ECONOMICS OF RICE PRODUCTION IN SOUTHERN TARABA STATE, NIGERIA
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Abstract
This study examined the economics of rice production in Southern Taraba State, Nigeria. Multi stage sampling procedure was employed in selecting 133 respondents for the study. Primary data used in the study were collected using structured questionnaire. Data collected were analysed using descriptive statistic and gross margin analysis. Result of the study indicates that majority (80.45%) of the rice farmers were male in the study area, the average age of the farmers were 39 years, and majority (67%) of the farmers were married. The average household size was 5 persons per household, the average farming experience was 15 years; majority (76%) of the respondents had formal education. The total variable cost (TVC) and total fixed cost (TFC) per hectare of rice production was ₦254,200 and ₦60,466.7 respectively. The total revenue generated was ₦480,000 per hectare while the total average cost incurred was ₦314,666 per hectare, the gross margin and net farm income were ₦225,800 and ₦165,333.3 respectively. The return on investment was 0.525kobo which means that in every naira invested there was returns of 53 kobo. It was recommended that the extension agents should be encouraged to visit and train rice farmers on the use of new technology in the study area.

Keywords: Gross margin, net farm income, Fixed cost, production, Variable cost

Introduction
Rice as a food crop ranks the third after wheat and maize in terms of world-wide production, and it is the most important staple food for about half of the human race (Akande, 2011). Nigeria has suitable ecologies that are suitable for different rice varieties which can be harnessed to boost production to meet domestic demand and export (Usman, 2011). Due to the increasing population over the years, the demand for the commodity has gone up to the position of prominence among all the staple food crops. The level of rice consumption in Nigeria increases with about 10 percent per annum as a result of changing consumer preferences amidst other factors (Okodua, 2017). The low productivity of rice farmers is occasioned by the use of low technologically empowered agricultural equipment which do not support large scale production. For instance, Fasoyiro and Yaiwo (2012), observed that in Nigeria, rice is mainly produced by small-scale farmers whose production are characterised by low output resulting from production inefficiency, aging farming population, low technological know-how, and so on. In the same vein Uduma, Samson and Mure (2016) noted that the inability of local supply to meet up with rice demand (consumption) has given rise to the high import of rice in Nigeria. According to Udoma et al (2016) there has been a phenomenal rise in imports of 300 thousand tons annually in recent times which on the average with an estimated cost of 300 million naira annually in foreign reserves. The Nigerian government is not left out as it has pursued and implemented various agricultural policies at the State and Federal levels on the rice transformation agenda to boost Nigeria’s rice production over the years (Okodua, 2017). He further stressed that among these is the Agricultural transformation agenda (ATA) with the success recorded in local rice production of 4.8 million tonnes per annum (FAO, 2016). Harold and Tabo (2015) further noted that similar rice-sector promotion programs have been embarked upon in other African countries like Ghana and Côte
d'Ivoire. Given the rise in food consumption (rice inclusive), some have argued that the production of rice in large quantities (that is, large-scale) should be considered as one of the major ways of ensuring food security for the teeming population in Nigeria (Herrmann, Jumbe, Bruentrup and Osabuohien, 2017; Osabohien, Osabuohien & Urhie, 2017). Others hold contrary view, stressing the need to empower small-holder farmers. Against that backdrop, Juliano (2016) stated the importance of rice over other crops, in terms of its total production in the developing countries and the number of consumers that are dependent on it as a staple food. This has also been stressed by Gyimah Brempong, Johnson and Takeshima (2016).

For optimum output to be attained in rice production, it is necessary that ecological consideration be factored in the production process, especially in the choice of land as well as the typological components of the area. In this respect, the method of land preparation plays a significant role in the rice production process. In relation to this, Amb and Ahluwalia (2016) observed that zero tillage in rice-wheat cropping system could have major benefits, such as: improved water usage efficiency, reduced investment cost, higher yield, reduced weed population and a positive environmental effect.

Rice is one of the most important cereal crop grown in Taraba state, Nigeria and is consumed in a variety of ways (Ministry of Budget and National Planning (MBNP), 2017). To bridge this gap, there is need for the farmers to venture into improved varieties production which will lead to increase in the domestic production and in turn reduce the volume of rice import.

Thus, the main objective of this studies was to estimate economics of rice production in the study area with a view to assisting cost and return of the enterprise to know whether the enterprise is a profitable venture. The specific objectives of the study were to:

- i. describe the socio-economic characteristics of rice farmers in Southern Taraba State;
- ii. estimate the profitability in rice production and
- iii. identify the constraints of rice production in the study area.

Methodology

The Study Area

The study was carried out in Southern part of Taraba state, Nigeria. The Southern part is made up of five local Government Areas (Takum, Wukari, Donga, Ussa and Ibi) and yangtu special development area. It lies between latitude 8°30′N and 9°30′N of the equator and longitude 8°30′E and 10°30′E of the Greenwich meridian. The study area has a land mass of 14,099km². The projected population of the study area as at 2017 is 1,036,183 with an annual growth rate of 3.5% (NPC, 2006, projection). The area shares a common boundary with Gassol, Bali, Kurmi, and Karim-lamido Local Government areas to the North, Nassarawa and Plateau state to the North-west, Benue state to the South-west and Republic of Cameroun to the Southeast (TADP 2004).

The state has a tropical climate marked by dry and rainy seasons. The rainy season starts in April and ends in October. The wettest months are August and September. The dry season starts in November and ends in April. The mean annual rainfall ranges from 800mm in the north to over 2000mm in the south. The mean minimum daily temperature recorded is 14.8°C and the mean maximum daily temperature recorded is 34.4°C (TADP, 2004).

The dominant soil groups in the study area are ferruginous (gleyric, luvisol, eutric, regosol and ferric luvisol). The vegetation of the state is the guinea savanna type. The state is predominantly agrarian with about 80% of its inhabitants depending on subsistence agriculture practices mainly in food and cash crops like cassava, yams, rice, benni seed and maize (TADP, 2004). The ethnic groups found in the study area are Ichen, Jukun, Kuteb, Chamba, KPanzo and Tiv.

Sampling Techniques

All the rice farmers in the study area form the population of the study. A multi-stage sampling procedure was employed to select rice farmers in the study area. In the first stage, three Local Government areas which include Wukari, Ibi and Donga were purposively selected because of their prominence in rice production.
In the second stage; two farming communities were randomly selected from each of the selected Local Governments area totalling six farming communities. In the third stage farmer were randomly selected in proportion to the population of rice farmers in the study area. Finally, a 5%. Proportion of the total population of 200 rice farmers in the selected farming communities were taken using Yaro Yamen (1964) formula to arrived at a total sample size of 133 respondents.

Table 1: Population and Sample size distribution using Yaro Yamen (1964) formula

<table>
<thead>
<tr>
<th>Local Government Areas</th>
<th>Farming communities</th>
<th>Population of Rice farmers</th>
<th>% of the population</th>
<th>Sample size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Donga</td>
<td>Akete</td>
<td>32</td>
<td>16</td>
<td>21</td>
</tr>
<tr>
<td></td>
<td>Suntai Daji</td>
<td>33</td>
<td>16.5</td>
<td>22</td>
</tr>
<tr>
<td>Ibi</td>
<td>Ibi town</td>
<td>29</td>
<td>14.5</td>
<td>19</td>
</tr>
<tr>
<td></td>
<td>Sarkin kudu</td>
<td>36</td>
<td>18</td>
<td>24</td>
</tr>
<tr>
<td>Wukari</td>
<td>Bantaje</td>
<td>30</td>
<td>15</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Gidin doruwa</td>
<td>40</td>
<td>20</td>
<td>27</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>6</td>
<td>100</td>
<td>133</td>
</tr>
</tbody>
</table>

The sample size was determined at 5% level of significance using Yaro Yamen’s formula presented by Baridam (2001)

\[ n = \frac{N}{1+Ne^2} \]  

where \( n \) = sample size

\[ N = \text{population size} \]

\[ e = \text{level of significance (5%)} \]

\[ n = \frac{200}{1+200(0.05 \times 0.05)} = 133 \]

Analytical Techniques

The data collected were analyzed using descriptive statistics and Gross Margin Analysis. The descriptive statistics were used to address objective (i) and (iii) while the gross margin was used to evaluate net income.

The gross margin was used to achieve objective ii.

\[ GM = GI - TVC \]  

Where: \( GM = \text{Gross Margin} \)

\( GI = \text{Gross Income} \)

\( TVC = \text{Total Variable Cost} \)

\( NFI = GM - TFC \)  

Where: \( NFI = \text{Net Farm Income} \)

\( TFC = \text{Total Fixed Cost} \)

Results and Discussion

Socio-Economic Characteristics of Rice Farmers

Table 2 revealed that about 80% of the farmers were males, while females contributed 20%. This means that males dominated the business of rice farming in the study area. This finding agrees with the findings by Odoemenem and Inakwu (2011) who reported that men constitute about 65% of rice farmers in Cross River State. This result is obvious that men are more capable of coping with the drudgery associated with Rice farming. However, this is at variant with the findings of Abuh and Mohammed(2017), who reported that women play a vital role in rice production enterprise.

Result in Table 2 shows that majority (67%) of the farmers were married while 33 represent single an indication that married farmers dominated the rice enterprise in the study area. This findings in agreement with the findings of Ahmadu and Erhabor (2012) who confirmed that majority (77%) of the respondents were married in the research titled determinants of technical efficiency of rice farmers in Taraba State.

The finding revealed that majority (75.94%) of the farmers in the study area are literate implying that most of the farmer have acquired one form of formal education or the other. The result is in consonant with the findings of Ogundari, Ojo& Ajibefun, (2006) which confirmed that education is needed to enhance productivity among farming households in Nigeria. Aboki, Luka and Danji (2016) also reported that education enhances the acquisition and utilization of information on improved technology by farmers as well as their innovativeness.
The distribution of farmers by farm size as presented in Table 2 shows that 39.10% of the respondent had farm size between 0.25 – 1.24 hectare, 27.82% of the farmers had farm size of between 1.25 – 2.24 hectares, 17.30% of the farmers had farm size of between 2.25-3.24 hectares, 9.02% of the farmers had farm size between 3.25 – 4.24 hectares and 6.76% of the farmers had farm size between 4.25 and above, with a mean farm size of 1.88 hectare.

The findings indicates that most of the farmers had a farm size greater than one hectare. This reveals that rice farmers in the study area were mainly small scale farmers. Thus agreeing with the findings by FAO (2017), who reported that the Nigerian rice sub sector witnessed a remarkable increase in output from 1.9 million metric tonnes in 2000 to about 2.7 million metric tonnes in 2017. This increase in output of rice over the years was a result of increase in hectare cultivated.

The distribution of farmers by extension contact as presented in Table 2 indicated that very small percentage of farmers (4.51%) had extension contact ranged between 1-4. The majority of farmers (95.49%) had no extension contact in a year. This implies that farmers had insufficient extension visits. The result is in consonance with the findings by Aboki et al., (2016) who found out that only 6.02% of the farmers had extension contact that range between 1-4 times per year.

The distribution of farmers according to their access to credit as presented in Table 2 revealed that those that have access to credit ranges from ₦1000-200,000 were about 30.83% with minimum, maximum and mean amount of ₦35, 000, ₦200, 000 and ₦84, 000 respectively. Majority (69.17%) of the farmers did not have access to credit. This implies that the farmers used their personal saving to purchase farm inputs and adopt farm innovations. This agreed with the findings of Sa’a oador (2013) who found out that farmers used their personal saving to purchase farm inputs and adopt farm innovations.

Table 2: Socio-economic characteristics of the respondents

<table>
<thead>
<tr>
<th>Items</th>
<th>Frequency</th>
<th>Percentage</th>
<th>Max.</th>
<th>Min.</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>107</td>
<td>80.45</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>26</td>
<td>19.55</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marital Status</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>89</td>
<td>67</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>44</td>
<td>33</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Level of education</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No formal education</td>
<td>32</td>
<td>24.06</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adult/Quaranic education</td>
<td>15</td>
<td>11.28</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary education</td>
<td>29</td>
<td>21.80</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Secondary education</td>
<td>41</td>
<td>30.83</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tertiary education</td>
<td>16</td>
<td>12.03</td>
<td>24</td>
<td>12</td>
<td>17</td>
</tr>
<tr>
<td>Farm size (ha)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.25 – 1.24</td>
<td>52</td>
<td>39.10</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.25 – 2.24</td>
<td>37</td>
<td>27.82</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.25 – 3.24</td>
<td>23</td>
<td>17.30</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.25 – 4.24</td>
<td>12</td>
<td>9.02</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt; 4.24</td>
<td>9</td>
<td>6.76</td>
<td>4.00</td>
<td>0.50</td>
<td>1.88</td>
</tr>
<tr>
<td>Extension Contact</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>127</td>
<td>95.49</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-2</td>
<td>4</td>
<td>3.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3-4</td>
<td>2</td>
<td>1.51</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Access to Credit (₦)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>92</td>
<td>69.17</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1000-50,000</td>
<td>15</td>
<td>11.28</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>51,000-100,000</td>
<td>11</td>
<td>8.27</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>101,000-150,000</td>
<td>8</td>
<td>6.26</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>151,000-200,000</td>
<td>7</td>
<td>5.26</td>
<td>200,000</td>
<td>35,000</td>
<td>84,000</td>
</tr>
</tbody>
</table>

Source: Field Survey, 2018
**Estimated Costs and Returns in Rice production**

The costs and returns is presented in Table 3. The total variable cost (TVC) and the total fixed cost (TFC) per hectare of rice production was ₦254, 200 and ₦60, 466.7 respectively. The average revenue generated per hectare by the rice farmers in the study area was ₦480,000 while the total average cost incurred per hectare during the production year was ₦314, 666.7. The gross margin and the net farm income of the rice farmers were ₦225, 800 and ₦165, 333.3 respectively.

The return on investment (ROI) was 0.525 implying that rice production in the study area is highly profitable. This is because in every 1 naira invested a farmer realized a profit of 53 kobo. This result confirmed with the findings of Rekiyat (2016) who worked on comparative economic analysis of FARO-54 AND NERICA -1 rice production in selected Local Government area of Niger state, Nigeria and found that Rice production is a profitable venture with return on investement of 65 kobo per naira invested.

### Table 3: Average Cost and Returns per Hectare of Rice Production in the Study Area

<table>
<thead>
<tr>
<th>Item</th>
<th>Unit</th>
<th>Qty/ha</th>
<th>Price/unit (₦)</th>
<th>Value (₦)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>VARIABLE COST</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seed</td>
<td>Kg</td>
<td>100</td>
<td>120</td>
<td>12, 000</td>
</tr>
<tr>
<td>Fertilizer</td>
<td>Kg</td>
<td>200</td>
<td>120</td>
<td>24, 000</td>
</tr>
<tr>
<td>Herbicide</td>
<td>Litre</td>
<td>7.00</td>
<td>1300</td>
<td>7,800</td>
</tr>
<tr>
<td>Hire labor</td>
<td>Manday</td>
<td>42.5</td>
<td>2000</td>
<td>85,000</td>
</tr>
<tr>
<td>Family labour</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>30, 000</td>
</tr>
<tr>
<td>Loading/offloading and transportation</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>80, 000</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>15, 400</td>
</tr>
<tr>
<td>Total variable cost</td>
<td></td>
<td></td>
<td></td>
<td>254, 200</td>
</tr>
<tr>
<td><strong>FIXED COST</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Purchase Land (Ha)</td>
<td>Ha</td>
<td>-</td>
<td>-</td>
<td>45, 000</td>
</tr>
<tr>
<td>Rented land</td>
<td>Ha</td>
<td>-</td>
<td>-</td>
<td>10, 000</td>
</tr>
<tr>
<td>Depreciation on assets</td>
<td>Ha</td>
<td>-</td>
<td>-</td>
<td>54, 666.7</td>
</tr>
<tr>
<td>Total fixed cost</td>
<td></td>
<td></td>
<td></td>
<td>60, 466.7</td>
</tr>
<tr>
<td>Total cost (TFC + TVC)</td>
<td></td>
<td>-</td>
<td>-</td>
<td>314, 666.7</td>
</tr>
<tr>
<td><strong>RETURNS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quantity of output</td>
<td>Kg</td>
<td>4000</td>
<td>120</td>
<td>480, 000</td>
</tr>
<tr>
<td>Gross margin TR-TVC</td>
<td></td>
<td></td>
<td></td>
<td>225, 800</td>
</tr>
<tr>
<td>Net farm income (GM – TFC)</td>
<td></td>
<td></td>
<td></td>
<td>165, 333.3</td>
</tr>
<tr>
<td>Return on investment [ROI] (NFI/TC)</td>
<td></td>
<td></td>
<td></td>
<td>0.525</td>
</tr>
</tbody>
</table>

**Source:** Field Survey, 2018

**Constraints Associated with Rice Production in the study area**

The constraint associated with rice production in the study area is presented in Table 3. Lack of visit and training by extension agent to rice farmers was ranked first as the most (92.7%) serious problems encountered by rice farmers in the study area. This implies that rice farmers in the study area were not given adequate attention by the extension agents in the area of visit and training.

The problem of inadequate finance was ranked the second most (88.4%) serious problem facing rice farmers in the study area. This problem made it difficult for the farmers to acquired farm inputs, apply new farming technologies and expand their scale of production. The result agrees with the findings of Damola (2010) that most rice farmers in the developing countries are subsistence in nature, hence do not have access to enough credit facilities.

Problem of pest and disease was ranked the third most (76.2) serious problems facing the rice farmers in the study area. Pest and disease reduce the quality and quantity of the farm produce, reduce income and discourage...
farmers from further production (Ekeleme et al., 2008).

Poor marketing system: was ranked fourth most (74.4%), serious problem hampering rice farmers in the study area. This result is in-line with Aboki, et al., (2016) which reported that lack of market outlets and poor marketing price reduces the farmer’s production goal.

<table>
<thead>
<tr>
<th>Major problems</th>
<th>Ranked order</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of visit &amp; training by extension agent</td>
<td>1</td>
<td>123*</td>
<td>92.7</td>
</tr>
<tr>
<td>Inadequate finance</td>
<td>2</td>
<td>118*</td>
<td>88.4</td>
</tr>
<tr>
<td>Problems of pest and disease</td>
<td>3</td>
<td>101*</td>
<td>76.2</td>
</tr>
<tr>
<td>Poor marketing system</td>
<td>4</td>
<td>99</td>
<td>74.4</td>
</tr>
<tr>
<td>High cost of farm inputs</td>
<td>5</td>
<td>81</td>
<td>60.6</td>
</tr>
<tr>
<td>Problems of Transportation</td>
<td>6</td>
<td>72</td>
<td>54.3</td>
</tr>
<tr>
<td>Problems of draught</td>
<td>7</td>
<td>59</td>
<td>44.7</td>
</tr>
<tr>
<td>Inadequate storage facilities</td>
<td>8</td>
<td>58</td>
<td>43.7</td>
</tr>
</tbody>
</table>

Source: Field Survey, 2018
Multiple responses*

Conclusion and Recommendations
In conclusion, it was found that 80% of the farmers were males and that majority (67%) of the rice farmers were married. The result of the findings also revealed that majority (75.94%) of the farmers in the study area were literate implying that most of the farmer have acquired one form of formal education or the other and Majority (69.17%) of the farmers did not have access to credit. This implies that the farmers used their personal saving to purchase farm inputs. Based on the findings the following recommendations were made:

References
FAO (2016). Rice Market Monitor, Volume XIX Issue N0.1 Trade and Market Division. Food and Agriculture Organization of the United Nations, Rome, Italy, 5-40


