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Efficiency of Resource-Use and Marginal Value Productivity Analysis Among Maize Farmers, Abuja, Nigeria

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Abstract
The study examined efficiency of resource-use and marginal value productivity analysis among maize farmers, Abuja, Nigeria. Specifically, the objectives were to: determine the socio-economic characteristics of maize farmers, analyze costs and returns of maize production, determine the marginal value productivity among maize farmers, evaluate resource-use efficiency of maize production, and determine the constraints faced by maize farmers in the study area, multi-stage sampling technique was used to select one hundred (100) maize farmers. Primary data were used. Data were collected through the use of well-designed and well-structured questionnaire. The analytical tools used were descriptive statistics, farm budgeting technique, financial analysis, Cobb-Douglas production function model, marginal value productivity index, resource-use efficiency index, and principal component analysis. The results show that 65% of maize farmers are less than 50 years of age. The mean age of maize farmers was 47 years. The maize farmers are energetic, active, resourceful in their youthful age. Maize farmers are smallholder, peasant, poor farmers with average of 4.75 hectares of farmland. Maize farmers had on the average of 8 people per household. Maize production is a profitable enterprise with gross margin and net farm income of 776,100 Naira and 758,700 Naira per hectare of farmland respectively. The gross margin ratio of 0.64 implies that for every naira invested in maize production by smallholder maize farmers, 64 kobo covered interest, profits, expenses, taxes and depreciation. Age (X_1), and fertilizer input 〖(X〗_4) are statistically significant factors influencing output of maize production at (P<0.01), while farm size 〖(X〗_2), labour input (X_3), seed input 〖(X〗_5) and chemical input 〖(X〗_6) are statistically significant factors influencing output of maize production at (P<0.05).The coefficient of multiple determinations (R^2) was 0.789. This implies that the explanatory variables included in the Cobb-Douglas production regression model explained 78.9% of variations in output of maize produced. The resource-use efficiency index [r], which is a ratio between marginal value productivity of resource input and marginal factor cost, the factor price shows that land input, seed input, fertilizer input, labour input and chemical input were underutilized. The retained constraints in the principal component analysis faced by maize farmers were lack of fertilizers, poor road infrastructures, lack of improved seeds, lack of credit facilities, lack of extension services and poor storage facilities. The study recommends adequate supply of farm inputs like improved seeds, fertilizers, chemicals such as insecticides and pesticides. Bureaucratic processes and cumbersome administrative procedures involved in accessing credit facilities should be removed, government should provide good roads linking maize producing areas and extension services should be employed who will organize workshops, seminars and training of maize farmers on research findings and efficient use of farm resources.

Key words
Efficiency of Resource-Use, Marginal Productivity Index, Maize Production, Nigeria.

Introduction

Maize (*Zea mays*) is the most important cereal crop in Nigeria. Maize ranks third coming after sorghum and rice which ranks second and first respectively (Alabi and Abdulazeez, 2018). Nigeria is African second largest producer of maize after South Africa (FAOSTAT, 2018). Maize serves as good sources of food for human, feed for livestock, also source of income and foreign exchange earnings to Nigeria. Maize is a good source of raw materials to different agro-based industries as it is an essential material for the industrial production of fuel, starch, medicine, and food sweeteners (Egwuma *et al*, 2019; Amanza *et al.*, 2021). In Nigeria, maize is used by brewing industries for producing various types of beer, production of maize flour by milling industries, corn flakes and confectionary for human consumption. Maize can be boiled, roasted or the grain can be dried, and the dried grain can be made into popcorn (Onuk *et al.*, 2010). It is a good source of minerals, protein, carbohydrates, iron, and Vitamin B. Maize can be grown in marginal areas, it has ability to grow in all ecological zones in Nigeria, that is why the production of maize is widespread across different parts of Nigeria (Ado *et al.*,2004; Yahaya, *et al.*, 2020). Maize production is well distributed in low rainfall and high rainfall around the world, it can grow in hot, humid tropical areas and cool temperate region and can thrive in wide ranges of soils (Philip *et al.*, 2006). Nigeria produces 10 million metric tonnes of maize in 2020 and 11.6 million metric tonnes of maize in 2021, this is about 16% increase over the previous year 2020 (USDA, 2021). As a result of low productivity of maize, Nigeria could barely satisfy the huge quantity of maize demanded which is estimated at 12 – 15 million metric tonnes of maize, in line with this, maize demand-supply create gaps of nearly 4 million metric tonnes of maize. The potentials of Nigeria to produce maize is enormous and the economic importance of maize to the rural populace is much, yet the country has not been able to produce maize to meet the food requirements and the needs of the industries. The inability of Nigeria to produce enough quantities of maize for both human and animal consumption and for local industries is due to low productivity of maize by resource poor farmers, in addition, smallholder farmers were not adopting and use improved technologies for maize production. Nigeria as reported on the average produces 1.69 tonnes of maize per hectare of land in 2019 (USDA, 2020). Among the developed countries, United States of America (USA) is the largest producer of maize in the world with about 383.94 million metric tonnes of maize in 2021/2022 and the average yield of 6 tonnes per hectare of land. According to Awotide *et al* (2008) and Ibrahim *et al* (2008) they all reported that inadequate fertilizers input, use of unimproved local seeds input, lack of farmland input and use of manual labour input limit maize output in Nigeria.

Extension services and easy access to research findings by peasant farmers is also capable of increasing maize output in Nigeria (Bamire *et al.*, 2007). The use of improved maize seeds and agricultural technologies can increase productivity. Resources such as pesticides, fertilizers, and herbicides are scarce, and when available the resource poor maize farmers cannot afford to purchase the quantities, he required. Maize farming is mainly dependent on rainfed system in Nigeria, rainfall is both resource and constraint to maize production in the tropics as maize relates to amount of rainfall and its distributions. Maize farming in Nigeria is also faced with lack of access to credit facilities, poor storage facilities, lack of farm inputs, pests and disease infestations, and lack of mechanized farming. The returns to land in terms of maize output is generally poor (Babatunde *et al.*, 2007). Improving productivity of resource poor farmers is crucial for improving the livelihoods, well-being of smallholder farmers and for economic development (Girei *et al.*, 2018, Msuya, 2008). Low productivity is the major cause of unstable and low value added along the maize value chain which leads to stagnation of the rural economy with high poverty level (Msuya, 2018). Smallholder maize productivity is generally low this is due to the fact that peasant farmers are poor, subsistence in nature and do not practice high yielding farming methods (Isinika *et al.*, 2003). According to Alabi *et al* (2021) farm resource productivity can be increased and improved when smallholder farmers properly understand efficient use of farm resources and how to select farm enterprises. Agriculture in Nigeria is faced with low farm productivity due to inefficient use resources available (Alabi, Oladele and Oladele, 2020; Udoh, 2005; Obasi and Agu, 2000). Efficiency with available technology and resource base can increase and sustain farm productivity (Alabi *et al*., 2021).

Objectives of the Study

The broad objective is to evaluate efficiency of resource-use and marginal value productivity analysis among maize farmers in Abuja, Nigeria. Specifically, the objectives were to:

(i) determine the socio-economic characteristics of maize farmers,
(ii) analyze costs and returns of maize production,
(iii) evaluate factors influencing output of maize production,
(iv) determine the marginal value productivity among maize farmers,
(v) evaluate the resource-use efficiency of maize production, and
(vi) determine the constraints faced by maize farmers in the study area.

Methodology

The research was conducted in Abuja, Nigeria. Abuja is located between Latitudes $9^0\ 4^{|}\ 20^{||}$ North and Longitudes $7^0\ 29^{|}\ 28^{||}$ East. Abuja has three weather conditions annually, they are: rainy season, dry season and the harmattan period. The brief harmattan period comes in between the rainy and dry seasons. Abuja falls within the savannah zone vegetation, the vegetation in the territory is classified into three savannah types: grassy savannah, savannah woodland and the shrub savannah. Abuja has population of about 776,298 people (NPC,2006). The population of Abuja in 2022 is about 3,652,000 people which is 5.43% increase over the population of 3,464,000 people in 2021(Figure 1). The people are engaged in agricultural production activities. They are involved in growing crops and animal production. Crops grown include: maize, millet, soybean, garden egg, beans, rice, yam, groundnut, sorghum. Animal kept include: poultry, goats, sheep, cattle, rabbit and turkey.

Multi-stage sampling technique was adopted. Sample size of 100 maize farmers were selected. Data used were of primary sources. Data were collected through the use of well-designed well-structured questionnaire. The questionnaire was administered to the target respondents through the help of well-trained enumerators. Data were analyzed through the use of the following analytical tools:

Descriptive Statistics: This involves the use of measures of central tendency which include: mean, percentages, and frequency-distributions. They are used to summarize data collected from the field survey from the target maize farmers. Descriptive statistics was used to summarize the socio-economic characteristics of sampled maize farmers as stated in specific objective one (i).

Farm Budgetary Technique: The farm budgetary techniques used was Gross Margin Analysis (GM) and is defined as the difference between gross farm income (GFI) and total variable cost (TVC). This tool of analysis was used to determine the costs and returns of maize production as specified in specific objective two (ii). The Gross Margin Model is stated thus:

$$GM = TR - TVC \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (1)$$
$$GM = \sum_{i=1}^{n} P_i Q_i - \sum_{j=1}^{m} P_j X_j \dots\dots\dots\dots\dots\dots (2)$$
$$NFI = TR - TC \dots\dots\dots\dots\dots. (3)$$
$$NFI = \sum_{i=1}^{n} P_i Q_i - \left[\sum_{j=1}^{m} P_j X_j + \sum_{k=1}^{k} GK\right] \dots\dots\dots. (4)$$

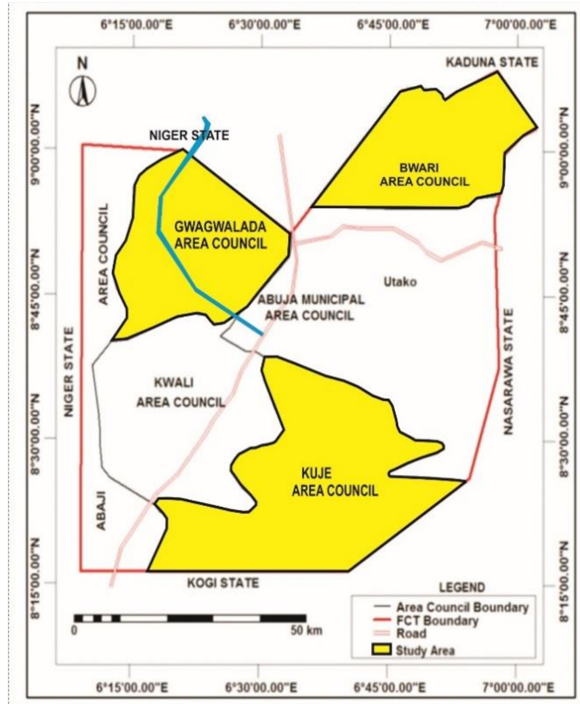

Figure 1: Map of Abuja Showing the Study Areas

Where; P_i = Price of Maize ($\frac{N}{Kg}$),
Q_i = Quantity of Maize (Kg),
P_j = Price of Variable Inputs ($\frac{N}{Unit}$),
X_j = Quantity of Variable Inputs (Units),
$TR =$ Total Revenue obtained from Sales from Maize (N),
TVC = Total Variable Cost (N),
GK = Cost of all Fixed Inputs (Naira)
NFI = Net Farm Income (Naira)

Financial Analysis: This is an analytical tool used to determine the profitability of maize production. The financial analysis was used to achieve part of specific objective two (ii). Gross Margin Ratio according to Alabi, Oladele and Oladele (2020) and Ben-Chendo (2015) is defined as:

$$Gross\ Margin\ Ratio = \frac{Gross\ Margin}{Total\ Tevenue} \dots\dots\dots\dots. (5)$$

The operating ratio (OR) according to Olukosi and Erhabor (2015) is defined as:

$$Operating\ Ratio = \frac{TVC}{GI} \dots\dots\dots\dots\dots\dots\dots\dots (6)$$

Where, TVC = Total Variable Cost (Naira),
GI = Gross Income (Naira),

According to Alabi, Oladele and Oladele (2020) and Olukosi and Erhabo (2015) an operating ratio of less than one (1) implies that the gross income from maize enterprise was able to pay for the cost of the variable inputs used in the enterprise. The rate of return per naira invested (RORI) in maize production according to Alabi, Oladele and Oladele (2020) is defined as:

$$RORI = \frac{NI}{TC} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (7)$$

Where, $RORI$ = Rate of Return per Naira Invested (Unit)
NI = Net Income (Naira)
TC = Total Cost (Naira)

Cobb-Douglas Production Function Model*:* The model is defined as follows:

$$Log\ Y = \alpha_0 + \alpha_1 Log\ X_1 + \alpha_2 Log\ X_2 + \alpha_3 Log\ X_3 + \alpha_4 Log\ + U_i \dots\dots\dots\dots(8)$$

Y = Output of Maize (Kg),
X_1 = Age of Farmers (Years),
X_2 = Farm Size (Hectares),
X_3 = Labour Input (Mandays),
X_4 = Fertilizer Input (Kg),
X_5 = Seed Input (Kg),
X_6 = Chemical Input (Litres),
U_i = Error Term,
$\alpha_1 - \alpha_6$ = Regression Coefficients,
α_0 = Constant Term,

This was used to achieve specific objective three (iii).

Marginal Value Productivity Index: This is defined as follows:

$$MP_x \times P_Y = MVP_x \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (9)$$

$$\alpha_i \left[\frac{\bar{Y}}{\bar{X}_i}\right] \times P_Y = MVP_x \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (10)$$

Where, MVP_x = Marginal Value Product of x,
P_Y = Price of Output (Naira),
$\bar{Y}$ = Mean Value of Output Y,
$\bar{X}_i$ = Mean Values of Input x_i,
MP_x = Marginal Physical Product of x,
α_i = Regression Coefficients

This was used to achieve specific objective four (iv).

Resource-Use Efficiency Index: This is stated as follows:

$$r = \frac{MVP}{MFC} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (11)$$

Where, MFC = Marginal Factor Cost (Naira),
r = Efficiency Ratio (Unit),
$r = 1$ Resources is Efficiently Utilized,
$r > 1$ Resources is UnderUtilized,
$r < 1$ Resources is OverUtilized,

This was used to achieve specific objective five (v)

Principal Component Analysis: The constraints facing maize farmers was subjected to principal component analysis. This was used to achieve specific objective six (vi).

Results and Discussion

Socio-Economic Profiles of Maize Farmers in the Study Area

Table 1 presented the socio-economic profiles of maize farmers. About 65% of sampled maize farmers were less than 50 years of age. The mean age of maize farmers was 47 years. This implies that maize farmers were young, active, resourceful, and energetic. Young and energetic maize farmers can withstand stress, adopt new research findings and farm technologies on maize production. Also, 97% of maize farmers had formal education. Educated farmers can easily take advantages of new innovations and research findings. These findings are in line with Alabi, Oladele and Oladele (2020); Alabi and Abdulazeez (2018), and Udoh and Nyienekuma (2008). Maize farmers with basic education are better equipped and will be able to make informed farm decisions (Girei *et al*, 2018). Education has the tendency to significantly improve agricultural productivity (Adenuga *et al*, 2013). About 67% of maize farmers had less than 10 years farming experience. Averagely, maize farmers had farming experiences of 9 years. This is an indication that maize farmers had enough farming experience to enhance maize production. Experience of farmers are linked to age, as maize farmers get older, they must have acquired more experiences in maize production (Alabi, Oladele and Oladele, 2020). Furthermore, 65% of maize farmers had less than 10 people as members of household. The mean household size was 8 people. According to Ozor and Cynthia (2010) who reported that fairly large household size means more family labour available for the household farm activities. About 79% of maize farmers had less than 5 hectares of farm size. Averagely, maize farmers had 4.75 hectares of farm land. This implies that they are smallscale, smallholder, peasant, poor farmers. According to Alabi and Abdulazeez (2018), farmers are classified as smallscale if they have 0.1 – 5.0 hectares of farm land; medium scale if they have between 5.1 – 10 hectares of farm land and large scale if they have above 10 hectares of farm land.

Table 1: Socio-Economic Profiles of Maize Farmers

Socio-Economic Profiles	Frequency	Percentage	Mean
Age (Years)			
31 – 40	21	21.00	
41 – 50	44	44.00	**47.0**
51 – 60	35	35.00	
Gender			
Male	85	85.00	
Female	15	15.00	
Educational Status (Years)			
Primary	19	19.00	
Secondary	31	31.00	
Tertiary	47	47.00	
Non-Formal	03	03.00	
Farming Experience (Years)			
1 – 5	28	28.00	
6 – 10	39	39.00	**9.0**
11 – 15	31	31.00	
16 – 20	03	03.00	
Household Size (Units)			
1 – 5	39	39.00	
6 – 10	26	26.00	**8.0**
11 – 15	35	35.00	
Farm Size (Hectares)			
1 – 5	79	79.00	
6 – 10	10	10.00	
11 – 15	08	08.00	**4.75**
16 – 20	03	03.00	
Total	**100.00**	**100.00**	

Source: Field Survey (2021)

Costs and Returns Analysis of Maize Production in the Study Area

The results of profitability and financial analysis of maize production was presented in Table 2. The costs incurred on various activities and the returns of maize production was based on the prevailing market prices of goods and services during the period of field survey. The total variable cost (TVC) accounted for 96.14% of the total cost of production of maize production. The total variable cost consists of: fertilizer input (46.53%); labour input (17.15%); seed input (12.69%); chemical input (08.19%); land preparation (06.16%); transportation cost (03.75%) and loading and offloading cost (01. 68%). The fixed cost accounted for 03.86% of total cost of production. The total revenue was 1, 210,000 Naira per hectare of farmland. The gross margin and net farm income per hectare of farmland were 776,100 Naira and 758,700 Naira respectively. The implies that maize production is profitable in the study area. The results of financial analysis show that the operating ratio, gross margin ratio and rate of return on investment in maize production were 0.56, 0.64 and 1.68 respectively. The gross margin ratio of 0.64 implies that for every naira invested in maize production by smallholder farmer, 64 kobo covered interest, profits, expenses, taxes and depreciation. The remaining 36 kobo covered cost of operations involved in activities of maize production. Operating ratio is used to measure profitability and operating efficiency of maize production. It shows whether or not the cost component in the sales number of maize produce is within the normal range. Operating expenses in the computation of operating ratio exclude interest, taxes, and depreciation. An operating ratio that is decreasing is viewed as a positive sign as it indicates that operating expenses are becoming an increasingly smaller percentage of maize produce sales. Lower operating ratio means a higher operating profit; on the other hand, a high operating ratio indicates less operating profit. Operating ratio of maize production was estimated at 0.56, this implies that 56% of maize produce sales revenue was used to cover cost of maize produce sold and other operating expenses. This result is in line with findings of Alabi, Oladele and Oladele (2020), Yahaya *et al* (2020) and Alabi and Abdulazeez (2018). The rate of return on investment in maize production was estimated to be 1.68. This shows that for every one naira invested on maize production, a higher return of 168 kobo is obtained, this is an indication that the investment is worthwhile. This result is in line with findings of Zalkuwi *et al* (2010), and Adam (2018), in their results, they obtained higher return per capital invested in maize farming.

Table 2: Costs and Returns Analysis of Maize Production per Hectare

Variable	Value (N)	Percentage
(a) Variable Cost		
Land Preparation	27,800	06.16
Fertilizer Input	210,000	46.53
Seed Input	57,300	12.69
Chemical Input	36,900	08.18
Labour Input	77,400	17.15
Transportation Cost	16,900	03.75
Loading/Offloading Cost	7,600	01.68
(b) Total Variable Cost	**433,900**	**96.14**
(c) Fixed Cost		
Depreciation of Assets/Farm Tools	5,700	01.26
Interest	4,800	01.07
Taxes	6,900	01.53
(d) Total Fixed Cost	**17,400**	**03.86**
(e) Total Cost of Production	**451,300**	**100.00**
(f) Total Revenue	**1,210,000**	
(g) Gross Margin	**776,100**	
(h) Net Farm Income (NFI)	**758,700**	
(i) Operating Ratio	**0.56**	
(j) Gross Margin Ratio	**0.64**	
(k) Rate of Return on Investment	**1.68**	

Source: Field Survey (2021)

Factors Influencing Output of Maize Production in the Study Area

The results of multiple regression analysis of Cobb-Douglas production function model are presented in Table 3. Age (X_1), farm size (X_2), labour input (X_3), fertilizer input (X_4), seed input (X_5) and chemical input (X_6) were the explanatory variables considered in the model. All the explanatory variables included in the model had positive coefficients. Age (X_1), and fertilizer input (X_4), are statistically significant at $(P < 0.01)$. Farm size (X_2), labour input (X_3), seed input (X_5) and chemical input (X_6) were statistically significant at $(P < 0.05)$. The F-value of 356.78 was significant at $(P < 0.01)$, this implies that all explanatory variables included in the model jointly were responsible in explaining for the variations in maize output. The coefficient of multiple determinations (R^2) was 0.789, this implies that 78.9% of variations in output of maize produced were explained by explanatory variables included in the model. The regression coefficients in Cobb-Douglas production function model are the elasticities of production. The elasticities of production for farm size, fertilizer input and seed input were 0.2349, 0.4672 and 0.1798 respectively. The sum of elasticities of production gave the return to scale. The return to scale was estimated at 2.380, this means increasing return to scale. These results are in line with findings of Alabi, Oladele, Oladele (2020), Alabi and Abdulazeez (2018), Girie *et al* (2018) and Onuk *et al* (2010).

Table 3: Result of Multiple Regression Analysis of Cobb-Douglas Production Function Model

Variable	Regression Coefficient	Standard Error	t-Statistics
Age (X_1)	0.5642	0.1938	2.91***
Farm Size (X_2)	0.2349	0.1062	2.21**
Labour Input (X_3)	0.5321	0.2236	2.38**
Fertilizer Input (X_4)	0.4672	0.1455	3.21***
Seed Input (X_5)	0.1798	0.0661	2.72**
Chemical Input (X_6)	0.4019	0.1702	2.36**
Constant	1.8921		
RTS	2.380		
R^2	0.789		
Adjusted R^2	0.718		
F-Value	356.78***		

Source: Data Analysis (2021)

**-Significant at 10% probability level*

***-Significant at 5% probability level*

****-Significant at 1% probability level*

Marginal Value Productivity and Resource–Use Efficiency among Maize Farmers in the Study Area

The marginal value productivities of each resource input and the resource-use efficiency among maize farmers are presented in Table 4. The regression coefficients in the multiple regression analysis of Cobb-Douglas production function model $[\alpha_i]$ are used in the computation of marginal value productivities of each resource input and resource-use efficiency ratios $[r]$ among maize farmers. Marginal value productivities for land, and chemicals were estimated at 411,840 and 400,080 respectively. The factor price is the marginal factor cost (MFC) of the factor input used by the maize farmers. Maize farmers with resource-use efficiency ratios $[r]$ close or equal to unity (one) were adjudged to be efficient in the utilization of that resource inputs. The resource-use efficiency index $[r]$ which is the ratio of marginal value productivities to the factor price (marginal factor cost) of various farm resource inputs shows that maize farmers underutilized the following resource: land, seeds, fertilizer, labor and chemical inputs. Similar cases of underutilization of resource inputs were reported by Alabi, Oladele, and Oladele (2020), Onuk *et al* (2010), Nwakpu (2008) and Iheke *et al* (2008).

Table 4: Marginal Value Productivity and Resource-Use Efficiency among Maize Farmers

Variable Input	MP_x	MVP_x	MFC (N)	r	Decision
Land	17.16	411,840	25,700	16.02	Underutilized
Seeds	16.56	397,440	6,500	61.14	Underutilized
Fertilizer	22.39	537,360	31,000	17.33	Underutilized
Labour	12.67	304,080	5,700	53.34	Underutilized
Chemical	16.67	400,080	7,500	53.34	Underutilized

Source: Computed from Data Analysis (2021)

Constraints Faced by Maize Farmers in the Study Area

Constraints faced by maize farmers are subjected to principal component analysis model and presented in Table 5. In the principal component analysis model, constraints with Eigen-values greater than one (1) were retained and used in the model. Constraints with Eigen-values less than one (1) were discarded by principal component analysis model. The retained constrains in the principal component analysis model explained 89.24% of all constraints included in the model. Lack of fertilizer with Eigen-value of 2.8082 was ranked 1st in order of importance based on the perception of smallholder farmers and they explained 13.09 % of the retained constraints in the model. Lack of improved seed input was ranked 3rd and this 14.92% of all retained constraints in the model. The number of retained constraints facing maize farmers in the model were six (6). The Bartlett test of sphericity of 3279.29 was found to be significant at ($P < 0.01$).This result is similar to the findings of Alabi, Oladele and Oladele (2020).

Table 5: Principal Component Analysis of Constraints Faced by Maize Producers

Constraints	Eigen-Value	Difference	Proportion	Cumulative
Lack of Fertilizer	2.8082	0.3679	0.1309	0.1309
Poor Road Infrastructure	2.7065	0.5142	0.1411	0.2720
Lack of Improved Seeds	2.6521	0.2901	0.1492	0.4212
Lack of Credit Facilities	2.2340	0.3172	0.1512	0.5724
Lack of Extension Services	1.9732	0.3501	0.1578	0.7302
Poor Storage Facilities	1.8230	0.4205	0.1622	0.8924
Bartlett Test of Sphericity				
KMO	0.824			
Chi Square	3279.29***			
Rho	1.000000			

Source: Computed from Data Analysis (2021)

****-Significant at 1% probability level*

Conclusion and Recommendations

Maize production is dominated by male farmers who are active, energetic, and resourceful in their youthful age. Maize farmers are smallholder, poor farmer with an average 4.75 hectares of farmland. Maize production in the area is profitable and worthwhile enterprise with gross margin and net farm income of 776, 100 Naira per hectare and 758,700 Naira per hectare of farmland respectively. Age, farm size, labour input, fertilizer input, seed input, and chemical input were statistically significant factors influencing output of maize production in the study area. The resource-use efficiency index $[r]$ which is the ratio between marginal value productivity of resource input to marginal factor cost, the factor price shows that the resources of land input, seed input, fertilizer input, labour input and chemical input were underutilized. Lack of fertilizer, poor road infrastructures, lack of improved seeds, lack of credit facilities, lack of extension services and poor storage facilities were constraints retained in the principal component analysis model facing maize farmers in the study area. The research study recommends the following:

(a) Government should provide adequately farm inputs such as improved seeds, fertilizer inputs, chemical inputs such as insecticides and pesticides, with adequate access to farmland.

(b) Bureaucratic processes and cumbersome administrative procedures involved in accessing credit facilities by maize farmers should be eliminated.

(c) Extension services should be employed, who will teach maize farmers on research findings, organize workshops, seminars and train farmers on efficient use of farm resources

(d) Maize farmers should form cooperative groups, the groups can access farm inputs at subsidized price and the group can market farm produce, they can pool resources together and access adequate funds to finance activities of maize production.

(e) Government should provide good roads linking maize producing areas, this will facilitate easy evacuation of maize produce to nearby marketplaces.

(f) Government should make tractors available for mechanization, this will lead to lower cost of production

Statement of Conflict of Interest

The author(s) declare no conflict of interest for this study.

Author's Contributions

The contribution of the authors is equal

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