an idea, practice or object that is perceived as new or an improvement over the existing one by individual or other units of adoption aimed for improvement, development and investments in agriculture, which are intended to improve their productivity. The Idea constitutes the central element of an innovation which often manifests itself in a material or behavioral form. Most agricultural innovations manifest in material form, which includes improved implements, high-yielding and disease resistance seeds, bio-fertilizers, botanical pesticides and herbicides. Some innovations manifest themselves in behavioral forms such as improved cultural practices like soil conservation practices. In their pioneering work of diffusion of hybrid corn seed in two Iowa's communities in the United States, Ryan and Gross (1943) first drew attention to the existence of a sequence of stages in the process of adoption by farmers: awareness of the existence of an innovation, conviction of its usefulness, acceptance in the sense of willingness to try the innovation and complete adoption.

The existence of an adoption process involving four interrelated stages was also outlined by Wilkening (1953). He described that the adoption of innovation as a process, composed of

learning, deciding and acting over a period of time. He identified four adoption stages namely: awareness, obtaining information, conviction, trial and adoption. Land tenure problems remain unsolved, and constrain the efforts of the farmers in adopting innovations and investments in agriculture, which are intended to improve their productivity.

Hence, the need to address the important issues on the various features of land tenure, farm- size distribution ,innovations and factors affecting agricultural productivity in the study area.

The objectives of the study are to;

(i) examine the socio-economic characteristics of farmers in the study area,
(ii) estimate and examine the farm size of the farmers in the study areas,
(iii) identify the reasons for non-practicing mechanized farming,
(iv) identify the factors that affect agricultural productivity in the study area,
(v) examine the innovations adopted by the farmers to improve production and,
(vi) make policy recommendations based on the outcome of the study.

The null hypothesis (Ho :) of the study is: Socio-economic factors do not significantly affect the farmer's productivity in the study area.

2 Materials and Methods

The study was carried out in Ihitte / Uboma Area of Imo State South East Nigeria. The area lies within latitude $4^0$45N and $7^0$15N, and longitude $6^0$15'E and $7^0$25'E and covers an area of 5,100sq.km. The Area was purposely chosen because majority of the population of the people living in the area are farmers and they depend mostly on agriculture as their primary source of livelihood. Six (6) communities were randomly selected so as to avoid bias and to give every community equal chance of being selected. From each of the six communities, twenty (20) farmers were randomly selected among which are the household heads that culturally are in custody of land ownership in the area for the administration of questionnaire. Therefore, in all, one hundred and twenty respondents were interviewed. This area of study is central enough in Igbo land to constitute a good representation of southeast Nigeria. Data for this study were collected from both primary and secondary sources. Collected data were analyzed using simple

descriptive statistics such as; means, percentages and frequency distributions and multiple regression.

3.0 RESULTS AND DISCUSSION

3.1 SOCIO-ECONOMIC CHACTERISTICS OF RESPONDENTS

Table 1 shows the socio-economic characteristics of the respondents.

Table 1: socio – economic characteristics of 120 respondent farmers in Imo-State

Variables/ Categories	**Frequency**	**Percentage (%)**
Age		
30-39	8	6.667
40-49	19	15.833
50-59	36	30.000
60-79	40	33.333
80-89	17	14.167
Mean Years of age is 59 years		
Educational attainment		
Non literate	7	5.833
Adult education	20	16.67
Primary school	34	28.33
Secondary school	48	40.00
Tertiary education	11	9.167
Mean educational attainment is Primary education		
Marital status		

Married	82	68.33
Single	38	31.67
Household size		
1 – 5	38	31.67
6 – 10	76	63.33
11 – 15	6	5 .00
Mean household size is 7		
Involvement in farming		
Full time farming	22	18.33
Part time farming	98	81.67
Males in the households		
0 – 3	28	23.33
4 – 6	76	63.33
7 – 9	14	11.67
10 – 12	2	1.67
Mean males in the household is 6 males		

(Source: Field survey data, 2010)

The table shows that majority of the respondents (33%) in the study area were elderly farmers between the ages of 60-69 years. The mean age of the respondents was calculated to be 57 years. Ages within this range 60-69 are usually the ages at which people in the study area relinquish their land holdings to their children through inheritance by male heirs, which leads to constant

land fragmentation in the study area. About 68% of them had both primary and secondary levels of formal education while 17% of them had only received education as an adult while 6% of them did not receive any form of formal education. This result suggests that majority of the land users in the study area do not have adequate educational background and this resulted to their clinging to the traditional methods of farming, thus reducing the agricultural productivity of the land.

About two third of the respondents were married and the mean household size of the farmers was 7 persons. This implies that there exist free and cheap labours to the farming households. Though this helps to increase productivity, but a substantial quantity of the output will be used for household consumption and maintenance.

The mean number of males per household in the study area was calculated as 6 males which implied that under land tenure system by inheritance land had to be fragmented severally to accommodate every male member of the household. The Table also indicated that less than one quarter of the total number of respondents was fully involved in farming activities. Research indicated that 82% of the respondents were not fully involved in farming activities because of insufficient availability of land for maximum participation and productivity. The farmers therefore were engaged into various off-farm jobs which included, trading, civil service, transport service e. t. c. so as to supplement farm income sources.

Table 2 shows the various forms and characteristics of land rights among the respondents

Table 2: Assessment of the various forms and characteristics of land rights among the respondent owners (N=120)

Forms of land Tenure practices in the study area	**Frequency**	**Percentage (%)**
Individual	102	85.00
Communal	2	1.67
Individual + communal	16	13 .33
Methods of acquiring land		
Inheritance	18	15.00
Communal	2	1.67
Purchase	4	3.33
Inheritance + communal	12	10.00

Inheritance + purchase	50	41.67
Inheritance + lease	16	13.33
Inheritance + pledge	6	5.00
Inheritance + borrowed	8	6.67
Inheritance + sharecropping	4	3.33
Farm size (Ha)		
0.5 – 0.9	24	20
1.0 - 1.9	42	35
2.0 – 2.9	36	30
3.0 – 3.9	18	15
Mean farm size available to respondents is 1.55 hectares		

(Source: Field survey data, 2010)

Table 2 shows that 85% of the respondents practiced individual holdings only, 13% had a combination of communal land tenure systems, while only 2% practices communal land tenure systems. This explained that, greater than half of the respondents had full ownership of land. By implication, because of the less practices of the land tenure system in the area, land ownership is prominently by inheritance and purchase among other forms. The information given in table 2 concerning methods of acquiring land explained that majority of the people acquired their land through inheritance and purchase. This reveals the fact that, constant transfer of land rights through inheritance led to land fragmentation thereby reducing farm size.

The mean land area available to each farmer was 1.55 hectares. Eighty five percent (85%) of the respondents owned farm holdings that were less than 3.0 hectares, while 15% of the respondents owned between 3.0 hectares and 3.9 hectares. It could be deduced that large expanse of land was not available to majority of the farmers; thus extremely limiting commercialization and adoption of innovation in agriculture in the study area. Table 3 shows the frequency distribution on the reasons for none practice of mechanization in their farms.

Table 3: Frequency Distribution on the reasons why mechanization was not practiced.

Reasons	Frequency	Percentage (%)
Insufficient availability of land	48	40.0
Insufficient capital	32	26.67
Soil type	12	10.00
Non interest	12	10.00
Insufficient land + capital	16	13.33
Total	**120**	**100**

(Source: Field survey data, 2010)

Table 3 shows that majority (40%) of respondent farmers did not embark on mechanized farming due to insufficient land .In fact a combination of insufficient land and capital was attributed to the non-mechanization of the agricultural activities in the study area. Also the farm holdings which were scattered far apart resulted in the inability of the respondents to practice mechanization which is an innovation to their farming practice that can improve productivity. Table 4 is the frequency distribution according to known and adopted innovations by farmers.

Table 4: Frequency distribution according to forms of known and adopted innovations by the farmers

	Known		**Adopted**	
Innovations	**Frequency**	**Percentage**	**Frequency**	**Percentage**
Material:				
Improved planting	17	14.17	13	10.83
Improved fertilizer and other				
Agro-chemicals	13	10.83	7	5.83
Improved pesticides	9	7.50	6	5.00
Irrigation system	7	5.83	2	1.67
Behavioral:				
Increased fallow length	24	20.00	2	1.67
Other soil conservation methods	15	12.50	5	4.20
Total	**85**	**70.83**	**35**	**29.20**

(Source: Field survey data, 2010)

Table 4 showed that, majority (70.83%) of the respondents claimed to have known or heard about one innovation or the other but due to lack of capital and access to enough land; only about (29.20%) agreed to have adopted and is practicing the use of the innovations. Even land conservation that will help in the improvement and sustainability of the farmer's physical production was adopted by only four percent of the respondents.

Table 5: Frequency distribution of respondents according to their productivity level

Productivity Level: Output/Input	Frequency	Percentage (%)
0.010 – 0.99	16	13
1.00 – 1.99	30	25

2.00 – 2.99	48	40
3.00 – 3.99	18	15
4.00 – 4.99	8	7
Total	**120**	**100**
Factors affecting agricultural productivity.		
Insufficient land	22	18.33
Inadequate fertilizer	18	15.00
High labour cost	14	11.67
Insufficient capital	12	10.00
Inadequate extension service	8	6.67
Diseases and pests	6	5.00
Insufficient capital + land	36	30.00
Miscellaneous	4	3.33
Total	**120**	**100**

(Source: Field survey data, 2010)

From table 5, it was revealed that, the mean productivity level of respondents in the area was 2.20.This implied that farmers in the area are productive given the available input level, though the majority of them produced at subsistence level. The survey also revealed that, seven main factors affect agricultural productivity in the study area. Eighteen percent of the respondents had their agricultural productivity hampered due to insufficient land, 15% resulting from inadequate fertilizer available to them, 12.67% due to high cost of labour, 10% as a result of insufficient capital, 5% affected by diseases and pests, 33.33% caused by a combination of insufficient

capital and land, while 3.33% affected by other miscellaneous reasons. Table 6 shows the socio-economic factors affecting farmers' productivity using econometric tool of analysis.

Table 6: The socio-economic factors affecting farmer's productivity in the study area using econometric tool.

Explanatory Variables	Linear Function	Semi-log Function	Double-log Function	Exponential Function
Age (X_1)	-0.0221	-0.3323	-0.1381	-0.0102
	(-2.3140)**	(-0.4569)	(-0.4106)	(-2.0035)**
Farming Experience (X_2)	0.0280	0.6837	0.3565	0.0152
	(2.8143)***	(2.0832)**	(2.3030)**	(2.8718)***
Fallow-Length (X_3)	-0.1314	-0.1636	-0.0356	-00648
	(-2.0063)**	(-06656)	(-0.3068)	(-1.8578)
Household-size (X_4)	0.0391	0.1041	0.0533	0.0206
	(1.1529)	(0.4789)	(0.5197)	(1.1399)
Expenditure on agro chemicals (X_5)	-0.0004	-0.0463	-0.0206	-0.0002
	(-2.5858)***	(-0.6909)	(-0.6524)	(-2.1822)
Expenditure on planting materials (X_6)	8.79E-1	0.3339	0.2098	4.49E-1
	(9.8426)***	(4.1376)***	(5.5116)	(9.4317)***
Tenure system (X_7) Dummy	-0.5289	-0.1864	-0.1658	-0.3665
	(-2.1168)***	(-0.5119)	(-0.9649)	(-2.7539)***
Farm size (X_8)	-0.0944	0.0211	-0.0216	-0.0600
	(-1.7104)	(0.1318)	(-0.2866)	(-2.0376)**
Labour cost (X_9)	-0.0006	0.0159	-0.1578	-0.0003
	(-5.5631)***	(0.0414)	(-0.8731)	(-5.7981)***
Constant	4.0800	-1.3800	-0.3165	1.7091

F – Ratio	14.2890	3.6199	5.3463	12.9316
R2	0.7200	0.3945	O.4904	0.6995
Total	120	120	120	120

Significant at 5% = **

Significant at 1% = ***

Figure in parentheses are t-ratios.

Source: Field survey data, 2009.

Table 6 shows the result of the four functional forms used for the analysis. The functional forms that best fits the data on the basis of econometric and statistical criteria such as having the highest values of the coefficient of multiple determination (R^2), the highest number of significant variables and conformity to a priori expectations was chosen as lead equation. However, the F-Ratio was used to test the hypothesis at 1% level of significance. The linear functional form was found to give the best fit (F = 14.2890) of the four functional forms tested, and the coefficient of determination (R^2 = 0.7200) showed that 72% of the variation in the farmers productivity is explained by the joint action of the independent variables (X_1-X_9) investigated, while the remaining 28% of the variation in farmers productivity is explained by other variables not included in the model. The F-Ratio value is statistically significant at 1% implying that the model is adequate for further analysis. Farmers' age (X_1), showed a negative relationship with the farmer's productivity and was significant at 5% level of probability. This means that increase in age of farmers did not increase the level of farmers' productivity. Farming experience (X_2), increases as productivity increases and was significant at 1% level of probability. This means that as the years of experience of the respondents increased, their productivity also increased because the farmers with the highest number of years of experience in farming will have good skills and better approaches to farming operations, hence increased farmer's productivity .Fallow length (X_3) showed a negative relationship with productivity and was significant at 5% level of probability. This implied that increase in the fallow length beyond its present level in the area will decrease the farmer's productivity level. Household size (X_4) showed a direct relationship with productivity and was not significant; this may be explained by the fact that as household size increases, there will be an increase in availability of free and cheap farm labour. Expenditure

on Agro-chemicals (X_5), this showed an inverse relationship with productivity and was significant at 5% level of probability. This means that as the farmers spent more money on agro-chemicals due to increased cost of herbicides, pesticides etc, against weeds, disease and pest attacks there is a reduction in the amount of funds meant for other farm inputs as well as productivity. Expenditure on Planting Materials (X_6) showed a direct relationship with productivity and was significant at 1% level of significance. This means that the output of farmers increased as the farmers spent more money on planting materials such as improved seeds, seedlings and cuttings hence increase in productivity. Tenure system (X_7) showed a negative relationship with productivity and was significant at 1% level of probability. This implies that as tenure system decreases, farmer's productivity decreases and vice versa. However, decreased tenure system with an attendant adoption of innovations and proper execution of the technologies could lead to improved productivity of the farmers. The decrease in tenure system was due to the prevalence of individual landholding tenure system in the area resulting to fragmentation of land among male heirs in the households. Farm size (X_8) also showed a negative relationship with productivity and was not significant; this implies that a decrease in farm size would lead to a decrease in productivity. Lastly, Labor Cost (X_9) also showed an inverse relationship with productivity and was significant at 1% level of probability. This relationship is explained by lower opportunity costs of labor for small scale farmers. This means that as the labor cost increases, it increased cost of operations, hence a decreased level of productivity.

The linear function which is the lead equation can therefore be stated as;

$$Y = 4.0800 - 0.0221X_1 + 0.0280X_2 - 0.1314X_3 + 0.0391X_4 - 0.0004X_5 + 8.79^{E-1}X_6 - 0.5289X_7$$

(-2.3140) (2.8143) (-2.0063) (1.1529) (-2.3140) (9.8426) (-2.1168)

$$- 0.0944X_8 - 0.006X_9.$$

(-1.71040) (-5.5631).

$R^2 = 0.7200.$

Therefore, since F_{cal} is greater than F_{tab} [i.e. F_{cal} (14.28) > F_{tab} (1.879)] at 5% level of significance. Hence, we reject the null hypothesis concluding that socio-economic factors, affected the farmers productivity in the area.

CONCLUSIONS AND RECOMMENDATIONS

The following conclusions were drawn from the findings of this study:

(1) The respondents were involved in both farm and other off – farm jobs.
(2) The land tenure practiced by majority of the respondents was individual and communal ownership; and they acquired their land mostly through inheritance, purchase and the community. From the analysis, it was found that lands were severally fragmented during the acquisition and sharing of either family or community lands, and this went a long way in discouraging adoption of laudable innovation like the mechanized farming as a result of reduced farm size of land.
(3) Also farmers were not at liberty to sell a portion of land acquired through communal ownership and thus, majority of them could not acquire extensive land for considerable agricultural productivity.
(4) The econometric result revealed those socio-economic factors which significantly affected the farmers' productivity in the area to include; planting materials, household size, farming experience, tenure system and labor cost.

The following recommendations are made for increased farm size, improved agricultural productivity and adoption of innovations

(1) The 1978 land use Act needs to be urgently amended by the parliament to make available state owned vast lands to agricultural investors who are willing to improve agricultural productivity.
(2) The farmers should form cooperatives so as to enable them consolidate their small scale holdings into economic size to encourage large-scale production.

(3) Farmers should reduce cost of procuring farm inputs (machineries, planting materials, agro-chemicals etc) for their use by forming cooperative societies so as to take advantage of bulk purchase.

(4) Lastly, the number of extension agents posted to the area should be increased to improve on the quality of extension services in the area so as to help the farmers improve on their farm production techniques and adoption of innovations.

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