RESOURCE-USE EFFICIENCY OF SMALL SCALE MAIZE FARMERS IN LAVUN LOCAL GOVERNMENT, NIGER STATE, NIGERIA.

BY

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ABSTRACT

The study examined resource-use efficiencies of maize production in Lavun Local Government Area of Niger State, Nigeria. Maize is the most important staple food of great socio-economic importance in Nigeria, however price fluctuation, disease and pest, poor storage facilities and efficiency of resource utilization have been identified as reasons for low maize production in Nigeria. An improvement in the understanding of the levels of resource-use efficiency and its relationship with a host of farm level factors can greatly aid policy makers in creating efficiency, enhancing policies as well as in judging the efficiency of present and past reforms. The primary data used for the study were obtained using structured questionnaires administered to 100 randomly selected farmers. Descriptive statistics, gross margin and production functions analysis and resource-use efficiencies were used for the analysis of data. The result showed that maize production is profitable in the area. Farm size and seed input were significant factors influencing output level of maize in the area. Estimated efficiency-ratio (r) shows that the resources used were not efficiently utilized. The study recommended that farm inputs especially improved seeds and agrochemicals for the controlling of pest and disease should be supplied to farmers at the right time and at cost that is within their reach. Also good roads must be constructed to aid the easy movement of their farm products to the point of consumption
Keywords: Resource-use efficiencies, maize production small scale.

INTRODUCTION

Maize (*Zea mays*) is an important cereal crop grown for human and animal consumption in Nigeria. Studies in maize production in different parts of Nigeria have shown an increasing importance amidst growing utilization by food processing industries and livestock feed mills. (Ogunsumi *et al*, 2005). Among the grains that are grown in Nigeria, maize has taken the greater proportion of them because of its ability to thrive under different ecological condition (Alabi and Esobhawan, 2006). Maize is the most important staple food of great socio-economic importance in Nigeria and it accounted for 43% of calorie intake (Nweke, 2006).

Ojo (2000), reported that price fluctuation, disease and pest, poor storage facilities and efficiency of resource utilization are the identified reasons for low maize production in Nigeria. The constraint to the rapid growth of good production seems to be mainly that of low crop yields and resource productivity. In view of this, resource-use efficiency of small farm holder farms has important implications for development strategies adopted in most developing countries where the primary sector is dominant. An improvement in the understanding of the levels of resource-use efficiency and its relationship with a host of farm level factors can greatly aid policy makers in creating efficiency, enhancing policies as well as in judging the efficiency of present and past reforms Resource allocation and productivity is an important condition for increased food production which is also associated with the management of the farmer s who employ these resources is a major factor for achieving profitability in any enterprise. This study attempts to examine the resource-use efficiency among small scale farmers in Niger State, Nigeria. The specific objectives are to; (i) identify the socio-economic characteristics of the sampled farmers in the study area; (ii) evaluate the gross margin for the sampled farmers growing maize in the study area; (iii) determine the resource-use of maize production in the study area and (iv) describe the problems encountered by farmers in the study area.

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METHODOLOGY

<u>Study Area:</u>
The study was conducted in Lavun Local Government Area of Niger State. The State is located within latitudes 8°-10°North and longitudes3°-8° East of the prime meridian. Lavun Local Government is located in the Southern Guinea savannah region of Nigeria with land area of 4,707.50 square kilometers (NSADP, 1994). It is also having population of 209,917 people (Wikipedia, 2008).

The data mainly from primary source were collected from Lavun Local Government which was purposively selected because of prevalence of the crop in the area. The data were generated through the use of structured questionnaires designed in line with objectives of the study. The questionnaire was designed to collect input-output data of the farmers. The output data include yield of maize in kg. Data were also collected on the socio-economic variables such as age, level of education household size sex and marital status, A total of hundred (100) farmers were systematic randomly sampled to give each farmer an equal chance of being selected and interviewed .

Analytical Technique
<u>Descriptive Statistics:</u>
This includes the use of mean, standard deviation, frequency distribution etc. to group and summarize the data obtained from the field.
<u>Production Function Analysis</u>:
Regression model was used to examine input-output relationship and the implicit form of the model is given by:

$$Y = f(X_1, X_2, X_3, X_4, U_i) \qquad (1)$$

Where Y = Output of Maize (kg)
X_1 = Farm Size (ha)
X_2 = Quantity of seeds (kg)
X_3 = Quantity of Fertilizer (kg)
X_4 = Labour Input (Man hour)
U_i = Error term

The explicit form of these functions takes the following forms:

$$Y = a + b_1 \log X_1 + b_2 \log X_2 + b_3 \log X_3 + b_4 \log X_4 + U_i \ (Semi \ \log) \qquad (2)$$

$$\log Y = a + b_1 \log X_1 + b_2 \log X_2 + b_3 \log X_3 + b_4 \log X_4 + U_i (Double \ \ \log) \qquad (3)$$

$$Y = a + b_1 X_1 + b_2 X_2 + b_3 X_3 + b_4 X_4 + U_i (Linear) \qquad (4)$$

<u>Gross Margin:</u>
This is the difference between the gross farm income (GFI) and the total variable Cost (TVC). It is a useful planning tool in situations where fixed capital is negligible portion of the farming enterprises in the case of small scale subsistence agriculture (Olukosi and Erhabor, 1988)

$$GM = GFI - TVC \qquad (5)$$

Where GM = Gross Margin, GFI = Gross Farm Income and TVC = Total Variable Cost.
<u>Efficiency of resource use</u>
Efficiency of resource use was determined by the ratio of marginal value product (MVP) to marginal factor cost (MFC) of inputs based on the estimated regression coefficients. Following Rahman and Lawal (2003) and Iheanacho et-al (2003) efficiency of resource (r) is given as:

$$r = \frac{MVP}{MFC} \qquad (6)$$

The rule provides that when r = 1, there is efficient use of resource; r > 1 and r < 1 indicate underutilization and over-utilization of a resource respectively. The values of MVP and MFC were estimated as follows:

$$MVP = MPP \cdot Py$$

$$MFC = Px_i$$

Where MVP = Marginal Value Product of a variable Input;

  MPP = Marginal Physical Product;

  Py   = Unit Price of Output;

  Px_i = Unit Price of Input Xi

  R = Efficiency ratio.

Economies of Scale: This is may be defined in terms of elasticity of input with respect to output. However, in a multi-product setting, economies of scale (Es) is defined as those reduction in average input when all outputs are increased proportionally holding all other inputs constant. The elasticity of production (Ep) and return to scale (RTS) was estimated using the formula $\sum_i^n Epx_i = RTS$.

RESULTS AND DISCUSSION

Socioeconomic Characteristics of Sampled Farmers:

Some socioeconomic characteristics are known to influence maize production in the area. The variables analyzed in this study include gender, marital status, age, household size, and level of education

Table1: Socioeconomic Characteristics of sampled farmers

Variables	Frequency	Percentage
Sex		
Male	89	89
Female	11	11
Marital Status		
Single	16	16
Married	84	84
Age (years)		
21-30	22	22
31-40	30	30
41-50	33	33
51-60	12	12
61-70	2	2
Education		
No Formal Education	58	58
Primary	23	23
Secondary	13	13
Tertiary	8	8
Household Size		
1-10	39	39
11-20	53	53
21-30	8	8

Source: Field Survey, 2006

Table1 shows that 85% of the sampled farmers were between the ages 30 and 50 years. Thus, majority of the sampled farmers were middle- age which implies that they were still in their economically active age which could result in a positive effect on production . The distribution by gender (sex) showed that majority of the respondents (89%) were males.

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This is a manifestation of gross inequality in gender distribution and calls for concerted effort in empowering the women to contribute their own quota to production in the study area. The study also showed that 89% of the sampled farmers were married. The modal class of household size is 11-20 (53%) followed by 20-30 (23%). These relatively large household sizes are expected as most rural farmers make use of family labour on the farm. The modal class of educational level of respondents is informal education (56%) followed by primary education (23%). This educationally disadvantaged states of Nigeria. Only 8% had tertiary education.

Production Function Analysis:

The production function that was used to determine the nature of inputs-output relationship in maize production is shown in Table2 (Double log production function as the lead equation). The value of coefficient of determinations (R^2) indicated that about 51% of the variation in output of maize production is explained by the inputs included in the regression model (Table2). The regression coefficients of farm size ($X1$), quantity of seeds ($X2$) and quantity of fertilizer($X3$) are positive indicating that an increase in these inputs, holding others constant, will lead to an increase in the gross output. Conversely, the regression coefficient of labour is negative indicating that an increase in this input, holding others constant, will lead to a decrease in the gross output. The F-ratio is 24.81 and significant at ($P<0.01$) percent, implying that the variables significantly explained variations in the gross output.

Farm size (X_1), quantity of seeds (X_2) and constant value were significant at 1% level of probability.

Table2: Estimated double-log production function (lead equation).

Variables	Regression Coefficient	t-value
Farm Size (X_1)	0.517	5.301***
Quantity of Seed (X_2)	0.239	2.372***
Quantity of fertilizer (X_3)	0.124	1.075[N.S]
Labour (X_4)	-0.019	-0.232[N.S]
Constant	5.743	9.593***
$R^2 = 0.511$	F.ratio = 24.812***	

Source: Field Survey, 2006
*** Significant at 1% level of probability
N.S: Not Significant

Resource-use Efficiencies: Estimated efficiency ratio (r) shows that all the significant inputs in the model were under-utilized (Table 3). This implies that the resources are not efficiently utilized.

Table3: Estimated Efficiency Ratio (r)

Variables	MPP	MVP	MFC	Efficiency Ratio
Farm Size (X_1)	27155.49	1493551.95	7200	207.44
Labour (X_4)	36.72	2019.60	88	22.95

Source: Field Survey, 2006

Table 4: Estimated Elasticity of Factor Inputs and Return to Scale

Variables	Coefficients of Elasticity of Production
Farm Size (X_1)	0.517
Quantity of Seed (X_2)	0.239
Quantity of fertilizer (X_3)	0.124
Labour (X_4)	-0.019
Returns to Scale	0.861

Source: Field Survey, 2006

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Elasticity of Production and Returns to Scale: The elasticity of production inputs, which is also explained in terms of return to scale, is presented in Table 4. The elasticity of production was less than 1 for all the inputs used. Analysis of the data gives an estimated return to scale of 0.861 which implies that the production is characterized by a decreasing return to scale.

Gross Margin Analysis: The various costs incurred on different types of resources used and the revenue obtained from sales were estimated based on the prevailing market price as at the period of the survey. Because the sampled farmers were small-scale, their fixed cost was negligible so only the variable costs were considered. The gross income estimated gives an average of N52, 660.15 per hectare. Thus, the Gross margin was estimated at N42, 739.20

Table 5: Gross Margin Analysis of Sampled Farmers

Variables	Mean Cost (N)/year	Mean Cost (N)/hectare
Transportation/Handling cost	128,030.00	658.25
Seed cost	208,750.00	1,073.27
Fertilizer cost	535,575.00	2,753.60
Agrochemical cost	308,000.00	1,583.55
Hired Labour cost	455,900.00	23,439.59
Gift	293,370.00	1,508.33
Total Variable Cost (TVC)	**1,929,625.00**	**9,920.95**
Gross Income (GI)	**10,242,400.00**	**52,660.15**
Gross Margin	**8,312,775.00**	**42,739.20**

Source: Field Survey, 2006

Table 6: Production Problems Encountered by Sampled Farmers

Problems Encountered	Frequency	Percentage
Lack of capital	39	37.14
Problems of pest and disease	6	5.71
Lack of farm inputs	30	28.57
Problem of land acquisition	4	3.81
Problem of transportation	26	24.76

Source: Field Survey, 2006

The production problems faced by the farmers are shown in Table 6. This shows that lack of capital, lack of inputs and problem of transportation (which are 37.14%, 28.57% and 24% respectively) are prevalent in the study area.

CONCLUSION AND RECOMMENDATIONS

Resource-use efficiency of maize production among the small scale farmers in Lavun Local Government, Niger State, Nigeria was examined in this study. Production resources such as land size and quantity of seeds used affected output significantly but were under-utilized. Adjustments in resource use are required in order to improve farm profit at present level of technology employed by maize farmers. The study also showed that maize production is profitable with a gross margin of N8, 312,775.00.

Based on these findings, it is recommended that farm inputs especially improved seeds and agrochemicals for the controlling of pest and disease should be supplied to farmers at the right time and at cost that is within their reach. Also good roads must be constructed to aid the easy movement of their farm products to the point of consumption. Finally, extension services should be provided to enable maize farmers improve their level of resource-use efficiency.

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