ANALYSIS OF PROFITABILITY IN SMALL SCALE MAIZE PRODUCTION IN BORNO STATE, NIGERIA

1Tahir, A.D. 2Suleiman, A and 1Shettima, B.G.
1Department of Agric. Economics, Faculty of Agriculture, University of Maiduguri, Borno State, Nigeria.
2Department of Agricultural Economics and Extension, Bayero University Kano, Nigeria.
07039271418/tahirdori@gmail.com

Abstract

The study analyzed small scale maize production in Borno State, Nigeria. One hundred and twenty small scale maize producers were selected for the study using multistage sampling procedure. Data were collected using structured questionnaire. The data were analyzed using budgetary technique and descriptive statistics. Gross margin was used to determined profitability while constraints faced by small scale maize producer were described by percentages and means. The result showed that the labour cost accounted for about 40.19% of the total cost of production. Cost of seed accounted for 5.00%, cost of fertilizer accounted for 36.06%, cost of herbicide accounted for 9.62%, cost of transportation accounted for 3.27% and cost of bags accounted for 5.77%. On the average, it cost ₦52,000/ha to cultivate maize in the study area. An average of ₦136,500/ha accrues to a farmer as the revenue, and ₦84,500 is left as the gross margin. The result further indicated that, the operation ratio was 0.38 and the return per naira invested was 1.63. Constraints faced by small scale farmers were high cost of production inputs 93.10%, poor access to credit 72.40% and insecurity 64.70%. The study concludes that small scale maize production in the study area was profitable and the major constraint faced by small scale farmers was high cost of production input. Therefore, it was recommended that government should ensure tight and adequate security in order to boast agricultural sector in north eastern part of Nigeria and government should also subsidize the production inputs.

Keywords: Profitability, Gross Margin, Small Scale Farmer, Maize Production, Borno State

Introduction

Nigeria with a population of over one hundred and eighty million people is the Africa’s most populous nation and agriculture is the predominant activity (Daniel, 2013). Agriculture is traditionally the mainstay of many developing countries, Nigeria inclusive as it plays multiple roles in the development of the economy, Agricultural sector was the major source of national income, foreign exchange, employment and contributor to the Gross Domestic Product (G.D.P) and it employs about 70 per cent of the rural working population (Joshua and Teli, 2010).

Agricultural sector still remains the major source of food and raw materials for the teeming population and domestic industries and had sustained the growth of the Nigerian economy for decades. However, Nigerian agriculture is characterized by small scale farm, low farm income, low level of capacity and primitive techniques of production (Obadun, 2008). While it is widely recognized that, the development of agriculture is one of the crucial requirement for the overall economic growth, there is little consensus with respect to most appropriate strategy for securing increase farm output and productivity in developing agriculture. Moreover, as a result of the seasonal nature of production, government opted to embark upon various strategies aimed at ensuring production of crops (Makama, 2006).

Maize (Zea mays L.) is a versatile crop with wide adaptations, it can be produced in large volumes in small area, it is easy to grow and harvest, is readily storable over the seasons and has multiple uses. Maize can be suitably intercropped with potatoes, grain, legumes and variety of other vegetables which enhance effective land utilization. Maize has multiple uses and the green stover is an excellent fodder for cattle in the critical feed storage months. Maize stover produces an average of 6.89 t/ha of dry matter, which is good enough to feed up to 5 adult cows for about five months (Dukpa and Rai, 2006). Maize by product from processing is also important source of feed for backyard piggery and poultry. Maize is a nutritious crop and a wholesome food. On average maize kernel contains about 71% starch, 9.9% protein and 4.45% fat (Ikem and Amusa 2004).

A key feature of the Nigerian Agriculture is the dominance of small scale farms, which constitute an important component of the Nigerian economy. It is a known fact that over 12million farmers, scattered in different ecological zones, engage in the production of a wide variety of arable crops and this is done under traditional subsistence agriculture.
Individually, while not exerting much influence, they collectively form an important foundation on which the nation’s economy rests (Olayemi, 2008, Okuneye, 2006). Louise (2003) reported that 90% of the Nigerian total food production comes from these small scale farms. Therefore, effective economic development strategy will depend critically on promoting production and output growth in the agricultural sector, particularly among small scale producers since they are responsible for the bulk of the nation’s agricultural production.

In spite of the great potentials of maize farming in the State, factors such as low technical knowledge of maize farmers, high cost of production inputs and insufficient fund to finance their farming activities such as payment for hired labour, have constrained its contribution to increased food supply and poverty reduction. Information obtained from this study would be very useful to potential maize producers as well as researchers and students in the field of agricultural economics and other related discipline. The specific objectives of the study were to estimate costs and return in small scale maize production and described the constraints associated with small scale maize production.

Methodology

Study Area

The study was carried out in Borno State which is located in the extreme north-eastern corner of Nigeria. The State has a land area of 73,273 km² and roughly lies between latitudes 11°09' and 11°45' North of the equator and longitudes 11°50' and 13°09' East of the Greenwich meridian (Daura, 2001; BOSADP, 2003). The State share international borders with Niger Republic in the North, Chad Republic in the North-east, and Cameroon Republic in the East. Within the country, Borno State shares boundaries with Adamawa State to the South, Yobe State to the West and Gombe State to the South-west therefore; the State has potentials for interstate and cross boarder trade on agricultural commodity. Nigeria’s National Population Census (NPC, 2006) gave the population of Borno State to be 4,151,193 with an annual growth rate of about 3.5 per cent. The projected population of 2017 as 6,452,110.

The study area is made up of 27 Local Government Areas (LGA) spread over three Agro-Ecological Zones (AEZs), namely: Sahel in the north, Sudan in the middle and Guinea Savannah in the Southern part of the state (Joshua and Teli, 2007). Borno state is hot climate for most part of the year especially in the Northern part of the state, while the southern part is slightly milder in climatic temperature. The rainy season varies from the extreme north to the southern part of the state with the former having about 450mm per annum while the latter records about 1000mm per annum (Daura, 2001; Odo and Oleghe, 1998). Therefore, the rainfall and vegetation in state favours maize production.

On the basis of rainfall and vegetation, states in Nigeria have more than one Agro Ecological Zones. Borno State is divided into three major AEZs (Table 1); namely: Sahel savannah, the Sudan savannah and the Guinea savannah (Joshua and Tile, 2007). There is however, no clear cut boundary; rather, the zones gradually merge into the next.

Agriculture is the main stay of the economy of Borno State. Crops grown reflect the nature of the agro-ecological zones. The major crops cultivated include millet, sorghum, groundnut, maize, cowpea, and vegetable (onion, pepper, tomatoes etc) through irrigation. The major livestock reared in the area are cattle, camel, sheep, goats and poultry.

<table>
<thead>
<tr>
<th>Agro ecological Zone</th>
<th>Local Government Areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sahel savannah</td>
<td>Abadam, Dikwa, Jere, Monguno, Mafa, Kala Balge, Ngala, Nganzai, Marte, Magumeri, Gubio, Guzamala, Kukawa, Mobbar.</td>
</tr>
<tr>
<td>Sudan savannah</td>
<td>Damboa, Gwoza, Bama, Konduga, Maiduguri and Kaga.</td>
</tr>
<tr>
<td>Guinea savannah</td>
<td>Chibok, Biu, AskiraUba, Hawul, Bayo, Shani and Kwayakusar.</td>
</tr>
</tbody>
</table>
Sampling Procedure

Multi-stage sampling technique was used to select the farmers for this study. Borno State comprises 27 LGAs which are spread among fairly distinct AEZs, namely the Sahel savannah, the Sudan savannah and the Guinea savannah. Thus, the State was stratified based on the prevailing AEZs. The first stage of the sampling was a purposive selection of guinea savannah due to high production of maize grain in the area. At the second stage, a random selection of Biu and Hawul from guinea savannah by ballot box method. The third stage involves random selection of 4 villages from each L.G.A making a total of 8 villages that were sampled, the villages were Yawi, Galdimare, Dugja and Zarawuyaku from Biu L.G.A, while Shafa, Marama, Kida and Kwajafa from Hawul L.G.A. At the final stage, 10% of the number of registered farmers from the villages were randomly selected. Therefore, a total of 120 farmers were selected to serve as the sample size for the study.

Table 2 Sampling Frame and Size

<table>
<thead>
<tr>
<th>Selected LGAs</th>
<th>Selected villages</th>
<th>NO of registered farmers</th>
<th>10% of the NO of registered farmers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biu</td>
<td>Zarawuyaku</td>
<td>181</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>Dugja</td>
<td>140</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>Yawi</td>
<td>160</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>Galdimare</td>
<td>150</td>
<td>15</td>
</tr>
<tr>
<td>Hawul</td>
<td>Shafa</td>
<td>147</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>Kida</td>
<td>152</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>Marama</td>
<td>98</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Kwajafa</td>
<td>172</td>
<td>17</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>1200</strong></td>
<td><strong>120</strong></td>
</tr>
</tbody>
</table>

Source: field survey, 2016

Sources of Data

Data for the study were collected with the aid of structured questionnaire by the researcher and with the assistance of trained enumerators. Data on Costs and return in maize production and constraints in small scale maize production were collected.

Analytical Technique

Both descriptive statistics and budgetary technique were used to analyze the data in the study area.

Budgetary Technique

The gross margin analysis involves evaluating the profitability of an individual enterprise. It is a very useful planning tool in situation where fixed capital is a negligible portion of the farming enterprise (Olukosi, 2008). Gross margin by definition is the difference between the gross farm income (GI) and the total variable cost (TVC).

\[ GM = GI - TVC \]

Where

\[ GM = \text{Gross margin (N)/ha} \]
\[ GI = \text{Gross income (N)/ha} \]
\[ TVC = \text{Total variable cost (N)/ha} \]

Gross income also called total value of production, it is a total physical production multiplied by the unit price of the product.

Gross ratio

The gross ratio was also used to determine the total farm cost of the gross income. The gross ratio (GR)
is the total farm expenses (TFE) divided by the gross income (GI) i.e
\[ GR = \frac{TFE}{GI} \] eqn2

**Operation ratio**

Operating ratio measures the solvency of the farm. A ratio less than one is desirable because it indicates that the farm is making profit. A ratio of one implies break even and ratio greater than one implies a loss (Olukosi and Erhabor, 2008). According to Musa et al. (2006), the lower the ratio (<1) the higher the profitability of the farm business.

It is mathematically express as:
\[ OR = \frac{TVC}{TR} \] eqn3

Where

\[ OR = \text{Operating ratio/ha} \]
\[ TVC = \text{Total variable cost/ha} \]
\[ TR = \text{Total revenue/ha} \]

Not only that, but also the return for every naira invested was measured so as to determine the profitability of the business i.e.

**Return per Naira Invested**

\[ \text{Return per Naira Invested} = \frac{GI}{TVC} \]

Where

\[ GI = \text{Gross farm income/ha} \]
\[ TVC = \text{Total variable cost/ha} \]

**Descriptive Statistics**

Descriptive statistics such as frequencies and percentages were used to describe constraints associated with small scale maize production.

**Result and Discussion**

**Estimation of Costs and Return of Small Scale Maize Production**

As revealed in the previous section, Maize farming may not be for the purpose of only satisfying the household food need. The farmers may be interested in selling their output to raise income. Thus, the farmers like any other entrepreneurs would be interested in the profitability of the farm enterprise. For this reason, effort was made to determine the costs associated with maize farming and revenue that accrue to the farmer’s efforts.
Table 3: Estimation of Costs and Return on Small Scale Maize Production.

<table>
<thead>
<tr>
<th>Costs and Return</th>
<th>Quantity/Ha</th>
<th>Value (₦/ha)</th>
<th>%TVC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seed</td>
<td>7kg</td>
<td>2,600</td>
<td>5.00</td>
</tr>
<tr>
<td>Fertilizer</td>
<td>125kg</td>
<td>18,750</td>
<td>36.06</td>
</tr>
<tr>
<td>Herbicide</td>
<td>5ltr</td>
<td>5,000</td>
<td>9.62</td>
</tr>
<tr>
<td>Transportation</td>
<td></td>
<td>1,700</td>
<td>3.27</td>
</tr>
<tr>
<td>Bag</td>
<td>20bags</td>
<td>3,000</td>
<td>5.77</td>
</tr>
<tr>
<td>Land preparation</td>
<td></td>
<td>5,000</td>
<td>9.62</td>
</tr>
<tr>
<td>Planting</td>
<td></td>
<td>1,200</td>
<td>2.30</td>
</tr>
<tr>
<td>Fertilizer application</td>
<td></td>
<td>2,500</td>
<td>4.81</td>
</tr>
<tr>
<td>Weeding</td>
<td></td>
<td>6,000</td>
<td>11.53</td>
</tr>
<tr>
<td>Harvesting</td>
<td></td>
<td>3,600</td>
<td>6.92</td>
</tr>
<tr>
<td>Spraying</td>
<td></td>
<td>2,650</td>
<td>5.01</td>
</tr>
<tr>
<td>Total cost of labour</td>
<td></td>
<td>20,950</td>
<td>40.19</td>
</tr>
<tr>
<td><strong>Total variable cost</strong></td>
<td></td>
<td><strong>52,000</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

**Revenue component**

- Average output kg/ha: 1000kg
- Average price ₦/kg: 136.50
- Total revenue: ₦136,500
- Gross margin: ₦84,500
- Operating ratio: 0.38
- Return per naira invested: 1.63


The result in table 2 indicated that labour cost accounted for about 40.19% of the total cost of production, cost of seed accounted for 5.00%, cost of fertilizer accounted for 36.06%, cost of herbicide accounted for 9.62%, cost of transportation accounted for 3.27% and cost of bags accounted for 5.77%. On the average, it cost ₦52,000/ha to cultivate maize in the study area. An average of ₦136, 500/ha accrues to a farmer as a revenue, and ₦84,500 is left as gross margin. At farm level, the gross margin analysis indicates that maize production is profitable in the study area. This result agrees with that of Ogaji (2010), who indicated that maize production is profitable in Kogi State with a gross margin of ₦79,000.

The result indicated that the operating ratio is 0.38 which reveals that maize production in the State is profitable. This result agreed with the finding of Musa et al., in Maiduguri Metropolitan Area of Borno State (2006), Onoji (2001) in Idah of Kogi State, Ogaji (2010) in Kogi State and Olukosi et al (2006),
where they stated that the lower the operation ratio, the higher the profitability of the farm enterprise and vice versa. Given the magnitude of this ratio, it can be said that maize production at farm level is a profitable venture in the State. The return per naira invested was 1.63, implying that for every naira invested there is a return of ₦1.63. This finding is slightly higher than the findings of Usman (2009) in Jigawa State, where he found total variable cost of ₦28,657.6 per hectare and return per naira invested of ₦1.54 and also tallies with that of raw material research development, (2004) who reported a return per naira invested of ₦2.62.

Yusuf et al. (2010) used gross margin technique in determining the profitability of improve maize variety production in sabonGari Local Government of Kaduna State and found farming of improve maize variety to be profitable. The result indicated that labour cost accounted for about 43.12% of the total cost of production. Cost of seed accounted for 7.21%, cost of fertilizer accounted for 4.39%, cost of herbicide accounted for 9.81%. On the average, it cost ₦59,000/ha to cultivate maize in the study area. An average of ₦147,500/ha accrue as a revenue, and ₦88,500 left as the Gross margin. It indicates that maize production is profitable in the study area.

### Constraints in Small Scale Maize Production

Problems faced by maize producers in the study area were ranked according to their severity as stated by the farmers in table 3 below.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Frequency*</th>
<th>Percentage</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>High cost of production inputs</td>
<td>108</td>
<td>93.1</td>
<td>1st</td>
</tr>
<tr>
<td>Poor access to credit</td>
<td>84</td>
<td>72.4</td>
<td>2nd</td>
</tr>
<tr>
<td>Insecurity</td>
<td>75</td>
<td>64.7</td>
<td>3rd</td>
</tr>
<tr>
<td>Poor extension services</td>
<td>70</td>
<td>58.5</td>
<td>4th</td>
</tr>
<tr>
<td>Inadequate infrastructure</td>
<td>52</td>
<td>44.8</td>
<td>5th</td>
</tr>
</tbody>
</table>

Source: field survey, 2016

*Multiple responses.

High cost of production input was the most serious problem with about 93.1% of the small scale maize producers attesting to this fact. While poor access to credit was ranked 2nd (72.4%) based on the reason that most of the farmers associations in the study area were not formal therefore, don’t have access to financial institution. Insecurity, poor extension services and inadequate infrastructure were ranked third, fourth and fifth respectively. These problems can drastically reduce the impact of maize production, thereby affecting their household livelihood. Usman (2009), reported that the major constraints faced by maize producers in Jigawa State include high cost of production input, poor access to credit among others.

### Conclusion and Recommendation

The study has established that small scale maize production in the study area was profitable with a positive gross margin per hectare and also showed that high cost of production input was the major constraint faced by small scale maize producer in the study area. The study recommended that government should ensure tight and adequate security to encourage production and government should subsidize production input.

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