Profitability and technical efficiency among the beneficiary crop farmers of National Fadama II Project in Adamawa State, Nigeria

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ABSTRACT

The study assessed the profitability of Fadama II project facilities supported ton crop farmers in Adamawa State. Data were collected on a sample of 160 farmers and were analyzed using descriptive statistics, budgetary technique, linear programming and stochastic frontier production function. The findings from the study showed that the gross margin per hectare from these enterprises ranged from $41,715.86 for sole maize to $75,071.84 for sole rice. The result of the linear programming revealed that only two of the six enterprises entered the programme, these are sole rice and vegetables enterprises. The existing farm plan allocated 1.56 hectares to sole rice and 0.77 hectares to vegetables, while the optimal farm plan generated from the LP allocated 0.60 hectares to sole rice and 0.77 hectares to vegetable enterprise. The maximized total gross margin (TGM) from these two enterprises per hectare is $100,261.90. The sensitivity analysis reveals a significant difference between the plans. The vegetable enterprise had existing plan per hectare of $71,955.14, with an optimized plan per hectare of $111,887.18, indicating that vegetable production in the Fadama areas of the State brings in more profit per hectare. It is however recommended that, Government should take renewed interest in dry season production by strengthening support and public-private partnership so as to boost production and win niche markets with a challenge of making better markets for farmers.

Keywords: Profitability, technical efficiency, Fadama II, crop production.

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INTRODUCTION

Agriculture serves as the mainstay of most developing countries. It is the only means of livelihood of members of the rural communities in these countries and especially in Nigeria. According to NBS (2012), agriculture contributes about 56.8% to GDP and a source of food nutrition for Nigerian households which decline in 2012 to 36.2%. The sector’s performance could probably have been better but for the flooding crisis which was experienced in the year accounting for the decline in its contributions to the GDP, agriculture is a key factor that can affect majority of Nigerians since over 60% of its population is involved in farming (Aturamu and Daramola, 2005). Unfortunately, agriculture alone can no longer provide a reliable livelihood for the growing populations in these countries (Mhazo et al., 2003). Alternative or additional income generating opportunities are needed to support the millions of poor families who can no longer support their livelihoods from the land alone (Simalenga, 1996). In Nigeria, incomes and productivity in rural areas is low hence rural population remain poor.

Poverty is not only a state of existence but also a process with many dimensions and complexities (Khan, 2000). Recent statistics from the National Bureau of Statistics indicate a worsening poverty statistics in the country and a cause for concern (Ayanwale and Alimi, 2004). The report of the 2006 Nigerian Core Welfare Indicator (CWI) on the poverty profile in the country stated that the dependency ratio, which was defined as
the total number of household members aged 0 to 14
years and 65 years and above to the number of
household members aged 15 to 64 years, was 0.8 (CBN,
2005). This indicated almost a one-to-one dependency
ratio, and reflected the high population growth rate in the
country. There is also large income inequality with the top
10% of the income bracket accounting for close to 60% of
total consumption of goods and services (Ayanwale and
Alimi, 2004).

The concern about the threat posed by poverty has led
the Nigerian government to devote considerable attention
to alleviating its scourge through various aid
programmes, some of the time in collaboration with the
civil society and donor agencies. Some of these
programmes include: Agricultural Development
Programme (1975), Operation Feed the Nation (1979),
National Directorate for Employment (1987), National
Fadama Development Programme I (1992), Family
Support Programme (1996), National Poverty Eradication
Programme (2001), Special Programme on Food
Security (2001), National Fadama II Programme (2004),
Community and Social Development Project (2009)
among others.

Despite all these programmes, the percentage of the
population living below the poverty line in Nigeria is still a
subject of concern to government and donor agencies
NBS, (2011). 67.38% of population in Nigeria is living
below the poverty line. However, the Second National
Fadama Development Project (NFDP - II) was developed
as a poverty reduction projects designed to sustainably
increase the incomes of the Fadama users through
expansion of farm and non-farm activities with high value
added output, and to improve the living conditions of the
rural poor, contribute to food security as well as
increased access to rural infrastructure. Simonyan and
Omolehin (2012), shows that the income of the
beneficiary farmers in Fadama II project has increased
significantly more than before the project and also more
than the non-beneficiaries' income.

This study therefore was designed to assess the
National Fadama II facility in Adamawa State on the
beneficiaries in terms of their income, access to
necessary enabling facilities and general well-being on
the premise that there wasa relationship between poverty
and productivity and that the Fadama II facilities
benefitted in Adamawa State has increase the income
and wellbeing of the beneficiaries. If this facility achieved
the envisaged objective(s), the welfare of the rural
farming households would be improved with the attendant multiplier effect in the state and the country as
a whole.

Consequently, the study was structured to provide
answers to the following questions:

(i) What were the socio-economic characteristics of
Fadama II participants in Adamawa State?
(ii) What were the optimum quantities of inputs and
output for profit maximization in Fadama crop
production?

Hypotheses:

H0: The socio-economic characteristics of Fadama II
participants does not affect food crop production in the
study area.

H1: There is no relationship between optimum quantities
of inputs and outputs and profitability of Fadama II
participants in food crop production.

METHODOLOGY

The study was carried out in Adamawa State on 10 out of the 21
local government areas that participated in Fadama II project. The
state has a tropical climate with maximum temperature reaching to
as high as 40°C between December and January (Adebayo and
Onu, 1999). The Fadama land in the state lies along the basins of
major rivers, streams, lakes and dams, which are located in the
state. These are: Benue, Gongola, Yedzaram, Gerio, Mayo-Ine,
Mayo-Belwa, Kilange, Kiri, Song, Wandu, Digi, Chochi, Faro and
Mayo-Hesso. The state has 923-registered fadama user's
associations (FUA's) that are into crop production with each
comprising of 10 to 30 members (SFDO, 2006). Multistage stratified
random sampling and purposive sampling techniques were used in
the selection of respondents. In the first stage, the state was
stratified into four according to the Adamawa Agricultural
Development Programme (ADADP) zones. In each of the zone,
participating local government areas in Fadama crop production
was purposively selected in proportion to the existing number of
Fadama User Associations (FUA). In line with this, four local
government areas in Zone II and one each in Zones I, III and IV
were selected. In all, a total of seven local government areas were
sampled. One hundred and sixty (160) food crop farmers were
randomly selected in the FUA groups in the seven selected local
government areas in proportion to their number in each local
government. The membership of each FUA ranges from 10 to 30.

Conceptual and analytical framework

Linear programming was used to determine the combination of
enterprises that maximizes the enterprises’ total gross margin
(TGM) subject to the production constraints associated with the
available resources. The model equation is presented thus
following Fabusoro and Agbonlahor (2002).

Max Z = Σaixi

Subject to: Σbi ≤ G

Where:

Z = TGM to be maximized as the objective function
a = Gross margin (GM) of the ith enterprise/ha
xi = Farm size of the ith crop enterprise (ha)
b = Factor requirement of the ith enterprise
G = Available resources for the factor requirements of the ith
enterprise

The LP was used for each of the identified enterprise.
The Gross Margin (GM) per hectare is therefore expressed as:
Table 1. Cost and returns from food crop production among Fadama farmers.

<table>
<thead>
<tr>
<th>Crop enterprise</th>
<th>Variable input</th>
<th>Variable cost (₦)</th>
<th>% share in total variable cost</th>
<th>Returns (₦)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sole rice</td>
<td>Agro chemicals</td>
<td>129,600.00</td>
<td>9.35</td>
<td>TR: 3,732,015.00</td>
</tr>
<tr>
<td></td>
<td>Inorganic fertilizer</td>
<td>444,500.00</td>
<td>32.07</td>
<td>TR/ha: 119,424.48</td>
</tr>
<tr>
<td></td>
<td>Hired labour</td>
<td>600,450.00</td>
<td>43.32</td>
<td>GM/ha: 75,071.84</td>
</tr>
<tr>
<td></td>
<td>Water cost</td>
<td>118,000.00</td>
<td>8.51</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Seeds</td>
<td>28,175.00</td>
<td>2.03</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Other cost (transport, sacks and baskets)</td>
<td>62,295.00</td>
<td>4.71</td>
<td></td>
</tr>
<tr>
<td></td>
<td>TVC</td>
<td>1,386,020.00</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td></td>
<td>TVC/ha</td>
<td>44,352.64</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sole maize</td>
<td>Agro chemicals</td>
<td>510,000.00</td>
<td>15.12</td>
<td>TR: 8,607,500.00</td>
</tr>
<tr>
<td></td>
<td>Inorganic fertilizer</td>
<td>643,650.00</td>
<td>19.09</td>
<td>TR/ha: 68,585.66</td>
</tr>
<tr>
<td></td>
<td>Hired labour</td>
<td>1,455,700.00</td>
<td>43.17</td>
<td>GM/ha: 41,715.86</td>
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<tr>
<td></td>
<td>Water cost</td>
<td>223,000.00</td>
<td>6.61</td>
<td></td>
</tr>
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<td></td>
<td>Seeds</td>
<td>272,250.00</td>
<td>8.07</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Other cost (transport, sacks and baskets)</td>
<td>267,560.00</td>
<td>7.93</td>
<td></td>
</tr>
<tr>
<td></td>
<td>TVC</td>
<td>3,372,160.00</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td></td>
<td>TVC/ha</td>
<td>26,869.80</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maize/rice</td>
<td>Agro chemicals</td>
<td>954,400.00</td>
<td>21.42</td>
<td>TR: 9,776,240.00</td>
</tr>
<tr>
<td></td>
<td>Inorganic fertilizer</td>
<td>676,580.00</td>
<td>15.18</td>
<td>TR/ha: 82,674.33</td>
</tr>
<tr>
<td></td>
<td>Hired labour</td>
<td>1,630,300.00</td>
<td>36.59</td>
<td>GM/ha: 44,991.29</td>
</tr>
<tr>
<td></td>
<td>Water cost</td>
<td>329,100.00</td>
<td>7.39</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Seeds</td>
<td>225,000.00</td>
<td>5.05</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Other Cost (Transport, Sacks and baskets)</td>
<td>665,640.00</td>
<td>14.94</td>
<td></td>
</tr>
<tr>
<td></td>
<td>TVC</td>
<td>4,456,020.00</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td></td>
<td>TVC/ha</td>
<td>37,683.04</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Field survey, 2011.

\[
GM = \sum QyPy - \sum XiPxi
\]  \hspace{1cm} (2)

Where:
- \(Q_y\) = Output of food crop (kg/ha)
- \(P_y\) = Unit price of the output (in naira) per 100 kg bag
- \(Q_iP_i\) = Total revenue from food crop produced (in naira) per ha
- \(X_i\) = Quantity of the \(i^{th}\) input used in kg/ha
- \(P_{xi}\) = Price per kg of the \(i^{th}\) input
- \(X_iP_{xi}\) = Total cost associated with the \(i^{th}\) input per hectare
- \(\Sigma\) = Summation sign

The empirical probit model was estimated using E-view software, version 5 to determine the probability of technical efficiency indices of farmers and farm size and output levels. Mesike and Okoh (2008) reported that probability was given as index which was unobservable. The un-observable index was a linear combination of observable explanatory variables expressed as production function postulated for crop farmers in the study area is presented by:

\[
Y = B_0 + B_1X_1 = e
\]  \hspace{1cm} (3)

Where: \(Y\) = dichotomous dependent variable taking the value of 1 or 0. However, to meet this requirement a slight modification was made:

\[
Y = \text{technical efficiency indices of respondents if } TE \leq 0.50 = 0; \text{ if } TE > 0.50 = 1.
\]

It is on this basis that the probit analysis was run.

\(B_0\) = intercept, \(B_1\) = regression coefficients that explain the probability of technical efficiency influencing farm size and output level and \(X\) are the independent variables \((i = 1 \text{ to } 2)\), and \(e\) = error term.

**RESULTS AND DISCUSSION**

**Profitability analysis**

The gross margin analysis used as a proxy for profitability estimation is presented in Tables 1 and 2. The result has shown that there are six different enterprise combinations that are associated with food crop production by beneficiaries of Fadama II facility in the study area. The enterprises are sole rice, sole maize, maize/rice, vegetables, maize/vegetables and maize/rice/vegetables. The gross margin per hectare from these enterprises
Table 2. Cost and returns from food crop production among Fadama farmers.

<table>
<thead>
<tr>
<th>Crop enterprise</th>
<th>Variable input</th>
<th>Variable cost (₦)</th>
<th>% share in total variable cost</th>
<th>Returns (₦)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vegetable</td>
<td>Agro chemicals</td>
<td>110,400.00</td>
<td>25.01</td>
<td>TR: 1,106,925.00</td>
</tr>
<tr>
<td></td>
<td>Inorganic fertilizer</td>
<td>47,000.00</td>
<td>10.65</td>
<td>TR/ha: 119,667.57</td>
</tr>
<tr>
<td></td>
<td>Hired labour</td>
<td>189,000.00</td>
<td>42.82</td>
<td>GM/ha: 71,955.14</td>
</tr>
<tr>
<td></td>
<td>Water cost</td>
<td>45,500.00</td>
<td>10.31</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Seeds</td>
<td>24,360.00</td>
<td>5.52</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Other cost (transport, sacks and baskets)</td>
<td>25,080.00</td>
<td>5.68</td>
<td></td>
</tr>
<tr>
<td></td>
<td>TVC</td>
<td>441,340.00</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td></td>
<td>TVC/ha</td>
<td>47,712.43</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maize/vegetable</td>
<td>Agro chemicals</td>
<td>36,000.00</td>
<td>8.64</td>
<td>TR: 1,061,824.00</td>
</tr>
<tr>
<td></td>
<td>Inorganic fertilizer</td>
<td>124,250.00</td>
<td>29.81</td>
<td>TR/ha: 84,945.92</td>
</tr>
<tr>
<td></td>
<td>Hired labour</td>
<td>177,250.00</td>
<td>42.46</td>
<td>GM/ha: 51,597.92</td>
</tr>
<tr>
<td></td>
<td>Water cost</td>
<td>32,000.00</td>
<td>7.68</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Seeds</td>
<td>27,600.00</td>
<td>6.62</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Other cost (transport, sacks and baskets)</td>
<td>20,000.00</td>
<td>4.80</td>
<td></td>
</tr>
<tr>
<td></td>
<td>TVC</td>
<td>416,850.00</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td></td>
<td>TVC/ha</td>
<td>33,348.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maize/</td>
<td>Agro chemicals</td>
<td>34,400.00</td>
<td>10.52</td>
<td>TR: 776,680.00</td>
</tr>
<tr>
<td>rice/vegetable</td>
<td>Inorganic fertilizer</td>
<td>81,000.00</td>
<td>24.77</td>
<td>TR/ha: 103,557.33</td>
</tr>
<tr>
<td></td>
<td>Hired labour</td>
<td>125,300.00</td>
<td>38.32</td>
<td>GM/ha: 59,957.33</td>
</tr>
<tr>
<td></td>
<td>Water cost</td>
<td>26,100.00</td>
<td>7.98</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Seeds</td>
<td>28,000.00</td>
<td>8.56</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Other cost (transport, sacks and baskets)</td>
<td>32,200.00</td>
<td>9.85</td>
<td></td>
</tr>
<tr>
<td></td>
<td>TVC</td>
<td>327,000.00</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td></td>
<td>TVC/ha</td>
<td>43,600.00</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Field Survey, 2011

ranged from ₦41,715.86 for sole maize to ₦75,071.84 for sole rice. Sole maize had the lowest total variable cost per hectare of ₦26,669.80, followed by maize/vegetable enterprise of ₦33,348.00. However, vegetable enterprise had the highest total variable cost per hectare of ₦47,712.43 followed by sole rice with ₦44,352.64. The percentage of the expenditure on hired labour in all the enterprises tend to be higher than expenditure on other inputs, and this may be attributed to labour requirement in agricultural activities. This is followed by expenditure on inorganic fertilizer. Maize and vegetables dominated most of the combinations due largely to the high demand of the commodities during the dry season. The domination of most activities by vegetable production is similar to the work of Jema (2007) who reported profitability of vegetable production in Kenya. Maize is roasted and sold as a delicacy, while vegetables are part of the normal diet.

Efficiency estimation

Efficiency analysis is generally associated with the possibility of farms producing a certain level of output from a given bundle of resources or certain level of output at least cost. Maximum efficiency is attained when it becomes impossible to reschedule a given resource combination without decreasing the total output (Adeoti, 2001; Adebayo, 2006).

The maximum likelihood estimates (MLE) for the stochastic production function used in explaining the influence of production inputs on the output of food crop among beneficiaries of Fadama II, and also in determining the effect of farmer specific characteristics on technical inefficiency is presented in Table 2. The parameters were estimated simultaneously using frontier 4.1c developed by Coelli (1996).

The results shows that the coefficients of farm size (X₁), inorganic fertilizer (X₃), hired labour (X₅) and expenses on ploughing (X₆) were found to be positive and significantly affect food crop output of the respondents as revealed by the computed t-values in Table 3. This implies that any increase in the use of these production inputs would bring about increase in food crop output.

The value of the sigma squared (δ²) is 0.6548 and is statistically significant at 1% level. This indicates a good
fit and correctness of the distributional form assumed for the composite error term in the model. The variance ratio (γ) is 0.88 and also statistically significant at 1% level, implying that 88% of the variation in crop output of the respondents is due to differences in their technical efficiencies. All the estimated coefficients are less than one, indicating that input allocation is in stage II of the production function.

The estimated coefficient for farm size is positive, which conform to *a priori* expectation and significant at 1% level. The magnitude of the coefficient (0.24) indicates that the output of food crop is inelastic to changes in the level of cultivated land area. Therefore, this implies that a 1% increase in cultivated land area, ceteris paribus, would lead to an increase of 0.24% in the output of food crop, and vice versa. This further suggests that land is a significant factor associated with changes in food crop output among the beneficiaries. Fadama land is usually scarce and also limited in size, having superior fertility status over other agricultural lands (Kyuma, 1999); thus, increase in output is guaranteed with additional increase in area under cultivation. This result is in accord with Udoh (2006) who identified land as a critical factor in agricultural production.

The production elasticity with respect to inorganic fertilizer is positive as expected and statistically significant at 5% level. This stems from the fact that fertilizer is a major land augmenting input which improves the productivity of existing land by increasing yield per unit area. Fadama lands have superior fertility status, but increase in the quantity of fertilizer used in food crop production would further increase the fertility of the existing land resulting in higher output. This study is consistent with the findings of Umoh (2006) that fertilizers increase crop yield.

The magnitude of the coefficient of hired labour, which is 0.13, indicates that output in food crop production in the Fadama lands is highly inelastic to changes in the amount of hired labour used. Thus, a 1% increase in the man-days of hired labour used would induce an increase of 0.13% in the output of food crop, and vice versa. Farmers who have the main objective of income maximization in food crop production would tend to allocate scarce resources more efficiently, including the allocation of hired labour (Amaza and Gwary, 2000). On the other hand, farmers whose main objective is household food security would be more concerned with output maximization per unit of resources used, especially family labour; that is, they tend to emphasize on technical efficiency.

The estimated coefficient for expenses on ploughing is positive and statistically significant at 1% level as shown in Table 3, indicating that food crop output among the respondents is inelastic to changes in the expenses on ploughing. A 1% increase in the expenses on ploughing would bring about 0.05% increase in the output of food crop.

The returns to scale which is the sum of elasticities

### Table 3. Maximum likelihood estimates of parameters of stochastic frontier production function.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Parameters</th>
<th>Coefficient</th>
<th>t-ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>β₀</td>
<td>2.172</td>
<td>3.5468***</td>
</tr>
<tr>
<td>Farm size (X₁)</td>
<td>β₁</td>
<td>0.2372</td>
<td>2.7908***</td>
</tr>
<tr>
<td>Agrochemicals (X₂)</td>
<td>β₂</td>
<td>0.0381</td>
<td>0.2045</td>
</tr>
<tr>
<td>Inorganic fertilizer (X₃)</td>
<td>β₃</td>
<td>0.2019</td>
<td>2.1634**</td>
</tr>
<tr>
<td>Family labour (X₄)</td>
<td>β₄</td>
<td>0.0213</td>
<td>1.6310</td>
</tr>
<tr>
<td>Hired labour (X₅)</td>
<td>β₅</td>
<td>0.1332</td>
<td>2.8675***</td>
</tr>
<tr>
<td>Ploughing expenses (X₆)</td>
<td>β₆</td>
<td>0.0549</td>
<td>2.8934***</td>
</tr>
<tr>
<td>Water cost (X₇)</td>
<td>β₇</td>
<td>-0.0226</td>
<td>-0.1762</td>
</tr>
</tbody>
</table>

Inefficiency model

<table>
<thead>
<tr>
<th>Variables</th>
<th>Parameters</th>
<th>Coefficient</th>
<th>t-ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>δ₀</td>
<td>-2.5813</td>
<td>-2.8675***</td>
</tr>
<tr>
<td>Farming experience (Z₁)</td>
<td>δ₁</td>
<td>-0.0302</td>
<td>-0.2453</td>
</tr>
<tr>
<td>Education (Z₂)</td>
<td>δ₂</td>
<td>-0.0210</td>
<td>-2.7564***</td>
</tr>
<tr>
<td>Extension contact (Z₃)</td>
<td>δ₃</td>
<td>-0.0473</td>
<td>-2.1735**</td>
</tr>
<tr>
<td>Household size (Z₄)</td>
<td>δ₄</td>
<td>-0.0257</td>
<td>-0.0293</td>
</tr>
<tr>
<td>Age (Z₅)</td>
<td>δ₅</td>
<td>-0.2116</td>
<td>-2.5425**</td>
</tr>
</tbody>
</table>

Variance parameters

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Coefficient</th>
<th>t-ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sigma square</td>
<td>δ²</td>
<td>0.6548</td>
</tr>
<tr>
<td>Gamma</td>
<td>Γ</td>
<td>0.8756</td>
</tr>
</tbody>
</table>

Source: Computer Output from Frontier Analysis. *** Significant at 1% level; ** Significant at 5% level.
reveals that food crop production among Fadama II beneficiaries are inelastic (0.663) and is in stage II of the production surface. Thus, additional input would bring about increase in output but at a decreasing rate although it is the rational stage of production.

The inefficiency parameters were specified as those relating to farmers’ specific socio-economic characteristics. Three out of the five variables used in the model are significant and also have prior expected signs. A negative coefficient indicates that the variable increases efficiency in food crop production and vice versa; hence, education, extension contact and age increase the efficiency in food crop production in the study area.

Conclusions

The study reveals that, the gross margin per hectare from these enterprises for sole maize and sole rice indicates profitability in the short run. This can be seen from the net increase of ₦186,585.09 (99%) from the survey which was far above the goal of 20% of Fadama II Project and that recorded during the impact assessment study conducted in the state. The result of the LP paradigm revealed that only two of the six enterprises entered the programme, these enterprises were sole rice and vegetables enterprises. The study recommends intensive advisory services activities on effective resource allocation, utilization and other ways of increasing farmers’ beneficiary income and to also develop a renewed interest by the government in dry season production by strengthening support and public-private partnership so as to boost production and win niche markets with a challenge of making better markets for farmers, while at the same time ensuring that production technologies adopted is more environmentally sustainable.

REFERENCES