Efficiency of Resource Use in Small Scale Swamp Rice Production in Obubra Local Government Area of Cross River State, Nigeria

M.O. Oniah, O.O. Kuye and I.C. Idiong

Abstract: In this study, the allocative efficiency of resources used in small-scale swamp rice production was carried out in Obubra Local Government Area of Cross River State, Nigeria. Two hundred (200) small-scale swamp rice farmers were selected and used for the study. Questionnaires, personal interviews and field observations, were used to gather information from the farmers on their inputs and output of paddy rice. A rice production function fitted into three functional forms (exponential, double log and semi-log) was estimated using the Ordinary Least Squares (OLS) approach. Findings showed that the farmers were allocatively inefficient in their resource use and more so these resources were under-utilized. This suggests that for the farmers to increase paddy rice output in the area, they should employ more of the productive resources.

Key words: Allocative efficiency - Marginal value product and Resource use

INTRODUCTION

Rice is the staple food for about 2.6 billion people in the world. Global output shows that, the Asian continent accounts for about 92%, while America and the Caribbean account for 5 and 3 % for Africa [1].

In Africa, FAO [2] reported that apart from Egypt and Morocco, which have attained self-sufficiency in local rice production, all other countries in the Sub-Saharan Africa have rice demand exceeding local production. Spore [1] reported in 2002, four of the six largest rice importers in the world were in Africa viz: Cote d’ivoire, Nigeria, Senegal and South Africa.

The World Bank [3] projected that from 2010, the poorest income class of urban households in Nigeria may obtain not less than 33% of their cereal-based calories from rice annually. This is due to the changing consumer preferences and rapidly increasing population. FAO [2] reported that as more family income rises in Nigeria there have been a shift in the consumption pattern from roots and tuber crops in favour of rice. This is one of the probable reasons why, rice that was once reserved for ceremonial occasions, has grown in importance as a daily food intake in most homes today. If Nigeria is to become self-sufficient in rice production, productivity must increase. This implies that resources allocated to rice production, must be efficiently utilized.

Khurso [4] noted that resource use efficiency emphasis is on marginal productivity because it is the most economical and optimal way to maximize the net output in farming; and a resource is said to be efficiently used if its marginal product is equal to the cost of production.

Olukosi and Ogungbile [5] noted that the marginal value product (MVP) is used as a yardstick for judging the marginal factor cost. Apparently, the marginal value product (MVP) is the expected return from addition of one extra unit of input concerned as other inputs are held constant and when this is compared with the input price it will determine whether to increase the level of resource use or not. If the marginal value product (MVP) is greater than the unit input price, it implies under-utilization of the resource and this indicates the scope for raising output efficiently by increasing the use of that particular resource. On the other hand, if the marginal value product...
(MVP) is less than the input price, it implies that the input concerned has been over-utilized and as such the output level cannot be increased by raising more of the resource.

Literature indicates that the output of rice is dependent on production variables such as land, labour, seed, fertilizer, capital and management [6-9]. Oggunfowora et al. [10] used production function approach to determine farm resources in food production in Kwara State and found that the farm resources were not efficiently utilized. Eremie and Akinwumi [6] used production function approach to examine labour productivity on irrigated rice scheme in the three geographical zones of Nigeria and found that there was low rice yield, high labour cost and inefficient utilization of resources.

Nwagbo and Onwuchekwa [11] also employed the production function approach to study the efficiency of productive resources in swamp rice cultivation in the Abakiliki area of former Anambra (now Ebonyi) State and found that farmers inefficient in utilising labour, fertilizer and seed. Onyenweaku et al. [8] used production function approach to determine resource use efficiency in three production systems of rice cultivation (irrigated, swamp and upland) in south Eastern Nigeria and found that the farmers were technically efficient in the three production systems but were allocatively inefficient in the swamp and upland production systems.

Ogar et al. [9] also adopted production function approach to study allocative efficiency of labour for swamp rice production in Obudu local Government Area of Cross River State and found that farmers were inefficient in the allocation of labour for land clearing but were efficient in allocating labour for weeding

Though most of these studies are conducted in Nigeria, there is every indication that a research to determine the allocative efficiency of resources use in swamp rice production in Obubra Local Government Area of Cross River State is necessary as this area is known to cultivate rice on a large scale in the State.

METHODOLOGY

Study Area: The study area is Obubra Local Government Area of Cross River State. It is located in the Central Senatorial District of the State. Ecologically, it falls within the tropical rainforest zone and it is suitable for the cultivation of many types of crops such as yams, cassava, rice, maize, plantain, banana, fruits, vegetables and tree crops. Both lowland and upland rice are cultivated, however, majority of the farmers cultivate rice under lowland ecology because of the available inland valleys in the area.

Method of Data Collection: A total of 200 swamp rice farmers were sampled for the study. Data were collected through structured questionnaires, personal interviews and direct field observations. The data collected include, farm size, labour, seeds, fertilizer and output of paddy rice.

Inputs and output prices were also taken based on the prevailing market prices in the study area during the 2004 production season. These were taken as follows:

- Land rent at N2,000.00 per hectare
- Labour wage rate at N250.00 per man-day
- Cost of seeds at N30.00 per kg
- Cost of fertilizer at N40.00 per kg
- Output price at N20.00 per kg of rice paddy.

Model Specification: The explicit form of the production function is as specified;

\[ Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + U \]  

\( Y \) = Output of paddy rice in kg
\( X_1 \) = Farm size in hectares
\( X_2 \) = Labour in man days
\( X_3 \) = Seeds in kg
\( X_4 \) = Fertilizer in kg
\( X_5 \) = Capital in N
\( \beta \) = Coefficients to be estimated and U is the error term.

This production function was fitted to three functional forms (exponential, double and semi-logarithmic) and estimated using the Ordinary Least Squares (OLS) technique. The lead equation was chosen on the basis of the values of the coefficient of multiple determination \( R^2 \) as well as the signs and significance of the regression parameters. The estimates of the production function were then used to estimate the allocative efficiency of resources of the swamp rice producers in the study area.

RESULTS AND DISCUSSION

Table 1 shows the multiple regression estimates of the three functional forms that were fitted with the production function models.

The double logarithmic functional form was the most fitted as this form satisfied the economic, statistical and econometric conditions and therefore chosen as the lead
Table 1: Multiple Regression Estimates Swamp Rice Production Function using three functional forms

<table>
<thead>
<tr>
<th>Variables</th>
<th>Exponential</th>
<th>Double-log</th>
<th>Semi-log</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>6.199</td>
<td>3.298</td>
<td>-16827.49</td>
</tr>
<tr>
<td></td>
<td>(53.37)***</td>
<td>(5.54)***</td>
<td>(18.30)***</td>
</tr>
<tr>
<td>Farm size (X₁)</td>
<td>2.355</td>
<td>0.164</td>
<td>-367.16</td>
</tr>
<tr>
<td></td>
<td>(3.01)***</td>
<td>(1.69)*</td>
<td>(3.62)***</td>
</tr>
<tr>
<td>Labour (X₂)</td>
<td>0.005</td>
<td>0.620</td>
<td>203.30</td>
</tr>
<tr>
<td></td>
<td>(0.69)</td>
<td>(4.88)***</td>
<td>(1.28)</td>
</tr>
<tr>
<td>Seeds (X₃)</td>
<td>0.021</td>
<td>0.053</td>
<td>124.40</td>
</tr>
<tr>
<td></td>
<td>(3.67)***</td>
<td>(6.31)***</td>
<td>(1.31)</td>
</tr>
<tr>
<td>Fertilizer (X₄)</td>
<td>0.004</td>
<td>0.054</td>
<td>50.69</td>
</tr>
<tr>
<td></td>
<td>(5.07)***</td>
<td>(6.31)***</td>
<td>(6.91)***</td>
</tr>
<tr>
<td>Capital (X₅)</td>
<td>-0.009</td>
<td>0.004</td>
<td>168.40</td>
</tr>
<tr>
<td></td>
<td>(37.74)***</td>
<td>(0.17)</td>
<td>(14.20)***</td>
</tr>
<tr>
<td>R²</td>
<td>0.88</td>
<td>0.97</td>
<td>0.86</td>
</tr>
<tr>
<td>F cal</td>
<td>131.84</td>
<td>659.90</td>
<td>178.14</td>
</tr>
</tbody>
</table>

Note: *** significant at 1%, ** significant at 5%, * significant at 10%.
Source: Computed using field survey data.

Table 2: Estimates of Allocative efficiency for swamp rice inputs

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>MVP=MPP*Py</th>
<th>Pₓ</th>
<th>AEI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farm size (X₁)</td>
<td>0.289ha</td>
<td>11825.02</td>
<td>2000</td>
<td>5.91</td>
</tr>
<tr>
<td>Labour (X₂)</td>
<td>42.50mandays</td>
<td>303.99</td>
<td>250</td>
<td>1.21</td>
</tr>
<tr>
<td>Seeds (X₃)</td>
<td>33.89kg</td>
<td>242.26</td>
<td>30</td>
<td>8.07</td>
</tr>
<tr>
<td>Fertilizer (X₄)</td>
<td>15.26kg</td>
<td>73.73</td>
<td>40</td>
<td>1.84</td>
</tr>
</tbody>
</table>

Source: computed from lead equation (+).
Note: Px = Input prices, Py= output price (N20/kg), MVP= Marginal value product: AEI= Allocative Efficiency Index

The results indicate that all the resources were inefficiently utilized as the marginal value products (MVPs) for farm size ((X₁), labour (X₂), seed ((X₃), fertilizer ((X₄) are greater than their respective factor prices.

The allocative efficiency indices of the resources (AEI > 1) indicate that the resources were under-utilized. This result supports the findings of Ogunforowa et al. (1975), Eremie and Akinwumi (1986) and Onyenweaku et al. (2000).

CONCLUSION AND RECOMMENDATIONS

The study concludes that the farmers were generally inefficient in the allocation of their resources in swamp rice production in the study area. The resources were generally under-utilized.

The study recommends that more of the productive resources should be employed by the swamp rice farmers for increase paddy rice production since all inputs are under utilized. It is recommended that the farmers be advised to use their up to the point the values of the marginal products (MVPs) equates their factor prices (i.e. MVPs = Pₓ).

REFERENCES


