Analysis of Profitability and Constraints of Maize Production in Chikun Local Government Area of Kaduna State, Nigeria

Ayodele, J.T., Ijah, A.A., Ishola, B.F. and Yahaya, U.F.

Federal College of Forestry Mechanization, Afaka, Kaduna State, Nigeria

Abstract : **This study analyse the profitability and constraints of maize production in Chikun Local Government Area of Kaduna State. Structured questionnaire was used to generate primary data for the study. Descriptive statistics, Net farm income analysis, and profitability ratios were employed in the analysis. Results revealed that majority of the respondents (99 %) were relatively young and fell within the active age (21 – 60 years). Male respondents dominated maize production at 87 % and majorities (81%) of the farmers were married. Results further revealed that significant (71%) number of the respondents had below 11 inhabitants in their households. Educationally, 51 % of respondents had post primary education. The net farm income per hectare was N74,606.40 and gross income of N132,000.00 were obtained per hectare of maize cultivated with a return on capital invested determined at 0.57 implying that for every naira invested, the farmers makes 57 kobo (N0.57)and the gross ratio was calculated at 0.47 indicating that total farm costs was about 47% of the gross income which shows that maize production is a viable, beneficial and profitable enterprise in the study area. Major constraints faced by the farmers were poor transportation, high cost of hired labour, lack of extension services and inadequate supply of agrochemicals and fertilizer,   incidence of pests and diseases infestation plus inadequate capital and credit facilities.   Despite these constraints, the farmers were still able to made profit. Therefore, maize production could be one of the poverty alleviating enterprise in the study area. It is recommended that: credit facilities should be provided so that farmers can have fund to purchase farm inputs such as fertilizer, pesticides and insectices to combat problem of pests and diseases infestation identified, improve varieties of maize should be developed and made available to the farmers so that their yield can be improved and farmers should form themselves into cooperative society so that they can pool their resources together in getting adequate funds to finance maize production activities.**

Keywords: **Profitability; groundnut; production; Constraints; Kaduna State.**

I. INTRODUCTION

According to Bernard (2003) the use of costs and returns analysis as basis for profitability evaluation possesses some limitations which are: (i) It is location bound and the applicability is specific due to use of money as the common unit of measurement and the prevailing price of the estimates and (ii) It does not show the relative importance of each of the resources in production. Despite these limitations, costs and returns analysis has been widely used in research studies. Sadiq *et.al.* (2013) employed costs and returns estimates to determine profitability and production efficiency of small-scale maize production in Niger State, Nigeria and reported a gross margin income of ₦ 55,191.00 and net farm income of ₦ 48,109.00 respectively with a gross ratio of 0.39 and operating ratio of 0.31 indicating that maize production is profitable in the study are . Profitability of maize production in Yola North Local Government Area of Adamawa State was carried out by Lamba *et.al.*(2016) using cost and return variables, they reported that maize production was a profitable business in the study area with an average variable cost, average fixed cost, gross margin and net farm income per hectare of ₦31, 437.22, ₦4, 300.00, ₦23, 910.78 and ₦19610.78 respectively. In his study titled analysis of resource use efficiency and profitability of maize production in some selected agricultural zones of Kaduna State, Nigeria, Ayodeji (2009) reported that maize farming was profitable in the study area with gross margin of N121, 784.75. In a study carried out by Girei *et.al.*(2018) to examined the economics of small-scale maize production in Toto Local Government Area of Nasarawa State, Nigeria reported that a gross margin of ₦170,594.50 was earned from one hectare of maize farm with a return per naira invested of 2.40 indicating that maize production is profitable in the study area. They also observed that the cost of labour constituted a greater proportion of the costs of production, accounting for about 58.38% and 39.52% of the total variable cost and the total cost respectively. Similarly Sadiq *et.al.* (2013) reported that labour cost accounted for about 24.6% of the total cost of production in their study. However high cost of labour, pests and diseases, inadequate storage facilities, inadequate capital, marketing problems, transportation, poor access to credit facilities and high cost of inputs.er a study by Kaine (2016) using cost and return variables to determine the economics of maize production in Aniocha North Local Government Area, Delta State, Nigeria reported that the maize farmers were at loss. The result indicates that a total income of ₦4, 400,000.00 was generated with a Net profit margin of minus (-) ₦112,909.00. A further investigation shows that for every N1.00 invested in maize production, there was a loss of N3.84. This implies that maize production is not profitable in the study area

Maize (Zea mays), is one of the oldest and widely cultivated cereals in the world. It provides food for man and livestock. Maize, which is also commonly known as corn, is one of the most popular food crops in Africa. Maize is cooked in various ways and millions of Africans rely on this crop because it usually costs less than wheat and rice and other common grains and cereals. Actually, a lot of daily diets would not be possible without maize; a lot of animal products like eggs, meat, and milk production depend on maize, because this ingredient is used to feed animals (Odusanya, 2018). According to the latest research, the African continent produces about 6.5% of maize in the world. Nigeria is the largest maize producer in Africa, with South Africa holding the second place. Annually, Nigeria produces about 8 million tons of this food crop. Maize is widely grown all over the country. However, the leaders in this crop production are Niger, Taraba, Kaduna, Adamawa, and Plateau states (Odusanya, 2018).

According to Prathyusha *et al.* (2013) the third most important cereal in the world with highest production potential next to rice and wheat is maize. In Nigeria maize ranked third among widely domesticated grown crop after sorghum and millet. It is highly productive, cheap, and less rigorous to produce and adapts to wide range of agro-ecological zones (FAO, 2014). Maize is an important source of carbohydrate, protein, iron, vitamin B, and minerals. It is also used as animal feed and as raw material for brewing beer and for producing starch (IITA, 2008).

Maize production in Nigeria is faced with some problems and according to Girei *et.al.*(2018) in their study some of the problems militating against maize production are high cost of labour, pests and diseases, inadequate storage facilities, inadequate capital, marketing problems, transportation, poor access to credit facilities and high cost of inputs.

The aimed of this study is to analyse the profitability and constraints of maize production in Chikun Local Government Area of Kaduna State,Nigeria.

II. MATERIALS AND METHODS

A. Study Area

The study was carried out in Chikun Local Government Area of Kaduna State. The local government covers area of about 4456.59km and lies between the latitude 10˚N and longitude 90˚E. and situated in the Northern Guinea Savannah Zone. It shares boundary with Igabi and Kaduna South Local Government Area to the North - East and with Kajuru to the East, Birnin Gwari and Giwa Local Government Area to the North - West and Kachia Local Government Area to the South East. The ethnic group in the study area comprises of Gbagyi predominantly, with other tribes like Hausa, Kataf, Igbo, Fulani and Yoruba. Their occupation is farming and crops cultivated include groundnut, rice, yam, maize, guinea corn, millet and cassava. They also reared livestocks such as goat, sheep, pig, cattle and poultry bird.

B. Sampling Techniques and Frame

Multi-stage and random sampling techniques were adopted to select the respondents for the study. In the first stage five (5) wards namely; Rido, Kakau, Chikun, Kujama and Gwagwada were selected purposively due to high concentration of maize farmers in the wards. In the second stage two villages each from the five (5) wards were also purposively selected which includes; Rido, Karji.Kakau, Buwaya, Chikun, Kugo,Kujama, Kafari, Gwagwada and Dutse because of their predominance and intensively cultivation of maize. In the third stage random sampling was used to select ten (10) maize farmers in the selected villages in the study area which gave a total of one hundred (100) respondents respectively.

C. Data Collection

Data for this study was obtained from primary sources. The primary data was obtained through the use of structured questionnaire and oral interview to gather information on the socio-economic characteristic such as age, sex, level of education, household size etc. other information that was gather from the respondents include the inputs and output variables associated with maize production in the study area.

D. Data Analysis

The following tools of analysis were employed to achieve the stated objectives of the study.

i. Simple descriptive statistics

ii. Net farm income analysis

iii Profitability ratios

1).Simple Descriptive Statistics: This involves the use of descriptive statistics such as table percentage, mean and frequency distribution.

*2) Net Farm Income Analysis.:*Net farm income analysis was used to estimate costs and return associated with maize production in the study area. It is expressed as follows:-

$$GM = GI - TVC$$

$$NFI = GM - TFC$$

Where: GM=Gross Margin (Naira/ha)

TVC=Total Variable Cost (Naira/ha)

GI= Gross Income (Naira/ha)

NFI = Net Farm Income (Naira/ha)

TFC = Total Fixed Costs (Naira/ha)

3) *Profitability Ratios*: The gross, operating and return per capital invested ratios were employed to analyse the performance of the maize farmers in the study area.

The Gross Ratio (GR) is given as Total Cost (TC) divided by Gross Income (GI). That is GR=TC ÷ GI. This shows the

proportion of the G.I. that goes into the total farm costs during the production period.

Operating Ratio (0R) is given as Total Variable Cost (TVC) divided by Gross Income (GI). That is OR=TVC÷GI. The ratio indicates the proportion of the G.I that goes to pay for the operating cost. It is directly related to the farm variable input usage.

Return Per Capital Invested (RPCI) is given as Net Farm Income (NFI) divided by Gross Income (GI). That is RPC I= NFI÷ GI. This indicates the amount of money return to the investor for every Naira invested on a business.

III.RESULT AND DISCUSSION

A. Socio-economic Characteristics of respondents in the study area

1). *Distribution of the Respondents based on Age Group*: Table 1 shows that respondents (36 %) are within the age range of between 41-50 years, (29 %) of the respondents are within the age range of 31-40 years, (19%) of the respondents are between the range of 51-60 years, (15%) of the respondents are within 21- 30 years, while (1%) of the respondents are 61 years and above. The result shows that most of the respondents are in their youthful age which makes them active in maze production, Taru *et. al.* (2008), opined that eligibility of one's performance in certain activities or role including agricultural activities is determined by the age and too young or too old people are generally inactive or of low productivity on the farm.

2).*Distribution of the Respondents based on Gender:* Table.2 revealed that majority of the respondents (87%) are male while (13%) are female. This implies that male dominated maize production in the study area. This result is in line with the finding of Sadiq *et. a*l. (2013) that reported that majority of naize producers in Niger State of Nigeria are male (67 %).

3). *Distribution of the Respondents based on Marital Status:* Table 3 shows (81%) of the respondents are married, (13%) of the respondents are single, (3%) of the respondents are widow and divorcee respectively. This implies that majority of the respondents are married people.

4). *Distribution of the Respondents based on Religion:* Table.4 revealed that majority of the respondents (63%) are Christians, (29%) are Muslims, while very few (8 %) are traditional worshippers. This implies that Christians dominated maize production in the study area. This result is in line with the finding of Ayodele (2019) that most groundnut producers in Chikun LGA of Kaduna State are predominantly Christians.

5).*Distribution of the Respondents based on Household Size:*Table 5 shows that majority of the respondents (48 %) have household size ranging from 1-5 members, (33%) of the respondents have household size ranging from 6-10 members, (13%) of the respondents have household size that is between 11 – 15 and 6% of the maize farmers have family size that are 16persons and above. This implies that majority of the farmers have over five household members which signifies that labour can be easily sourced from the family members. Alabi *et. al.* (2005) stated that family with high family members is more helpful to their family in terms of agricultural production than family with small family members.

6). *Distribution of the Respondent based on Educational Qualification*: Table 6 shows that (39%) of the farmers have primary education, (29%) of the respondents have secondary education, (23%) of the respondents have tertiary education, (9%) have non-formal education. This shows that about 52 % of the farmers had secondary school certificate and above while 91% of the farmers can read and write. Murtala *et al* (2004), stated that education plays a important role in farming activities. It gives the farmer an insight about important technology and decision making that determines success of their farming enterprise.

7). *Distribution of the Respondents based on Sources of Capital:* Table 7 shows that (53%) of the respondents acquire their capital from personal saving, (21%) of the respondents sourced their capital from relations / friends, 14% from banks, and (12%) of the respondents sourced their capital from money lenders. This implies that most of the farmers sourced capital through personal saving which implies that they will have ability to manage their finances well if given credit loan. The result confirmed the assertion of Ayodele (2019) that majority of groundnut farmers in Chikun Local Government Area sourced their capital through personal savings.

8). *Distribution of the Respondents based on Farm Size:* Table 8 revealed that (57%) of the respondents have farm size of two to less than four hectares of land, (28%) of the respondents have farm size of less than one to less than two hectare, (14%)of the respondents have four to less than six hectares and (1%) of the respondents have six or more hectares of farm size . The result shows that most of the respondents are small scale maize farmers..

9). *Distribution of the Respondents Based on their Years of Experience :* Table 9 shows that majority of the respondents (35 %) have 1-5 years farming experience in maize production, (31%) of the respondents have less than one years in maize farming experience, (13 %) of the respondents have within 11-15 years of experience in maize farming, (11 %) of the respondents have 16 and above years while 10% of the respondents have between 6 – 10 years experience in maize farming in the study area. According to Alabi *et al* (2005) more years of experience in farming enhance efficiency and productivity in business.

B. Costs and Return associated with Groundnut Production in the Study Area.

Net farm income analysis in Table 10 represents costs and returns on production of maize in the study area and was determined on a per hectare basis. The costs (variable and fixed) include all the expenses encountered in the maize production process. These include cost of variable inputs namely, labour, seed, agro-chemical, fertilizer and transportation while the fixed cost includes land rent, cutlasses, hoes, and wheelbarrow which were depreciated. On the other hand, revenue was computed by considering the money realized by selling the maize grains. The total variable cost (TVC/ha) was estimated at N41633.32 which represented the total farming cost, while the depreciated cost on fixed items (TFC/ha) was N15760.28, the total revenue per hectare was computed at N132000.00 though farmers yield which stood at an average of 1650Kg/ha were observed to vary from one farmer to another and from one location to the other on the average. The gross margin and net farm income were N90388.68 and N 74606.40 respectively. This implies that groundnut production is profitable in the study area. The result agreed with the finding of Ettah *et.al. (*2018*)* that reported that maize production is a profitable investment in Obubra Local Government Area of Cross River State with a net farm income of N102300.00/ha.

C. Profitability Ratios.

In order to have a clearer picture of the performance of any enterprise, it is necessary to examine other measures of financial analysis such as, returns to the various factors of production inputs and other financial ratios. So this study therefore considered some profitability ratios namely, gross, operating and return per capital invested ratios which were also computed in Table 10

Gross ratio generally helps in measuring the overall financial success or otherwise of a farm. The gross ratio (GR) from the table is obtained by dividing the total farm costs (TFC) by the gross income (GI) and this was computed to be 0.44. The ratio reveals that the total farm costs was about 44% of the gross income. Therefore, as a rule, a less than one ratio is always desirable for any investment. This means that the lower the ratio, the higher the return per Naira invested.

Table 10 also captured the operating cost ratio (OCR) for the respondents in the study area and it was calculated by dividing the total variable cost (TVC) by the gross income (GI) and from the analysis it was found to be 0.32 (32%). This established the proportion of the gross income that goes to service the operating expense of the respondents and this is directly related to the farm variable input usage. As a rule, an operating ratio of one means that the gross income just defray the expenses incurred on the variable inputs used on the farm.

The return per capital invested in this study was computed to be 0.57. This shows that for every one naira invested on maize production a return of 57 kobo is obtained which an indication

that the investment is a worth one. These ratios are similar to the values reported by Ettah *et.al.* (2018) that obtained gross ratio of 0.47 and operating cost ratio of 0.32.

Table 1: Distribution of the Respondents based on Age Range

Ages	Frequency	Percentage (%)
21-30	15	15.00
31-40	29	29.00
41-50	36	36.00
51 - 60	19	19.00
61 above	1	01.00
Total	100	100

Source: Field survey, 2019

Table 2: Distribution of the Respondents Based on Gender

Religion	Frequency	Percentage (%)
Male	87	87.00
Female	13	13.00
Total	100	100

Source: Field survey, 2019

Table.3: Distribution of the Respondents Based on Marital Status

Marital status	Frequency	Percentage (%)
Single	13	13.00
Married	81	81.00
Divorcee	3	03.00
Widow	3	03.00
Total	100	100

Source: Field survey, 2019

Table 4: Distribution of the Respondents Based on Religion

Religion	Frequency	Percentage (%)
Muslim	29	29.00
Christian	63	63.00
Tradition	8	08.00
Total	100	100

Source: Field survey, 2019

Table 5: Distribution of the Respondent Based on Household Size

Household size	Frequency	Percentage (%)
1-5	48	48.00
6-10	33	33.00
11-15	13	13.00
16 above	6	06.00
Total	100	100

Source: Field survey, 2019

Table 6: Distribution of the Respondents by their Educational Qualification

Education background	Frequency	Percentage (%)
Non-formal education	9	09.00
Primary education	39	39.00
Secondary education	29	29,00
Tertiary	23	23.00
Total	100	100

Source: Field survey, 2019

Table 7: Distribution of the Respondents Based on Sources of Capital

Sources	Frequency	Percentage (%)
Personal saving	53	53.00
Loan from families/friends	21	21.00
Credit from bank	14	14.00
Money lenders	12	12.00
Total	100	100

Sources: Field survey, 2019

Table 8: Distribution of the Respondents Based on Farm Size

Farm size (ha)	Frequency	Percentage (%)
0.10 to < 2.00	28	28.00
2.00 to < 4.00	57	57.00
4.00 to < 6.00	14	14.00
> = 6	1	01.00
Total	100	100

Source: Field survey, 2019

Table 9: Distribution of the Respondents Based on their Years of Experience

Years of experience	Frequency	Percentage (%)
Less than one year	31	31.00
1-5	35	35.00
6-10	10	10.00
11-15	13	13.00
16 above	11	11.00
Total	100	100

Source: Field survey, 2019

Table 10: Average costs and return per hectare of groundnut production in the study area .

Variable	Value (N/ha)	Percentage (%)
Variable cost		
Seed	2175.23	3.79
Labour	18429.08	32.11
Transportation	5739.36	10.00
Fertilizer	11254.88	19.61
Agro-Chemicals	4034.77	7.03
Total Variable Cost (TVC)	41633. 32	72.54
Total Fixed Costs (Depreciated value)	15760.28	27.46
Total Costs {TC}	57393.60	100.00
Return		
Gross Income (GI)	13200.00	
Gross Margin (GM)	90366.68	
Net Farm Income (NFI)	74606.40	
Profitability Ratios		
Gross Ratio (TC/GI)	0.44	
Operating Ratio (TVC/GI)	0.32	
Return Per Capital Invested (NFI/GI}	0.57	

Source: Field Survey 2019

D .Constraints Associated with Groundnut Production in the Study Area.

Table 11 presents the constraints faced by farmers in producing maize in the study area. The table revealed that (86 %) of the respondents identified poor transportation as a constraint hindering their level of maize production, (80 %) of the respondents reported they lack extension services, 73% identified high cost of hired labour as a constraint, 72% reported that inadequate supply of agrochemicals as a constraint, 51% reported inadequate supply of fertilizer, 50% lack capital and credit facilities, poor while 47 % reported that they are faced with pests and diseases infestation. All the constraints identified in the study area negatively affect maize production in the area. Most of the constraints observed in yhis study were similar to those reported by Girei et.al.(2018) in their study where they identified high cost of labour, pests and diseases, inadequate capital, poor transportation, poor access to credit facilities and high cost of inputs as constraints militating against maize production in Toto Local Government Area of Nasarawa State, Nigeria.

Table 11: Constraints associated with Groundnut Production in the Study Area

Constraints	Frequency	Percentage (%)
Pest and disease	47	47.00
Poor transportation	86	86.00
Lack of credit facility	50	50.00
Lack of capital	50	50.00
Inadequate supply of fertilizer	51	51.00
Inadequate supply of agrochemicals	72	72.00
High cost of hired labour	73	73.00
Lack of extension service	80	80.00

Source: Field survey 2019

IV. CONCLUSION

The study in conclusion revealed that maize farming in Chikun Local Government Area of Kaduna Stare, Nigeria is dominated by male who are in their active age and the business ia a viable and profitable investment with a net farm income of   N74606.40 and   gross income of N90366.68 obtained   per hectare of maize cultivated and a return on capital invested of   0.57 implying that for every naira invested, the farmers makes 57 kobo (N0.57). However the business is faced with constraints such as poor transportation, high cost of hired labour, lack of extension services and inadequate supply of agrochemicals and fertilizer, incidence of pests and diseases infestation plus inadequate capital and credit facilities, but despite of these constraints, the maize farmers were still able to made profit. Therefore,   it is recommended that credit facilities should be provided so that farmers can have fund to purchase farm inputs such as fertilizer, pesticides and insecticides to combat problem of pests and diseases infestation identified, improve varieties of maize should be developed and made available to the farmers so that their yield can increase, and farmers should form themselves into cooperative groups so that they can pool their resources together in getting adequate funds to finance maize production activities.

REFERENCES

[1] Alabi J, Musa, D.and Filein, W. (2005). Seed Systems in Sub-Sahara Africa: issues and options. The World Bank Discussion paper 266: The World Bank, Washington D.C USA.

[2] Ayodele, J.T.(2019). Determinants and Resource Use Efficiency of Groundnut Production in Chikun Local Government Area, Kaduna State, Nigeria. *International Journal of Research and Innovation in Applied Science* (IJRIAS) |Volume IV, Issue VII,Pp 81 – 85.

[3] Bernard, C. H. (2003). Economic Analysis of Cassava-based Cropping in Crude Oil Producing Area: A Case Study of River State Nigeria. Unpublished Ph.D Thesis, submitted to the Department of Agricultural Economics and Rural Sociology, Ahmadu Bello University Zaria, Nigeria. Pp 38-41.

[4] Ettah, O. I., Ettah, G. I., Ukwuaba, I. C. (2018). Analysis of Profitability in Maize Production in Obubra Local Government Area of Cross River State, Nigeria. *International Journal of Interdisciplinary Research and Innovations* Vol. 6, Issue 1, Pp 159-163.

[5] Food and Agriculture Organisation (FAO). (2014). Food Outlook; Global Market Analysis. Rome: Food and Agricultural Organisation of the United Nations.

[6] Girei, A. A. , Saingbe, N. D ., Ohen, S. B and Umar, K. O. (2018). Economics of Small-Scale Maize Production in Toto Local Government Area, Nasarawa State, Nigeria. *Agrosearch*, vol. 18 No. 1, Pp 90 – 104

[7] International Institute for Tropical Agriculture (IITA) (2008). Increasing maize production in West Africa. http://www.iita.org/cms/details/newssummary.aspx

[8] Kaine A.I.N. (2016). Economic Analysis of Maize Production in Aniocha North Local Government Area, Delta State, Nigeria. *International Journal of Agricultural Economics and Management,* Volume 6, Number 1, Pp 9-20

[9] Murtala.F, Ocra, V.K, I.C. Dehimini, R.A Asuboah and E.AAsuedu (2004), seed Management Manual to Ghana, Mofa, Accra, Chanu, Loaf.3(1).pp30-41.

[10] Odusanya, R, (2018). Maize Production in Nigeria: Is it profitable in 2018? https:// www. Legit.ng/author/racheal-odusanya.html. Accessed 4th March, 2020.

[11] Lamba, C., Taru, V.B., Otitujo, M.A. and Tumba, A. (2016). Profitability of Maize production in Yola North Local Government Area of Adamawa State.*Scientia Agriculturae*, 13 (3), 119-125. Retrieved from www.pscipub.com (DOI:10.15192/PSCP.SA.2016.13.3.119125.

[12] Oye, A.O. (2016). Analysis of Resourse Use Efficiency and Profitability of Maize Production n Some Selected Agricultural Zones of Kaduna State, Nigeria. Unpublished M.Sc. Thesis, submitted to the Department of Agricultural Economics and Rural Sociology, Ahmadu Bello University Zaria, Nigeria.

[13] Prathyusha, C., Hemalatha, S. and Sharana, B. (2013). Growth and productivity of speciality corn as influenced by different levels of nitrogen under Pongamia Plantations. *International Journal of Applied Biology and Pharmaceutical Technology,* 4(4).

[14] Sadiq, M.S., Yakassai, M.T., Ahmad, M.M., Lakpene, T.Y., and Abubakar, M. (2013). Profitability and Production Efficiency of Small-Scale Maize Production in Niger State, Nigeria. *IOSR Journal of Applied Physics*(IOSR-JAP),3(4):19 – 23.

[15] Taru, V.B., Kyagya, I.Z., Mshelia, S.I., and Adebayo, E.F.(2008). Economic Efficiency of Resource Use in Groundnut Production in Adamawa State of Nigeria. *World Journal of Agricultural Sciences*, 4: 896 – 900.