

Economic Analysis Of Maize Production In Aniocha North Local Government Area, Delta State, Nigeria

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Abstract

The study specifically sought to determine the economics of maize production in Aniocha North Local Government Area, Delta State, Nigeria. Multi stage sampling procedure was used to select forty (40) households that participated in the study. Descriptive and inferential statistical tools were used to determine the economics and profitability of maize production in the study area. Findings indicate that average age was 47 years while the minimum and maximum age range was 21-30 and above 50 respectively. Gender distribution of the respondents indicates that 36 (90%) were male while 4 (10%) of them were female. Marital status of the household studied indicates that majority (37) representing 92.5% were married and living together with their family while 25% (1) were single and 5% (2) were either widow or widower. Twenty (50%) of the household examined had one form of education or the other. Mean household size was 10. The study indicates that average output was 55 bags (2750kg) with a mean profit of ₦2,822.73 indicating a loss. The result also indicates that a total income of ₦4,400,000.00 was generated with a Net profit margin of ₦112,909.00. A further investigation shows that for every ₦1.00 invested in maize production, there was a loss of ₦3.84. This implies that maize production is not profitable in the study area.

Keywords: Maize, profitability, variable cost, total cost and fixed cost

INTRODUCTION

The term maize was derived from a Spanish name after Taino Mahiz (Zea Mays), the crop is known in many English speaking countries as Corn or Mielie/Mealie, it is a grain domesticated by indigenous people in the Meso America in Pre-historic time.

The leaf stalk produces ears which contain seeds called karnnels. Though technically a grain, maize karnnels is used in cooking as vegetable or starch.

Maize should be planted in well drained soil, sandy, loamy to clayey loam, which is rich in humans and plants nutrients (Anyanwu, *et al* 1979). The soil should be alkaline or almost neutral. Maize does poorly on heavy soil, sandy, or gravelly soils. It requires a minimum temperature of 10oc and maximum of about 33°C to 34°C. The good performance of maize production does not depend so much on the amount of rain fall but on the distribution which ranges from 75cm per year. Maize has very low ability of extracting water from the soil, so it must have steady water supply during it critical growth period. Otherwise the performance of crop yield will be very poor. Hence, it is advised that planting time for early maize should be done in March or April, while late cropping of maize is August or September. The best Ph range for maize cultivation is between 5.5 and 8.0.

Maize production in Nigeria requires that the land must be cleared. Land clearing must be carried out with minimal displacement of the top soil. Sowing date is an essential component of crop management. Yield declines with lateness of planting after an optimum time, usually the start of the rains. For optimum production, maize should be planted in:

- (i) Forest zone-Mid April-second week of May
- (ii) Forest-savanna transition-Third week of April-third week of May.
- (iii) South Guinea Savanna last week of April-Third week of May
- (iv) North Guinea Savanna-Last week of May-first week of June.
- (v) Sudan Savanna-First two weeks of June.

An optimum plant population is essential for maximum yield in maize. A plant population of 53,333 plants /ha is recommended (Ikem and Amusa 2004). This is obtained with a 75cm x 50cm spacing at two plants per hole, or a 75cm x 25cm spacing at one plan per hole. Farmers are known to prefer wide spacing so as to afford easy movement for weeding and other operations.

For good growth and high yield, the maize plant must be supplied with adequate nutrients particularly Nitrogen, phosphorus and potassium (NPK). The quantity required of these nutrients particularly Nitrogen depends on the pre-clearing vegetable, organic matter contents, tillage methods and the light intensity (Kang 1981).

Weeding is an essential component in maize production. Weeds cause severe yield reduction in maize in Nigeria because they complete with the crop for nutrients, water and light. Weed control is the most expensive operation in traditional maize farming, since it is carried out manually. Often, the labour is too expensive causing many farmers to abandon weed control, thereby resulting in very low yields.

Although several diseases has been identified on maize in Nigeria (Fajemisin *et al* 1976; Oladipo *et al* 1993) only few of them significantly reduce maize yields. Such diseases are maize Rust, leaf Blight, maize streak, Downy Mildew, maize Mottle/Chlorotic stunt, Curvalatia Leaf Spot, Stalk and Ear Rots. In order to make maize farming economically feasible, resistant lines were breed and made available to farmers. With these efforts maize streaks, smut and rust have been kept under control.

Stem borers army worms, silk worms, grasshoppers, termites and weevils are the economically important insect pests of maize in Nigeria (Daramola 1991). Maize can be harvested dry or green. If maize is wanted green, it should be harvested soon after the silk has turn brown and if you want to harvest dry maize, you should harvest when the silk is completely dried up and the leaves and husk are also dried up. (Anyanwu 1997).

Maize could be well stored in airtight container. A heat absorbent surface could be used. The grain well dried will be brittle and hard and should not feel damp when hard plunged into the sun-heated products (Williams 2002).

METHODOLOGY

The study was conducted in Aniocha North Local Government Area, Delta State, Nigeria. Issele-Uku is the headquarter of the Local Government Area. It has an area of 406 Kilometer Square. The Local Government was carved out from erstwhile Aniocha Local Government Area in the default Bendel State in August 27, 1991. Aniocha North Local government Area is made up of seventeen communities with the total population of 104,062, made up of 52,448 male and 51,614 female by 2006 census figures (NPC 2006). The Local Government is subdivided into three Clans which include:

The Local Government lies roughly between Longitude $5^{\circ} 00'$ and $6^{\circ} 30'$ North, and Latitude $5^{\circ} 00'$ and $6^{\circ} 45'$ East. The study area is bounded in the North by Essan Northeast Local Government, Edo State; in the South by Aniocha South Local Government, Delta State; in the East by Oshimili North Local Government, Delta State and in the West by Ika Northeast Local Government Area, Delta State, Nigeria (Delta State Diary 2007).

The climatic and edaphic factors are favourable for agricultural production. Crops produced include but not limited to maize, yam, cassava, egusi (melon) and vegetables. Cash crops include kola nut, oil palm, pear, e.t.c. Among the livestock produced include poultry, piggery and small stock ruminant animals.

Data Collection/Analysis: Data for this study were collected through the use of well structured and pre-tested questionnaire. Data were collected by well trained enumerators. The data generated were analyzed using descriptive and inferential statistical tools. The descriptive tools used were mean, percentages and frequency tables. Gross margin analysis and return on investment were used to determine the profitability of maize. Abbott and Makeham (1980), defined Gross Margin as the difference between Gross Income earned and variable cost incurred. Erhabor (2005), defined Gross Margin as the difference between Total Revenue (TR) and Total Variable Cost (TVC) incurred by the farmer. Net revenue (Profit) margin is defined as the difference between Gross Margin and Depreciation.

Determination of Gross Margin and Net Profit (Erhabor 2005) is expressed as:

$$GM = TR - TVC$$

$$TC = TVC + TFC$$

$$NPM = GM - \text{Depreciation}$$

Where:

GM =Gross Margin

TR =Total Revenue (₦)

TVC =Total Variable Cost (₦)

TFC =Total Fixed Cost (₦)

NPM =Net Profit Margin

TC =Total Cost

Return On Investment (ROI)

The return on investment (ROI) is a measure of profitability of any given project. It was used in this study to analyse the return on investment of maize produced and sold (dry and fresh green) in the study area. Symbolically, it is expressed as:

$$\text{ROI} = \frac{\text{Net Profit}}{\text{Total Cost}} \times 100$$

RESULTS AND DISCUSSION

Socio-economic profiles of respondent: The socioeconomic characteristics of the respondents were examined under the variables: age, gender, marital status, level of formal education attained and household size.

Age of respondents: the mean age of the respondents from the survey was 47 years, while the minimum and maximum age range were 21-30 and above 50 respectively (Table 1). This indicates that youths are involved in maize production in the study area. It implies that youths are also involved in agriculture.

Gender of respondents: The distribution of respondents by gender is depicted in Table 1. Out of 40 households that participated in the study, 36 of them representing 90% were males while 4 of them which represent 10% were females. This indicates a dominance of male folks in maize production in the study area.

Marital status of respondents: Marital status of household examined indicates that majority (37) representing 92.5% were married and living together in the family while 25% (1) were single and 5% (2) were either widow or widower (Table 1).

Level of formal education attainment by the respondents: twenty (50%) of the respondents interviewed had one form of education or the other while 20 (50%) of them had no formal education. Ten (25%) and 6 (15%) of them completed and attained primary and secondary education respectively. However, 4 (10%) of them had a tertiary education. This implies that literacy level of the sampled respondents was average. **Household size of respondents:** household size is the number of persons under the same roof and feeding from the same pot with a household head (National Population Commission 2006). A detailed analysis shows that average household size was 10. Percentage distribution indicates that 5% (2) of the sampled respondents had household size of between 5 and 8, 30% (12) had household size of less than 4, while 15% (6) and 50% (20) have family size 9-12 and more than 13 respectively. Large

household size has been reported to have essential influences on the supply and availability of unpaid labour services, especially where maize production is labour intensive. Similarly, the availability of family labour depends largely on the household size and its age structure. Household size can have influence on the household expenditure on food, clothing and shelter. This implies that respondents would have the need for external financing outside personal savings to cater for farming activities and other purposes.

Table 1: Socio-Economic Characteristics of Respondents

CHARACTERISTICS	FREQUENCY	PERCENTAGE	MEAN
Age (categories)			
20 and below	0	0	
21-30	3	7.5	
31-40	8	20	
41-50	8	20	
51 and above	21	52.5	
Total	40	100	47
Sex			
Male	36	90	
Female	4	10	
Total	40	100	
Marital Status			
Single	1	2.5	
Married	37	92.5	
Divorced	0	0	
Widow/Widower	2	5	
Total	40	100	
Education (Categories)			
Non	20	50	
Primary/JSS III	10	25	
SSCE	6	15	
Vocational Edu.	0	0	
Tertiary	4	10	
Total	40	100	6
Household Size (Categories)			
4 and below	12	30	
5-8	2	5	
9-12	6	15	
13 and above	20	50	
Total	40	100	10
Use of Herbicides?			
Yes	28	70	
No	12	30	
Total	40	100	

Farming Exp. (Categories)			
15 and below	5	12.5	
16-30	4	10	
31-45	7	17.5	
46 and above	24	60	
Total	40	100	42
Farm Size (Categories)			
1 ha. and below	7	17.5	
2-3	20	50	
4-5	9	22.5	
6 ha. and above	4	10	
Total	40	100	3
Source of Fund:			
Personal savings	29	45	
Borrowed from friends/relative/ cooperation	22	34	
ISUSU	14	22	
Bank	0	0	
Ministry of Agriculture	0	0	
Total	*	*	
Source of Labour:			
Household Labour	6	13	
Hired Labour	39	83	
Commercial Labour	0	0	
Rotational Labour	2	4	
Total	*	*	

* Multiple responses-some of the respondents indicated that they used more than one source.

Source: Field Survey 2013

Some Inputs Used In Maize Production

- (a) Matches used for clearing, cutting down of trees and shrubs, weeding, harvest and planting. The machet cost from N750 to N1,800 with an average cost of N1,167.00. The live span is about five years.
- (b) **Hoes used for weeding:** These kinds of hoe are usually smaller in size compared to the bigger ones used for planting of cassava and yam. Some of the smaller hoes are sometimes known as African hoe or bent cutlass (referred to as 'Agor') in the study area. The weeding hoe costs about N300 to N700 with an average of about N553.00. This live span is about five years.
- (c) **Seeds:** This is preserved and treated maize seeds for the purpose of planting. Seeds cost about N40.00 to N60.00 per cup with the average cost of N56.00. The life span is one year.
- (d) **Fertilizers:** These are inorganic compound used to boost the soil fertility. Different types of fertilizers exist but the NPK compound fertilizer are the

most commonly used fertilizer in the study area. The fertilizer cost about N3,500 to N4,000 with an average cost of about N3,824.00.

- (e) **Bags:** These are of different types-the fertilizer bags, poultry bags and salt bags. They are of 50kg in size and are used for easy conveyance of maize from farm to place of sale or need. Their cost ranges from N80.00 to N100.00 with the average cost of N97.00. The life span is about eight months.
- (f) **Herbicides:** This is commonly known as weed killers. Herbicides are chemicals used to kill unwanted plants/weeds. Selective herbicides kill specific targets, while leaving the desired crops relatively unharmed. It act by interfering with the growth of the weed and are often synthetic “imitation” of plant hormones. Their cost ranges from N800 to N1,000 per-bottle with the average cost of N817.00.
- (g) **Sprayer (Calibrator):** This is an accurately calibrated tools used for the application of liquid fertilizer, herbicides, pesticides. It is a four gallon backpack and it is very light weighted but durable. The cost of the sprayer ranges from N4,000.00 to N5,000.00 with average cost of N4,776.00. The life span is about eight years. The salvage value was assumed to be done at the end of useful life. This is shown in the Table 2.

Table 2: Depreciated value of input used in maize Production

S/N	Inputs	No	Unit cost (₦)	Total cost (₦)	Life span (Years)	Depreciated value (₦)
i.	Machetes	127	1,167	148,209	5	29,641.8
ii.	Weeding hoes	137	553	75,761	5	15,152.2
iii.	Seeds	193		56	38,808	38,808
iv.	Fertilizers	17	3,824	65,008	1	65,008
v.	Bags (empty)	314	97	30,458	0.67	45,459.7
vi.	Herbicides	550	817	449,350	0.33	1,361,666.7
vii.	Sprayers	29	4,776	138,504	8	17,313
Total Depreciation Value						₦1,573,049.4

Source: Field survey 2013

Net Profit Margin (NPM) and Return On Investment

Kay (1986) referred to budgeting as a tool used to select the most profitable plan from number of alternatives and test the profitability of any proposed change in plan.

In this study, the profitability (economics) of the maize production was analyzed by computing the value of output of all the respondents for the period of one year and the net change in farm income was estimated by computing the net profit.

For the purpose of uniformity ease of comparison and evaluation, the current price was used to determine the net farm income and losses were computed by finding the differences in the value of the output for the given period. Table 3 shows the estimated value of output, annual income, expenses and losses.

In order to estimate the Net Farm Income (i.e. Profit) or Net Margin, Cost items, average annual yield and income were estimated and analyzed using Net Profit

Margin analysis. The cost items were made up of the Variable Cost and Fixed Cost. The Fixed Cost items include the cost of acquiring farm land, the cost of all tools used. The Variable Cost items include the cost of purchasing seeds, fertilizers, herbicides, bags, labour cost and the cost of transportation.

The study indicates that average output was fifty five bags (2750kg) with a mean profit of ~~₦~~2,822.73 indicating a loss. The result (Table 3) also shows that a total income of ~~₦~~4,400,000.00 was generated. A further investigation shows that a Net Profit Margin of ~~₦~~112,909.00 was realized. The result indicates a negative value and a decline in productivity. This implies that maize producers in the study area are not making profit.

Table 3: Estimated value of output income, expenditure, losses and NPM

Output (bags)	Average output	Price	Income
2,200	55	2,000	4,400,000
Variable cost (VC)			
Seeds (cup)		₦ 39,080	
Hired labour (man day)		₦1,385,280	
Household Labour (Man day)		₦ 172,350	
Fertilizer (Kg)		₦ 65,000	
Herbicides (MM)		₦ 449,200	
Bags (kg)		₦ 30,310	
Transportation cost		₦ 356,350	
Total Variable Cost (TVC)		₦2,497,420	
Fixed cost (FC)			
Matchet		₦143,200	
Weeding hoes		₦75,740	
Sprayer		₦138,500	
Land acquisition		₦80,000	
Total Fixed Cost (TFC)		₦442,440	
Average Fixed Cost (AFC)			
TFC			
AFC=-----			
n			
where n=Number of respondents			
Given			
TFC=442440			
n=40			

$$\text{AFC} = \frac{442440}{40} = 11,061$$

AFC = N11,061

Average Variable Cost (AVC)

$$\text{AVC} = \frac{\text{TVC}}{n}$$

where n = Number of respondents

Given that
 TVC = 2,497,420.00
 n = 40

$$\text{AVC} = \frac{2497420}{40} = 62435.5$$

AVC = N62435.5

Total Cost (TC)

$$\text{TC} = \text{TVC} + \text{TFC}$$

TVC =	N2497420
+ TFC	= N442440
Total Cost	= N2939860

The total expenses for all respondents is **N2939860**

Gross Margin (GM)

$$\text{GM} = \text{TR} - \text{TC}$$

$$\text{GM} = 4,400,000 - 2939860$$

GM = 1,460,140

Net Profit Margin (NPM)

$$\text{NPM} = \text{GM} - \text{Depreciation}$$

$$\text{NPM} = 1460,140 - 1,573,049$$

NPM = -N112,909

Average Net Profit Margin (AVNPM)	
-N112,909	
AVNPM=-----	= -N2,822.73
40	
Average Net Profit=-N2,822.73	

Source: Field Survey 2013.

RETURN ON INVESTMENT (ROI)

Table 4: Return On Investment of Maize Production in the Study Area

Net Profit	
ROI=-----x 100	
Total Cost	
Net Profit =	-N112,909
Total Cost =	N2939860
-112,909	
ROI=-----x 100	
2939860	
ROI=-N3.84	

Source: Field Survey 2013.

Return on investment was determined (Table 4). The result indicates that for every N1.00 invested in maize production, there is a loss of about N3.84. This implies that maize production is not profitable in the study area. It also implies that maize farmers are faced with various challenges that may tend to limit their production capacity.

Challenges to maize production

Respondents interviewed were confronted with a number of challenges which tend to limit their production capacity, reduce their level of participation in large scale production of maize and consequently retard expansion on investment in farm and agro-allied business.

The major challenges are shown in Table 5.

Table 5: Distribution of Respondents according to the major challenges encountered in maize production.

CHALLENGES	FREQUENCY	PERCENTAGE
Market Uncertainty	39	23
Inadequate Finance	38	22
Poor quality of seeds	0	0
Use of crude implements/tools	18	11
Inadequate labour supply	10	6
High cost of labour	22	13
Inadequate storage facilities	23	14
Poor access road	20	12
Total	*	*

**Multiple response-some respondents indicated more than one challenge.*

Source: Field Survey 2013

The major challenges encountered by the maize producers in the study area which tend to reduce their productivity and at the same time reduce income and profit realized from the sales of the proceeds as was identified by the respondents include market uncertainty which was considered to be a major challenge by twenty three percent of the respondents. Twenty two percent of the respondents reported inadequate finance as one of the challenges encountered in maize production. Eleven percent, six percent, thirteen percent, fourteen percent and twelve percent indicated use of crude implements/tools, inadequate labour supply, high cost of labour, inadequate storage facilities and poor access road as major challenges to maize production respectively.

CONCLUSION

The study established that average output was 66bags (2750kg) with a mean profit of N2822.73 indicating a loss. The result also established that a total income of N4,400,000 was generated with net profit margin-N112,909.00. The study was able to reveal too that for every N1.00 invested in maize production, there is a loss of N3.84 indicating that maize production in the study area is not profitable.

POLICY RECOMMENDATION

Following the result of the study, a number of policy implications arose and appropriate recommendations are made. Since fixed cost items account for the greater percentage of total cost of production, it is therefore recommended that maize producers should form cooperative societies and pull their resources together with a view to maximizing profit. The result also shows that input is greater than the output and consequently income. This implies that maize producers in the study area are not breaking-even. It is recommended that enlightenment campaign on modern and cost

reducing methods of maize production should be carried out. The multiplier effect of this is a consequent increase in return on investment and a boost in productivity.

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