RESOURCE USE EFFICIENCY AMONG SMALL SCALE MAIZE FARMERS IN OVIA NORTH EAST LOCAL GOVERNMENT AREA OF EDO STATE, NIGERIA.

BY

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A PROJECT SUBMITTED TO THE DEPARTMENT OF AGRICULTURAL ECONOMICS AND EXTENSION SERVICES, UNIVERSITY OF BENIN, BENIN CITY IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF BACHELOR OF AGRICULTURE (OPTION: AGRICULTURAL ECONOMICS AND RESOURCE MANAGEMENT).

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CERTIFICATION

This is to certify that the project work 'Resource Use Efficiency Among Small Scale Maize Farmers in Ovia North East Local Government Area of Edo state' was carried out by **ILOKA ADAOBI** (**AGR1600060**) of the Department of Agricultural Economics and Extension , Faculty of Agriculture, University of Benin, Benin City, Edo- State,Nigeria.

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_____	_____
Date	Date

DEDICATION

This work is dedicated to God, My family members, friends and well wishers especially my mother whose sacrifice and encouragement helped me through out the whole project process . God bless you all.

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ABSTRACT

This study examined the Resource Use Efficiency Among Small Scale Maize Farmers in Ovia North East Local Government Area. The specific objectives were to describe the socioeconomic characteristics of the farmers, estimate the cost and returns of maize production, estimate resource use efficiency of maize farmers and identify the constraints to increased production in the study area. Multistage sampling techniques were used to select 100 respondents and they were interviewed using a well structured and designed questionnaire. Data analysis was carried out with the use of descriptive statistics like frequency count, mean and percentage. Cobb Douglas stochastic frontier approach and marginal value product approach were used also.

The findings revealed that the study area had both active male(54%) and female(46%) farmers, majority also were married(68%), experienced and smallholder farmers with mostly secondary school level of education(68%). Most of the respondents fell within a household size of 6-9. From the findings also, resources like farm size(1.24), labour (2.18)and quantity of herbicides(1.09) were found to be underutilized which indicated that they should be reduced to optimum level for output increase and revenue respectively. There is need for adjustment in resource use in order to improve farm profit for maize farmers in the study area.

Based on the findings, the study concluded that maize production is a profitable enterprise with a net profit of N932,775.50 and has potentials of alleviating poverty, provision of employment and revenue for the residents and farmers of the study area. It was recommended that government and non governmental agencies should provide extension and supportive services, could be granting of funds to the maize farmers to aid in their production of attaining more profit and expanding their establishment.

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background of study

Agriculture constitutes a significant sector of Nigeria's economy (Adebowale, 2014). The sector is significant in terms of employment of labour, contribution to Gross Domestic Product (GDP) and until early 1970, agricultural exports were the main sources of foreign exchange earnings(Amaza and Olayemi, 2002). The sector accounted for 31– 42% of Gross Domestic Product (GDP) between the year 2005 and 2008. However, in recent years, there has been a marked deterioration in the performance of Nigeria's agriculture resulting in the decline in export crop production, the low level of agricultural technology, low investments, inefficient utilization of farm inputs, drought and post harvest losses which have all largely contributed to the poor performance of agricultural sector(Umar, 2011). Nigeria with a population of over 180 million people(National Bureau of Statistics(NBS,2008) is yet to be achieving self sufficiency in food production in spite of the country's numerous natural resources.There is a growing emphasis on the need for rapid development of the agricultural sub-sector in Nigeria, which is today dominated by subsistence farmers. Increase in the productivity of maize is required to achieve a minimal level of food security since maize is the second most popular cereal grown.

Maize is one of the most important crops in Nigeria and the world at large.Nigeria is the

largest African producer with over 33million tons, followed by South Africa, Egypt and Ethiopia. It is a high yielding crop with multiple uses, it is high in dietary fiber,rich in antioxidants and over 30% of the caloric intake of people in Sub-Saharan Africa comes from maize. It is suitable to various ecological zones in every continent except Antarctica. In Nigeria at large, maize led to the expansion of the industrial sector being used as raw material, as human food, as bio fuel and feed for livestock. Examples are flour mills and animal feed mills. Maize accounts for 30–50% of low income household expenditures in Africa.More than 300million Africans depend on maize as the main staple food crop.Maize is also an important staple food for more than 1.2 billion people in the Sub-Saharan Africa and Latin America according to International Institute of Tropical Agriculture(IITA).

Resource is used to describe those means available for producing goods and services.The goods are used in turn to satisfy wants.Major resources are land, labour,capital and management. Agricultural inputs include seeds, fertilizers, chemicals and many others.To achieve optimum production level, resources available must be used efficiently. Successful planning and result-oriented policies require the technical knowledge of productivities of farm resources to know the needed necessary adjustments to achieve a correct input mix, (Jirgi, 2002).

Maize production is important to the Nigeria economy as it serves as a source of food,source

of income, reduces the rate of unemployment and increases the Gross Domestic Product. Efficient and viable maize production in Nigeria will serve as a stepping stone to food security and also create foreign exchange for development of the nation's economy.Also, given that maize is an important part of food diet, any attempt to increase the farmer's productivity and maize production would be the best step to better their lives and their households.

1.2 Statement of Problem

In Nigeria, food crop production increases have not met up with the level of population growth, resulting in rising food imports and declining levels of food sufficiency(Federal Ministry of Agriculture and Rural Development, (FMARD), 2008). Despite the country's endowment with diversified range of resources, it has remained one of the poor countries of the world. Although agriculture is practiced everywhere, small scale farmers are still engrossed in abject poverty, one would expect that maize farmers and their household have good living standard since maize is a major food security crop and its availability of market but the reverse is the case, farmers mostly rely on the use of basic implements and underdeveloped farm technologies and practices, lack of formal education and agricultural extension agents which leads to low productivity and income, low savings and investments,(Jirgi, 2002).

A previous study done by Umar(2011) which he examined resource use efficiency on

small-scale Cowpea production in Katagum zone of Bauchi state. The result revealed that three of the coefficients of the inputs had positive and significant relationship with the farmers total output while farm size and labour had negative insignificant coefficients . The sum of elasticity of production indicated decreasing return to scale.

Umar (2011) also examined resource use efficiency on small scale Sorghum production in Katagum zone of Bauchi state. The result showed that the production inputs such as feed,fertilizer and labour affected output significantly. It had an increasing return to scale from the sum of elasticity production. Seeds and fertilizer were underutilized and labour was overused. Alimi (2000) examined resource use efficiency on food crop production in Oyo state. The result revealed that land,labour and capital were used within the rational range but not at economically optimal level. Only hired labour was used close to economically optimal level. In addition, farmers might use resources rationally but not at economically optimal level, all these contribute to low output. Therefore, it is proper to examine the resource use efficiency of small scale Maize farmers in the area of study.

This study tends to add to the body of knowledge on resource use efficiency with emphasis on resources utilization in Ovia North East which addresses not only the amount of resources available and how it is used. It also covers the general management practices in the area of study.

1.3 Research Questions

This study was undertaken to provide answers to the following research questions:

(i) What are the socio-economic characteristics of the maize farmers in the study area?

(ii) What are the cost and returns of maize production in the study area?

(iii) What is the resource use efficiency level of maize farmers in the study area?

(iv) What are the constraints to increased maize production in the study area?

1.4 Objectives of the Study

The broad objective of this research was to examine the resource use efficiency among maize farmers in Ovia North-East Local Government Area of Edo state.

The specific objectives were to :

(1) describe the socio-economic characteristics of the maize farmers and the farming systems utilized in maize production in the study area.

(2) estimate the cost and returns of maize production in the study area.

(3) estimate resource use efficiency of maize farmers in the study area.

(4) identify the constraints to increased maize production in the study area.

1.5 Justification of the Study

Maize is an essential food security crop. It is extremely important to low income farmers as a result of its high productivity on vast soils even under drought conditions, with no known religious, social or cultural inhibitions associated with the consumption. Agriculture has to be given the needed impetus to make it become the mainstay of the Nigerian economy and for it to make meaningful contribution towards the economic development of the country through increased maize production.If maize farmers can enhance their resource use efficiency in production, they can eliminate hunger and poverty with the ever increasing population,they can also manufacture and process different maize products which improves its storability and adds value and eventually command higher prices. This research is a frontline work of resource use efficiency in the study area as it seeks to gather reliable information on the structural distribution of resources and resource use, production system,conditions and constraints of the farming households.

Findings of this research will be useful to the government in formulation of appropriate policies, non-government organization in planning and implementing of programs that are aimed at reducing or eradicating food scarcity, hunger and poverty. This study would hence fill the knowledge gap by providing empirical data on the socio-economic characteristics and efficiency in maize production of farming households in Ovia North East Local Government Area of Edo State, Nigeria.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Origin and Distribution of Maize

Maize (Zea mays) is a member of the grass family(poaceae). It is also called Indian corn or corn. It is a cereal plant and has an edible grain,it is also a monocotyledon plant and about 50 species with different colours, textures and grain shapes. White, yellow and red are the most commonly cultivated. It originated from South and Central America. It was introduced to West Africa by Portuguese in the 10th century.Maize was first domesticated by native people in Southern Mexico about 10,000 years ago. Its culture had spread as far north as Southern Maine by the time of the European settlement of North Americans and Native Americans taught European colonists to grow the indigenous grains. Maize can be boiled, roasted on the cob, creamed,converted into hulled kernels, corn puddings,griddle cakes,cornbread and so many more. For example, maize flour is gluten free and can be used to make rising bread, it can be used for popcorns or confections. Its oil is favored as salad oil or frying oil cause it contains little cholesterol. Corn can also be fermented into a number of alcoholic beverages, notably bourbon and other corn whiskeys. Corn starch can be broken down into corn syrup which is a common sweetener, corn stalks can also be made into paper and wallboard.

2.2 Profit and Profitability

The terms Profit and Profitability are used interchangeably. But in the real sense,there is a difference between the two. Profit is an absolute term whereas the profitability is a relative concept. Profit refers to the total income earned by the farm during the specified period of time. While profitability refers to the operating efficiency of the farm. It is the ability of the farm to make profit on sales. According to Harward and Upton, profitability is the ability of of a given investment to earn a return from its use. The net profit figure simply reveals a satisfactory balance between the values received and values given.

Cost return analysis usually forms the basis for farm profitability analysis. It involves itemizing the cost and returns of production and using them to arrive at such estimates as the return to one unit of resources used, the gross margin, as well as the gross and net returns. The farm income is the total output multiplied by the price per unit cost. Therefore farm income is the total revenue generated from the production while net farm income is the difference between the total revenue and total cost. The total cost of production includes both total variable cost and total fixed cost. Profitability in some farm business exists because they are managed more efficiently than others. An enterprise can be said to be profitable in the short

run if the gross revenue is greater than total variable cost. In other words, the gross margin which is the difference between the two should be positive. This enables investors decide whether or not to invest in a business(Emokaro, 2009).

NFI = TR - TC

Where;

NFI = Net Farm Income

TR = Total Revenue

TC = Total Cost

Total Cost (TC) = Total Variable Cost (TVC) + Total Fixed Cost (TFC)

Gross Margin = Total Revenue - Total Variable Cost

2.3 Concept of Productivity

Resource productivity is definable in terms of individual resource inputs or a combination of them. Optimal productivity implies an efficient utilization of resources in production process hence productivity and efficiency are synonymous in thus content. The production function represents the relationship between outputs of goods and services in real physical volumes to the different inputs used. Besides the production function, other techniques have been used for

empirical estimation of resource productivity and efficiency. This means that individual resource productivity in any production process is measured in terms of the ratio which the total enterprise bears to the amount of input used. A powerful technique used to derive MVP of resources is Linear programming, although it required substantial data and is also difficult to generate in a largely traditional agriculture. Linear programming result cannot be tested statistically to know the degree of reliability (Olajide and Heady, 1982). Another powerful tool of investigating resource use efficiency on the farm is the stochastic production frontier. Coelli(1995) has employed it to capture resource use efficiency of farmers.

This study adopted the stochastic production approach.

2.4 The Concept of Efficiency

The concept of efficiency is concerned with the relative performance of the processes used in transforming given inputs into outputs. Farrel(1957) identified three types of efficiency; Technical, Allocative and Economic efficiency. He distinguished between the three types of efficiency thus: Technical efficiency in production is the physical ratio of product output and the factor input, the greater the ratio, the greater magnitude of technical efficiency. A firm is allocative efficient when production occurs at a point where the Marginal Value Product(MVP) is equal to the Marginal Factor Cost(MFC). Economic efficiency is a situation where there are

both technical and allocative efficiency. Unlike technical efficiency concept that only considers the process of production, allocative efficiency concept pertains to the idea that society is concerned not only with how an output is produced but also with what outputs and balance of output (Hensher, 2001).

Resource use efficiency generally starts with the assumption of profit maximization which is an ideal frame work against which the various forms of efficiencies can be adequately measured or tested.(Aromolaran, 2000). Olajide and Heady (1982) emphasized resource allocation as a means of achieving maximum efficiency. Maximum efficiency is attained when it becomes impossible to reshuffle resources without decreasing the total value of product of the production. The price or allocative efficiency can be measured by either simple input-output ratio, linear programming (Data Envelopment Analysis),and some others. Measurement in terms of input-output method depends on the contribution of each resource used to the output. The disadvantage of this method is that it ignores the quality of the resources and also the results obtained are not amenable to statistical test of reliability(Kareem *et al*.2008). The production function approach seems to be the most appropriate. It represents the relationship between output of goods and services in real physical volume to the different inputs used in physical volume also.

Ogundari and Ajibefun (2006), stated that the price relationships are employed to denote

maximum profits for the firm or when choice indicators are employed to denote the maximization of other economic objectives. Marginal Value Product is computed and compared with the value of Marginal Factor Cost, where the ratio of Marginal Value to Marginal Factor is equal to one, production is said to be efficient. If the ratio is less that one, resources have been over utilized while a ratio of more than one indicates under utilization of resources(Aromolaran,2000). Farmers might use resources rationally but not at the economic optimal level,as the aim of every agribusiness firm is to maximize profit while minimizing cost, it is pertinent to determine the efficiency of resources. Most production resources are used more efficiently with increasing output. Whether external means of production are used at all depends on their price but as soon as the farmer can afford them, they should be used in such a way that the production possibilities of all other available resources are fully exploited.

2.5 Empirical studies: Estimation of Efficiency and Inefficiency Equations

Estimation methods exist for the estimation of efficiency and inefficiency equations. These are the maximum likelihood procedures, the Corrected Ordinary Least Squares Method(COLS) (Jaforulah and Premachendra, 2003), and Zellner's Seemingly Unrelated Regressions (SURE) approach. In stochastic efficiency estimation, the use of Ordinary Least Squares(OLS) results in parameters that are less efficient(especially the intercept) compared to maximum likelihood estimates (Green, 1980). OLS provides linear unbiased estimates of the slope and the

computed standard errors, it provides a downwardly biased estimate of the intercept.

The stochastic frontier model is nonlinear, a nonlinear estimation procedure provides consistent and efficient estimates (Green,1980). The stochastic production function analysis is an economic model introduced by Aigner *et al*. (1977) and Meeusen and Van den Broek (1977). For a given combination of input levels, it is assumed that the realized production of a firm is bounded by the sum of parametric function of known inputs,involving random parameters , a random error, associated with measurement error of the level of production or other factors. The greater the amount by which the realized production falls short of this stochastic production frontier, the greater the level of technical inefficiency. The stochastic frontier incorporates the traditional random of regression. In this case, the random error, besides, capturing the effects of unimportant left out variables and errors of measurement in the dependent variable, it could also capture the effect of random breakdown on input supply channels not correlated with the error of the regression.

In the stochastic frontier approach, the technical relationship between inputs and outputs of a production process is described by a production function which establishes the maximum level of output attainable from a given vector of input. As a result it is called The Production Frontier. The stochastic frontier specification has been more widely used than the deterministic specification since it can handle statistical noise, resulting in more accurate specification. A

more complete specification is essential for accurate efficiency measures. There are two objectives in stochastic frontier analysis (Kumbhakar and Lovell, 2000). The first is to estimate an efficiency level (allocative or technical) of each producer. The second is the incorporation of exogenous variables that are neither inputs nor outputs to the production process but nonetheless affects producer‘s performance with the intent to identify the determinants of efficiency.

Similarly, Reinschncider and Stevenson (1991) suggested the expression of the inefficiency effects as an explicit function of a variable factor and a random deviation, as well as the estimation of all the parameters in a single stage maximum likelihood procedure . According to Khem *et al.* (1998) the most popular procedure is to first estimate efficiency scores and regress them against a set of firm specific factors or to use nonparametric or analysis of variance test(ANOVA). Battese and Coelli(1995) challenged this approach by arguing that specific farm factors should be incorporated directly in the estimation of the production frontier because such factors have a direct impact on efficiency.

2.6 Resources in Maize production

2.6.1 Land

Chikwaira(1991) noted that land for agriculture could be justifiably be viewed as the most important assets and the most important resource for the enhancement of peasant production.

FAO (1997) also mentioned land as the most fundamental productive resource in the rural economy. In most countries, it has not been possible to increase production as land for cultivation is becoming effectively scarce (Chikwaira, 1991). This is aggravated by the fact that most lands have lost their productive capacity in a situation where the cost of bringing new lands under cultivation ie also high and rising. Land acquisition and ownership is a hindrance to production. Where agriculture is the predominant occupation, the means of livelihood will be dependent not only on fertility and ease of putting land into productive use but also on allocation of rights in land and the marketing and sharing of its produce.

2.6.2 Labour

Apart from land, labour and capital are other essential resources that are of great importance in maize production. Production is quite labour demanding and that many farmers will rely on family labour. Most farmer therefore hire labour to supplement their own family labour supply.

2.6.3 Capital

Maize production is capital intensive , equipment is needed to till the land, irrigate, to apply crop protection chemicals and to process harvested products m. There are varied sources or acquiring capital for farming as savings, gifts, inheritance and borrowing. Lack of cash and

credit opportunities limit the possibility to substitute inputs.

2.6.4 Water

Irrigation is the application of water supplementary to that supplied by precipitation for production of crops. Irrigation has been used to increase production levels in many nations and is used for production of a whole range of crops including maize. Increased crop production depends largely on rainfall reliability. However, rainfall patterns in Nigeria can be sometimes erratic in distribution which affects crop production directly. Shortage of water supply constitutes a major constraint in Ovia north east local government area to which limits the production of maize.

2.6.5 Fertilizers and Agrochemicals

They are variable resources which are normally used up in one production process (Olukosi and Erhabor, 1988). Examples of agrochemicals include herbicides, pesticides and insecticides. Maize farmers in the study area made use of fertilizers and herbicides during the production season.

2.7 Causes of Inefficiency

There are two main reasons why firms or individuals might fail to minimize inputs and input costs. One explanation is that they are in fact seeking to minimize costs but are being

prevented from doing so due to institutional constraints(short run cost) or by information problems which prevent them from identifying efficient input combinations and processes. Also they are simply not trying to minimize costs for some behavioral or motivational reasons(Hensher, 2001).

According to Kalirajan(1981), variables such as credit, education, experience, extension contact and family size may affect efficiency. These factors have a negative relationship with technical inefficiency. There are four main conceptual sources of technical and economic efficiency (Hensher, 2001):

Failing to minimize the physical inputs (that is, operating within the production possibility frontier).

Failing to use the least cost combination of inputs(that is, failing to operate at the point of tangency between the isocost curve and isoquant).

Operating at the wrong point on the short run average cost curve.

Operating at wrong point on the long run average cost.

2.8 Previous Works on Resource Use Efficiency

Many scholars have attempted to give insights into resource productivity on food crops. In

Nigeria, Olagoke (1991) examined the efficiency of resource use in the production system in Anambra. The study showed statistically significant differences between the net return from irrigated rice field on their swamp, rice field and upland rice fields. Allocative efficiency tests revealed that all sources were underutilized.

Ogunforowa *et al* (1975) had determined resource use efficiency in four agricultural divisions of Kwara state using cross sectional data from some randomly selected farmers. The results showed a case of excessive and inefficient use of labour in traditional agriculture. Equally, Osuji (1978) estimated resource productivity in traditional agriculture in Kano state. The marginal value productivity of seeds were found to be higher than acquisition cost while those of hired labour were below the average wage rate. The marginal productivity of labour was negative in the three of the five clans showing excessive use of family labour in the areas.

Ugwumba (2010) in a work on resource use efficiency and determinants of catfish production output in Anambra state, gave resource use efficiency ratios as 12.78,1.12,0.15,4,70 and 14.47 for stock size,feed,capital and fuel respectively. It implied that the labour unit were over utilized contrary to stock size, feed,capital and fuel inputs that were underutilized. The reason for over utilization of labour input could be due to its availability or cheap rates especially in rural areas.

Onugbuogu *et al* (2014) in a work of resource use efficiency of small holder cassava farmers in Owerri agricultural zone, Imo state, Nigeria, stated that resource use efficiency ratios were 11.20, -4.28, 1.21, 355.3 and 1.01 for farm size, fertilizer, labour, stem cuttings and capital respectively. It showed that fertilizer was over utilized contrary to farm size, labour, stem cuttings and capital inputs were underutilized. Onyewanku (1994) differed from Olagoke comparing resource use efficiency between irrigated and non-irrigated farms. Both farm groups had underutilized land,capital and any other form of input but over utilized labour and irrigation services.

CHAPTER THREE

3.0 RESEARCH METHODOLOGY

3.1 Area and Scope of study

Ovia North-East local Government Area was the study area. It is a local government area in Edo state. It is located geographically between longitude $6^0$4'East and $6^0$43 East and latitude $5^0$44'North and $7^0$34'North.It has an area of 2,324 kilometer square and a population of 203,500 at the 2016 population projection. The postal code of the area is 302. It has a population density of 87.55 per kilometer square as at 2016 also with an annual population change of 2.7% (2006-2016). Ovia North East Local government area is one of the largest local areas in Edo state in terms of land mass. Ovia North-East Local Government Area counts as one of the eighteen local government areas with its administrative headquarters in Okada

town, thus falling within the southern senatorial district of Edo state. Ovia North-East Local Government Area hosts industries, hotels, banks, privately owned institutions as well as government owned establishments.

Agriculture is an important economic activity in Ovia North-East Local Government Area. Farming is a major occupation in this area,the inhabitants are predominantly farmers producing several crops for consumption and sale and a good number of its farmers are involved in maize production, since a large market for maize product exists. It consists of activities such as cultivation,marketing which includes transportation,storage and processing of maize into products such as pap and maize pudding.Other important economic activities include trading, lumbering and crafts making.

3.2 Sampling Procedure

Multi-stage sampling procedure involving purposive and simple random sampling techniques was used in selecting respondents for this study. The first stage involved a purposive selection of Ovia North-East Local Government Area on the basis of proximity and preponderance of maize production in the study area.

In the second stage, simple random sampling was used to select 10 villages from the Local Government Area using the ballot box method.

In the third stage, simple random sampling was used to select 10 farmers from each of the 10 villages mentioned earlier using the random number method giving a total sample size of 100 Maize farmers in Ovia North-East Local Government Area of Edo state. The simple random sampling procedure in second and third stage was used so that there would be equal chance of selection.

3.3 Data Collection

A set of well structured questionnaires were designed and delivered to the farmers. It represented the basic source of data for the study. The questionnaire was designed in such a way to collect required information from the target farmers. Secondary data was obtained from journals, published articles, textbooks and the internet.

3.4 Measurement of Variables

Variables	Measurements
Age	Years
Gender	Male=1 and Female=0
Farming experience	Year(s)
Level of education	Ordinal value with he following categories; Non-Formal=1, Primary=2, Secondary=3,

	Tertiary=4
Household size	Number of individuals in the family
Farm establishment cost	Naira
Cost of maize seeds	Naira
Labour	Manday
Farm size	Hectare(s)
Marital status	Single=1, Married=2, Divorced=3, Widowed=4

3.5 Analytical Techniques

A combination of descriptive and inferential statistics were used for this study.

Objective 1, to describe socio-economic characteristics of the respondent. Descriptive statistics such as mean,percentage and frequency count and tables were used to describe the data obtained.

Objective 2, to estimate cost, returns and profitability. Budgetary analysis was used.

Gross margin analysis was carried out…as done by Egbodion (2011).

Gross margin is the difference between total revenue and total variable cost. The assumption is that the higher the gross margin the higher the profit made by maize farmers.

$$GM = TR - TVC\ldots. \quad (1)$$

$$TR = PQ$$

$$TVC = XM$$

Where GM=Gross Margin, TR=Total Revenue, P=Unit price of Maize, Q=Quantity of output, XM= Market Price of variable input.

Net return is the difference between gross margin and total fixed cost.

Net return = Gross margin – Total fixed cost

Net profit will be determined by deducting total cost of production from total revenue.

$$\text{Net profit} = TR - TC\ldots. \quad (2)$$

$$TC = TVC + TFC$$

Where TR= Total revenue, TC= Total cost, TVC= Total variable cost(fertilizer, pesticide, labour), TFC= Total fixed cost which includes cost of fixed assets(land, hoes, cutlass).

Objective 3, to estimate the resource use efficiency of maize production.

The Cobb-Douglas stochastic frontier model was assumed for the production technology of the farms and the empirical stochastic frontier model will be specified as:

$$LnY = Ln1\beta0 + \beta1LnX_1 + \beta_2LnX_2 + \beta_3LnX_3 + \beta4LnX_4 + \beta5LnX_5 + \beta6LnX_6 + Vi \ldots (3)$$

Where Y= Maize output (kg), X_1= Quantity of seed(kg), X_2=Farm size(ha),

X_3 = Pesticide(liter), X_4=Family labour (mandays), X_5=Hired labour (mandays),

X_6 =Quantity of fertilizer(kg), Vi=Random error factor, Ln=Natural logarithm.

The intercept (β_0) and the coefficients of the independent variables which range from B_1 to B_6 are parameters that were estimated. The random error factor(vi) was assumed independently and identically distributed output random variations due to the factors beyond the control of the maize farmers in the study area. The Cobb-Douglas functional form is the best for resource use efficiency parameters.

Further analysis to derive the marginal value product (MVP) of the production inputs was done using coefficients of the inputs from the estimated Cobb-Douglas output.The MVP was computed for each input as the product of its regression coefficient and the geometric mean value of farm revenue and farm input. That is:

$$MVP = bi \times \frac{Y}{X_i} \times Py$$

Where MVP = Marginal value product, bi= Regression coefficient, Y= mean of output, X_i= mean of input, Py= per price unit of output.

A given resource was optimally allocated when there is no divergence between its MVP and

its acquisition cost (Marginal factor cost (MFC)). The MFC is the opportunity cost or the market price of each input in a competitive market.

MFC = Px (Price unit of input).

A ratio less than one(<1) shows over utilization of that resource and the profit will be increased by decreasing the quantity of its input use. Resource under utilization is indicated by a ratio greater than one(>1) and the profit will be increased by increase in the rate of its input use. The ratio will be computed as follows: As done by Ugwumba (2010).

$$r = \frac{MVP}{MFC}$$

Where r = efficiency ratio

Mathematically:

If, $\frac{MVP}{MFC} = 1$, use of resource is at optimum (optimum utilization)

$\frac{MVP}{MFC} = < 1$, use of resource is above optimum (over utilization)

$\frac{MVP}{MFC} = > 1$, use of resource is below optimum (under utilization)

Objective 4, to identify the constraints to increased maize production in the study area; Likert scale was used.

The likert scale involves a list of variables related to attitude in question.Likert scale is a bipolar scaling method measuring either positive or negative response to statement. The scale is a five point scale which uses an ordinal level of measurement. The measurements are:

Very serious = 5, Serious = 4, Undecided =3, Slightly serious = 2 Not serious = 1

The cut off point was determined as follows:

$X = \sum f/n$

Where X= critical mean score, f=total score(5,4,3,2,1), n=scale point

$$\frac{5+4+3+2+1}{5} = 3.0$$

This was analyzed using descriptive statistics such as mean and standard deviation. A weighted mean of 3.0 is obtained. Variables whose mean are greater than or equal to 3.0 (≥3) are considered as a serious constraint to increased maize production in the study area.

CHAPTER FOUR

4.0 RESULT AND DISCUSSION

4.1 Socio-economic characteristics of the Respondents in the Study Area.

One of the objectives of this study was to determine the socio-economic characteristics of the respondents and how it affects their production. The socioeconomic characteristics examined were sex, age ,marital status,level of education,religion, household size, major occupation, farming experience, farming purpose and source of finance. Table 4.1 represents the socioeconomic characteristics of the respondents.

4.1.1 Sex

The table shows the distribution of farmers according to their gender. It revealed that 54% of maize farmers are male while 46% are female. The minor difference between male and female shows that both men and women are active farmers in maize production in the study area. A probable reason for this could be as a result of the less tedious and region activities in the production of maize.

4.1.2 Age

The table also revealed the age categorization of respondents. The least age bracket of the respondents fell in the ages of 30 and below. 51% had the largest age bracket with 31- 40 with a mean age of 39 which indicated that maize farming is predominant among the middle aged folks. Ibitoye (2011) asserts that farmers are most productive between the ages of 20 and 50. The implication of this is that most of the farmers are adults with much energy and as such could be so efficient in their farming activities, hence their output or productivity will be quite high,compared to that of the older age because they are still vibrant and have energy to cope with the stress in farming. Active age also plays a significant role in maize production as agreed by Adeoye, Olajide, Adelani, Usman and Badmus(2011) in that young men and women are known to be economically active, productive and innovative.

4.1.3 Marital Status

The marital status of the respondents from the table shows that 18% of maize farmers are single, 68% are married, 7% are divorced and 7% are widowed. The very high percentage of the married maize farmers can be attributed to the fact that married farmers are faced with the responsibility of providing food for their families. Adegeye and Dittoh (1985) assert that marriage is essential to the prosperity of small scale farmers, particularly when the farmer depends on family labour.

4.1.4 Level of Education

From the Table, 9% have non formal education, 7% have primary education, 68% have secondary education which was the majority and 16% have tertiary education. The high educational level of the maize farmers is expected to have a positive influence on the adoption of improved technologies such as farm mechanization which has high potentials to increase farm productivity. It also supports the result of Onubuogu and Onyeneke(2012) and Onumadu(2014) that individuals with higher education attainment are usually faster in adoption of improved farming technologies. This result agrees with the findings of Amaza(2000) that farmers efficiency in using information on new production techniques increase with education and thus, their productivity. This result also agrees with the findings of Ada-Okugbowa and Egbodion(2017) who asserted that education positively and significantly influences farmers production efficiency.

4.1.5 Religion

The religion of the respondents also showed that 98% are Christians while 2% are Muslims. This indicates that most of the farmers practiced the Christianity form of religion. Religion influences the farmers' choices of inputs such as fertilizer, seeds and management practices in the farm. Traditional agricultural practices are transferred from generation to generation. If a religious rule in a certain community states that farmers are to scatter seed and plough it into the soil, the people will grow up into believing that it is the only correct way of planting. This could attribute to the fact that their rate of adoption of new and improved technologies might take a longer time.

4.1.6 Household Size

Family size is an important socio-economic characteristic due to the fact that availability of family labour contributes immensely to agricultural production. The table revealed that 11% of the respondents had household size of below 5, 34% had household size between 6 - 9, 23% had between 10 -14 people and 32% had 15 and above household size. The implication is that as the household size becomes larger , the efficiency(higher output and larger area of land cultivated) could increase because large household size increases the opportunity for family

labour usage. This agrees with the results of Ewaonicha(2005), Ohiwatayo(2008), Onaiwu(2011), Onubuogu(2013) and Esiobu(2014),who reported that the large household size compliments labour to enhance production and reduce the cost of hired labour. The household size also had a mean of 4, which implies that household consumes lesser and more is marketed.

4.1.7 Major Occupation

The table also shows the main occupation also showed that 15% of the respondents are engaged in farming, 42% are in trading and 43% have formal employment. The result implies that farming can be undertaken as a sole means of livelihood and it can also be combined with other jobs or endeavors thereby serving as a supportive means of per capital income.

4.1.8 Farming Experience

From the table, 41% of maize farmers have been in maize production for less than 5years, 3% for 6 - 10years and 56% for 10years upwards. The mean farming experience was 13years which implied that the maize farmers in the study area were quite experienced and knowledgeable enough to adopt new and improved farming technologies in a bid to increase maize production.Farming experience is an excellent predictor of adoption because it helps

farmers understand the value of innovation. (Idrisa *et al*, 2012). With the farmer's level of expertise it is easier for him or her to accept and understand new agricultural technologies. Experience here, also supports the findings of Onubuogu(2013) and Esiobu(2014) that previous experience in agribusiness management enables farmers to set realistic time and cost targets, allocate, combine and utilize resource efficiently and identify production constraints.

4.1.9 Farming Purpose

The table from 4.1 also revealed 41% of the maize farmers produce for domestic purposes only, 3% for commercial only and 56% for both domestic and commercial purposes. Agricultural production is mainly for the purpose of providing food, profit maximization or both. Majority of the farmers depend on their farms for food and the little marketable surplus to earn some money for other domestic uses.

4.1.10. Source of Finance

Sources of finance was revealed from the table also, 80% of maize farmers financed from personal savings, 1% from bank loans, 7% from cooperatives, 1% from money lenders and 11% from friends and relatives. This indicates that majority of the farmers used their personal savings as capital to start up the maize production and had little or no external source of funds for the enterprise.

Table 4.1: Socio-economic characteristics of farmers in the Study Area.

Sex	**Freq.**	**%**	**Mean**
Male	54	54.0	
Female	46	46.0	
Age in years			
30 and below	10	10.0	
31-40	51	51.0	39.0
41-50	39	39.0	
Marital status			
Single	18	18.0	
Married	68	68.0	

Divorced	7	7.0	
Widowed	7	7.0	
Level of education			
Non formal education	9	9.0	
Primary education	7	7.0	
Secondary education	68	68.0	
Tertiary education	16	16.0	
Religion			
Christian	98	98.0	
Muslim	2	2.0	
Traditional			
Household size			
0-5	11	11.0	4.0
6-9 ppl	34	34.0	
10-14 ppl	23	23.0	
15 and above	32	32.0	
Main Occupation			
Farming	15	15.0	
Trading	42	42.0	
Formal employment	43	43.0	
Farming Experience			
0-5 years	41	41.0	
6-10 years	3	3.0	13.0
10 years plus	56	56.0	
Farming Purpose			
Domestic purposes	41	41.0	
Commercial purposes	3	3.0	
Both	56	56.0	
Source of finance			
Personal savings	80	80.0	
Bank loans	1	1.0	
Cooperatives	7	7.0	
Money lenders	1	1.0	
Friends and relatives	11	11.0	

Source: Field survey, 2022.

4.2 Maize farming characteristics of farmers in the Study Area.

Table 4.2 presents the distribution of the maize farming characteristics of the respondents in the study area.

4.2.1 Cropping system

Table 4.2 revealed 12% of the respondents practiced mono-cropping, 87% practiced mixed cropping and 1% practiced crop rotation. This could be attributed to the fact that the farmers practiced mixed cropping due to scarcity of land, to minimize production risks, prevent infestation of pest and diseases, maintain fertility of soil and derive other sources of income.

4.2.2 Farm Size

The table also indicated the average farm size. The mean farm size cultivated was1.56ha, this implies that majority of the respondents are small holder farmers operating on less than or equal to 1.56 hectares of farm land. A probable reason could be due as a result of high cost of land or land tenure duster predominant in the study area. Large farm size increases agricultural productivity and improves farmer's technical and resource use efficiency.

4.2.3 Land Acquisition

The mode of land acquisition of respondents in the table revealed 66% acquired their farm land through inheritance, 29% had theirs through purchase and 5% from rent. It revealed that majority of the farmers owned their land through inheritance. This implies there is availability of land in the study area. Farmers that own land tend to have an edge over farmers renting land, the amount that will paid as rent would be channeled to other farm activities. Rahman(2003) stated that the pattern of land ownership by inheritance and purchase tends to promote security, motivation and management to farmers for efficient utilization of resource than land acquired through lease or hire.

4.2.4 Source of Maize Seed

The table revealed 7% of the respondents obtain their maize seeds from research centers, 64% obtain from government, 2% from seed companies and 27% from open markets. This indicates that the maize farmers obtained maize seeds from a verified source and government aided in provision of input.

4.2.4 Source of Labour

Main source of labour was also revealed in the table, 40% of farmers used family labour while 60% used hired labour. This attributes to the fact that some members of a household might not

be strong or matured enough to help with the maize production process or some might be occupied with school work or other jobs hence hired labour usage is more than family labour usage.

4.2.5 Variety of Maize

The table in addition shows that 31% of the respondents cultivate White maize variety. 66% cultivate Suwan-1-sr and 3% cultivate Samaz-14. Majority cultivated the Suwan-1- sr variety of maize in the study and could be attributed to its high yielding ability and early maturity.

4.2.6 Seed(s) per stand and Plant Spacing

From the table, 1% of the respondents also practiced 1 seed per stand while 99% practiced 2 seeds per stand to prevent crop failure and adequate use of space. 99% of the respondents use plant spacing of 75cm x 50cm while 1% use 50cm x 25cm. Majority use the plant spacing of 75cm X 50cm to be able to achieve maximum yield of maize.

4.2..7 Use of Fertilizer and Herbicides

Finally, the table also revealed that 4% of the respondents apply fertilizers could be either organic or inorganic to improve the maize growth process and 76% also use herbicides in destroying of weeds that disturb and compete with the maize crops for nutrients, space, light and water.

Table 4.2: Maize farming characteristics of farmers in the Study Area.

Cropping system	Freq	%	Mean	Std. Dev
Mono-cropping	12	12.0		
Mixed cropping	87	87.0		
Crop rotation	1	1.0		
Farm size (hectare)			1.56	0.17
Land acquisition				
Inheritance	66	66.0		
Purchase	29	29.0		
Rent	5	5.0		
Borrow				
Source of seed				
Research centers	7	7.0		
Government	64	64.0		
Seed companies	2	2.0		
Open market	27	27.0		
Source of labour				
Family labour	40	40.0		
Hired labour	60	60.0		
Variety of maize				
White Maize	31	31.0		
Suwan-1-sr	66	66.0		
Samaz-14	3	3.0		
Seed(s) per stand				
1	1	1.0		
2	99	99.0		
Plant Spacing				
75cmx50cm	99	99.0		
25cmx50cm	1	1.0		
Fertilizer	4	4.0		
Herbicides	76	76.0		

Source: Field survey, 2022.

4.3 Cost and Returns of Maize Production in the Study Area.

The cost and returns obtained per hectare for maize were estimated to determine profitability of maize production in the study area. The quantity of profit made over a given period of time is a good indicator of an enterprise's profitability. Cost is an expense that the business takes in an effort to sell a product or render service. Profit is the financial gain the business when revenue or return surpasses cost or expenses. Variable costs are the costs that change as the quantity(volume) of the goods or services change. Fixed costs are the costs that do not change when quantity or volume of a production changes.

Table 3 shows the Total Variable Cost(TVC) of maize production incurred as N237,194.50 and Total Revenue(TR) as N1,669,570.00. Fertilizer(82.13%) accounted for most of the Total Variable Cost and maize seeds accounted for the least (5.62%). Also the cost of acquiring some fixed inputs such as hoe which was N1500, cutlass also cost N1700 and the average of land with 1.56ha also sold at N300,000. The value of Total Cost(TC) was N732,794.50. This shows the cost of inputs used by maize farmers in the production was high. The value of the Gross margin received was N1,432,375.50(Revenue less Total Variable Cost), the positive gross margin indicated that maize production is viable and highly profitable if the farm is well managed . Net return earned by the surveyed maize farmers was N936,775.50 (Gross margin less Fixed cost) and Net profit received on average also was N936,775.50(which is Total

Revenue less Total Cost). It indicated that maize production is profitable and viable.

Table 4.3:Cost and Return Analysis

Variable Cost	**Qty**	**Cost/unit (N)**	**Total (N)**	**%**
Maize seeds (kg)	20.39	654.00	13335.06	5.62
Herbicide (litre)	7.46	3312.99	24714.91	10.42
Fertilizers (kg)	53.13	3666.67	194810.18	82.13
Labour (Man/day)	1.79	2421.43	4334.36	1.83
Total Variable Cost			237,194.50	
Fixed Cost				
Land(ha)	1.56	300,000	468,000	
Hoe	4.00	1500	6000	
Wheelbarrow	1.00	16,500	16,500	
Cutlass	3.00	1700	5100	
Total Fixed Cost			495,600.00	
Total Cost			732,794.50	
Gross Margin			1,432,375.50	
Net Return			936,775.50	
Net Profit			936,775.50	
Total Revenue				
Quantity sold(kg)	2737.00	610.00	1,669,570.00	

Source: Field survey, 2022.

4.4 Result of Regression Analysis for Maize Farmers in the Study Area.

Table 4 shows R^2 with a value of 0.716 was significant at 1% and an adjusted R^2 of 0.512 was significant at 1% also. Regression shows the magnitude of the relationship between the variables. It shows how the independent variables (inputs) affects the dependent variable(output) significantly or non significantly. All the variables had positive coefficients which implied that they all affected output significantly except herbicide which had no significance on the output and had the least t-ratio. This also implies that an increase in quantity of input will result to an increase in output and for variables that are significant, they are the major determinants of output(Salish *et al*, 2015). Labour was positive(5.306) which means it was properly utilized and significant at 1%. The coefficient of fertilizer(1.318) was also positive, the highest and significant at 1% level which indicated that fertilizer usage had great impact on maize production.

Table 4.4 : Regression Analysis

Variable	Coeff	Std. Err	t ratio
Farm size (ha),	0.417	0.119	3.504*
Quantity of seed (kg),	0.715	0.241	2.967*
Herbicide (litre),	1.692	1.319	1.283
Labour used	0.642	0.121	5.306**
Quantity of fertilizer (kg)	1.318	0.248	5.315**
The intercept parameter,	1.464	0.215	6.809**
Regression coefficients,	0.571	0.123	4.642*

Source: Field survey, 2022

$R^2 = 0.716^{**}$; Adjusted $R^2 = 0.512^{**}$; F-ratio = 13.71 ; n = 100

**Significant at 1% level, *Significant at 5 % level, NS Non-significant.

4.5 Return To Scale (RTS)

Return to scale describes the rate by which output changes if all inputs are changed by the same factor. The table below also shows the variables and their respective elasticity. The sum of the respective elasticity gives the return to scale. Production elasticity indicates the percentage change in output relative to a percentage change in input if other factors are held constant. Maize production in the area had an increasing return to scale from the sum of the elasticity of production(3.800) which indicated that the output increases by a larger proportion than an increase in inputs during production process. It is considered irrational. Production factors should be expanded to advance to economic region of production where production inputs are to maximally utilized.This result is consistent with Egbodion and Igbinidu (2019), where similar RTS was observed.

Table 4.5: Return to scale

Variable	Elasticity
Farm size (ha)	1.1800*
Quantity of seed (kg)	1.3600**
Herbicide (litre)	0.1300
Labour used	0.9600*
Quantity of fertilizer (kg)	0.1700
Return to scale	3.800

Source: Field survey, 2022

Increasing return to scale.

4.6 Resource Use Efficiency of Maize Production

Table 4.6 reveals the estimate of resource use efficiency in maize production in the study area. The level of utilization of different inputs is determined by measure of efficiency of resource use. Marginal Value Product(MVP) approach was used to get efficiency ratio(r), where r = MVP/MFC. Marginal Value Product is the marginal revenue created due to an addition of one unit of resource. MVP was estimated through Cobb-Douglas production function. Marginal Factor Cost(MFC) is the additional cost created by adding a single unit of input. From the results, farm size, use of herbicide and labour were underutilized, this implied that use of the resources were below optimum, in other words, optimum yield was not achieved, adequate quantity of resources should be used to give high output hence high profit. Quantity of seed and fertilizer were found to be optimally utilized, the resources were used at optimum(they were used to the most favorable amount).

Table 4.6: Resource use efficiency of maize production

		Coeff	MVP	MFC	MVP/MFC	Decision
Farm size (ha),	2737	0.318	12.81	10.32	1.24	Under - utilized
Quantity of seed (kg),	20.39	0.715	183.33	184.02	1.00	Optimum utilization
Herbicide (litre),	7.46	1.692	214.53	196.41	1.09	Under-utlized
Labour used	53.13	0.642	98.31	45.05	2.18	Under-utlized
Quantity of fertilizer (kg)	1.79	1.318	184.49	184.39	1.00	Optimum utilization

Source: Field survey, 2022.

4.7 Constraints to Maize production

Small scale farmers are faced with various problems in Nigeria which posed a lot of threat to successful agricultural production. Likert scale was used to identify the constraints. Constraints who had a mean greater than 3 are perceived as serious and those lesser than 3 not serious. As revealed in table 4.7, all the constraints were observed to have a mean greater than 3 which indicated they were all serious and needed to be looked into urgently . The major problem of the farmers was insufficient capital with a mean of 4.63 which tends to limit ability to purchase adequate amounts of inputs. These constraints hinder maize production on the study area and it agrees with Mshelia *et al*and Stephen *et al*(2008).

Table 4.7: Constraints to maize production

Constraints	Mean	Std. Dev
Insufficient capital	4.63	0.60
High cost quality of Maize seeds	4.19	0.56
Difficulty in getting seeds	3.51	1.43
Water availability problem	3.88	0.97
Pest and disease infestation	4.32	0.92
Erratic power supply	4.26	0.82
High cost of labour	4.02	1.02
Theft and predators	3.39	1.38
Poor extension services	4.37	0.72
Transportation problem	4.29	0.77
Lack of modern technologies	4.10	0.92
Lack of government support	4.16	0.93
Land acquisition	3.96	1.28

Source: Field survey, 2022.

*Mean > 3.0 = Serious constraints

CHAPTER FIVE

5.0 SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Summary

Efficiency of the resource use of production of maize in Ovia north-east local government has been analyzed. The stochastic frontier approach was used for the analysis. The data collected were analyzed using descriptive statistics such as frequency,percentage and mean. The result indicated that maize farmers in the study area consisted of both male and female although the male farmers were more (54%) and most farmers fell within the ages of 31-40 with a mean age of 39. Cobb-Douglas production function was used to examine the resource use efficiency allowing for computation of marginal value productivity for the estimated coefficients with quantity of seeds(1.00) and use of fertilizer(1.00) fully optimized, farm size(1.24), herbicide(1.09) and labour(2.18) had their resource use efficiency ratio to be greater than one that was below optimum which indicated under utilization and an increase in farm size, labour and herbicide use would increase output and thereby lead to an increase in income. Also, maize production in the area had an increasing return to scale .The source of credit of most maize farmers were their personal savings with little or no external aid. The gross margin received was N1,432,375.50 and net return earned was N932,775.50. Thus it could be

concluded that maize production in the study area was profitable. The constraints faced by maize farmers were insufficient capital, high cost quality of maize seeds, difficulty in getting seeds, water- availability problem, pest and disease infestation,erratic power supply, high cost of labour, theft and predators, poor extension services, transportation problem, lack of modern technologies,lack of government support and land acquisition which were above the critical mean of 3 were regarded as serious in the study area.

5.2 Conclusion

Maize production was found to be a profitable business in the study area despite the problems opposing it. Based on the findings from this study,it can be concluded that an investment in maize production is a profitable enterprise for income generation, poverty alleviation, job creation and improvement of food security to every household since it is a profitable venture.

5.3 Recommendations

In line with the findings from this study, the following recommendations were suggested towards improving the current level of operation of Maize farmers in Ovia North-East Local Government Area.

Provision of adequate extension and supportive services by government or nongovernmental agencies with a view to improving farming techniques with technological innovations and

expanding of the enterprise.

Government should also ensure that amenities like electricity supply,water supply in the areas are stable and available to reduce the high cost incurred on fuel for generators.

Maize farmers should be encouraged to form and join cooperative societies to aid their affordability and access to improved varieties, farm inputs , information and lesser cost of labour.

Farm inputs should be supplied at the right time and cost that is within the farmer's reach.

Monetary policies should be made to encourage lending institutions like bank to administer loans to maize farmers at a lower interest rate as well as timely release of funds.

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APPENDIX

RESEARCH QUESTIONNAIRE

DEPARTMENT OF AGRICULTURAL ECONOMICS AND EXTENSION SERVICES. FACULTY OF AGRICULTURE, UNIVERSITY OF BENIN, EDO STATE.

Dear Respondent,

I am a final year student of the above-named university and department carrying out a research on the topic; "Resource Use Efficiency among Maize Farmers Ovia North East Local Government Area of Edo State, Nigeria". I need your help in carrying out this research by providing answers to the following questions as correctly as possible so as to enable reliable data collection for this study.

The research work is solely for academic purposes and information given will be treated with maximum confidentiality.

Thank you for your cooperation.

Yours faithfully,

Adaobi Iloka.

INSTRUCTION : Please tick (✓) or fill in the necessary information in the appropriate brackets .

SECTION A : SOCIO-ECONOMIC VARIABLES

(1) Village : ——————————————

(2) Sex : (a) Male ( ) (b) Female ( )

(3) Age : ———————— years.

(4) Marital status : (a) Single ( ) (b) Married ( ) (c) Divorced ( ) (d) Widowed ( )

(5) Level of education: (a) Non formal education ( ) (b) Primary education( ) (c) Secondary education ( ) (d) Tertiary education ( )

(6) Religion : (a) Christian ( ) (b) Muslim ( ) (c) Traditional ( ) (d) Others (please specify) ( )

(7) Household size : ——————

(8) Main Occupation : (a) Farming ( ) (b) Trading ( ) (c) Formal employment ( ) (d) Casual work ( ) (e) Others (please specify) ( )

(9) How long have you been involved in Maize farming ? 0-5 years ( ), 6-10 years ( ), 10 years plus ( )

(10) Is your Maize farming for : Domestic purposes ( ), Commercial purposes ( ), Both ( )

(11) Source of finance? (a) personal savings ( ) (b) Bank loans ( ) (c) Cooperatives ( ) (d) Money lenders ( ) (e) Friends and relatives ( ) (f) Others (please specify) ( )

SECTION B : PRODUCTION INFORMATION ON MAIZE

(12) Which cropping system do you use? (a) Mono-cropping ( ) (b) Mixed cropping ( ) (c) Crop rotation ( )

(13) What is your farm size measured in hectare(s)? _____

(14) How do you acquire your land ? Inheritance ( ), Purchase ( ), Rent ( ), Borrow ( ).

(15) How do you obtain your Maize seeds ? Research centers ( ), Government ( ), Seed companies ( ).

(16) What is the main source of labour ? Family labour ( ), Hired labour ( ).

(17) What varieties of maize do you grow ? ——————————-

(18) How many seeds do you plant per stand? ——————————-

(19) What plant spacing do you use ? ——————————-

(20) Do you use fertilizers ? Yes ( ) No ( )

(21) Do you use pesticides? Yes ( ) No( )

(22) Do you use herbicides? Yes ( ) No( )

SECTION C : INPUT AND OUTPUT INFORMATION

23)

Variable Inputs	Quantity (kg)	Price per unit (Naira)	Total
Land preparation			
Seeds used			
Pesticides			
Herbicides			
Fertilizer			
Water			

Fixed inputs	Quantity (kg)	Price per Unit (Naira)	Total
Land			
Implements			

Items	Quantity Sold (kg)	Price per quantity sold (Naira)	Total sales

SECTION D : CONSTRAINTS FACED BY MAIZE FARMERS

24)

Constraints	Very serious	Serious	Undecided	Slightly serious	Not serious
Insufficient capital					
High cost quality of Maize seeds					
Difficulty in getting seeds					
Water availability problem					

Pest and disease infestation					
Erratic power supply					
High cost of labour					
Theft and predators					
Poor extension services					
Transportation problem					
Lack of modern technologies					
Lack of government support					
Land acquisition					

25) What do you think can be done to improve your level of production?

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