ANALYSIS OF COSTS AND RETURNS IN RICE FARMING BY FARM SIZE IN EBONYI STATE

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ABSTRACT
Small-scale rice farmers are not equally considered with their large scale counterparts in resources inputs allocation and distribution with the presumption that their returns on investment is not as high as those of the large scale farmers. However, this presumption of lower returns on investment has no empirical backing for rice production in Nigeria. This study was designed to analyze the costs and returns of rice farming by farm size in Ebonyi state of Nigeria. Data were collected through the cost-route approach with pre-tested structured questionnaire from 40 randomly selected small scale and 40 purposively selected large-scale rice farmers. Data were analyzed by Net Farm Income analytical technique, Z - statistics and percentages. Rice production was found to be profitable enterprise but there was no significant difference in the net farm income levels of large scale and small-scale rice farmers. Labour cost is a major component of the total variable costs in rice farming and is higher in large-scale rice farms. There would be increased rice outputs and farm income if resource inputs are equally distributed among large scale and small scale farmers by the agencies charged with farm inputs distribution.
INTRODUCTION

Nigeria is one of the developing countries of the world identified as the largest producer and consumer of rice. Zziwa et al (1987) estimated the land size under rice cultivation to be 610,000 ha which was observed to be just 13% of the total estimated wetlands in the country. Despite government efforts at increasing the hectare under rice cultivation, yields remain low, between 1.5 ton/ha and 1.8 ton/ha, which will not be able to satisfy a demand that is growing by nearly 4.5 percent per year and according to FAO (1989), will reach a million ton in the year 2000.

The prospects of increased rice outputs depends, to a large extent on equitable allocation and distribution of production inputs such as credit; agro-chemicals, improved seeds and fertilizers. For years, small scale rice farmers have been the pillar of rice production among rice farming communities in Nigeria, and produce over 90% of total rice outputs (WARDA, 1993), yet, the technical and managerial constraints of the small scale rice farmers such as labour scarcity, discriminatory delivery of inputs such as seeds, fertilizers and agro-chemicals identified to be seriously hampering small scale rice production in Nigeria (Nwagbo and Onuwuchekwa, 1988), do not attract the desired closer sympathy from the Nigerian policy executors with the presumption that they earn lower returns on investment. However, this assumption has not been empirically investigated for rice in Nigeria,
there by leaving an information gap. This paper examines the costs and returns of large and small rice farmers and problems militating against increase rice outputs in the state, so as to close the information gap. It is hypothesized that there is no significant difference in the net income levels of large and small rice farmers in Ebonyi state.

METHODOLOGY

This study was conducted in five local government areas of Ebonyi state. The sampling frame was the list of farmers provided by resident agricultural extension agents and key informants. From this frame, eight large-scale rice farmers and eight small-scale rice farmers were randomly selected per local government area, giving a sample size of 40 large-scale and 40 small-scale rice farmers. In all, 80 rice farmers were involved in the study.

The cost route approach was used in the scale of operation disaggregated and micro-level data collection. Data were collected from each farmer once fortnightly by means of pre-tested structured questionnaire and observation technique between April and December 2000.

Farm sizes were measured and rent per hectare estimated, value in naira of the quantities of fertilizer and agro-chemicals used were obtained, value of rice paddy cultivated in naira, amount spent on tractor hiring, labour, capital inputs and interest on loan were also collected, output data were obtained by estimating the naira value
of the number of bags of rice produced per farmer. Data on the major constraints to increased rice outputs by the farmers were obtained.

**Analytical Techniques**

The basic statistical tools used in analyzing the data include, Net Farm Income (NFI) model, Z-statistics and Percentages. In estimating the costs and returns, the NFI model was used. It is mathematically specified as:

\[
NFI = \text{Revenue} - \text{Total Costs} \quad (1)
\]

\[
NFI_i = \sum_{j=1}^{n} (TVP_j - (TVC_j + FC_j)) \quad (2)
\]

\[
NFI_i = \sum_{j=1}^{n} \sum_{k=1}^{m} \{\sum_{x=1}^{z} P_k X_{k} + \sum_{L=1}^{z} P_L F_L\} \quad (3)
\]

**Where**

- \( i \) = 1 for large-scale farmers and 2 for small-scale farmers
- \( j \) = the \( j \)th farmer
- \( n \) = number of farmers (1, 2, \ldots, 40)
- \( P_j \) = Price of the \( j \)th farmer’s output.
- \( Q_j \) = Output of the \( j \)th farmer
- \( P_k \) = Price of the \( k \)th variable input
- \( X_k \) = Variable inputs
- \( m \) = number of variable inputs
- \( P_L \) = price of the \( L \)th fixed inputs
- \( F_L \) = fixed inputs.
A basic language computer programme was written and used to perform the Net Farm Income analysis; while the differences in the resulting net incomes between the large and small rice farmers were tested for significance by the use of Z-statistics. The Z – statistics is generally stated as:

\[
Z = \sqrt{\frac{S^2_{1}}{n_1} + \frac{S^2_{2}}{n_2}} \quad (4)
\]

Where,

- \( Z \) = the value by which the statistical significance of the mean difference is to be judged.
- \( X_1 \) = mean net income of large rice farmers
- \( X_2 \) = mean net income of small rice farmers
- \( S^2_{1} \) = variance from net income of large rice farmers
\[ S^2_2 = \text{variance from net income of small rice farmers} \]
\[ n_1 = \text{number of large rice farmers} \]
\[ n_2 = \text{number of small rice farmers}. \]

RESULTS AND DISCUSSIONS
Table 1. Average costs and returns of rice production per hectare by farm size

<table>
<thead>
<tr>
<th>Item</th>
<th>Farm size</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Large</td>
</tr>
<tr>
<td>(A) Revenue</td>
<td></td>
</tr>
<tr>
<td>(i) Total Value Production (N)</td>
<td>46050</td>
</tr>
<tr>
<td>(B) Production Costs</td>
<td></td>
</tr>
<tr>
<td>(i) Capital operating expenses</td>
<td></td>
</tr>
<tr>
<td>Seeds (N)</td>
<td>972</td>
</tr>
<tr>
<td>Fertilizer (N)</td>
<td>2400</td>
</tr>
<tr>
<td>Agro-Chemicals (N)</td>
<td>760</td>
</tr>
<tr>
<td>Tractor-hire (N)</td>
<td>638</td>
</tr>
<tr>
<td>Others (N)</td>
<td>200</td>
</tr>
<tr>
<td>Total (N)</td>
<td>4970</td>
</tr>
<tr>
<td>(ii) Labour input (man-days)</td>
<td></td>
</tr>
<tr>
<td>Hired Labour (N)</td>
<td>5237</td>
</tr>
<tr>
<td>Family labour (N)</td>
<td>2183</td>
</tr>
<tr>
<td>Total (N)</td>
<td>7420</td>
</tr>
<tr>
<td>Total Variable Costs (N)</td>
<td>12390</td>
</tr>
</tbody>
</table>
JASR Vol. 3, No. 1, 2003

(C) Fixed Costs

Depreciation charges on
Capital inputs (N) 1945 1086
Interest on loan (N) 799.5
2301
Land rent (N) 1350 1350
Total (N) 4094.5
4737
Total Costs (N) 16484.514924.5

(D) Net returns (N)
% Net returns (64.2)
(64.1)


The results of data analysis as indicated in table 1 revealed a Total Cost of N16484.5 and N14924.5 and a gross revenue of N46050 and N41550 per hectare for the large scale and small scale rice farmers respectively, which yielded net returns of N29565.5 and N26625.5 per hectare for the large scale and small -scale rice farmers respectively. This result implies an average net returns of N64.20 and N64.10 for every N100 invested in a hectare of rice farm by large scale and small-scale farmers respectively. This result further implies that rice farming in Ebonyi state is a profitable enterprise. The difference in average net returns of N2940 per hectare to the credit of large-scale farmers may have resulted from greater access and use of agro-chemicals, fertilizers, tractor-hire, capital inputs and farm credit that gave rise to increased
rice outputs and farm income. When variable inputs were 
disaggregated, it was found that labor constituted, the 
highest cost component of the TVC (59.9% and 67.9% for 
the large and small scale farmers respectively), 
suggesting that labour was the most constraining 
resource input due to its scarcity and high wage rate 
during the rice-farming season.

**Differential Net Income Levels of Large and Small Scale Rice Farmers.**

The hypothesis states that, there is no significant 
difference in the net income levels of large - scale and 
small-scale rice farmers in Ebonyi state. 
The result of this test is presented in Table 2. The 
respondents comprised 
of 40 large -scale and 40 small-scale rice farmers.

**Table 2. Differences in the average net income levels of large scale and small scale farmers.**

<table>
<thead>
<tr>
<th>Farmer No. Category</th>
<th>Avg. net income</th>
<th>Variance</th>
<th>Critical Computed z-value @5% z-value</th>
<th>Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large scale 40</td>
<td>29565.5</td>
<td>67453369</td>
<td>1.96</td>
<td>1.74 NS</td>
</tr>
<tr>
<td>Small scale 40</td>
<td>26625.5</td>
<td>47045881</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

NS = Z value not significant at 0.05 level.  
Ho = Null hypothesis

The average net income level of the large-scale rice 
farmers was N29565.5 per hectare with a variance of
67453369, while the average net income level of small-scale rice farmers was N26625.5 per hectare with a variance of 47045881. That analysis resulted in a Z-value of 1.74, which was not significant at 0.05 level for a two-tail test ($Z_{\text{tab}} = 1.96$ at 5%). The hypothesis was thus, accepted because there was no significant difference at 0.05 level. The result further shows that the difference in their percentage net returns per hectare does not make much meaning because going by the proportion of revenue to costs, the levels of resources use amongst them were similar.

**Constraints to increased rice production**

Large and small-scale rice farmers in Ebonyi state are faced with a lot of farm level problems. Figure 1 reveals that a larger proportion (40.5%) of the large and small-scale farmers reported inadequacy and untimely input supply as the most pronounced constraint to rice production in the state. The farmers found it difficult to purchase farm inputs such as fertilizers, pesticides, insecticides and improved rice seeds from the state ministry of Agriculture on account of unavailability. The farmers therefore resorted to buying the inputs from the “open market” where they can be found at very high prices. The farmers also identified inadequate production capital (23.5%), inadequacy of farm land (15.9%), high cost of labour (8%) inadequate extension services (6%), pests and diseases out break (3.6%) and inadequate infrastructure facilities (2.5%).
**CONCLUSION**

This study analyzed the costs and returns of rice farming by farm size. Results of the study revealed that rice production in Ebonyi state is a profitable venture, but there was no significant difference in the net returns levels of large and small-scale farmers. So, there is no economic rationale for biasing resource inputs distribution towards the large-scale farmers. Increased rice outputs and enhanced farm income would be achieved if purchased inputs are equitably distributed amongst large and small-scale farmers in the desired quantity and at considerable prices.
REFERENCES


