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Land Use Pattern and Productivity among Smallholder Farmers in Kogi State: A Case Study of Igalamela/Odolu Local Government Areas, Kogi State

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Abstract
The study was carried out to determine the land-use pattern and productivity among smallholder farmers in Igalamela/Odolu Local Government of Kogi State of Nigeria. Primary data collected with the aid of structured questionnaire were used in this study. A multi-stage sampling technique was used to select 125 respondents for the study. The analytical techniques used include descriptive statistics such as frequency, percentage, mean, and inferential statistics such as Stochastic frontier production and Pearson moment correlation. Results obtained showed that majority (72.8%) of the farmers were males while 26.4% were females. Also, about 68% were married, and the average age of the farmers was 45years with years of farming experience estimated at 20years. Average size of total land holding was 7.06ha. Majority of the farmers (60%) acquired land through inheritance. The result also revealed that 82.4% of the respondents practiced fertilizer application, 48.8% of the respondents practice crop rotation, 28% of the respondents practices cover cropping while 24% of the respondents practice mulching on their farms. Other results revealed that the farmers practiced mixed with 12.9% mixture of maize and groundnut, 8.0% mixture of maize and beans, 6.4% mixture of maize and melon, 5.6% mixture of guinea corn and millet and also mixture of yam/bean/maize respectively. The result further revealed that cost of labour, cost of fertilizer and farm size are the variables that significantly affect the productivity of farmers while annual income and mulching are negative and significant at 1% and 10% level of probability respectively. Also, Sigma square is positive and significant implying goodness of fit of the model. Also, Gamma is positive and significant implying that 55% of the variation in productivity is due to technical inefficiency. It was recommended that inputs such as fertilizers, chemicals and improved seed should be made available to farmers by Government and that the government should subsidize the prices of farming inputs such as fertilizer, agrochemical to enable farmers acquire and use them.
Keywords: *Land use pattern, Productivity, Smallholder farmers, technical inefficiency.*

Introduction

In Nigeria, the demand for agricultural produce is continually rising due to the geometric rise in population; this has resulted in intensification of cultivable land in an attempt to increase agricultural productivity (Akinbile and Adekunle, 2000). Nigeria like most developing countries is an agrarian society where vast percentage of the population is involved in several agricultural activities. The rural population in the country represents a strong and virile production force of subsistence agriculture. They play important role in the management of land. This recognition is not unconnected with the central role that the sector has played over the years in food security, employment generation, and poverty alleviation especially in the rural sector of the economy. Agricultural growth is however a fundamental necessity for the development of the sector and this is in turns predicated on increased productivity of farmland committed to production of different kinds of crops (Okuneye, 2002; Olayide *et al*., 2009*)*.

Land use pattern implies different uses of land which could be forest, pasture, human habitation and various economic activities; agriculture is the prime and most important for the survival of humankinds. Land use intensification refers to the extent of use of land and the availability of resources has been used to achieve desire goal. Intensification may cause

conversion of marginal land such as grassland or rangeland to crop production (Li *et al*., 2013). Research systems have over the years committed enormous human and material resource of development of improved crops varieties and complementary technologies; modest achievements have been recorded in the task of raising crops yield through improved varieties. One of the prominent limiting factors in the manifestation of the full potential of the crop varieties is the declining condition of the resource base especially in the face of increasing pressure on land and declining capabilities of the dominant smallholder farmers to access and procure inorganic fertilizer (Okoruwa *et al*., 2006, Yusuf *et al*., 2016). Various reports have over the years identified declining soil fertility as a major constraint on the quest for agricultural growth through increase productivity of arable land (Henoa and Baanante, 2006).

Sound land use practices are major concern in Nigeria, this is because land degradation resulted in low productivity and food security of millions of smallholder farmers is getting critical. These resource poor smallholder farmers who contribute more than 90% of agricultural output in Nigeria in particular and sub-Saharan Africa in general, must be assisted to rise beyond their current level of subsistence (Federal Ministry of Agriculture and Water Resources, 2008). In an attempt to raise productivity, smallholder farmers are encouraged to adopt different production technologies and move on to higher level of profitability through improved land management practices. This is more auspicious now in the wake of looming "global food crisis" that threaten to reduce world food production by as much as a quarter. These farmers need to learn new and sustainable ways of growing their crops to avoid the imminent displacement and marginalization that is bound to take place in a fast-changing world. Given the above reasons, there is need to consider the pattern in which land is used to ensure productivity among smallholder farmers who constitute a major part of agricultural production.

Land is becoming a scarce resource due to immense agricultural and demographic pressures. With the ever-increasing Nigeria's population, the pressure on land has become so prominent that land which was initially regarded as a gift of nature tends to be most highly priced factor of production (Gomez, 1993). Agricultural productivity could be sustainable only if land use pattern used by farmers could compensate for nutrient loss and environmental stress because of improper use of land. Hussain (2004) revealed that natural disaster such as flooding/erosion soil, earthquake, volcanic eruption, and fire affect the land and its sustainability is threatened. The alternative features to this, are the intensive use of the few plots of land which usually would result in land nutrient exhaustion or degradation, low yield restricted farms and continuous poverty following low productivity.

Despite these benefits in using appropriate land use pattern for various crop production, land use in many African nations have been characterized by significant amount of land degradation (Barbier and Hochard, 2016). Although, other research works have been carried out on the subject matter by other researchers, there is no known study on land use pattern and productivity Kogi State; hence a need to carry out this study to fill this research gap.

The broad objective of this study is to determine the land use pattern and productivity among smallholder farmers. The specific objectives include to describe the socio-economic characteristics of smallholder farmers; identify the cropping pattern in the study area; determine the effect of land use pattern on technical efficiency of smallholder farmers; examine the factors affecting agricultural productivity in the study area; and determine the relationship between the farm size and productivity.

Methodology

The study was carried out in Igalamela-Odolu Local Government Area of Kogi State, Nigeria. The study area is bordered by the Niger River in the west and Enugu State in the east with headquarters in the town of Ajaka. It lies between latitudes $7^{o}05`N$ and $7.08^{o}$ N and longitudes $6^{o}49`E$ and 6.82`E. It has an area of 2,175km^2 and a population of 148,020 at the 2006 census and 139 meters' elevation above the sea level. Igalamela-Odolu LGA has an unusually and richly endowed environment. It is within the middle-belt of Nigeria which has an advantage of the climate of drier savannah vegetation to the north and the wet forest region to the south.

The area lies within the warm humid climatic zone of Nigeria. There is a distinctive wet-dry season dichotomy. The wet season lasts from about April to the end of September or early October while the dry season lasts from about October to about the end of March or early April. Rainfall can be heavy and the effects of the harmattan can be severe, especially from about November. The most common economic trees are palm trees, locust beans, mahogany, iroko, whitewood and raffia palm. 90% of the population practices farming. Both forest and savannah crops thrive on Igalamela-Odolu soil very well. Thus, the main forest crops produced are: yams, cassava, maize, melon and groundnut. And they produce such savannah cereals as guinea corn, beans, millet and benniseed.

Primary data were used in this study and were collected with the use of structured questionnaire which was administered to the respondents. The population of this study consisted of all farmers in Igalamela-Odolu LGA, Kogi State. A multi-stage sampling technique was used in the selection of respondents. Firstly, six (6) communities were selected from three district councils using random sampling technique. Secondly, one hundred and twenty-five (125) respondents were picked from the six communities according to the population density. Data collected for this study were analyzed using both descriptive statistics and inferential statistics. Descriptive statistics such as percentages and frequency distribution and inferential statistics such as Stochastic frontier production and Pearson moment correlation were used for data analysis.

Model Specification

Stochastic Frontier Regression Model was used to determine the technical efficiency of the effect of land use pattern on the productivity of smallholder farmers (Coelli, Prasada and Batesse, 1998; Jeffrey and Xu, 1998: Ajibefun, 2008; and Rahji and Fakayode, 2009). The Stochastic Frontier Production Function Model has the advantage of allowing simultaneous estimation of individual TE as well as its determinants. Following Dawson and Lingard (1989), the production technology of each farm was assumed to be characterized by a Cobb-Douglas function. Apart from the usual rationale for its use, experience has shown that simple functions involving few parameters as practically feasible perform best since convergence problems in the estimation process occur when there are a large number of explanatory variables in the estimated equation. The Cobb-Douglas functional form is a compromise between a complex production process and a complex estimation technique. It is defined as:

$$InY_i = \beta_0 + \beta_1 InX_1 + \beta_2 InX_2 + \beta_3 InX_3 + \beta_4 InX_4 + \beta_5 InX_5 + \beta_6 InX_6 + \beta_7 InX_7 + \beta_8 InX_8 + \beta_9 InX_9 + V_i - U_i \ldots (1)$$

Where, In = natural logarithm (base e), Y_i= output of crop of the ith farmer in kilogram, X_1 = farm size in hectares, X_2 = cost of fertilizer in ₦, X_3 = cost of herbicide in ₦, X_4 = cost of pesticide in ₦, X_5 = cost of seed in ₦, X_6 = cost of labour in ₦. V_i is the two-sided error component that represent random variations in output due to factor outside the control of the farmers as well as the effects of the measurement error in the output variable, left out

explanatory variables from the model and stochastic noise. It is assumed to be normally distributed with zero mean and variance, σ^2_v; and U_i is a non-negative random variable that represent stochastic shortfall of outputs from the most efficient production. It is assumed to be independently distributed such that U_i is defined by the truncation (at zero) of the normal distribution with mean μ_i and variance σ^2_u where μ_i is defined by:

$$\mu_i = \delta_0 + \delta_1 InZ_1 + \delta_2 InZ_2 + \delta_3 InZ_3 + \delta_4 InZ_4 + InZ_5. \ldots\ldots (2)$$

Where, μ_i= inefficiency effects, Z_1 = age of farmer (years), Z_2 = farming experience (years), Z_3 = household size (number of persons in household), Z_4 = education (number of years of formal schooling). Given functional and distributional assumptions, maximum-likelihood estimates (MLE) for all parameters of the stochastic frontier production and inefficiency model defined by equations 1 and 2 were simultaneously estimated using the program, FRONTIER 4.1 (Coelli, 1994), which also estimated the variance parameters in terms of parameterization:

$$\sigma^2 = \sigma^2_v + \sigma^2_u \ldots\ldots\ldots\ldots\ldots\ldots (3)$$

and

$$\gamma = \sigma^2_u / \sigma^2 \ldots\ldots\ldots\ldots\ldots\ldots (4)$$

So that $0 \leq \gamma \leq 1$

The TE of production of the ith farmer (TE_i) given the levels of inputs used is defined by:

$$TE_i = \exp(-U_i) \ldots\ldots\ldots\ldots\ldots\ldots (5)$$

The TE of a farmer was between 0 and 1 and is inversely related to the level of the technical inefficiency effects (Battese and Coelli, 1995). The TE is also predicted using the FRONTIER program, which calculates the maximum-likelihood estimator of the predictor for equation 5 that is based on its conditional expectation, given the observed value of $(V_i - U_i)$ (Battese and Coelli, 1995).

Results and Discussion

Socio-economic Characteristics of Respondents

The result of the socio-economic characteristics of the respondents is presented in Table 1. The result according to age distribution shows that 54.4% of the respondents were between the age range of 40-60 years, 36.4% were between 20 – 40 years, and 8.8% were above 60 years. The mean is 44.49 which indicates that the farmers were in their active years which may increase the efficiency of crops production.

The distribution according to sex shows that 72.8% of the respondents are male while 27.2% of the respondents are females. It shows that agriculture in the study area is male dominated.

The result according to marital status distribution shows that 68.0% of the respondents are married, 12.0% of the respondents are divorced, and 10.4% of the respondents are widowed while 9.6% of the respondents are single.

The result according to educational attainment reveals that 32.8% of respondents had no formal education, 32.0% of the respondents had primary education, 24.0% had secondary education while 11.2% had tertiary education. This implies that literacy level of respondents was high. The implication of these results is that well educated farmers might be efficient in food crops production. These conform to Opara (2010) who opined that farmer with basic education are better equipped for making more informed decisions.

The result according to household size shows that 35.2% had household size of between 4-6 persons, 28.0% had household size of ≤3 persons, and 26.4% had household size between 7-9 persons, while 10.4% had household size of 10 and above. The mean household size was

about 6 persons implying that high percentage of household size translates to high labour for farming activities. This study agrees with Oviasogie (2005) who observed that labour is the most important factor of production among smallholder farmers in Nigeria agriculture as it is usually dominated by family labour.

The result according to annual income reveals that 38.6% of the respondent earned ≥₦150000, 25.6% of the respondents earned between ₦50001-100000, 22.4% of the respondents earned ≤₦50000, while 13.6% of the respondents earned between ₦100001-150000. This implies that most of the farmers depend solely on their source of farm income. This is because financial institution such as bank and other lending agencies appears either not accessible or have stringent conditions attached to their services such as high interest rate and hidden charges thereby making it inaccessible. These of course can hamper production to a large extent, however, Anon (2009) asserted that loan is a crucial input and can be used to establish and expand farm size thereby increasing production.

The result according to farming experience reveals that 40.0% of the respondents had 21 and above years of experience, 24.0% of the respondent had 16-20 years of farming experience, 18.4% of the respondent had 11-15 years of farming experience, while 17.6% of the respondent had ≤10 years farming experience. The mean of the years of experience in farming by the respondents were 19.79 years. The result implies that majority of the food farmer have been producing food crops for a long time and this might be an indication of efficiency in food crops production.

The result in according to farm size reveals that 40.0% of the respondents had farm size of ≥5.1 hectares of land, 25.6% of the respondent had farm size within the range of 1.0-3.0 hectare of land, 19.2% of the respondent had ≤ 1 hectares of land while 15.2% of the respondent had within 3.1-5.0 hectares of land. The average farm size was about 7 hectares while the minimum and maximum farm sizes were 0.5 and 26 hectares respectively. This implies that most of the farmers in the study area predominantly small-scale farmers as such, this would affect their efficiency in production. The study agrees with Masterson (2007) who observed that the inverse relationship between farm size and efficiency could be attributed to higher labour intensity on small scale farms due to lack of off-farm employment opportunities.

The result according to source of land shows that 60% of the respondents acquired land through inheritance, 14.4% acquired land through renting of farmland, 12.8% of the respondent acquired land through purchase, while 12.8% acquired land through otherwise. This implies that majority of the farmers in the study area acquired land through family inherited source. All other things being equal, access to abundance farmland might lead to efficient crops production.

The results according to source of labour reveal that 39.2% of the respondents use family labour, 36.0% of the respondents use both family and hired labour, 24.8% of the respondents' use hired labour for their production. This implies that farming in the study area is dominated by family labour therefore they would be low cost of production. The study agrees with Oviasogie (2005) who observed that labour is more important factor of production in smallholder Nigeria agriculture as it accounts for more than half of the costs of production. Further, the result reveals that 97.6% of the respondents had no contact with extension agents, 2.4% of the respondents had access to extension visit. This indicates that majority of the respondents had no extension visit and thereby not exposed to new technologies and improved practices of production. This conforms to Shehu *et al.* (2010) who observed that contact with extension agents exposes farmers to new technologies and improved varieties of inputs, providing access to resources and information that will improve their production.

The result according to access to credit shows that 90.4% of the respondents had no access to credit, 9.6% of the respondents had access to credit. This implies that the majority of the

respondents faced limited access to credit facilities due to high interest rates and lacks of collateral which results in low production. The study agrees with Oluwatosin (2011) who observed that the farmers' efficiency is reduced due to limited access to credit which would have enabled farmers to adopt high yielding varieties and access information useful for the productivity and efficiency.

Table 1. Distribution of Respondents According to Socio-economic Characteristics (N=125)

	Frequency	Percentage (%)	Mean
Age			
20-40	45	36.8	
40-60	68	54.4	44.49
≥61	12	8.8	
Sex			
Male	91	72.8	
Female	34	27.2	
Marital Status			
Single	12	9.6	
Married	85	68.0	
Divorce	15	12.0	
Widow	13	10.4	
Educational Status			
No formal Education	41	32.8	
Primary Education	40	32.8	
Secondary Education	30	24.0	
Tertiary Education	14	11.2	
Household Size			
≤3	35	28.0	
4-6	44	35.2	5.60
7-9	33	26.4	
≥10	13	10.4	
Annual income			
≤50000	28	22.4	
50000-100000	32	25.6	
100000-150000	17	13.6	
≥150000	48	38.6	
Farm size			
≤1.0	24	22.4	
1.0-3.0	32	25.6	
3.1-5-0	19	15.2	
≥5.1	50	40.0	7.06
Source of Land			
Inheritance	75	60.0	
Purchase	16	12.8	
Otherwise	16	12.8	
Renting	18	14.4	
Mode of Farming			
Full Time	94	75.2	
Part Time	31	14.4	
Source of Labour			
Family	49	39.2	

Hired	31	24.8
Both	45	36.0
Extension Visit		
Yes	3	2.4
No	122	97.6
Access to Credit		
Yes	12	9.6
No	133	90.4

Source: Field survey, 2019

Cropping Pattern

The result of the cropping pattern of the respondents is presented in Table 2. The result reveals that 68% of the respondents practice mixed cropping while 32% practice sole cropping. This implies that mixed cropping is the most common cropping pattern in the study area. Mixed cropping encourages crop diversification whereby farmers tend to produce different crops on the same piece of land. Farmers that practiced mixed cropping, have better returns. This study conforms to Fasoranti, (2009) who observed that most farmers devote more hectares of land to crop mixture in order to guard against crop failure.

Major Sole Crops Cultivated

Results in Table 3 showed that 8.8% of the respondents cultivated maize, 6.4% of the respondents cultivated millet, 4.8% of the respondents cultivated beans, 4.0% of the respondents cultivated groundnut, 3.2% of the respondents cultivated benneseed, 2.4% of the respondents cultivated yam while 2.4% of the respondents cultivated melon. This implies that there is favourable environment for food crop production in the study area and also a great demand for food crops such as maize, millet and groundnut in the study area.

Mixed Cropping

Results in Table 3 further showed that 12% cultivated maize and groundnut together, 8.0% cultivated maize and bean, 6.4% cultivated maize and melon while 5.6% cultivated guinea corn and millet and yam/bean/ maize respectively. This implies that maize is more produced in mixed cropping practice in the study with common mixed cropping of cereals and leguminous crops. The result also showed that maize crop performs well when combined with leguminous crops. This study conforms to Oviasogie (2005) who observed that mixed cropping is more productive and efficient than sole cropping for maize farmers.

Table 2: Cropping Pattern of the Study Area (N=125)

Variable	Frequency	Percentage (%)
Sole Cropping	40	32.0
Mixed cropping	85	68.0

Source: Field survey, 2019

Table 3. Major Sole Crops Cultivated and Mixed Crops Cultivated

Variables	Frequency	Percentage (%)
Sole Cropping		
Maize	11	8.8
Groundnut	5	4.0
Millet	8	6.4
Beans	6	4.8
Yam	3	2.4
Benneseed	4	3.2
Melon	3	2.4

Mixed cropping		
Guinea corn / Bean	4	3.2
Guinea corn / Groundnut	4	3.2
Guinea corn / Melon	5	4.0
Guinea corn /Millet	7	5.6
Maize / Millet	6	4.8
Maize / Bean	10	8.0
Maize / Benneseed	5	4.0
Maize / Guinea corn	6	4.8
Maize / Melon	8	6.4
Millet / Groundnut	4	3.2
Yam / Maize	5	4.0
Yam /Bean/Maize	7	5.6
Benneseed /Guinea corn	3	2.4
Maize / Groundnut	11	12.9

Source: Field survey, 2019

Land Management Practices

Use of land could be sustainable only if land management practices used by the farmers could compensate for nutrient loss and environmental stress induced by improper use of land. Farmers are using different soil conservation practices. The result of land management practices is presented in Table 4. The result shows that majority (82.4%) of the respondents practice fertilizer application. Fertilizer substituted for nutrient loss in the land and fertilizer also enhances soil fertility to achieve efficiency in food crop production (Akanbi, 2006). Results further revealed that 48.8% of the respondents practice crop rotation. Crop rotation could be a good land management practices if the choice of crop rotation is properly done for enhancing soil nutrient. The result also shows that 28.8% of the respondents practice cover crop while about 24.8% of the farmers were practicing mulching on their farms. Mulching is the use of crop and plant residues to cover the top soil before or after planting for the protection of the soil from direct sun and raindrops. The use of these practices might make much impact on efficiency of food crop production in the study area where problem of erosion is well pronounced.

Table 4. Land Management Practices

Variables	Frequency	Percentage (%)
Mulching	31	24.8
Crop Rotation	61	48.8
Cover Crop	36	28.8
Fertilizer Application	103	82.4

*Multiple responses

Technical Efficiency

The results on technical efficiency of the respondents is presented in Table 5. The result shows that cost of labour, cost of fertilizer and farm size are the variables that significantly affect productivity of farmers in the study area. Specifically, the coefficient of cost of labour and farm size were positive and significantly at 1% level of probability implying that a unit increase in cost of labour and farm size led to increase in the productivity by 0.48 and 0.32 respectively. Similarly, the coefficient of cost of fertilizer is positive and significant at 5% level of probability implying that a unit increase of the cost of fertilizer led to increase in productivity by 0.02. However, cost of herbicide, cost of pesticide, and cost of seed were not significant implying that they have no effect on their productivity.

The study further reveals that annual income and mulching are negative and significant at 1% and 10% level of probability respectively, implying that an increase in annual income and mulching decrease efficiency. However, age, sex, household size, education, farming experience, cropping pattern, crop rotation and cover cropping have no significant effect on technical efficiency of farmers. Sigma Square is positive and significant implying goodness of fit of the model. Also, gamma is positive and significant implying that 55% of the variation in productivity is due to technical inefficiency.

Table 5. Technical Efficiency

Variables	Coefficient	t-ratio
Constant	7.06	4.97
Cost of Labour	0.48	3.97***
Cost of Fertilizer	0.02	2.28**
Cost of Herbicide	-0.007	0.57
Cost of Pesticide	-0.007	0.51
Cost of Seed	0.03	0.89
Farm Size	0.32	3.40***
Inefficiency model		
Constant	1.39	3.57
Sex	0.05	0.45
Age	0.002	0.24
Household Size	0.01	0.93
Education	-0.001	-0.15
Annual Income	-0.000001	-4.87***
Farming Experience	-0.007	-0.65
Cropping Pattern	0.18	1.19
Mulching	-0.24	-1.99*
Crop Rotation	-0.14	-0.89
Cover Crops	0.06	0.57
Sigma Square	0.20	5.99***
Gamma	0.55	3.60***
Log likelihood	-77.41	

***Significant at 1%, **Significant at 5%, *Significant at 10%

Range of Technical Efficiency

The result of the range of technical efficiency is presented in Table 6. The result shows that 49.6% of the respondents had technical efficiency levels of ≤0.30, 41.6% of the respondents had technical efficiency levels of 0.31-0.60, 6.4% of the respondents had technical efficiency level of 0.61-0.90, and 2.4% 0f the respondents had technical efficiency level of ≥ 0.91. The mean level of technical efficiency for the respondents are less than 1.00, indicating that all the farmers are producing below the maximum technical efficiency frontier.

Table 6. Range of Technical Efficiency

Range of technical efficiency	Frequency	Percentage (%)
≤0.30	62	49.6
0.31-60	52	41.6
0.61-0.90	8	6.4
≥0.91	3	2.4
Minimum efficiency	0.13	
Maximum efficiency	0.97	
Mean	0.3519	

Source: Field survey, 2019

Factors Affecting Agricultural Productivity

The result of the factors affecting the productivity of farmers is presented in Table 7. The result shows that inadequate extension services has a mean of 3.64 which implies that

majority of the farmers had no extension contact which affects the level of adoption of new technologies in farming and input such as (fertilizer, improved seed etc).This conform with Adejoh(2009) who asserted that many farmers reported limited contact with extension workers and consequently receive unimproved production technologies and practice.

Table 7. Factors Affecting Agricultural Productivity of Farmers

Variables	Mean	Standard deviation
Land tenure system	2.8640	1.15942
Unavailability of fund	2.6480	0.96934
Cost of seed	2.0800	0.98045
Weed control problem	2.8560	0.66846
High cost of fertilizer	3.4400	0.66478
Poor storage facility	2.3200	1.00483
Inadequate extension services	3.6400	0.60107
Inadequate labour	2.3360	1.14261
High cost of chemical	3.1600	0.58750
Limited access to credit	2.7200	0.82891
Insect and diseases attack	2.4560	0.86606

Source: Field survey, 2019

The result further reveals that high cost of fertilizer and cost of chemical had mean values of 3.44 and 3.16 respectively which implies that high cost of inputs are some of the major impediments in raising the productivity of smallholder farmers in the study area.
The result also shows that land tenure system had a mean value of 2.86 which is one of the factors affecting the agricultural productivity of farmers in the study area. Weed control problem had a mean value of 2.85, limited access to credit had a mean of 2.72 and unavailability of fund had a mean value of 2.64 respectively which is as a result of high interest rates and lack of collaterals for farmers to acquire loans. Insect and diseases had a mean of 2.45, Inadequate Labour had the mean of 2.33, Poor storage facility had the mean of 2.32 and Cost of seed had the mean of 2.08 respectively. These are indications that these factors strongly affect the agricultural productivity of respondents in the production of food crops in Igalamela/Odolu LGA of Kogi State of Nigeria.

Relationship between Farm Size and Productivity

The result in Table 8 according to Pearson correlation shows a moderately statistical direct relationship of r(0.571) between farm size and productivity significant at 1% level probability which indicate that for every one hectare increase of farm size, there will be an increase in total revenue by 0.571%. Therefore, the null hypothesis which state there is no relationship between farm size and productivity is rejected.

Table 8. Relationship between farm size and productivity

Correlations	Farm size	Total revenue
Pearson Correlation	1	0.571
Significant (2-tailed)		0.000
Total	**125**	**125**

Correlation is significant at 0.01 level (2-tailed)

Conclusion and Recommendations

The study assessed *the land use pattern and productivity among smallholder farmers.* The study revealed that majority of the farmers practiced mixed cropping with intercropping of legumes and cereals prevalent. The study also revealed that farmers in the study area are producing below the maximum technical efficiency frontier. Farmers in the study used various land management practices such as mulching, fertilizer application, cover cropping

and crop rotation. The study observed that smallholder farmers in the study area are confronted by several factors affecting productivity such as inadequate extension visits, inadequate fund, insect, and disease attack and weed control problem which interfere with plant growth and reduce crop productivity. The study further revealed that if the level of variables such as farm size, labour input, chemical and fertilizer, levels of extension are increased, productivity will also increase.

The study therefore recommends that;

- Government should organize extension agents to rural farmers by way of organizing workshop, seminar, and conferences in other to keep the farmers abreast of the innovative farming methods and inputs to use.
- Food crop farmers should be encouraged to have access to financial institutions in obtaining loan at low interest rates.
- Government should subsidize the prices of the farming inputs such as fertilizer, agrochemical to enable the farmers acquire them.

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