PROFITABILITY OF MAIZE-BASED PRODUCTION IN UMUAHIA SOUTH LOCAL GOVERNMENT AREA OF ABIA STATE, NIGERIA

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Abstract

The study was designed to determine the profitability of maize-based production in Umuahia South Local Government Area of Abia State, Nigeria. The objectives were to describe the socio-economic characteristics of maize-based farmers in the study area, determine the effect of socioeconomic characteristics on quantity of maize output, determine the net income of maize-based farmers in the study area, and identify the constraints affecting the maize-based farmers in the study area. It involves a survey of 90 maize-based farmers in which three respondents were selected simple random sampling from 25 communities. Data analyzed using descriptive analytic tools such as tables, mean, percentages and frequency distribution. The result indicated that the average age of farmers were 22 and 23 years respectively having 55.5% of female farmers and 44.4% of male farmers while the farm size and household size has an average mean of 4.47ha and 6 persons respectively. The result of the gross margin analysis was N181,175.11 and that of the net farm income was N165,811.67. The double log functional form was chosen as the lead equation on the basis of "better fit" highest value of R^2 of 0.869 having more significant coefficient, highest F-ratio value of 9.140 and conformity to theoretical expectations of the regression coefficients. The major constraints identified in the production of maize were low soil fertility, land scarcity, lack of access to information of modern farming practices, high cost of labor, storage problem, unavailability of improved maize seed varieties and lack of technical support from agricultural extension services.

KEYWORDS: Maize based, production, profitability

1.0 Introduction

Maize *(Zea mays)* ranks third after wheat and rice in the world grain production. It is grown extensively with equal success in temperate, sub-tropical and tropical regions of the world (Wilson, 2020). It belongs to the grass family of Gramineae and originated from Central America where it is known as corn Gordon and Whitney, 2021. It is believed that maize was introduced into Africa and West Africa by the Portuguese at the beginning of the 16th century Onwueme, 2021. Its grains, which serve as food, feed as well as industrial raw materials contain carbohydrate in form of starch up to 80% and crude protein up to 10% (Mangel, 2021).

Maize crop is a key source of food and livelihood for millions of people in many countries of the world. It is produced extensively in Nigeria, where it is consumed roasted, baked, fried, pounded or fermented (Agbato, 2021). In advance countries, it is an important source of many industrial products such as corn sugar, corn oil, corn flour, starch, syrup, brewer's grit and alcohol (Dutt, 2019). Corn oil is used for salad, soap-making and lubrication. Maize is a major component of livestock feed and it is palatable to poultry, cattle and pigs as it supplies them energy (Iken *et al*, 2019). The stalk, leave, grain and immature ears are cherished by different species of livestock (Dutt, 2019). In spite of the increasing relevance and high demand for maize in Nigeria, yield across the country continues to decrease with an average of about 1/ha which is lowest African yield (Fayenisin, 2020).

2.0 Methodology

The study was carried out in Umuahia South local government area (L.G.A) in Abia State, South-east geopolitical zone of Nigeria. The headquarters of the Local Government Area (L.G.A) are in the town of Apumiri ubakala and the Local Government Area (L.G.A) shares borders with the Umuahia North, Isiala Ngwa, and the Ikwuano LGAs. Towns and villages that make up Umuahia South LGA include Amankwo, Ekenobizi, Ngodo, Ahiaukwu, Nsirimo, Omaegwu, Ezeleke umuokpara, Amakama olokoro, Umuopara, Old umuahia, Ohiocha, Ohiya, Eziama ubakala, Nsukwe ubakala, Amakama olokoro, Eluamana mgbedeala, Umuajata olokoro, Umuobia olokoro, Laguruna umuosu ubakala, Okwu olokoro, Umumba nsirimo, Umuosu alaocha, Abam alaocha ubakala, Umuanya ogbodi, Dim na opara, Umudere olokoro, Avonkwu olokoro, Umuntu olokoro, Itu olokoro, Amangwo olokoro, Umuokpara ozara, Uzi olokoro, Ipupe alaocha ubakala, Umuokorodo, Agbama olokoro, Umuihe umuokpara, Omaegwu, Alaoji amakama olokoro, Dikeukwu, Uturuisiala, Eluelu old umuahia, Erim nsirimo, Umuogo ubakala, Mgbarakuma ubakala, Umunwanwa, Ihenwekeala, Amuzu ubakala, Umutowe olokoro, Amizi-ekpe olokoro and Ubakala.

The estimated population of Umuahia South LGA after the 2006 census is put 183,590 inhabitants with the area majorly occupied by members of the Igbo ethnic group. The Igbo language is commonly spoken in the LGA while the religion of Christianity is widely practiced in the area. Festivals celebrated in Umuahia South LGA include the New Yam and the Ekpe Masquerade festivals. Umuahia south Local Government Area occupies a total area of 140 square kilometers (50 sq m^1) and lies within the rainforest zone. It's geographical coordinates are approximately 5.4623^0 N latitude and 7.4400^0 E longitude, the Local Government Area is stationed off the banks of the Imo River and has an average wind speed of 11 km/h. It lies between the tropical forest and is characterized by eight months and four months of the wet and dry season respectively. The average annual temperature is 26 ^{0}C, precipitation here averages 2153 mm.

Umuahia South Local Government Area has a vibrant trade sector with the area hosting a number of markets such as the Apumiri market where a variety of commodities are bought and sold. As a result of their fertile soil, members of the communities who are well known to be very hardworking have their primary occupation as mostly farming with crops such as yam, maize, and cassava grown in the area. Maize is among the staple food produced and consumed in the area by both farmers and consumers. Maize farmers in Umuahia South Local Government Area are involved in all the stages of maize production activities ranging from planting, harvesting, processing and marketing. Other important economic activities engaged in by the people of Umuahia South Local Government Area include food processing and animal rearing.

Umuahia South Local Government Area was created in August 1991 from the old Umuahia Local Government Area during the British colonial period with a postal code of 440.

3.0 Sampling Methods and Size

For the purpose of this study Multistage sampling technique procedure was used for the selection of 90 maize-based farmers in which three respondents were selected simple random sampling from 25 communities.

3.1 Model Specifications

The model is specified explicitly as follows: four functional forms of the regression was experimented, these are the linear, semi-log, double log and exponential forms which are expressed as follows;

Linear: $Y= \beta_o+\beta_1X_1+\beta_2X_2+\beta_3X_3+\beta_4X_4+\beta_5X_5+\beta_6X_6+\beta_7X_7+\beta_8X_8+e$

Double log: $\beta_o+\beta_1 \log X_1+\beta_2 \log X_2+\beta_3 \log X_3+\beta_4 \log X_4+\beta_5 \log X_5+\beta_6 \log X_6+\beta_7 \log X_7+\beta_8 \log X_8+e$

Semi-log Y: $\beta_o+\beta_1 \log X_1+\beta_2 \log X_2+\beta_3 \log X_3+\beta_4 \log X_4+\beta_5 \log X_5+\beta_6 \log X_6+\beta_7 \log X_7+\beta_8 \log X_8+e$

Exponential: $Y= \beta_o+\beta_1X_1+\beta_2X_2+\beta_3X_3+\beta_4X_4+\beta_5X_5+\beta_6X_6+\beta_7X_7+\beta_8X_8+e$

Where,

Y=*Profitability index*

β_o***= intercept***

β (123…...,8) = *regression coefficients to be estimated*

X (123…...,8) = *the explanatory variables*

The explanatory variables includes;

X1= Gender

X2 = Farm size

X3 = Farm experience

X4 = Age

X5 = Household size

X6 = Marital status

X7 = cost of labour

X8 = transportation cost

e = error term

4.0 Result and Discussion

Table 1. Demographic characteristics of the respondents.

Variables	Frequency(n=90)	Percentage	Mean
Gender			
Male	40	44.4	
Female	50	55.5	
Total	90	99.9	
Age(years)			
<30	15	16.6	
31-60	65	72.2	22 years
61 and above	10	11.1	
Total	90	99.9	
Marital status			
Single	17	18.9	
Married	62	68.9	
Divorced	7	7.8	
Separated	4	4.4	
Total	90	100	
Educational level			
No formal education	8	8.8	
Primary	21	23.3	
Secondary	30	33.3	
Tertiary	31	24.3	
Total	90	99.7	

Years of experience			
<10	67	74.4	
11-20	18	20	23 years
21 and above	5	5.5	
Total	90	99.9	
Farm Size			
<10	83	92.2	
11 and above	7	7.8	4.47 ha
Total	90	100	
Household size			
<5	47	52.2	
6-20	34	37.8	6 persons
21-32	3	3.3	
Total	90	93.3	

Source: Field survey, 2023.

Table 2. The profitability analysis.

Parameter	Amount (₦)
Variable Cost	
Seeds	35,500.74
Labor	6,283.92
Pesticides	10,800.00
Transportation	27,510.23
Total variable cost	80,094.89

Depreciation value of fixed items	63839.78
Total Cost (TVC+TFC)	95,458.33
Total Revenue (P×Q)	261,270.00
Net Profit margin (TR-TVC)	181,175.11
Net farm income (TR-TC)	165,811.67
Benefit Cost Ratio	2.74
Return on Investment ROI (GM/TC×100)	189.74

Source: Field survey, 2023.

Table 3. The regression analysis for the factors influencing the quantity of maize produced.

Variables	Linear	Double log	Exponential
(Constant)	1286549.300(3.888)***	1.7851(2.560)	3.5674(48.725)
Transport	0.064(0.608)	0.064(0.608)	-0.296(8.9373)
Age	-0.384(-2.931)***	-0.384(-2.931)**	-0.470(-2.250)**
Education	-0.272(-2.543)**	0.272(2.543)**	1.300(4.080)***
Experience	0.315(2.739)***	0.315(2.739)**	1.175(0.911)
Gender	-0.186(-1.822)	-0.186(-1.822)*	0.503(2.364)
Marital status	-0.301(-3.010)***	0.301(-3.010)***	0.742(1.380)
Labor (mandays)	-0.035(-0.369)	-0.035(-0.369)	-0.369(0.713)
Seed	0.477(4.378)***	0.477(4.378)***	1.414(0.2459)
Farm Size	-0.083(-0.8)	0.082(0.809)*	0.304(0.693)
R^2	0.450	0.869	0.614
F-ratio	5.829	9.140	7.012

Source: Field survey, 2023. R^2=0.869 F ratio=9.140 values in parenthesis are computed t-values ***significant at 1%, ** significant at 5%.

Table 4. the mean respondents on the constraints faced by maize farmers in the Umuahia South Local Government Area, Abia State.

Constraints	SA	A	SD	D	N	Mean	Standard Deviation
Pests and diseases infestation	38(41.8%)	40(44.0%)	1(1.1%)	11(12.1%)	90	1.70	0.726
Low soil fertility	2(2.2%)	19(20.9%)	15(16.5%)	54(59.3%)	90	2.72	0.983
High cost of labor	13(14.3%)	30(33.0%)	6(6.6%)	41(45.1%)	90	2.26	1.001
Lack of access to information of modern farming practices	17(18.7%)	29(31.9%)	14(15.4%)	30(33.0%)	90	2.32	1.090
Lack of technical support from agricultural extension services	31(34.1%)	32(35.2%)	8(8.8%)	19(20.9%)	90	2.03	0.965
Unavailability of improved maize seed varieties	21(23.1%)	34(37.4%)	19(20.9%)	16(17.6%)	90	2.22	1.169
Storage problems	11(12.1%)	32(35.2%)	8(8.8%)	35(38.5%)	90	2.22	1.056
Insufficient funds for new technology	32(35.2%)	36(39.6%)	4(4.4%)	18(19.8%)	90	1.89	0.880
Climate-change related issues	34(37.4%)	42(46.2%)	2(2.2%)	12(13.2%)	90	1.71	0.782
Land scarcity	10(11.0%)	29(31.9%)	30(33.0%)	21(23.1%)	90	2.58	1.254

Source: field survey, 2023

The result in shows that majority (55.5%) of the respondents were females and 44.4% were males. This implies that women contributed a larger percentage of persons involved in maize production in the study area.

The result of the marital status of the respondents in Table 4.1 shows that majority 62(68.9%) were married, 17(18.9%) were single, 7(7.8%) were divorced and 4(4.4%) were separated. This implies that they are responsible with the sense of responsibility to provide for the need of their families. This is in agreement with the work of Nanji *et al*. (2020) who stated that maize production is dominated by married people.

The findings show that 8(8.8%) had no formal education, 21(23.3%) had primary education, 30(33.3%) had secondary education and 31(24.3%) had tertiary education. The lack of education often affects the ability of farmers to adopt modern farming practices and access relevant agricultural information (Kayode *et al*., 2020).

The results of farm size of respondents in Table 4.1 show that majority 83(92.2%) farmed of plots less than 10 and 7(7.8%) farmed on plots above 11. It also show that less than 5 has a household size of 47(52.2%), 6-20 has 34(37.8%) and 21 and above has a household size of 3(3.3%).

Analysis of the age of the farmers showed that majority of the farmers were in age group of 31-60. Out of the 90 maize farmers, 15(16.6%) were in the age range of below 30 years, and 10(11.1%) were in the age range of above 61. The mean age was 43 years, indicating that maize farmers were still in their active years of production. This agreed with the report of Ajayi *et al*., (2020) that the age within (26-55 years) indicates that respondents were in their prime working years and they have the potential for them to contribute to increased maize production.

The findings showed that 74.4% of farmers engage in farming for a period ranging from 10 years and below, with an average mean of 8 years. This implies that the respondents have expertise in the farming of maize production. This result is in line with that of Ajayi *et al*., (2020) which indicated that wealth of experience inspires farmers to make informed decisions regarding the effective utilization of inputs which can enhance their profitability.

Profitability analysis

The profitability analysis is presented in the Table 2. The result of the gross margin analysis presented in shows that the gross margin of maize production was ₦181,175.11 and the net farm income was ₦165,811.67. Maize production is therefore profitable thereby making it a lucrative business among the farmers with a good net return on investment in the study area. This result is in line with that of Onuwa *et al.*,(2020) that stated that maize production is a profitable venture

Regression analysis

The regression analysis for the factors influencing the quantity of maize produced shown double log form was chosen as the lead equation on the basis of "better fit" highest value of R^2 having more significant coefficient, highest F-ratio value and conformity to theoretical expectations of the regression coefficients. The coefficients of multiple determinant (R^2) value of 0.869 indicates that 86% of the variation in the dependent variation were explained by the independent variables included in the regression; F-ratio is 9.140 has a positive value. From the table, independent variables like gender, household size and seed quantity has a positive coefficient in the study area. Significant ($p<0.01$) value were observed in coefficient values for constant in linear regression model while education level was significant at (<0.05).

Additionally, the variable of "seed" were found to be significant ($p < 0.01$) under the double log regression model. This suggests that the choice of seed used in maize production has a significant impact on the profitability of maize farming. Choosing the right seed variety with traits such as high yield potential, disease resistance, and suitability to local conditions can lead to increased maize production and higher profits for farmers in the study area.

Constraints faced by maize farmers

The data displays the constraints the respondents faced in maize farmers in the Umuahia South Local Government Area, Abia State. The findings showed that low soil fertility, land scarcity, lack of access to information of modern farming practices, high cost of labor, storage problem, unavailability of improved

maize seed varieties and lack of technical support from agricultural extension services have an average mean score of 1.70, 2.72,2.26,2.32,2.03,2.22,2.22,1.89,1.71,2.58. This means that these constraints are the major problem of maize farmers in the study area. This is in agreement with the results of Yusuf et al., (2023) and Onuwa, Ademiluyi and Yitnoe (2020) who observed that lack of low soil fertility was a major constraint faced by maize farmers. The result is also in line with the result of Ekunwe *et al*., (2013) which stated that pests and diseases infestation were one of the major challenges faced by maize farmers. Pests and diseases infestation, insufficient funds for new technology and climate-change related issues were the least problem encountered by farmers of maize with an average mean score of 1.70,1.89,1.71. This is because the farmers did not see them as problems.

5.0 Conclusion

This study has shown maize based production to be a profitable venture in the study area. Since resource inputs were not optimally utilized, it then means that increases are required in resources that were underutilized and decreases to those that were over-utilized. Higher output can be realized by increasing land, seed and fertilizer and decreasing labor and pesticides. Also, increase in the output of maize production could be improved if solutions were found to the identified problems associated with maize production.

6.0 Recommendations

Recommendations for this study are:

1. Farmers should be encouraged to form a cooperative society that will enable them share resourceful information among themselves and also allow them have access to loan from the various financial sectors.

2. Loan facilities should be provided to maize farmers from commercial bank or government with highest interest rate to increase their capital base which-h will in turn boost maize production in the study area because availability of funds will increase the ability of farmers to purchase hybrid seeds, purchase quality pesticides against pests, pay for farm labor adequately and acquire good fertile land.

3. The positive and significant relationship between farm size, seed and fertilizer imply that increasing the levels of utilization of each of these inputs will results in an increase in the level of maize production. Farmers should therefore increase the use of these inputs.

4. It was found that majority of the respondents were small scale maize farmers which impeded them from practicing mechanization. Knowing that farm size has positive relationship with output, government should look into the possibilities of facilitating access to farm lands; review the land use Act Decree and pay attention on land consolidation program in view of the scarcity and fragmentized farm holdings.

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