

ECONOMICS OF MAIZE (ZEA MAYS) PRODUCTION IN IVO LOCAL GOVERNMENT AREA, EBONYI STATE, NIGERIA

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ABSTRACT

The study evaluated the economics of maize Production in Ivo Local Government Area of Ebonyi State, Nigeria. The specific objectives were to describe the socio-economic characteristics of the maize farmers, estimate the profitability in maize production, determine effects of socio-economics characteristics on the maize output and to identify the constraints to maize production in the study area. Data was collected with the aid of a structured questionnaire that were administered to the respondents. A multi-stage sampling method was adopted in generating data from the respondents. In the first stage, 4 communities was selected from five(5) communities. In the second stage, two (2) villages were randomly selected from each of the four(4) communities. These brought to total of eight(8) villages. In third stage, ten (10) maize farmers were selected from each of the eight(8) villages and this brought to a total of 80 farmers for the study. Descriptive statistics such as percentages and frequency distribution were used to achieve objectives i and iv, multiple regression analysis was used to analyse Objective III, while objective II which is profitability in maize production was analysed using gross margin analysis. The result of the regression analysis revealed that the output of small-holder maize farmers were influenced by age, educational level, annual income, extension visit and farm size. The result of The gross margin revealed that a total amount of ₦5,200,000 was earned from a hectare of maize farm with a benefit-cost ratio of 2.27. This by implication shows that for every ₦1.00 spent, there was a corresponding profit of ₦2.27. Nevertheless pest and disease attacks, poor storage facilities, high cost of labour, poor access to fund were the problems militating against maize production in the study area; There is need to enhance farmers' access to credit facility at moderate interest rate, labour saving devices, pest and disease control measures, farming inputs at subsidized rate and training and educational programmes.

Keywords: Economics, maize, production, Net Farm Income, Nigeria

INTRODUCTION.

Agriculture in Nigeria is dominated by small-holder farmers who are engaged in the production of the bulk of food, maize inclusive requirement of the country (Mgbenka and Mbah, 2016). This farming class according to Ogunsumi, Ewuola, and Daramola, (2005) share similar characteristics, include limited fund to purchase inputs, consumes the major portion of their produce with little or nothing for marketing, the level of technology is based towards low risk, low production traditional techniques leading to low productivity, lack of collateral to procure loans from financial institution and farming methods that is basically subsistence. Other characteristics, included use of crude and primitive tools, labour is rarely hired since family labour is predominantly used, limited non-farm opportunities and improper management abilities (Okoye, *et al*; 2004).

Maize is the third most important cereal in the world next to rice and wheat, and has the highest production potential among the cereals (Prathyusha, Hemalatha, Sridhar and Sharana, 2013). In Nigeria,

maize consumption is widespread across the households with its consumption as at 2017 stood at 10.9 million metric tons (Food Agriculture Organization, (FAO), 2017). It is consumed as household food (akamu and seed), and industrial processed food (flour and beverage) (World Atlas 2017). Other importance of maize, included source of employment, income, livestock feed and Domestic Product (GDP) (Issa, Kagb and Abdulkadis, 2010). Maize is the second most cultivated crop in Nigeria in terms of area harvested (5.8 million Ha, second to Cassava's 7.1 million Ha, (FAOSTAT, 2014). Nigeria is currently the tenth largest producer of maize in the world, and second to South Africa in Africa with an estimated 10.79 million MT in 2017 in about 561,397,29 hectare, representing 61% of total cultivable land. (FAO, 2017). Maize is grown in Nigeria under various cropping systems, as a single crop (most popular in Northern part) or in mixed cropping as found in the southern (Onuk, *et al* 2010). Indeed, maize crop started as a subsistence crop in Nigeria and has gradually risen to a commercial crop

on which many agro-based industries depend on as raw materials (Ogunsumi, *et al*; 2005).

Despite Nigeria high production volumes, its' average maize yield of 1.8 MT/Ha (FAOSTAT, 2014) is one of the lowest among the top 10 maize producers in Africa. It lags behind countries such as Egypt and South Africa where the yields are 7.7MT/Ha and 5.3MT/Ha respectively (FAOSTAT, 2017). The low yield issue could be attributed to poor quality of seed, high cost of agrochemicals, land fragmentation, poor cultural practices and among others (Olaniyan, 2013). All efforts by successive governments in Nigeria and Non-Governmental Organization(NGO), through engaging into researches, extension services and provision of improved quality planting materials, have not yielded the necessary dividends through enhancing farmers' production and productivity(Ibeagwa, Eriogun, Chikezie, Ukoh, Osuji, Uhuegbulem and Barnabas, 2018). The supply –demand deficit could be as result of combination of socioeconomic factors affecting small-scale farmers. While some of these factors are outside the control of the farmers, others are within their control. It is important to find out the extent to which certain factors constrain the efficiency levels of the maize farmers so that specific policies may be premeditated to improve farm productivity in the study area. This study tends to abridge this research gap, as to the best knowledge of the researcher, there is no such work in the study area.

Specifically, the objectives of the study are to

- (i)describe the socio-economic characteristics of maize farmers.
- (ii) estimate the profitability in maize production.
- (iii) determine the factors affecting the production of maize in the area.
- (iv) identify the constraints affecting maize farmers in the study area.

MATERIAL AND METHODS

Study Area.

The study was conducted at Ivo Local Government Area (LGA) of Ebonyi State, Nigeria. The LGA lies between latitudes 5° 43' and 5° 5' North of the Equator and longitudes 7° 29' and 7° 35' East of the Greenwich Meridian. The population of Ivo local Government Area is about 121363 with a land Area of 245km² (NPC,2006). Ivo Local Government Area is made up of five autonomous community namely; Ishiagu, Obinagu, Ovumte and Akaeze. Ivo Local Government Area is bounded in the North by Aninri and Agwu LGA's of Enugu State in the West by Umunneochi and Isikwuato LGAs of Abia State, in the East by Onicha LGA of Ebonyi State and in the South by Bende and Afikpo South LGAs in Abia and Ebonyi States respectively. Ivo LGA has its Headquarter at Isiaka in Ishiagu. It has an annual rainfall of about 1,200mm to 1,600mm and temperature range from 27°C to 33°C .. Ivo local

government area is endowed with mineral resources like limestone, granite, zinc etc. The crops cultivated in the area, included cassava, yam, maize, okro, melon,etc Also, rearing of animals like goat, sheep, poultry and pig are common.The other economic activities involved by the people are mining, carpentering, tailoring and vulcanizing (Odoh,2006)

Sampling Procedure and Sample Size.

Purposive and multi-stage sampling methods were adopted in selecting the communities, villages and respondents. In the first stage, 4 communities were purposively selected from five (5) communities based on intensive cultivation of maize in those places. The selected four communities chosen were Ishiagu, Obinagu ,Ovumte and Akaeze.In the second stage, two(2) villages were randomly selected from each of the four(4) communities. This brought to a total of eight(8)villages. In the third stage, ten(10)maize farmers were randomly selected from each of the eight(8) villages and these brought to a total of 80 farmers for the study.

Method of Data Collection

The data used for this study were derived from the use of structured questionnaire as well as personal interview schedule.The primary data were complimented with secondary data, gathered from textbooks, encyclopaedia, journals, newspapers, published and unpublished thesis, government publications and from the internet

Method of Data Analysis

Descriptive statistics such as percentages and frequency distribution Table were used to achieve objectives i and iv. Gross Margin was used to achieve the objective ii, while objective iii was captured using ordinary least square regression analysis.

Model Specification

Ordinary Least Square Regression Analysis.

This can be represented as

$$Y = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + b_7X_7 + b_8X_8 + b_9X_9 + b_{10}X_{10} + e_i \dots\dots\dots(1)$$

Where

Y=output of maize(kg)

X₁=Age of farmers(years),

X₂=Gender(dummy 1=male,0=female), X₃=Marital status(married 1,single 0),

X₄=Household size(number), X₅=Educational Level(number of years spent in

school),X₆=Extensionservices(Access;1,non-access,0),X₇=Farmsize(hectares),X₈=Labour

cost(High cost; 1otherwise; 0),X₉=Annualincome(Naira, X₁₀=Farming

experience(years), Ei=Error term

Four functional forms of the multiple regressions were employed in order to select the one that has the best fit. The functional forms tried were:

Linear function; $Y = b_0 + b_1 X_1 + b_2 X_2 + b_3 X_3 + b_4 X_4 + b_5 X_5 + e_i \dots\dots\dots(2)$

Double log function:- $\ln(y) = \ln b_0 + b_1 \ln x_1 + b_2 \ln x_2 + b_3 \ln x_3 + b_4 \ln x_4 + b_5 \ln x_5 + e_i \dots\dots\dots(3)$

Semi log ; $Y = \ln b_0 + b_1 \ln x_1 + b_2 \ln x_2 + b_3 \ln x_3 + b_4 \ln x_4 + b_5 \ln x_5 + e_i$ (4)

Exponential function ; $\ln Y = b_0 + b_1 x_1 + b_2 x_2 + b_3 x_3 + b_4 x_4 + b_5 x_5 + e_i$ (5)

The choice of the best functional form was based on the magnitude of the R^2 value, the high number of significance, size and signs of the regression coefficients as they conform to *a priori expectation*

Gross Margin Analysis

Gross Margin Model can be represented as

$GM = TR - TC$ (6)

$TR = Q \cdot P$

$NR = TR - TC$ (7)

$TC = TVC + TFC$ (8)

$BCR = TR / TC$ (9)

Where

GM=Gross Margin

TR=Total Revenue

TVC=Total Variable Cost

TFC=Total Fixed Cost

Q=Quantity of maize cob sold

P=Prevailing market price for maize cob

BCR=Benefit Cost Ratio

RESULTS AND DISCUSSION

Socioeconomic Characteristics of the respondents

Table 1: Distribution of respondents according to their socio-economic characteristics

Age	Frequency	Percentage
20-29	30	37.50
30-39	24	30.00
40-49	23	28.75
50-59	3	3.75
Total	80	100
Gender		
Male	29	36.25
Female	51	63.75
Total	80	100
Marital Status		
Single	30	37.50
Married	44	55.00
Widow	2	2.50
Widower	2	2.50
Divorced	2	2.50
Total	80	100
Household		
1-5	47	58.75
6-10	32	40.00
11-15	1	40.00
16-20	0	1.25
Total	80	100
Farm Size		
0.1-0.59	52	65.00
0.6-1.09	11	13.75
1.1-1.59	17	21.25
1.6-2.09	0	0.00
Total	80	100
Educational level		
No formal education	15	18.75
Primary	30	37.5
Secondary	25	31.25
Tertiary	10	12.5
Total	80	100
Farm Size		
0.01-1.00	30	37.5
1.01 – 2.00	20	25
2.01 – 3.00	10	12.5
3.01 – 4.00	10	12.5
4.01 – 5.00	5	6.25
> 5.00	4	5

Total	80	100
Farming Experience		
1 – 5	5	6.25
6 – 10	5	6.25
11 – 15	10	12.5
16 – 20	40	50
21 and above	20	6.25
Total	80	100
Extension services		
Access	30	37.5
No access	50	62.5
Total	80	100
Labour cost		
High	80	100
Low	-	-
Total		

Source: Field Survey, 2021

Table 1 shows that most of the sampled farmers (37.50%) were in between 20-29 years old, while the least, (3.75%) were between 50-59 years old. This implies that most of the maize farmers were youthful, innovative, creative and active, hence could among others supply the much needed labour in maize production. Also, majority (63.75%) were females, while 36.25%, were males. Maize production is looked as female crops in many traditional society in South east but recent economic recession, have forced males into its production, especially as intercrop. Similarly 55.00% of the maize sampled farmers were married, while the least proportion (2.50%) were widowed. The domination of married people in the study area implies more available labour to accomplish farm work as married people are always expected to have members of household, all things being equal. This agreed with Girei *et al.*, (2018) who reported that married farmers tend to be more dedicated and possibly have a greater imperative for higher productivity in order to meet family demand for food, income and other basic family pressing needs.

Furthermore, .75% had household size of 1-5 persons, while the least (1.25%) had household sizes of 11-15 persons. This agrees with the findings of Sadiq *et al.*, (2013) and Ozor *et al.* (2010), who reported that a fairly large family size which implies that more labour available for the household farm activities which will increase their outputs. The table above also shows that the majority of the respondents (65.00%) had farm sizes of 0.1-0.59 hectares, while the least, (13.75%) had farm sizes of 0.6-1.09 hectares. This implies that farmers sampled from the study area were small holders, characterised of fragmented and scattered farms in many places. These situations could affect farm modernization leading to low outputs (Sadiq *et al.*, 2013). This is similar to the study of Ibeagwa *et al.*, (2018) in Ohaji/Egbema Local Government Area of Imo State,

Nigeria in which they reported that the majority of the farmers in the area do not farm up to 0.3 hectares.

Table 1 also revealed that 18.75% of the respondents had no formal education, the greatest majority (37.5%) attended primary school and only 12.25% attended higher institution. The high educational attainment in the study area is a desirable condition for agricultural development, since it augured well for extension services in transferring research result for sustainable food production (Isa, *et al.*; 2010). The result of farm size as well, indicated that majority (37.5%) of the farmers studied cultivated farm size ranged from 0.01 – 1.00, while the least (5%) cultivated above 5 hectares. This implied that maize production in the study area was at small scale. Ibeagwa *et al.*, (2018) reported that farm size played an important role in farm success because it reflects the availability of capital, access to credit and even good management ability. More so, the result of the maize farmers' years of farming experience reported that most (50%) of the respondents had farming experience of 16 – 20 years, while the least, 6.25% had 1 – 5 years and 6 – 10 years respectively. The number of years a farmer had spent in the farming business according to Okoye *et al.*, (2004) and Ajibefun and Aderinol, (2004) may give an indication of the practical knowledge he/she had acquired on how he/she can overcome certain inherent farm problems. As well, 37.5% of the respondents had contacts with extension agents, while the greater majority (62.5%) had no extension contact. The indication was poor extension outreach, which adversely affect innovation adoption, leading to poor farm output (Okoye, *et al.* 2004) Additionally, all (100%) of the respondents reported about high cost of labour. The cost of labour according to Ajibefun and Aderinol, (2004) contributes to more than 45% of total cost of production, especially in developing countries where farming is almost zero mechanized

Table 2: Estimation of profitability of Maize Production

Budget Items	Unit	Quantity	Unit Price	Total Cost(₦)
Revenue	Kg	4000	250	1,000,000
Variable				
Seeds	Kg	20	300	6000
Fertilizer	Kg	150	22000	66,000
Pesticides	Litre	3	4200	12,600
Labour	Manday			
Land Clearing	Md	14	2500	35,000
Tillage	Md	20	4,000	80,000
Planting	Md	7	1500	10,500
Weeding	Md	15	1800	27,000
Fertilizer Application	Md	15	1000	15,000
Harvesting/Bagging	Md	8	1000	8,000
Total Variable cost				260,100
Total Fixed Cost				25000
Total Cost=(TVC+TFC)				285,100
Gross margin(TR-TVC)				454,800
Net Farm Income(TR-TC)				714,900
Benefit cost ratio(TR/TC)				3.51

Source: Field Survey, 2021

Table 2 shows the result of profitability of maize production in Ivo Local Government Area of Ebonyi State. The result revealed that the total revenue (TR) was ₦1,000, 000, while the total cost (TVC+TFC) was ₦285,100. Labour costs constituted about 29.5% of total cost of production. High cost of labour could be linked to hyperinflation in the country, hence forcing farm labourers to charge high for sustenance. Net farm income was ₦714,900. The analysis also

showed that the benefit cost ratio is 2.51 indicating that for every ₦1 invested in maize production in the study area; a profit of ₦3.51k was realized. This finding agreed with Sadiq *et al* (2013), who reported a benefit cost ratio of ₦3.62 in Niger State. Thus it could be concluded from this study that though maize production is in a small scale, but its profitable high.

Determinant Factors Influencing Maize Output

Table 3: Socio-economic factors affecting production of maize

Variable	Linear	Exponential	Double log+	Semi-log
Constant	1.293(1.060)	0.170(0.382)	31.566(2.313)**	4.208(2.077)**
Age	0.183(0.907)	0.388(3.892)***	-3.949(-3.142)***	-0.335(-2.557)**
Gender	-1.408(-4.117)***	0.169(1.355)	0.547(0.143)	-0.017(-0.029)
Marital status	0.164(0.612)	-0.112(-0.143)	-2.100(-0.701)	0.394(0.887)
Household size	0.542(1.844)*	0.259(2.406)**	3.760(1.141)	-0.346(-0.708)
Educational Level	-1.166(-4.502)***	0.095(2.021)*	-2.896(-6.879)***	-0.268(-0.624)
Extension Service	-0.124(0.289)	-0.046 (-0.294)	4.796(3.828)***	-0.794(-1.927)*
Farm Size	-0.164(-0.593)	-0.103(1.017)	3.901(2.623)***	0.328(0.716)
Labour	1.178(3.308)***	0.071(0.528)	2.030(0.496)	-0.637(1.051)
Credit	-0.132(-1.279)	-0.053(-0.303)	6.432(1.998)*	0.785(2.055)**
Farm.Experience	1.322(2.626)**	0.184(14.154)***	-2.433(-0.432)	0.554(0.663)
R ²	0.641	0.595	0.710	0.478
F-Value	4.669***	3.292***	5.399***	3.444***

NB ***Significant at 1%, **Significant at 5%, *Significant at 10%

Source: Field survey, 2021.

Herein, the four functional forms of the ordinary least square regression model were fitted into the model and Double log regression functional gave the best fit, by having high R² value and highest number of significant. Hence, the model was chosen as the lead equation. The coefficient of multiple determinations (R²) was 0.710, indicating that 71.0 % of the variation in the output of maize were explained by the independent variables in the model,

while the remaining 29% were accounted by the error term. The F-ratio of the double log was significant at 1%

There was a negative relationship between the age of farmers and output of maize. Ibeagwa *et al.*, (2018) reported that as farmers start advancing in age, the less energetic and innovative he or she becomes, thereby resulting to low output. Also, there was a negative relationship between the level of

education of the farmers and output of maize. The implication is that farmers with low level of education could be less receptive to modern farming practical techniques and could therefore be less productive and efficient in resource utilization (Okoye *et al.*, 2004, Ajibefun and Aderinol, 2004). As well, relationship between extension services and output of maize showed a positive association. This implies that farmers who had access to extension services had better farm output compared to farmers that do not have access, as they are more inclined to having access to relevant innovations and sources of improved farm inputs (Ibeagwa *et al.*, 2018). Furthermore, there was a

positive relationship between farm sizes and the output of maize produced by the sampled farmers. This implies that as farm size increases, output of maize will also increase, all things being equal. This is similar to results of Onyebinama and Onyejelem (2010) and Onyeweaku and Effiong (2005), who reported that farm size affects adoption costs, human capital, and risk perception, hence influencing farmers' output. More so, access to credit was positive and statistically significant at 10% level of probability. Farmers' access to credit enhances their likelihood of boosting their farm output through procuring the necessary farm inputs required in the crop and at right time (Okoye, *et al.*; 2004).

Table 4: Distribution of Respondents According to Constraints facing Maize Production

Constraints	Frequency	Percentage	Rank
High Cost of Labour	54	67.50	2 rd
Unfavourable Climate	44	55.00	9 th
Poor access to credit	56	70.00	1 th
Pest and diseases attack	52	65.00	4 st
Poor storage facilities	53	65.25	3 nd
High cost of transportation	45	56.25	8 th
Low market Price	46	57.50	7 th
Neglect by the government	47	58.75	6 th
Illiteracy of farmers	27	33.75	10 th
Lack of good roads	50	62.50	5 th

*Multiple responses

Source: Field Survey, 2021

Table 4 shows the constraints faced by maize farmers in the study area. It was found that 70% of the respondents complained about poor access to credit. Similarly, Issa *et al.*, (2016) reported that poor access to credit as limitation to maize production in Niger State. They observed that poor access to credit to the farming population could be one of the reasons why agriculture remains in rudimentary, leading to food insecurity and poor living standard. This agrees with the finding of Nasiru (2010), who noted that access to credit has high propensity of improving the productivity of farmers and in furtherance of farmers' livelihood. Also, high cost of labour was followed, as reported by 67.50% of the sampled farmers. The high cost of labour could be as result of urban drift of youths for white collar job, leaving farming for aged parents and their children. Nevertheless, few of them that are left behind in the rural areas charges high prices to be par in terms of living standard with those in the urban area (Aduba *et al.*, 2013). Additionally, the least of the problems was illiteracy of the farmers, accounted for 33.75% of sampled population. The reason for the variable being counted as lowest in order of ranking may perhaps be to the fact that in farming, years of farming experiences counts more than educational attainment. This could be as result that with good extension education the farmers, especially illiterate ones, the problem of poor educational status could be

significantly minimized (Hyan *et al.*, 2008 and Tekana *et al.*, 2011).

CONCLUSION AND RECOMMENDATION

The study showed that extension visit, annual income and farm size had a positive influence on output of maize produced in the study area. Also, the study also confirmed that maize farming as a profitable venture because of its benefit ratio of 2.27. Furthermore, among the constraints to maize production in the study area were poor access to credit, high labour cost, pests and diseases and poor storage facility.

Based on the conclusion the following recommendations were proffered;

- (i), High cost of labour has been identified as among major constraints to farmers optimizing their profit. There is need to expose farmers to labour saving devices such as hand driven plough to curtail minimally cost of production.
- (II) Ensure credit access to farmers through micro credit institutions and other financial institutions.
- (III) Farm size was found to have positive influence on farmers' output. It becomes imperative that the land use Act of 1990 be reviewed to eliminate difficulties associated with land acquisition for agricultural purposes for genuine farmers.
- (iv) Extension agents should be motivated through payment of their salaries and allowances on time in order to make them to be alive yn their duties

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