ECONOMIC ANALYSIS OF LAND MANAGEMENT PRACTICES AMONG CROP FARMERS IN OSUN STATE, NIGERIA

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ABSTRACT

Increase in soil degradation has negatively impacted on food production. This therefore necessitates sound land management practices. This study analyzed the economics of the land management practices among crop farmers in Osun State, Nigeria. Data were collected with the aid of structured interview schedule from 80 respondents in four Local Government Areas of the state using a three-stage sampling techniques. Budgetary and multiple regression analyses were the analytical tools employed. About 63% of the farmers were male and 78.4% of them were above 38 years. Seventy-two percent of the farmers had secondary sources of income. The average gross margin of the farms was ₦48,456.56k. The total value product increases by a value of ₦4.90K for every ₦1 increase in the total variable cost. The study concludes that land management practices such as fertilizer application, length of fallow on land and length of tillage on land have a positive effect on crop output in the study area. Therefore, extension services should be intensified to disseminate modern ideas and technology in crop farming for greater productivity. Activities that promote soil tillage for crop production should be encouraged as this would increase crop output.

Keywords: Economic analysis, Land management, Fallowing, Crop output

INTRODUCTION

The contribution of agriculture to the Nigerian Gross Domestic Product (GDP) cannot be under-estimated. Of all the four sub-activities that make up the sector (crop production, livestock, forestry, and fishing), crop production remains the major driver of the sector, accounting for 89.84% of nominal agriculture GDP {National Bureau of Statistics (NBS), 2019}. In the third quarter of 2017, the contribution of agriculture to nominal GDP was 24.44% (NBS, 2017), indicating a marginal rise from 23.86 percent in the fourth quarter of 2014 {Central Bank of Nigeria (CBN), 2016}. It is noteworthy that agriculture has not reached its highest potential due to inherent constraints. One of these is the degraded form of soil fertility, resulting in nutrient deficiency, low organic matter, moisture stress, and high erosion.

According to Winslow et al. (2011), sustainable land management practices entail the long-term conservation of the ecological unit and establishment of biome services desired by people. This was defined by the World Overview of Conservation Approaches and Technologies (WOCAT) (2007) as the use of land assets in producing goods and services that satisfy changing human essentials while concurrently ensuring the long-standing availability of land resources with productive potential. Continuous cultivation leads to the reduction of humus in the soil. Human activities have grossly caused soil degradation and productivity of soils has been debar through natural forces, leading to a damaged ecosystem (Ifabiyi, 2004). Effective and economically feasible management practices are, therefore, needed to prevent soil degradation (USDA, 2001). Managing and enhancing the condition of soil environment is a veritable tool to enhance increased agricultural productivity. This determines the worth of bio-network amenities provided to the agricultural lands, preserves biodiversity and sustains the resilience of agricultural activities to climate variability. Land management practices involve ways by which farmers can raise yields and production to the required levels. Much more important is the management of the soils and water resources and improved cropping practices in developing countries. All these help agriculture in keeping pace with the world population and its rising demand for food. This study, therefore, examines the land management practices and their effects on crop production in Osun State, Nigeria.

METHODOLOGY

Study Area

This study was conducted in Osun State, Nigeria. The state is situated in the tropical rain forest zone. It covers an area of approximately 14,875 sq km and lies between latitude 7° 30' N and longitude 4° 30' E. Though a landlocked state, it is blessed with presence of many rivers and streams which serves the water needs of the state. It is bounded by Ogun State to the south, Kwara State to the north, Oyo State to the west and Ekiti and

Ondo State to the east. The state is within the tropical rain forest with abundance of resources. Mineral resources found in the state include gold, kaolin and others which are being extracted for the benefit of the state and the people. The state is widely known for the production of arable and cash crops (Osun state official website, 2020).

Sampling Procedure and Sample Size

A three-stage sampling technique was used in the study to select the respondents for the study. At the first stage, four Local Government Areas were selected. These were Atakumosa East, Atakumosa West, Aiyedaade and Aiyedire. The second stage involved the selection of five villages in each of the LGAs, making a total of 20 villages. The third stage involved the random selection of four respondents from each village. This summed up to 80 respondents.

Method of Data Collection

 Data collection was done using a structured schedule through personal interview.

Data Analysis

The tools used for the data analyses were descriptive statistics, farm budgetary technique and the logit regression analysis. Simple descriptive analysis was used to describe the demographic characteristics of the respondents as well as the level of use of various land management practices by the respondents. Farm budgetary technique was employed to estimate the profitability of farm enterprise by the respondents. Multiple Logit regression analysis was used to examine the effect of land management practices on crop production.

Following the works of Abbott and Makeham (1990) and Erhabor and Olukosi (1987), budgetary analysis was used to estimate the costs and returns of the crop farms in the study are and to determine the profitability of their production enterprise. This involved estimation of the variable costs, fixed costs, total cost, gross margin and net profit. Fixed cost is the total outlay which remains constant irrespective of changes in output level. Fixed cost refers to the cost of physical asset while the variable cost covers the expenses which range directly in size positively with variation in output level and production level. It is the cost incurred on various inputs used for production. Abbott and Makeham (1980) define gross margin as the difference between the total income or revenue and the total variable cost incurred by the farmers. The difference between the total revenue and the total variable cost of production is referred to as gross margin (Erhabor and Olukosi 1987). Net profit margin was defined as the difference between the gross margin and the depreciation.

GM = TR-TVC

TC = TVC + TFC

NM = TR-TC

Where TR is the total revenue; TVC is the total variable cost; TFC is the total fixed cost; TC is the total cost incurred and NM is the net margin.

A multiple regression technique was used to establish the exogenous variables determining the endogenous variable. The relevant relationship was established between the total output of crop (s) and the land management practices.

as: $Q = f(X, R, D)$

Where:

Q= Output (grain equivalent)

X= Vector of physical inputs

D= Vector of land management practices

R = Vector of parameter estimates

Q explicitly implies:

$lnQ = \alpha_1 + \alpha_2 lnx_2 + \alpha_3 lnx_3 + \alpha_4 lnx_4 + \alpha_5 lnx_5 + \alpha_6 lnD_2 + \alpha_7 lnx_1 lnx_2 + \alpha_8 lnx_1 lnx5 + \alpha_9 lnx_1 lnD_1 + U$

Where:

X_1 = Farm size (hectares)

X_2 = Labour (man-day)

X_3 = Herbicides (litres)

X_4 = Cost of planting materials

X_5 = Fertilizer (kg)

D_1 = Practice of tillage (dummy) (by considered those farmers that practiced tillage as 1 and non-practice tillage as 0) tillage mean land cultivation

D_2 = Practice of bush fallowing (dummy)

RESULTS AND DISCUSSION

Socio-economic Characteristics of the Farmers

The result shows that 63.4% of the respondents were male, while 36.6% were females. This implies that farming is a male-dominated activity in the study area. The majority of the farmers were within the age of 31 – 40 years. The major occupation of the majority of the farmers was farming. About 45% of the farmers had more than a farmland. This implies that such farmers could practice bush fallowing. About 87% of the farmers produced food crops. The results further show that only 19.4% of the farmers used tractor. This suggests that the majority of the farmers did not practice mechanized farming. However, the fact that most of the farmers did not use tractor had the tendency of reducing the rate of soil compaction on

their farms, thus enhancing aeration. At least, 50% of the farmers have been in farming for more than 10 years.

Table 1: Socio-economic characteristics of the farmers (n = 80)

Variables	Frequency	Percentage
Sex		
Male	50	63.4
Female	30	36.6
Age (Years)		
< 30	2	2.5
30 - 40	16	58.4
41 - 50	29	16.1
51 - 60	29	17.0
61 – 70	4	5.0
Marital status		
Single	14	17.5
Married	65	81.25
Separated	1	1.25
Household size		
1 - 5	62	77.5
6 – 10	18	22.8
Education		
No formal education	10	12.50
Primary education	26	32.75
Secondary education	29	36.25
Tertiary education	14	17.50
Adult education	1	1.25
Primary occupation		
Farming	59	72.0
Other businesses	21	28.0
*Farm Characteristics		
Have more than a farmland	40	45.2
Farmers producing food crops	61	87.1
Farmers using tractor	10	19.4
Experience (Years)		
< 10	40	50.0
11 - 20	23	28.75
21 - 30	14	17.5
31 – 40	3	3.0

*Multiple responses allowed; Source: Field survey, 2018.

Land Management Practices Employed by the Respondents

Table 2 shows the land management practices carried out by the respondents. The land management practices identified in the study area include tillage, bush fallowing, and fertilizer application. Some farmers used only one management method while others combined them. From the study, few farmers practiced bush fallowing and tillage. The majority (62.5%) of the farmers practiced fertilizer application. Meanwhile, 12.5% combined various land management practices. Tillage may impact crop production for future use of land. As regards the frequency of tillage, the implication is the fast removal of soil top layer nutrients and disturbance of bio-life.

Table 2: Land Management Practices Employed by the Respondents

Land Management Practices	Frequency	Percentage
Fertilizer application	50	62.5
Buh fallow	10	12.5
Tillage	10	12.5
Combine Land Management Practices	10	12.5

Source: Field survey, 2018.

Profitability of Crop Production in the Study Area

Table 3 summarizes the costs and returns to crop production by the respondents. A total variable cost of ₦65440.21 was incurred the farmers per hectare. This cost covered the costs of labour, planting materials, chemicals (fertilizer, pesticides, herbicide and insecticides) and transportation. These costs account for 80.77% of the total cost of production. A total fixed cost of ₦15632.37 was incurred by the farmers per hectare. This accounted for 19.28% of the total cost of production. This cost covered rent and depreciation on the farm equipment owned by the farmers. Such equipment include watering can, sprayer and rake, among others. These give a total cost of ₦81072.58 per hectare. Thus, the farmers had a gross margin and net profit of ₦48456.56/ha and ₦43456.56/ha respectively. This results show that crop production is a profitable venture in the study area.

Table 3: Analysis of costs and returns to crop farming

Variables	₦/ha
Variable Cost	65440.21
Fixed Cost	15632.37
Total Cost	81072.58
Total Revenue	124529.14
Gross Margin	48456.56
Net profit	43456.56

Source: Field survey, 2018.

Factors Influencing Crop Output in the Study Area

The result of the regression analysis on the factors influencing crop output in the study area is shown in Table 4. The result shows that the coefficient of multiple determinations (R^2) was 71.4%. This implies that 71.4% of the total variation in the farmers' crop output is explained by variation in the independent variables included in the model. These independent variables are: X_1 (cost of land), X_2 (cost of labour), X_3 (capital/fixed cost), X_4 (cost of materials/inputs}, X_5 (length of fallow), D_1 {length of tillage} and D_2 (fertilizer application}.

Table 4: Determinants of crop output in the study area

	Coefficient	Standard error	t-Value
Constant	37406.665	118118.18	0.317
X_1X_5 (land, length of fallow)	40.059	50.392	0.795
X_1X_2 (land, labour)	9.986**	30.499	3.327
X_1D_1 (land, length of tillage)	11.167**	15.281	1.931
X_3 (Capital)	0.994	1.324	0.750
X_4 (cost of planting materials)	4.934**	5.119	3.964
X_2 (labour)	-24.206	25.874	-0.936
D_2 (fertilizer)	-4336.073**	49176.971	-4.088
X_5 (length of fallow)	-37587.138	48991.518	-0.767

Source: Field Data, 2018.

Adjusted R^2 = 0.714; F-value = 0.313
Note: 5% level of significance (<0.05) =   (**)

$$\text{Log } Q = \log(37406.665) + (-24.206) \log x_2 + (0.994) \log x_3$$
$$ 0.317 -0.936 0.750$$
$$+ (4.934) \log x_4 + (-37587.139) \log x_5 + (-4336.073) D_2$$
$$ 3.964* -0.767 -4.088*$$
$$+ (9.986) \log x_1 x_2 + (40.059) \log x_1 x_5 + (11.167) \log x, D, +U$$
$$ 3.327* 0.795 1.931**$$

Table 4 indicates that fertilizer application (D_2) has an inverse relationship with the output. This implies that the marginal physical productivity MPP has fallen. Also, X_3 is positive, and this implies that there is a positive relationship between fixed capital and output Q. This could be because the MPP increases when fixed capital increases and therefore an increase in output Q. Cost of inputs (X_4) had a positive value, and their increase brought about an increase in total output in the study area. This suggests that rather than for farmers to increase spending on fertilizers, more should be spent on other chemicals to stop the

invasion of pest and disease. The total value product increases by a value of ₦4.90k for every ₦ 1 increase in the total variable cost (X_4).

Therefore, this has a direct relationship with output Q. This implies that more land demands more labour for an average of ₦9.90k worth increase in output for every naira expended. So also the estimated coefficients of the length of fallow on land (X_1X_5), shows that for every year the land is left to fallow, there is an increase of ₦40.01k on the total output produced compared to that of untilled land. The effect of length of tillage on land is significant at the 10% probability level.

CONCLUSION AND RECOMMENDATIONS

This study was carried out to analyze land management practices in crop production in Osun State, Nigeria. This is needed to improve food security and make Nigeria a net exporter of food. The study concluded on the premise that land management practices such as fertilizer application, length of fallow on land and length of tillage on land exhibit positive effect on crop output. Therefore, extension services should be intensified to disseminate information on modern land management practices in crop farming for greater productivity among farmers. In the same vein, activities that promote soil tillage for crop production in the area should be encouraged as this would increase crop output.

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