Resource Use Efficiency in Cassava Production in Ogo-Oluwa Local Government Area of Oyo State, Nigeria.

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ABSTRACT

This study analyzed the resource use efficiency of cassava production in Ogo-Oluwa local government area of Oyo state, Nigeria. Primary data were collected from a total of 80 cassava farmers using multistage sampling procedure. Data were collected on input-output activities for 2003 cassava farming season. The data were analyses using regression analysis. The study revealed that, land and hired labour were the significant factors influencing the output of cassava. Out of all the inputs of production only land was over utilized

Key words: Cassava production, resource use, efficiency

INTRODUCTION

Cassava (*Manihot sp*) is very important. It provides the staple food stuff for many people in the tropical and subtropical countries. Cassava is cultivated in many parts of Nigeria and ranks first among root crops produced in the country. Cassava was brought from Brazil and was first introduced to West Africa and the Congo basin. It was later introduced to East (Carter, 1995). Cassava is today grown to some extent in all the countries. It is the most widely distributed an10ng tropical tuber crops. Cassava is one of most popular Nigerian staple food crops. Beside the local use as food, it also serves as an industrial use and assumes world importance in international trade. Cassava serves as source of employment for farmers and those that goes into processing, also serves as source of income to poor farmers as well as prosperous ones. Both rich and poor farmers often sell a higher proportion of cassava than other crops and derive more income from cassava (Berry, 1993).

The measurement of efficiency has remained an area of important research both in the developed and developing countries, especially in developing agricultural economics, where resources are meager and opportunities for developing and adopting better technologies are dwindling (Ali and Chaudry, 1990). Measurement of efficiency is very important because it helps to determine productivity growth by improving the neglected resources. (Taddese and Kristinarmoorthy, 1997). Efficiency can be considered in terms of the optimal combination of inputs to achieve a given level of output (an input-orientation), or the optimal output that could be produced given a set of inputs (an output orientation)(Farrell ,1957). Amaza and Olayemi (2001) reported that 5% increase in cultivated land area, Ceteris paribus, would lead to an increase in 1.53% in the farm gross margin and vice versa, suggested that land is a major factor that is associated with change in output.

A lot of factors have been identified to explain the causes of food insecurity in the country. Factors such as stagnant technology in peasant agriculture, the effect of storage, processing and marketing facilities on the production of cassava causes glut in the market which invariably reduces and affect all year round supply of cassava in the market. These have greater impact on the farmers' income. The unstable price over the year is another problem causing loss to the farmer. Inadequate credit and capital which have a positive function with the scale of production force farmers to offer their produce at a give away prices whether at profit or at loss.

Land ownership and size of holdings known as tenure system is such as to encourage scattered and small holdings. Yet land is a basic of production. This fragmentation often resulted into low output. Cassava production is subject to uncontrollable and unpredictable factors such as weather and diseases, which affect the yield of cassava which invariably affect the income to

farmers. The bulkiness of cassava, high level of perishability makes application of uniform standard for efficient marketing difficult (David 1995).

The choice of cassava was informed based on the fact that, it is one of the very few crops that hold the key to ending hunger in Africa. Cassava has been recognized as Africa's food security crop because of its adaptability to marginal soils and erratic rainfall conditions. In this regards, this paper estimate the resource use efficiency in cassava production in Ogo-Oluwa local government area of Oyo State, Nigeria.

METHODOLOGY

Study Area and Method of Data Collection:

The study was carried out *in* Ogo-Oluwa local government area of Oyo State, Nigeria. Ogo-Oluwa local government area is approximately on 4°15' East longitude and 8°07' North latitude. Four villages covered in the local government area were Ajaawa, Idewure, Lagbedu and Otamokun. The respondents were cassava farmers *in* Ogo-Oluwa local government area of Oyo State. Primary data were collected through administration of structured interview schedule. Multistage sampling technique was employed in data collection. In this regard, local government area was stratified into four zones of North, West, East and South. The number of villages in the four zones ranges from 3 to 4. From each of these zones, one village was selected from which 20 farmers were randomly selected with the aid of Oyo State Agricultural Development programme (OYSADEP) farm household listing. The number of households, in each village was secured in the four villages. In each household cassava farmers were selected for interview. In all, 80 cassava farmers were interviewed.

Method of Analysis

The data collected for this study were analyzed using multiple regression analysis. The analytical framework is briefly discussed below.

The implicit function for the regression analysis is presented in equation (i)

$Y = f(x_1, x_2, x_3, x_4, x_5 e)$ ……. (i)

Y = Output (kg),
x_l= Land (ha),
X_2= Hired labour (mandays),
X_3= Input cost (N),
x_4= Family labour (mandays),
x_5 = Fertilizer (kg),
e = error term.

Functional Specification

The relationships between the endogenous and each of the exogenous variables were examined using four functional forms: Linear, Semi-log, Exponential and Double-log.

The models were expressed as follows:

Linear

$Y = b_0 + b_l x_l + b_2 x_2 + b_3 x_3 + b_4 x_4 + b_5 + e$ ..... (ii)

Semi log

$Y = b_0 + b_l \log x_1 + b_2 \log x_2 + b_3 \log x_3 + b_4 1 \log x_4 + b_5 \log x_5 + \log e$ ....(iii)

Exponential

$\text{Log } Y = b_0 + b_l x_l + b_2 x_2 + b_3 x_3 + b_4 x_4 + b_5 x_5 + e$ ……. (iv)

Double log

$\text{Log } Y = b_o + b_1 \log x_l + b_2 \log x_2 + b_3 \log x_3 + b_4 \log x_4 + b_5 \log x_5 + \log e$ …….(v)

The lead equation called the best linear unbiased estimate (BLUE) functional form was then chosen based on statistical significance, the economic theory that support production concept and the a priori expectation of the variables.

A priori Expectation

All the variables arc expected to positively influence output from cassava production except cost of input (x_3) which should be negative. Though, double logarithmic functional form was finally chosen on the basis of the a priori expectation viz signs and magnitude of the independent variables, economic considerations, the coefficient of determination and the magnitude of the error term as well as statistical significance of the coefficient of independent variables (Olayemi and Olayide 1981).

The final equation is therefore presented in equation (vi).

$\text{Log } Y = b_o + b_l \log x_l + b_2 \log x_2 + b_3 \log x_3 + b_4 \log x_4 + b_5 \log x_5 + \log e$……..(vi)

The efficiency of resource use was obtained from the estimated equation by comparing the marginal value product (MVP) of a particular input with the marginal factor cost (MFC) of that input. The MVP of an input was obtained through:

$$MVPX = \frac{biY}{X_1}$$

Where, Y is computed from the regression equation when all factors are fixed at their geometric mean.
bi represent the coefficient of X_1
X_I indicates input at geometric mean levels.
$MVPX_1$ indicates marginal value productivities of the inputs. (Amao et al., 2002).

The MFC for an input is defined as:
$MFCX_i = MPPX_i$ rxi.

Where;
rxi is the unit price of input X_i

The regression coefficients which are equal to the elasticity coefficients in Cobb-Douglas Production function have implications on food security status. When $b_1 + b_2 + \ldots + b_5$ equal one, there is constant returns to scales, above one indicate increasing returns to scale and less than one indicate decreasing returns to scale. Constant, increasing and decreasing returns to scale exist if as all inputs are raised by 100 percent. Output is increased by exactly 100, above 100 and below 100 percent respectively.

As regards the resource use efficiency, whenever,
MVPXi > MFCXi, there is under utilization of resource Xi
MVPXi < MFCXi there is over utilization of resource Xi and,
MVPXi = MFCXi, there is optimum/efficient utilization of resource Xi (Omonona, 2003).

RESULTS AND DISCUSSION

This section presents the results and discussion of the study. The study examines the resource use efficiency of cassava farmers in the study area. Olayemi and Olayide (1981) indicated that choice of appropriate functional forms may be based on apriori expectation which is in turn guided by economic theory. In this regard polynomials and double logarithmic functions are most common for production studies.

Based on the statistical significance of the coefficients and economic production function concept, the double logarithmic function was chosen as the lead equation. The result is presented in table 1.
The regression equation is:

$$\text{Log } Y = 9.14 + 0.6410gx_1 + 3.1210gx_2 - 1.291ogx_3 + 1.1210gx_4 + 6.15\ \log x_5$$
(16.62) (50.00) (180) (11.73) (10.40) (9.92) (Table 1)
Figures in parentheses represent the standard error.

The coefficient of multiple determination (R^2) was found to be 92%. This implies that 92% of the total variation in the value of total output of cassava produced is explained by the explanatory variable: land (ha), hired labour (mandays), input cost (N), family labour (mandays) and fertilizer (kg). The remaining 8% not explained is attributed to other variables not included in the model.

From the regression result in table 1, all regression coefficients are positively signed except input cost (x_3) which is in conformity with, apriori expectation. The regression coefficient with respect to land and hired labour (X_I and X_2) were statistically significant at 1% level. This implies that, the amount invested on land and hired labour had a significant influence on the output of cassava produced.

From positive signed coefficient, it implies that the variables had direct relationship with total output while the negative signed coefficient had an indirect relationship with output. An increase in the level of (x_1) land, (x_2) hired labour (x_4) family labour (x_5) fertilizer will lead to an increase in the output of cassava produced while an increase in (x) cost of input will lead to decrease in the output of cassava produced in the study area. The production elasticities generally represent the percentage increase in the output of cassava (Y), for each 1 percentage increase in the input of respective resources (Ogunfowora et al 1974). However, the most critical variables are the amount on land and hired labour. It was revealed that a one percent change in land and hired labour and by implication by number of land and hired labour used for production will lead to ₦ 0.64 and ₦312 percent change in income from cassava output respectively. In essence, output generated from cassava production is inelastic in response to the amount spent on land but elastic with respect to hired labour.

Given the levels of technology and prices of both input and output the marginal value

productivity is the yardstick for judging the efficiency of resource use (table 2). A given resources is optimally allocated when there is no divergence between its MVP and its acquisition price, hence, the marginal value productivities of individual resources provide a frame work for policy decision on resource adjustment and the deferential between the MVP and acquisition cost indicate the cost indicate the scope of resource adjustment necessary to attain economic optimum. As shown in table 2 with the input and output at their geometric mean. From table 3, it is observed that land (the only natural resource of all the resources) used in cassava' production was over-utilized, as the MFC was greater than the MVP. This means that for every naira of extra cost of land incurred, about 32 kobo is realized as an addition to the returns. Hence, there is the need to look for ways of reducing the land area cultivated so as to be able to reach a point of exacts utilization when MVP = MFC. As the area cultivated is reduced, it should be replaced with modern agricultural practices involving the use of improved techniques of production that will lead to an increase in yield of cassava. Land in the study area is over utilized because of the effect of deforestation being experienced in the area. This makes people, especially, the farmer to resort to continuous production of cassava on marginal lands thereby causing lost of nutrients and soil degradation. This result is in line with the findings of Omonona (2003).

The marginal value productivity (MVP) of hired labour was N450.00 und was found to be positive while its acquisition cost was ₦ *200.00* from this, it could be seen that MVP was higher than the acquisition cost of hired labour. This implies that the labour is adding to amount derivable than the total cost by ₦2.25.

Marginal value productivity (MVP) of input cost was ₦3000 and was found to be negative while its acquisition cost also found to be ₦1800 (table 2). From the table it could be seen that MVP is higher than the acquisition cost of input cost. The implication of this is that the producers are under utilizing cost of inputs and an increase in the level of input cost used by the farmers will contribute more to the output than to the total cost by ₦1.67.

The marginal value productivity of family labour was ₦650.25 while its acquisition cost was ₦289.00. The MVP of family labour is higher than its acquisition cost. The implication of this is that, the producers are under-utilizing family labour and an increase the amount of family labour used will contribute more to the output than to the total cost by ₦2.25.

Marginal value productivity (MVP) of fertilizer was ₦ 3000 and was also found to be positive while its acquisition cost also found to be ₦ 500 (table 2), from the table it could be seen that MVP is higher than the acquisition cost of fertilizer. The implication of this is that the producers are under utilizing the fertilizer available to them and that an increase in the level of fertilizer used by the farmer will contribute more to the output than to the total cost by ₦ 2.00. This findings is in line with the findings of Amao et a1., (2002).

CONCLUSION AND RECOMMENDATION

The recent emphasis on the awareness programme on food security in Nigeria made the study of the efficiency of resource use to be very necessary. The study utilized a random sample of 80 cassava fanners in Ogo-Oluwa local government area of Oyo State.

The study indicate that, cassava farmers were resource use inefficient as there were greater divergence between the marginal value productivities (MVP) and the marginal factor cost (MFC) of the resources employed in the production of cassava in the study area. In addition, all the production inputs except land are under utilized, meaning that opportunities still exist to increase output by increasing the level of those inputs.

Based on the findings of the study, it is recommended that, the extension agents of the Oyo State Agricultural Development Programmc (OYSADEP) should organize a training workshop for farmers on the need to avoid the use of marginal land and use more of other inputs in the production of cassava in the study area.

Secondly, agricultural extension officers and agents in the study area should develop cassava production packages for small scale farmers to boost food production and encourage other people who are not farmers to engage in cassava production for their domestic consumption.

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TABLE 1
Regression Result of Cobb-Douglas Production Function for Cassava Farmers in Ogo-Oluwa Local Government Area of Oyo State.

Variables	Co-efficient	t-ratios
Intercept	9.14	0.55
Land (X_1)	0.64	0.01*
Hired labour (X_2)	3.12	0.02*
Input cost (X_3)	-1.29	0.11
Family labour (X_4)	1.12	0.11
Fertilizer (X_5)	6.15	0.62

* t- Value significant at 1%
$R^2 = 0.92$

TABLE 2
Marginal value product and Marginal factor cost (in Naira) Production inputs in cassava production in Ogo-Oluwa Local Government Area of Oyo State.

Input	Geometric mean (X_1)	Log of geometric mean	Regression coefficient	MVP X_1(₦)	MFC X_1(₦)	MVP/MFC
X_1	2.48	0.40	0.64	160.00	500	0.32
X_2	6.21	0.79	3.12	450.00	200	2.25
X_3	6.85	0.84	-1.29	3000.00	289	1.67
X_4	1.88	0.27	1.12	650.25	289	2.25
X_5	1332.4	3.13	6.15	3000.00	1500	2.25