PRINCE ABUBAKAR AUDU UNIVERSITY
ANYIGBA, KOGI STATE, NIGERIA

THE ELEVENTH [11TH]

INAUGURAL LECTURE

IF AGRICULTURAL REVOLUTION IS THE ANSWER WHAT IS THE QUESTION?

By

STEPHEN JIMOH IBITOYE

B.Sc.(Ibadan), PGDE(Jos), M.Sc.(Ilorin), Ph.D(UNN)

Professor of Farm Management and Production Economics

TUESDAY 20TH SEPTEMBER, 2022

IF AGRICULTURAL REVOLUTION IS THE ANSWER, WHAT IS THE QUESTION?

BY

STEPHEN JIMOH IBITOYE

[Professor of Farm Management and Production Economics]

Being the text of the

11TH INAUGURAL LECTURE

Delivered

@

Prince Abubakar Audu University, Anyigba, Nigeria

National Anthem

Arise, O compatriots, Nigeria's call obey
To serve our fatherland
With love and strength and faith
The labor of our heroes past
Shall never be in vain
To serve with heart and might
One nation bound in freedom, peace and unity.

O God of creation, direct our noble cause
Guide our leaders right
Help our youth the truth to know
In love and honesty to grow
And living just and true
Great lofty heights attain
To build a nation where peace
And justice shall reign.

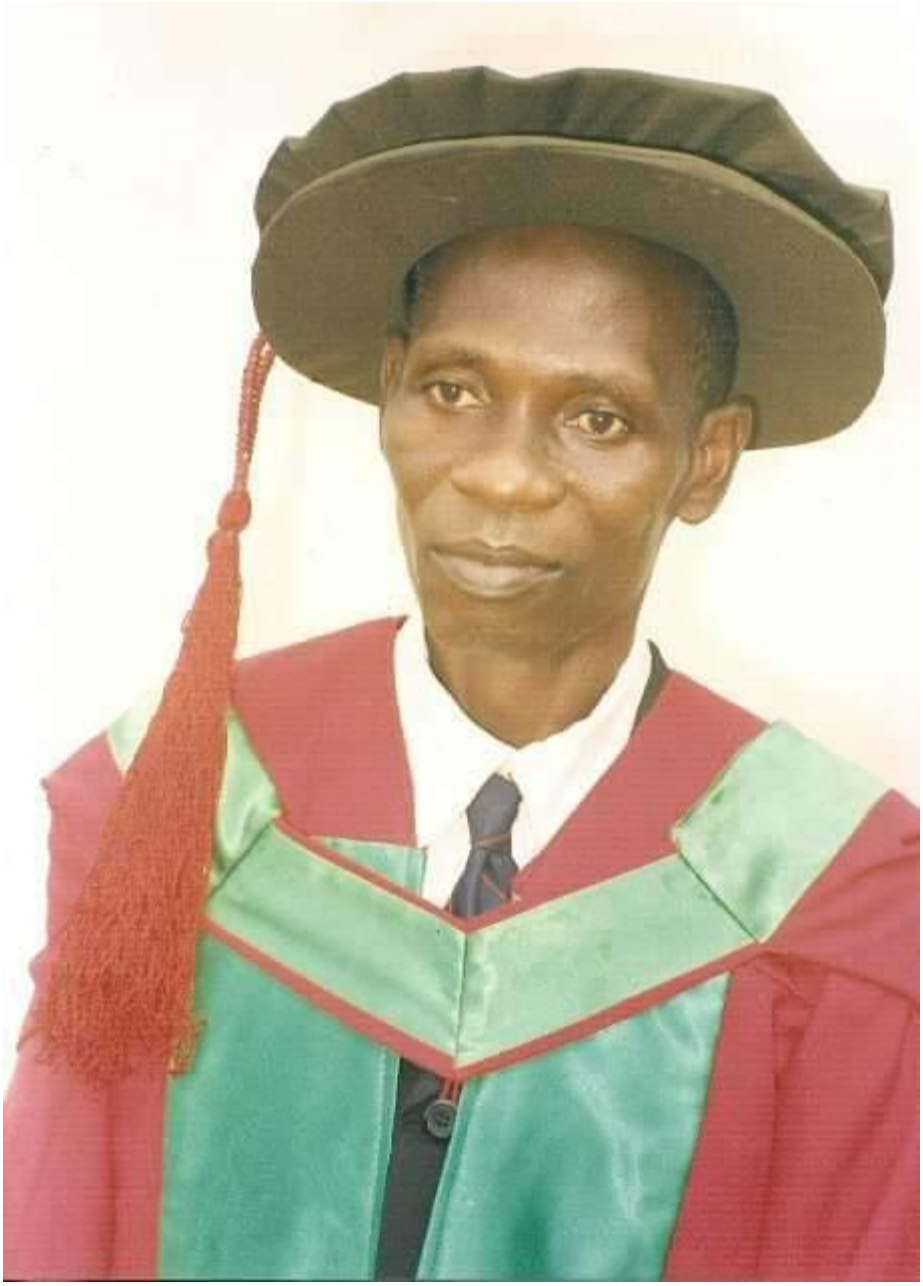
National Pledge

I pledge to Nigeria my Country
To be faithful, loyal and honest
To serve Nigeria with all my strength
To defend her unity
And uphold her honour and glory
So help me God.

Prince Abubakar Audu University Anyigba Anthem

Prince Abubakar Audu University, you stand in strength and pride
Showing the way for all who yearn
Standing firm in wisdom and truth
In unity we grow

Committed in imparting knowledge, skill and learning
To all who long for excellence
Prince Abubakar Audu University, the pride of the world
We honour your virtues



STEPHEN JIMOH IBITOYE

B.Sc., PGDE, M.Sc., Ph.D

Professor of Farm Management and Production Economics

Preceding Inaugural Lectures of Prince Abubakar Audu University, Anyigba

S/N	Inaugural Lecturers	Title	Date
1	Professor Sunday S. Arogba	Phenolics: A Class of Nature's Chemical Weapons of Self-Preservation	Tuesday, 26th August 2008
2	Professor Zacchaeus O. Apata	Unburdening the Colonial Burden: Lessons from History	Tuesday 17th August 2010
3	Professor Steve Metiboba, Jp	Matrimony between two Healthcare Systems: An Unholy Wedlock?	Monday, 27th June 2014
4	Professor Stephen I. Ocheni	Accounting for Public Funds: The Leviathan of Government Bureaucracy	Monday, 25th June 2018
5	Professor Eniolorunda A. Tai Oluwagbemi	Scientific Elegance and Political Naivety of Food and Wood Sufficiency In Nigeria: The Take of An Agroforester	Thursday, 28th June 2018
6	Professor Charles I. Oyewole	Coroner's Inquest: An autopsy of the Man with the Hoe	15th August 2019
7	Professor Odin Eboh Monday	Insanity and Life Pain Two Ancestral Curses: The Role of Village Herbalist	24th August, 2019
8	Professor Jimoh Habibat Isah	The Geography of Erosion in Nigeria: An Explanation	30th August, 2019
9	Professor Marietu Ohunene Tenuche	Neoliberalism: Forecasting Nigeria's Ungodly Romance with the East	29th September, 2020
10	Professor James Omale	Remedy or Poison? Double – Edge Sword PARADOX OF Alternative Medicine: The concern of Toxicologist.	11th March, 2021

COURTESIES

The Vice Chancellor,

Deputy Vice Chancellor Administration,

Deputy Vice Chancellor Academic,

The Registrar and other Principal Officers,

Provost of the College of Health Sciences,

Dean of Faculty of Agriculture, other Deans and Directors,

Heads of Departments,

Members of the University Senate,

Academic and Non Academic Staff,

Friends of the University,

My Lords Spiritual and Temporal,

Gentlemen of the Print and Electronic Media,

Students of This Great Institution,

Distinguished Ladies And Gentlemen

1.0 INTRODUCTION

I give Almighty God all the glory, honour, power and adoration who ordained that I stand here before you today to present this inaugural lecture. The Vice-Chancellor Ma, I feel honoured to be given the opportunity to present the 11th Inaugural Lecture of Prince Abubakar Audu University, Anyigba. It is the first in the Department of Agricultural Economics and Extension.

Inaugural Lecture to my own understanding is one of the unique academic rituals in the University system. Inaugural Lecture confers on a Professor, the freedom to present within his or her academic competence, any view on any subject or the summary of his or her research findings over the years to a congregation of scholars and others on a platform usually provided by the university that designated him or her as a Professor. This is what this lecture intends to achieve within the stipulated time.

NOW TO THE LECTURE "AGRICULTURAL REVOLUTION"

1.1 Conceptual Definitions

1.1.1 Agricultural Revolution

Agriculture is defined with varying scopes. In its broadest sense, it implies using natural resources to produce commodities which maintain life including food, fibre, forest products, horticultural crops and their related services.

Agriculture may also be seen as the cultivation of land and breeding of animals and plants to provide food, fibre, medicinal plants and other products to sustain and enlarge life.

Revolution simply refers to a great change in conditions, ways of working and beliefs that affects large number of people. It could be cultural, social or scientific.

Agricultural revolution therefore relates to the massive or notable changes that had taken place over periods of time in the practice of farming and its system.

The domestication of agriculture enables the human population to grow many times larger than what could be sustained by hunting and gathering. Agricultural revolutions began independently in different parts of the globe.

The first agricultural revolution also known as the Neolithic revolution is the transformation of human societies from hunting and gathering to farming and settlement. This change increasingly opened the way for the possibility of larger human population. The settled communities allowed humans to observe and experiment with plants to learn how they grew and developed. It thus offered the knowledge of plant and animal domestication.

Specifically, the human activity in this period resulted in the selective breeding. Plants with undesirable traits were not gathered at harvest while those that retained their good qualities were favoured. This activity made it possible to keep and also domesticate animals.

The second recognizable agricultural revolution was the British Agricultural Revolution which took place between 17th and 19th century. It marked unprecedented increase in agricultural productivity in Great Britain. Agricultural output grew faster than population and agricultural productivity remained among the highest in the world.

The major development in the second agricultural revolution include; the practice of crop rotation and convertible husbandry. The agricultural revolution also witnessed a massive and rapid increase in agricultural productivity and vast improvements in farm technology. Some of the inventions that were created, which greatly improved productivity during the agricultural revolution include plough and moldboard, seed drills, harvesters, rise of textile industry and advances in transportation lines.

After the second agricultural revolution, another revolution occurred which was referred to as the third agricultural revolution or the green revolution. The green revolution marked the period of increase in productivity of global agriculture as a result of new advances such as high yielding crops, chemical fertilizer, synthetic herbicide and pesticides. The green revolution was founded on scientific research whose results included improvement in seeds, farm technology, use of chemical fertilizer, better irrigation and technological transfers.

1.1.2 Agricultural Production Economics

Production is the process whereby some goods and services are transformed into other goods. The transformed goods are known as inputs, factors or resources while the newly created goods are called outputs, products or yields in the case of crops. Production can be categorized into three; primary, secondary and tertiary production.

In the process of producing agricultural commodities, resources (inputs) which are not only limited in both quantity and quality but also have alternative and often competing uses are employed. The main focus of production economics therefore is the management of resources (land, labour, capital and entrepreneur) in the process of producing commodities. Critical in the goal of resource management are choice and decision making among the alternative uses and alternative end products (output).

The two major goals of production economics are;

i. Provision of guidance to individual farmers for efficiency in resource use in production, and
ii. Provision of guidance to customers for efficiency in resource use in consumption and processing.

Agricultural production economics is an applied field of economic science which is essentially concerned with the application of the principles of choice to the utilization of capital, labour, land, water and management resources in the farming industry. Agricultural production economics is specifically concerned with the conditions under which the expected end objectives of farm operators, farm families and the consumers can be attained to the greatest degree possible.

This also implies an involvement of technical science in the specification of the physical relationship between resources and product. It connotes that the problem of choice involved should be one of economics just as the problem of how resources have to be employed to maximize the profit of the farm. Thus basic concept of the theory of the firm and the principles of resource allocation are the core areas in agricultural production economics. Production economics variables, unlike those of consumption are real and can be measured in tangible physical terms. Measurement of variables in this branch of economics is therefore more exact than other branches of economics. Research can therefore be conducted in a controlled manner as in the case of physical sciences.

Agricultural production economics is based on the principles of optimization. It is concerned with the conditions which are necessary to be fulfilled if a producer has to satisfy his objectives such as profit maximization or desirability to produce a given level of output with minimum cost or resources.

Although the main concern of an agricultural production economist is to attain economic efficiency in the use of resources, he has to be knowledgeable and familiar with the physical production information, factors of production, products, marketing conditions, government policies, and administration. He should be concerned with the factors relating to economic efficiency in the use of agricultural resources in different locations and regions around him. It is the task of agricultural production economist to provide guidance and advice to farm families and agricultural industry on how to use their resources including time, most efficiently in production in order to achieve their objectives and welfare.

1.1.3 Farm Management

In order to understand the concept of farm management, it is important to first of all understand what a farm is and then the concept of management. A farm is an economic unit (firm) where inputs are transformed into output(s) through an interaction between natural and man-made factors. A combination of inputs also called factors of production or productive resources are employed in various proportions using the management capability of the operator of the business who may be called a manager.

Management is seen as entailing both efficiency in resources use and effectiveness in the achievement of goals. Management aims to accomplish group purpose with the least expenditure of material and human resources. It ensures that the organization serves its mission in an effective way and also that it serve the needs of those who control or have power over the organization. It is the art of getting things done through other people.

Reflecting from the background meaning of farm and management, we can now understand better the concept of farm management. Farm management is seen as a decision making process whereby limited resources are allocated to a number of production alternatives in order to organize and operate the farm business in such a way as to attain some stated objectives that are contained in the farm plan.

Farm management is concerned with the organization of the factors of production by an individual farmer within a particular environment and to maximize net return while still maintaining the integrity of his land and equipment.

It involves the application of both economic principles and biological science to the job of organizing and operating a farm business. The ultimate objective of farm management is to maximize profit. Thus farm management seeks for ways of increasing output within a given outlay or minimizing cost of production within a given resource outlay. As such, farm management encompasses agricultural production economics, farm planning and control, farm resource management, farm records and accounting as well as farm financial management.

1.1.4 Agricultural Policy

A policy is a guideline consisting of principles and rules governing the behaviour of persons in an organization. Policies prescribe the way people in an organization should act or behave.

Policy differs from rule of law. While law can compel or prohibit behaviours, policy merely guides actions toward those taking decisions that are most likely to achieve a desired outcome. Policy is a deliberate course of action chosen and followed by a public body, private firm, family or individual. It is a carefully selected line of action that contrasts with a haphazard type of activity. It generally implores wisdom or prudence in managing affairs based on a definite plan or programme created through process of thought and reason.

Existence of a policy is a signal that there was a problem for which someone considered alternative resources and then choose course of action that seemed desirable in view of existing knowledge and feelings as well as foreseeable options.

Agricultural policy is a statement of action and a fundamental tool employed in achieving agricultural development. It is the set of government decisions and actions relating to domestic agriculture and imports of foreign agricultural products. Government usually implements agricultural policies with the goal of achieving a specific outcome in the domestic agricultural product markets.

Some overarching themes of agricultural policies include; risk management, economic stability, natural resources and environmental sustainability, research and development, and market access for domestic commodities. Agricultural policy can also touch on food quality; ensuring that the food supply is of consistent and known quality, food security; ensuring that the food supply meets the population needs and conservation. Policy programmes can range from financial programmes such as subsidies, to encouraging producers to enroll in voluntary quality assurance programme. There are many influences on the creation of agricultural policy including consumers, agribusiness, trade lobbies and other groups.

The objectives of agricultural policy can be grouped into three:

i. Objectives related to farmers – to achieve an acceptable level of farm income, reduce income variability and improve competitiveness of the agricultural sector.
ii. Objectives related to consumers – to assure provision of safe and high quality food at fair prices, assure food security and contribute to energy security.
iii. Objectives related to society at large – to protect the natural environment, preserve cultural landscape and contribute to the viability of rural areas.

2.0 OVERVIEW OF NIGERIAN AGRICULTURAL POLICIES AND PROGRAMMES

While agricultural policy is viewed as a statement of action and a fundamental tool employed in achieving agricultural development, a programme on the other hand is a comprehensive plan that includes objectives to be attained, specifications of resources required by stages of work to be performed.

Olatunji (2005) opined that a programme is a collection of coordinated activities that are mutually directed towards the attainment of a definite goal and it usually comprises of several segments or projects which can be separately pursued as components of the whole. The concept of programme implies that a goal is in focus and several activities would be needed and coordinated to attain the goal. It is generally accepted that Nigerian agriculture has suffered as a result of the resource cause effect of oil, inappropriate policies and institutions.

The persistent failures of agricultural programmes in Nigeria have revealed the basic weaknesses of agricultural policies in Nigeria; and inability of the several administrations in Nigeria to solve the basic and fundamental problems of agricultural development. Nigeria agricultural policies and programmes have undergone changes especially in the post-colonial era. These changes have been a mere reflection of changes in government. This is because these policies and programmes vary only in nomenclature and organizational setup. They emphasize almost the same objectives.

Most of them centered their objectives on the provision of food for the nation and export the excess to other countries and to provide rural dwellers and farmers with extension services, agricultural support and rural development services. Agriculture also continues to suffer from inertia associated with these policies and programme reforms. The potential of agriculture for propelling Nigeria's economic development was recognized by the colonial government when policies were put in place to encourage output growth and export the surplus. The main aim of agricultural policy during the colonial era was to generate immense products from the rural areas to satisfy the demand for raw materials for Britain.

This early policy was on forest resources and agricultural exports like cocoa, coffee, rubber, groundnut and oil palm.

The notable agricultural policies during the colonial era include:

i. Forest policy of 1937, 1945 and 1952
ii. Agricultural policy of 1946 and 1952
iii. Policy for the Marketing of Oils, Oil seeds and Cotton of 1948
iv. Western Nigeria Policy of Agricultural and Natural Resources of 1959

Most of the policies during this era focused mainly on forest related programme with less emphasis on food and animal production. More importantly, most of these policies were made without proper arrangement and institutional framework geared towards the realization of the dreams of the policies.

New policies were formulated in the post-independence era to actualize more equitable growth in agriculture. The earlier surplus extraction policies of the colonial era were quickly translated into the pursuit of an export-led growth. This led to the demarcation of the country into the Western Region, Northern Region and Eastern Region, with each region emphasizing on cocoa, groundnut and oil palm production respectively.

In the post-independent era, there was also an import substitution policy which saw industrialization as the best strategy to achieve economic growth. It emphasized on establishment of domestic industries behind tariff and quota barriers. Surprisingly there was no agricultural programme, project or scheme emanating within this period to accomplish the goal of these policies. For a policy to have meaningful impact; it must have programmes or project geared towards the accomplishment of specific objectives of the policy.

Some notable agricultural policies and programmes put in place in Nigeria by the government after independence in 1960 include the following:

i. River Basin Development Authority -1973
ii. Agricultural Credit Guarantee Scheme - 1978
iii. National Accelerated Food Production Programme - 1973
iv. Agricultural Development Programme - 1976
v. Operation Feed the Nation– 1976
vi. Green Revolution -1980
vii. Directorate of Food, Road Rural Infrastructure -1986
viii. National Agricultural Land Development Agency - 1978
ix. National Fadama Development Project 1993
x. Strategic Grains Reserves Programme
xi. Agricultural Marketing Board, Farm Settlement Scheme etc.

Most of these programmes were designed to take care of such objectives as employment generation, enhancing agricultural output and income, and stemming the tide of rural-urban migration. However, most of these programmes could not be sustained. Infact with time, many of them failed to produce the desired results because of the following reasons:

i. Diversion from the original focus
ii. Programme inconsistency
iii. Poor implementation
iv. Corruption of government officials and public servants
v. Poor targeting mechanisms, etc.

THE QUESTION

The Vice Chancellor Ma, we can see that the policies and programmes put in place in Nigeria to bring about the desired agricultural revolution since independence in 1960 were specifically designed to take care of such objectives as employment generation, enhancing agricultural output and income, and stemming the tide of rural-urban migration. Despite some significant degree of success made by few of these programmes, most of them could not be sustained. In fact with time, many failed due to some specific factors. For Nigeria to achieve the desired sustainable agricultural revolution, the country must as a matter of urgency find solution to the following questions:

3.1 Question I: How Can We Eliminate Corruption From Agriculture?

Among the greatest threats to economic, agricultural, rural and political development of any nation is corruption. Corruption is seen as the abuse of public office for private gain. Dike (2011) defines it as an anti-social behaviour which confers improper benefits contrary to legal and moral norms, and further undermines the authorities to improve the living conditions of the people.
In general, corruption covers such act as:

i. Use of one's office for self interest
ii. Gratification
iii. Insincerity in advice with the aim of gaining advantage
iv. Engaging in less than full day's work for a full day pay, etc.

Political corruption is the abuse of entrusted power by political leaders for private gain. Political corruption does not only involve money changing hands, it also involves granting unmerited favours. It occurs when the politicians and political decision-makers who are entitled to formulate, establish and implement the laws in the name of policy formulation and legislation is manipulated to benefit politicians and legislators.

Corruption occurs in many forms and it has contributed immensely to the poverty and misery of a large segment of the Nigerian population. It has been documented by analysts that corruption in Nigeria has been a hindrance to its economic development.
Nigeria is ranked as one of the world's most corrupt countries according to Transparency International's Corrupt Practices Index (TICPI). The ranking were based on weighted average of corruption perception indices.
The overall index measures the degree to which public officials and politicians are involved in corrupt practices such as accepting bribes, making illicit payment in public procurement and embezzling public funds. Corruption is caused by many factors including; lack of accountability among public servants, inequality in the distribution of resources, promotion of ethnicity and lack of nationalism and weakness of government enforcement agencies.

Corruption has a negative effect on the social, political, environmental and economic development of a country. Corruption results in a reduction in public spending as public funds are being diverted to the personal accounts of some public officials.

Corruption in agricultural sector poses a lot of challenges to making agricultural revolution unsustainable in Nigeria. Agricultural practices require funding especially in input delivery services. Poor logistic support for farmers is another area where corruption could be identified.

In a situation where enough budgetary provisions are made on papers, radios and television, but only a meager amount is actually made available to support agriculture makes agricultural production and services difficult.
Leaving tax exemptions, subsidies, public procurement of goods and services and credits in the hands and control of the politicians has made it open for corruption to exist. This has led to embezzlement and misappropriation of funds meant for agriculture which led to the neglect that agricultural sector is suffering today.

Corruption is an age-long phenomenon that has been a challenge to every development plan for ages. The present food insecurity in Nigeria is blamed on corruption due mainly to the failed policies in agriculture and the manipulations of strategies by political office holders for personal financial gains.

3.2 Question II: How can we eliminate the conflict between Herdsmen and farmers?
Pastoralists own about 90% of the national herd, estimated at 19.5 million cattle, about 975,000 donkeys, 28,000 camels, 72.5 million goat and 41.3 million sheep. Livestock represents between 20 to 30% of total agricultural production and about 6 to 8% of the overall Gross Domestic Product (GDP).
The conflict between farmers and herdsmen has remained the most predominant resource use conflict in Nigeria. For the average herdsman, cattle rearing is a way of living which is reckoned with as a mark of common heritage. In effect, any threat to his herd amounts to a threat not only to his survival but also to his common destiny. Every herdsman believes that nomadic life is worthless without his cattle. Any attempt by farmers to threaten their source of existence is regarded as a call to war. This perhaps explains the reason for the growth of this protracted conflict between the herders and farmers in Nigeria.
The war in the central and southern states of Nigeria between herdsmen and farming communities is an old age problem, but it has escalated in the last decades and has assumed a deadly dimension. In nearly every state of the central and southern parts of Nigeria, herdsmen graze where they like, destroy crops, block traffic, rape women, beat up hunters and wage deadly armed attacks on villages where there is slightest resistance to their depredations.
The conflicts have serious negative impact on the lives, properties, food security and educational development of affected communities. From 2015 to date, thousands of lives were lost and tens of thousands also have been displaced as a result of the conflict. The economic loss has also been huge. Some reports put the financial losses as much as about $13.7 million annually (See Appendix 1).

It is important to note that those responsible for the killings are not brought to justice. It is also important to note that the herdsmen are not forced to return to their own states of origin after these attacks. They remain where they have killed the owners of the land and remain above the law. It is pertinent to note here that, there could be no meaningful development in the agricultural sector in Nigeria if the situation is allowed to continue, unabated.

3.3 Question III: How can we eliminate Terrorism from Agriculture?

Terrorism refers to the use or threat of use of violence by an individual or a group whether acting for or in opposition to an established authority. When such action is designed to create extreme anxiety or fear including effects on a target group larger than immediate victims, it is with the purpose of coercing that group into accepting to the political demands of the perpetrators. Freedom (2014), defined it as a pre meditated use of threat or use of violence by an individual or group to cause fear, destruction or death especially against unarmed targets, property or infrastructure in a state intended to compel those in authority to respond to the demands and expectations of the individual or group behind such violent acts. Such demands or expectations may be for a change in status quo or in terms of the political, economic, ideological, religious or social order within the affected state or a change in the action or policies of the affected states in relation to its interaction with other groups or state.
Nigeria has played host to a terrorist scourge in recent years. Prior to the implementation of the Amnesty Programme in the Niger Delta, the oil region was ravaged by a youth rebellion aimed at attracting more federal government presence and development to the oil producing area of Nigeria. The militancy was also fuelled by clamor for environmental security of the region whose ecosystem and livelihoods had been substantially undermined by nefarious oil extractive activities. As relative peace returned to the Niger Delta, the Boko Haram rebellion broke out in the northern region of the country, dashing the hope of Nigeria's return to sustainable peace and the growth of Nigerian economy in the post-amnesty era.

Boko Haram uprising has proved to be more ferocious than the Niger Delta militancy, deploying the lethal strategy of suicide bombing hitherto unknown in the country. Thousands of people have been killed and property worth millions of dollars has been destroyed since 2009 when Boko Haram first appeared. Since security precedes economic development, there is no gain saying that social and economic development can only strive in a secured atmosphere. Terrorism creates insecurity which affects production and consumption patterns, thereby making the market less attractive for both local and international producers which would have contributed their quota to the growth of the Nigerian economy.

Agriculture accounts for roughly a fifth of the National Gross Domestic Product (GDP) and engages more than 35% of youths aged from 18 to 35 years, but it is showing signs of strain. In some part of the north, the security situation has affected farmland, production, increase in food prices and has also led to decline in the growth of Nigerian economy.

The cost of terrorism in Nigeria in terms of lost in GDP per annum is estimated at 0.82%. There is evidence that terrorism leads to the reallocation of economic activities away from private investment spending to government spending. In other words, terrorism crowds out private investment at a higher rate than its potential to crowd in government spending to enhance economic growth. It is then obvious that no agricultural revolution can strife where there is insecurity of life and property, and consequently no agricultural development can take place.

4.0. RESEARCH WORKS ON FARM MANAGEMENT AND PRODUCTION ECONOMICS

The Vice- Chancellor Ma, I wish to show case some of my research efforts either as sole author or in collaboration with other colleagues in the field of Agricultural Economics especially in farm management and production economics. The ultimate goal of my research effort is to improve agricultural production through efficient management of resources thereby improving the income and well-being of farmers.

My research efforts over the years have been on all the fields of agricultural economics with special emphasis on farm management and agricultural production economics. I have worked on economics of crop production, ditto for livestock production especially poultry and bee production. Other areas include policy institutions like Agricultural Development Programme (ADP), National Fadama Project, National Agricultural Insurance Scheme and Community and Social Development Agencies among others. Different econometric models were used to assess the performance of these various sectors of agricultural economics. My modest contributions in these aspects can therefore be discussed under the following categories:

4.1 Economics of Crop Production Research

The crop subsector of the agriculture sector in Nigeria has the potentials to give the agriculture opportunity for growth. The Central Bank of Nigeria (CBN) report of 2012 showed that between 1960 and 2011 an average of 83.5% of agriculture Gross Domestic Product (GDP) was contributed by the crop production subsector, making it the key source of agriculture sector growth. The food production role of the agriculture sector therefore depends largely on the crop subsector. The major food crops cultivated in the country include: yam, cassava, rice, maize, cowpea, potato, groundnut, and sorghum.

4.1.1 Economics of Grain Production

Studies carried out by Ibitoye, Orebiyi and Ekine (2012) showed that maize contributed the largest volume of grains in Nigeria with 36% followed by sorghum (24%), millet (20%), rice (12%) and cowpea (4%). Kogi state recorded one of the highest figures of maize grown in smallholding. The bulk of which is produced by small-scale farmers. As a major cereal crop widely grown throughout the state, maize is one of the major sources of income for the rural farmers. Ibitoye, Orebiyi and Ekine (2012), also examined the socio economic background of maize farmers as well as the cost and returns associated with maize production in Kogi State of Nigeria. The result showed that maize farmers operating on a profit level of between ₦25, 000 and ₦50, 000 dominated maize production. The result also showed that male farmers of less than one hectare of farm land dominated maize production (Table 1).

Table 1: Categorization of maize farmers by selected socio-economic variables into profit levels

Socio-economic variables	Respondents in the profit level of less than ₦ 25,000	Respondents in ₦25, 000 To ₦50,000	Respondents In Above ₦ 50,000	Total frequency	Percentage (%)
Sex					
Male	36	100	66	202	84
Female	36	2	0	38	16
Total	72	102	66	240	100
Age (years)					
Less than 25	0	2	0	2	1
25-50	32	89	51	172	72
Above 50	40	11	15	66	27
Total	72	102	66	240	100
Farm size (Ha)					
Less 1.0	62	24	35	121	50
1.0 – 2.0	5	38	8	51	21
2.1 – 3.0	5	38	8	51	21
Above 3.0	0	2	15	17	8
Total	72	102	66	240	100
Yrs of farming					
Less than 5	0	4	0	4	2
5 -10	10	14	38	62	26
11 – 15	8	10	21	39	16
Above 15	54	74	7	135	56
Total	72	102	66	240	100
Education					
Illiterates	53	22	55	130	54
Primary	12	71	0	83	35
Secondary	7	4	11	22	9
Tertiary	0	5	0	5	2
Total	72	102	66	240	100
Family size (No)					
Less than 5	17	0	0	17	7
5-10	52	96	61	209	87
Above 10	3	6	5	14	6
Total	72	102	66	240	100

Source: Field Survey, 2009

The gross margin for maize production was ₦57,000 per hectare of land and benefit cost ratio was 1.91. This implies that maize production in Kogi State is profitable (Table 2).

Table 2: Cost and returns for maize production per hectare

S/N	Budget items	Total quantity	Unit cost (₦)	Total Value (₦)
A.	Variable costs			
	i. Labour cost:			
	Land clearing	18MD	500	9,000
	Land cultivation	18MD	500	9,000
	Planting	4MD	500	2,000
	Weeding	10MD	500	5,000
	Fertilizer/chemical Application	10MD	500	5,000
	Harvesting	10MD	500	5,000
	Threshing	5MD	500	2,500
	Packaging/bagging			
	Total Labour Cost	5MD	500	2,500
				40,000
	ii. Other Farm Inputs:			
	Planting Seeds	50kg	60	3,000
	Fertilizer/ Agro-chemicals	LS	-	10,000
	Transportation	LS	-	4,000
	Miscellaneous	LS	10%	5,700
	Expenses			22,500
	Total other Farm input cost			62,700
	Total Variable Cost (i + ii)			
B.	Maize output	2,00kg	60	120,000
C.	Gross margin (B-A)			57,300
D.	Benefit-cost ratio (B:A)			1.91
E.	Level of efficiency (A:Bx100)			52.25%

Source: field survey, 2009

Note MD = Mandays LS = Lump Sum

The dynamic programming model was used by Ibitoye (2010) to investigate the influence of some socio-economic variables on the adoption of maize varieties in Kogi state. The result showed that small-scale farmers with no education and low level of income adopted local variety, while the medium scale farmers with income level of between ₦50,000 and ₦100,000 adopted the improved maize variety. But large scale educated farmers with high income level further adopted the Downy mildew resistant variety of maize (Table 3).

Table 3: Maximum quantity of each variety of maize planted based on farm size, educational status and income level

Category of farm size, Educational status and income level	Varieties of maize	No. of units planted
A. Farm size		
Less than 3.0 Ha	Variety C	122
3.0 Ha – 5.0 Ha	Variety A	102
Above 5.0 Ha	Variety B	114
	Total	338
B. Educational status		
Illiterates	Variety C	107
College-graduate	Variety A	106
College-graduate	Variety B	68
	Total	281
C. Income level		
Less than N50,000	Variety C	99
N50,000 – N100,000	Variety A	98
Above N100,000	Variety B	102
	Total	299

Source: Compiled from tables II and III.

Climate is perhaps the most serious environmental threat to the fight against hunger, malnutrition, diseases and poverty in Africa. The effect is manifested mainly through serious reduction in agricultural productivity. Climate change which is attributable to the natural climatic cycle and human activities has adversely affected agricultural productivity in Africa.

Available evidence shows that climate change is global likewise its impact, but the most adverse effects will be felt more by developing countries especially those in Africa due to their low level of coping capabilities. As the people of Nigeria strive to overcome poverty and advance economic growth, there is the need to study the effect of weather variability on agriculture in the country so that effort will be made towards combating the menace.

In line with this, Ibitoye and Shaibu (2014) analyzed the effect of rainfall and temperature on maize yield in Kogi state. The study showed that the rainfall range for the ten years period was 62cm while the temperature was 30^0C. Variation in both rainfall and temperature were found not directly related to the variations noticed in the output and yield of maize during the ten years period (Table 4).

Table4: Regression result on the effect of rainfall and temperature on maize yield

Variables	Linear	Semi-log	Double-log
Constant	2.355(177.269)	20.191(2.269)	2.133(7.630)
Mean rainfall	1.076(0.338)	1.251(0.386)	1.272(0.603)
Mean temperature	1.482(0.465)	1.465(0.452)	-1.672(-0.792)
R^2	0.31	0.36	0.62
Adjusted R^2	0.12	0.15	0.24
F-value	1.594	1.760	1.626

Source: computed from secondary data, 2014
Figures in parenthesis represent t-values

Food and Agriculture Organization (2003) pointed out that Nigeria is endowed with huge expanse of arable farm land, favourable climate, abundant streams, lakes, forests and grassland as well as large active population that can sustain a highly productive agriculture with a great potential to become the food basket of the West Africa sub- region.
It is against this background that Opaluwa, Otitolaiye and Ibitoye (2014) carried out the technical efficiency measurement among maize farmers in Kogi state as well as the factors affecting their efficiency. The study made used of the Cobb-Douglas production functional form of the stochastic frontier production function.

The stochastic frontier production function is thus expressed as

$$\sum_{j=1}^{5} \beta_j X_{ji} + (V_i - U_i)$$

$\text{In}Y_i = \beta_0 +$

Where Y is the quantity of maize harvested for the sampled farmers (in kilograms);

X_1 is the total land area planted to maize (ha);

X_2 is quantity of maize seeds planted (kg);

X_3 is the quantity of fertilizer applied (kg);

X_4 is the total quantity of chemical (pesticides and herbicides) used (litres);

X_5 is the total labour (family and non family) used in maize production (man days)

X_6 amount of capital used (₦)

Technical Inefficiency Model for Maize Farmers

$$\sum_{j=1}^{10} \delta j M j i$$

$$\mu i = \delta_{o+}$$

Where δs are unknown scalar parameters to be estimated;

M_1 = age (years)

M_2 = sex

M_3 = marital status

M_4 = years of schooling (yrs)

M_5 = household size

M_6 = farming experience (yrs)

M_7 = accessibility to credit facilities

M_8 = cooperative society

M_9 = number of extension visit.

The result of the effect of resources used on the output of maize in Kogi state as presented in Table 5, showed that the estimated value of the gamma (γ) was significant at 1% for the maize farmers in Kogi state. This coefficient had a value of 0.998 percent implying that 99.8 percent variability in maize output was due to technical inefficiency. The coefficient of the land area was significant at 1% and positively related to output.

The coefficient of the quantity of maize seed was significant at 5%. The coefficient also had positive relationship with maize output. The coefficient of the quantity of fertilizer had a positive relationship with output and was significant at 5%.

The coefficient of total quantity of labour was positively related to maize output and statistically significant at 5% level. The quantity of chemical and the amount of capital were not significant but had positive and negative relationship with maize output respectively. The coefficient of the returns to sale (RTS) indicated that the farmers were in stage II. The challenge for the farmer here is to know the level of input use and output that will maximize profit.

Table 5: Maximum Likelihood Estimates of Cobb-Douglas Stochastic Frontier Production Function for Maize Production in Kogi State

Variables	Coefficients
Constant β_0	8.900***
	(25.300)
Land area β_1	0.546***
	(10.700)
Quality of maize seeds β_2	0.062**
	(2.150)
Quality fertilizerβ_3	0.022**
	(2.217)
Quality of chemical β_4	0.009
	(0.561)
Total quality of labour β_5	0.085**
	(1.987)
Amount of chemical β_6	-0.040
	(-1.250)
Sigma squared δ^2	0.280***
	(12.902)
Gammaγ	0.998***
	(8.356)
Log likelihood function	-308.904
Returns to scale (RTS)	0.684

Sources: Field Survey 2012

***,** and * represent significance level @ 1%, 5% and 10% respectively. Figures in parenthesis represent t- values

The data on the distribution of maize farmers according to their technical efficiency levels in Kogi state as presented in Table 6 indicated that majority (79.75 percent) of the farmers in the state were in the least technically efficient group (less than 40.00 percent) while only 1.00 percent of the respondents were in the most efficient category (>80 percent). About 14.50 percent of the respondents belonged to the efficiency category of 41-60 percent while 4.75 percent were in the technical efficiency group of 61-80 percent. This result implies that maize farmers in the state were technically inefficient and thus need to improve their technical efficiency level by achieving maximum output from a given level of resources available for maize production. The most efficient farmer in the state had a technical efficiency level of 87.40 percent while the least efficient farmer had 2.41 percent level of efficiency with a mean technical efficiency of 25.10 percent. The mean technical efficiency implies that maize farmers in Kogi state fall short of the maximum possible efficiency level by 74.9 percent.

Table 6: Technical Efficiency Distribution of Maize Farmers in Kogi State

Efficiency level	Frequency	Percentage
<40	319	79.75
41-60	58	14.50
61-80	19	4.75
>80	4	1.00
Total	400	100.00
Mean		25.10
Minimum		2.41
Maximum		87.40

Field survey 2012

Similar study was carried out by Mohammed, Ibitoye and Okpanachi (2016) on technical efficiency and elasticity of resource use among cowpea farmers in Ofu local government area of Kogi state. The outcome of the findings showed similar trend with the results obtained in maize production.

Table 7: Distribution of Technical Efficiency of Cowpea Farmers

Technical efficiency class index	Frequency	Percentage	Cum
0.30 – 0.5	2	1.82	1.82
0.51 – 0.7	1	0.91	2.73
0.71 – 0.9	17	15.45	18.18
0.90+	90	81.82	100.00
Total	120	100	
Mean		0.9410(94.10%)	
Mean efficiency gain		0.0590 (5.90%)	
Maximum		0.9816 (98.16%)	
Maximum Efficiency gain		0.0184 (1.84%)	
Minimum		0.5525 (55.25%)	
Minimum Efficiency gain		0.4475 (44.75%)	
Technical Efficiency of farmers		81.82%	
Technical inefficiency of farmers		18.18%	

Sources: Field Survey/ MLE Result, 2015

The estimates presented in Table 7 revealed that all farmers were operating below the maximum frontier of the production function (less than 100%). This implies that all the small holder cowpea farmers are not fully efficient. The range of technical efficiency (TE) of the cowpea farmers was

0.30 to 0.90+ for the worst and best practiced farmers respectively. The mean TE was 0.9410 (94.10%). This implies that worst, best and average farmers have efficiency gain of 0.4475 (44.75%), 0.0184 (1.84%) and 0.0590 (5.90%) respectively at the given mix of production input levels to get to the frontier (maximum output). The efficiency gained represents the gap between the maximum or potential output (100%) and actual or obtained output. By this result we could say that most of the farmers were generally and relatively technically efficient; but there were still some levels of inefficiency as the case may be.

A farm is considered technically inefficient even if the farm has a technical efficiency index of 82%, going by this position, about 81.82% of the smallholder cowpea farmers in the area can be considered to be technically inefficient.

Therefore, resources are needed to be fully harnessed to raise productivity to a significant level and produce enough food in quantity and quality to feed the teeming population of the nation. Fully harnessed farm resources would lead to reduction in food importation in Nigeria that was once an exporter of a variety food items.

Table 8: Maximum likelihood estimates of parameters of the Cobb-Douglas stochastic frontier production function for smallholder cowpea farmers.

Production factors	Parameters	Co-efficient	Standard errors	t-ratio
Constant	β_0	6.74***	0.996	6.77
Farm size	β_1	0.908***	0.0646	14.1
Labour	β_2	0.5054***	0.0897	5.63
Seed	β_3	0.340***	0.0772	4.4
Herbicide	β_4	-0.353**	0.162	-2.18
Fertilizer	β_5	0.144**	0.0693	2.08
Capital	β_6	0.1388***	0.0516	2.69
Diagnostic statistic		0.186***	0.0113	
Sigma-square		0.9110***	0.0596	
Gamma (γ)		50.45		
Log likelihood		30.21		
Likelihood ratio (LR)		110		
Number of observation				
Determinants of Inefficiency				
Constant	δ_0	-0.278		-0.289
Age	δ_1	1.17		3.66
Gender	δ_2	0.023		0.072
Marital status	δ_3	0.3346		2.0047
Educational level	δ_4	-0.0394		-3.008
Farming experience	δ_5	-0.0388		1.9795
Household size	δ_6	0.0993		0.263
Extension contact	δ_7	-0.1661		2.7454

Source: Field survey/ MLE Results, 2015

*Significant at 10% level; **significant at 5% level; ***significant at 1% level

From Table 8, the generalized likelihood ratio test shows that the computed chi squared (X^2) was 30.21% significantly different from zero at 1% level of probability. This finding suggested that ordinary least square (OLS) could not be adequate for the data. The sigma-squared (δ^2) value of 0.075 was significantly different from zero at 1% alpha level, this shows a good fit of the model and correctness of the distributional assumption specified. The gamma (γ) value (0.9110) which is the variance ratio, measures the effects of technical inefficiency of the output.
This implies that 91.10% of the variation in output of cowpea in the study area was due to technical inefficiency. The result of the diagnostic statistic therefore confirms the relevance of the frontier production function and the maximum likelihood estimation model employed.

Table 8 also presents the result of the determinants of technical inefficiency of smallholder cowpea farmers. The coefficients of the inefficiency model explain the difference among the efficiency levels of the individual farms. The dependent variable U_i in inefficiency function represents inefficiency in the level of the technical efficiency (TE); therefore a positively signed independent variable of the inefficiency function increases U_i (the inefficiency factor) and as such reduces TE. Conversely, a negatively signed coefficient function reduces inefficiency value and increases TE. The coefficients of education, farming experience and extension contacts which are inefficiency parameters are negatively signed and as such they reduce inefficiency. These imply that farmers with higher educational level, more years of farming experience and had more extension contacts would be more technically efficient than farmers that had less of these factors in smallholder cowpea production in the area. As the levels of education, years of farming experience and number of extension contacts increase, inefficiency decreases and TE increases.

The positive coefficient of age implies that as age increases, the inefficiency level of the farmer rises and TE decreases. The findings shows that older farmers and married farmers are more technically inefficient than young farmers that are single or divorced in smallholder cowpea production in the study area. Other variables; gender and household size were not significant and therefore, had no effects on inefficiency level among smallholder cowpea farmers.

Table 9: Elasticity of production factors used by smallholder cowpea farmers

Production factors	Elasticity
Farm size	0.908
Labour	.5054
Seed	0.340
Herbicide	-0.253
Fertilizer	0.156
Capital	0.1388
Total (RTS)	1.7952

Source: Field Survey/ MLE Result, 2015

Elasticity measures the degree of response of output to proportional change in input level used. The elasticity of production as shown in Table 9 summed up to 1.7952; an indication of a short run increasing returns to scale. Therefore cowpea production in the study area is in stage 1 of production function. This implies that a unit increase in inputs used would result in a greater quantity of output.

Rice (*Oryza sativa*) is an integral part of human history. It is widely consumed and there is hardly any country in the world where it is not consumed in one form or the other. In Nigeria, rice is one of the few food items whose consumption has no cultural, religious, ethnic or geographical boundary

On average, rice is the 4th most important crop in terms of calories consumed following sorghum, millet and cassava (FAO, 2000). Rice is both a food and a cash crop to farmers, contributing to small holder's revenue in the main production areas. Rice is grown in approximately on 3.7 million hectares of land in Nigeria covering 10.6 percent of the 35 million hectares of land under cultivation.

Table10: Gross Margin Analysis of Fadama Rice Farming Per Hectare

S/N	Items	Total quality	Unit cost (₦)	TR/TC (₦)
A	Returns			
	Rice output	25 bags (100kg)	5000	125,000
	Total returns (TR)			125,000
B	Variable costs			
I	Labour cost			
	Land preparation (including nursery)	12MD	900	10,800
	Planting (including transplanting)	11MD	500	5,500
	Weeding	7MD	500	3,500
	Pesticide application	2MD	500	1000
	Fertilizer application	6MD	500	3000
	Harvesting	8MD	500	4000
	Bird searing	5MD	500	2500
	Total labour cost			30,300
II	Operating input costs			
	Seeds	1 Basket	2000	2,000
	Fertilizer	4 bags	3000	12,000
	Pesticide	2 liters	700	1,400
	Herbicide	6 litres	800	4,800
	Transportation	LS	-	5000
	Miscellaneous	LS	-	1,000
	Total operating input cost			26,200
	Total variable cost (I + II)			56,500
C	Fixed costs			
	Depreciation of fixed assets excluding land (tools and equipment)			7500
	Total fixed costs (TFC)			7500
	Total costs (TC) = TFC + TVC			64,000
	Gross margin = TR – TVC			68,500
	Benefit- cost ratio (TR/TC)			1.95

Source: computed from field survey data, 2011
Note: MD = man-day LS= lump sum

The main actors in the rice value chain in Nigeria are farmers, paddy rice traders, millers, wholesalers and retailers. The main value adding activities include: aggregation at the tractors level, parboiling, milling, wholesaling and retailing. The results (Table 10) of the gross margin analysis carried out by Ibitoye, Orebiyi and Shaibu (2012) on Fadama rice farming in Kogi state showed that an average of 25 bags of 100kg paddy rice was realized from one hectare of rice farm with a bag costing ₦5,000.00. This gives a total return of ₦125, 000.00 and a total variable costs of ₦56,500.00 with gross return of ₦68,500.00. A positive gross margin with benefit-cost ratio of 1.95 implies that every one naira invested in rice farming generates revenue of ₦1.95k.

Table 11: Computation of Net Returns by Processors [100kg of Paddy Rice]

Items	Value (₦)
Total revenue	28 596
Variable cost	
Cost of paddy rice	16 849
Utilities (firewood and water)	975
Labour	3 742
Transportation	409
Storage	697
Total variable cost (TVC)	22 672
Fixed cost	
Depreciation on fixed assets	4 863
Total fixed cost (TFC)	4 863
Total cost (TFC + TVC)	27 535
Net return (TR - TC)	1061

Field Survey Data, 2014

In a similar study by Ibitoye, Idoko and Shaibu (2014) on rice processing, the findings (Table 11) showed that the net return from rice processing was ₦1061 which also implies that rice processing in the study area was profitable and viable. Ibitoye, Idoko and Shaibu (2014) also used three functional forms to determine the factors that affect net return in rice processing (Table 12). It was found that, income, education, household size, distance to market, and sex statistically influenced net return in rice processing.

Table 12: Multiple Regression Result on Factors Affecting Net Return in Rice Processing

Variables	**Linear**	**Semi-log**	**Double-log**
Constant	-0.669 (-20527.682)	-4.913** (-1.083E6)	2.161* (1.114)
Income	7.305** (7.961)	5.478** (161228.009)	6.253** (0.430)
Age	0.174 (60.976)	0.192 (6270.871)	0.110 (0.008)
Educational status	-0.352 (0.015)	-0.528 (-9407.135)	3.316** (15596.349)
Household size	-2.555* (13.065)	-1.5526 (-1.2024)	-5.247** (-0.0572)
Processing experience	0.345 (0.262)	0.419 (20742.017)	1.648 (0.191)
Distance	-2.101* (3.799)	3.088** (75137.166)	-4.015** (-0.229)
Marital status	4.140** (13.041)	1.065 (2.149)	0.0919 (1.143)
Sex	1.427 (47.547)	2.157* (90490.673)	-2.487** (-0.244)
Extension contact	2.101* (10539.021)	0.994 (29944.016)	1.524 (0.107)

R^2	0.700	0.731	0.808
Adjusted R^2	0.681	-.715	0.769
F-value	37.349	43.553	67.211

Source: computed from field survey data, 2014.
Figures outside the parenthesis are t-ratio* =significant at 5%; ** =significant at 1%

Nigeria is finding itself more and more caught up in "wheat trap" in which most of her food are made from wheat. Presently the domestic consumption of wheat is far more than the local production. It is on record that over 90% of the wheat being consumed is imported from the United States of America. Onuche, Ibitoye and Akor (2015) carried out a comparative analysis of grafted polynomials and linear functions in forecasting wheat production in Nigeria. The study collected secondary data on wheat production in metric tons for the period 1965 – 2006 from Food and Agricultural Organization (FAOSTAT, 2013).

Method of Estimation: generally, the linear trend may be represented by

$Y = \propto + \beta_1 t$ (1)

Where: Y is the output of wheat in tons, $\propto$ and β are the parameters to be estimated and t is the trend variable.

A graphical examination of the data generally showed 3 periods: 1965 to 1987, 1987 to 2000 and 2000 to 2006. Thus the following were proposed for the three segments.

$Y = \propto_0 + \propto_1 t$, $1965 \leq t \leq 1987$ (2)

$Y = \beta_0 + \beta_1 t + \beta_2 t^2$, for $1987 \leq t \leq 1999$ (3)

And for the last segment

$Y = c_0 + c_1 t$, for $t > 1999$ (4)

The $\propto_s$, β_s and c_s are the structural parameters to be estimated while t and Y are as earlier defined in equation 1.

It is customary to fit the terminal segment (equation 4) using a linear trend for the purpose of forecasting. This is done in order to obtain a mean function which embodies all the key local trends observed in Y. According to Bivan *et al*. (2013), this mean function to be derived should possess the following characteristics: it should be continuous, linear in structural parameters and differentiable at the joints of the airs of the trend functions. That is, the following restrictions are required to hold.

$\propto_0 + \propto_1 k_1 = \beta_0 + \beta_1 k_1 + \beta_2 k_1^2$ (5)

$\beta_0 + \beta_1 k_2 + \beta_2 k_2^2 = c_0 + c_1 k_2$ (6)

$\propto_1 = \beta_1 + 2\beta_1 k_1$ (7)

$c_1 = \beta_1 + 2\beta_2 k_2$ (8)

Where: the k_s are the joints of the segmented functions: $k_1 = 1987$, $k_2 = 1999$.

There are 7 structural parameters and 4 restrictions. This implies that only 3 parameters will be estimated from the mean function. We retain the coefficients (c_0, c_1 and β_2) in the last segment for subsequent estimation since our goal is to forecast (Bivan *et al*.,2013, Rahman, 2001).

The mean function was derived thus;

We start with equation 8 in order to make β_1 the subject of the equation. This leads to

$\beta_1 = c_1 - 2\beta_2 k_2$ (9)

Using (9), we estimate β_1 from (7) to get an expression for $\propto_1$ as

$\propto_1 = c_1 - 2\beta_2 (k_2 - k_1)$ (10)

Using (9) we also derive an expression for β_0 from (6) thus:

$\beta_0 = c_0 + \beta_2 k^2_2$ (11)

Finally, we substitute β_1,$\propto_1$, and β_0 into (5) to obtain an expression for $\propto_0$

$\propto_0 = c_1 - 2\beta_2 k_2$ (12)

To get the mean function, $\propto_0, \propto_1, \beta_0$ and β_1 were substituted for as they appear in (2 - 4). In the case of (2), $t <= k_1$, coefficients $\propto_0$ and $\propto_1$ were substituted for using (9) and (10). The resulting calculation yields

$Y = c_0 + c_1 t + \beta_2 [k^2_2 - k^2_1 - 2 (k_2 - k_1)t]$ (13)

In the case of (3), $k_1 \leq t \leq k_2$, β_0 and β_1 were substituted for using (11) and (12) to yield

$Y = c_0 + c_1 t + \beta_2 (t - k_2)^2$ (14)

In (4), $t > k_2$ coefficient c_0 and c_1 were retained for forecasting purpose, it thus remains untouched.

Thus we have the mean functions

$Y = cX_0 + c_1 X_1 + \beta_2 X$ (15)

Where,

$X_0 = 1$, for all t

$X_1 = t$, for all t

$X_2 = [k^2_2 - k^2_1 - 2(k_2 - k_1)t]$, for $t \leq k_1 (t - k_2)^2$, for $k_1 \leq t \leq k_2 = 0$, otherwise

Equation 15, the mean function is now continuous given the set of restriction from (5) – (8). We used OLS to estimate (1) and (15) base on the observed data for wheat production from 1965 to 2006. To carry out the ex-post forecast, it is necessary to keep a part of the series (observed data) for comparison with the forecasted values from the different models tried. Hence, data for 2000 to 2006 were retained for the ex-post evaluation of the 2 equations estimated. The test of mean difference was employed in determining the respective level differences between the forecasts from the two models and the observed data.

Table 13 reports the numerical ex-post forecast for wheat in the last sub period. Estimates from the grafted trend function are closer to the observed data for the period than those from the linear trend. This result confirms the superiority of grafted models in the events where observed data do not follow a linear trend. This is confirmed by the test mean differences reported in Table 14.

Table 13: Ex- post forecasts of wheat production in Nigeria from 2002 to 2006

Year	Observed data	Forecast using linear equation	Forecast using grafted equation
2000	73000	67920.31	50825.64
2001	51000	69447.81	53039.88
2002	54000	70975.31	55254.12
2003	58000	72502.81	57468.36
2004	62000	74303.31	59682.60
2005	66000	75557.81	61896.84
2006	71000	77085.31	64111.08

Source: Data analysis. 2015

The test of mean difference between forecasted wheat production values of respective functions and the observed data for the 2000-2006 sub period reported in Table 14 reveals that while there is a significant difference between the observed data and forecast from the linear trend function at 1% level of error, the observed data and the forecasted values from the grafted function do not differ significantly at any reasonable error level.

Table 14: Test of mean difference between forecasts of respective functions and the observed data for the 2000-2006 sub period.

Variables	Mean value	Mean difference	z-value
Observed data	62142.86	-10359.96	-3.2
Linear estimate	70990.53		
Observed data	62142.86	4674.50	1.49
Grafted estimate	57468.36		

Sources: Data analysis, 2015

4.1.2 Economics of Tuber Crop Production

Yam production in Nigeria has more than tripled over the past decades. The increase in output is attributed more to the large area planted to yam than to increased productivity. Though the area cultivated to yam production is still being increased, production growth rate declined tremendiously from average of 27.5% between 1986 and 1990 to 3.5%in the period between 1991 and 1999. However,the peroid between 2001 and 2006 recorded 23.4% increase in the average yield.

Yam production trend in Kogi state has been observed to be fluctuating for the past 15 years and has not kept pace with other yam producing states in the country. The production index was estimated at 1.174m metric ton in 2000. Yam production output in the state dropped to 1.00331 million metric tons in 2003, there was significant rise to 1.26428m metric tons in 2006 with the cultivated area of 120,400 ha. In 2008, the total area cultivated for the state reduced to 104,560 ha and the corresponding production output was 1.28696m metric tons

The production figure for 2008 marked the beginning of increase yam production in the state as the produvtion of yam increased to 1.3616m metric tons in 2009 with cultivated area of 114620 ha.

On the basis of quantity of root and tuber crops produced in Nigeria, yam ranks second to cassava. Yam is the perfect stable food appreciated in its state and cultural role. It is a major source of energy in diet of Nigeria people. Yam can be eaten when boiled, roasted, baked or fried. It can also be processed into crude flour by drying thin slices in the sun and then pound or ground into flour. Yam can further be processed into instant flakes producing a food similar to instant potato and can also be made into fried chips. Most of starch industries also make use of yam as one of their important raw materials. It provides job oppunities and income to both the producers and the marketers. Yam peels serve as feed for livestock and as a good component of farm yard manure. It is used as laboratory crop for scientific investigations.

As food crop, the place of yam in the diet of Nigerians cannot be overemphasized. It contribute more than 200 dietary calories daily, for more than 150 million people in west africa as well as serving as an important source of income.Yam contains a high value of protein (2.4%) and substantial amount of vitamins and minerals than some other common tuber crops. It is also comparable to any starchy root crops in energy and the fleshy tuber is one of the main sources of carbohydrates in the diet of most Nigreians. Yam also plays vital roles in traditional culture, ritual and religion as well as local commerce of African people. Yam is reported to be part of the religious heritage of several Nigerian tribes and often play key role in religious ceremony. Due to the importance attached to yam, many communities in Nigeria celebrate the new yam festival annually.

In Nigeria, some of the constaints to yam production are unavaliability of planting materials, soil degredation, poor handling and storability, pest and disease, and other environmental factors (Ibitoye and Atah. 2012). Seed yam for cultivation has continued to be a problem to the farmers. The cost of producing yam is also observed to be higher compared with other tubers in the country. This is largely due to the high cost of seed yam. On the average, about 25% of the annual yam harvest is used as seed yam. This situation has caused yam cultivation to suffer a servere setback due to high cost of production. It is in the light of these problems that,Ibitoye and Onimisi (2001) assessed the economic performance of yam production in Kabba/Bunu Local Government Area of Kogi State, Nigeria. The regression result showed that farm income, age and education have significant effect on yam output in the area. The Gross Margin analysis also showed that yam production is profitable in the study area with an average profit of ₦121,200 per hectare.

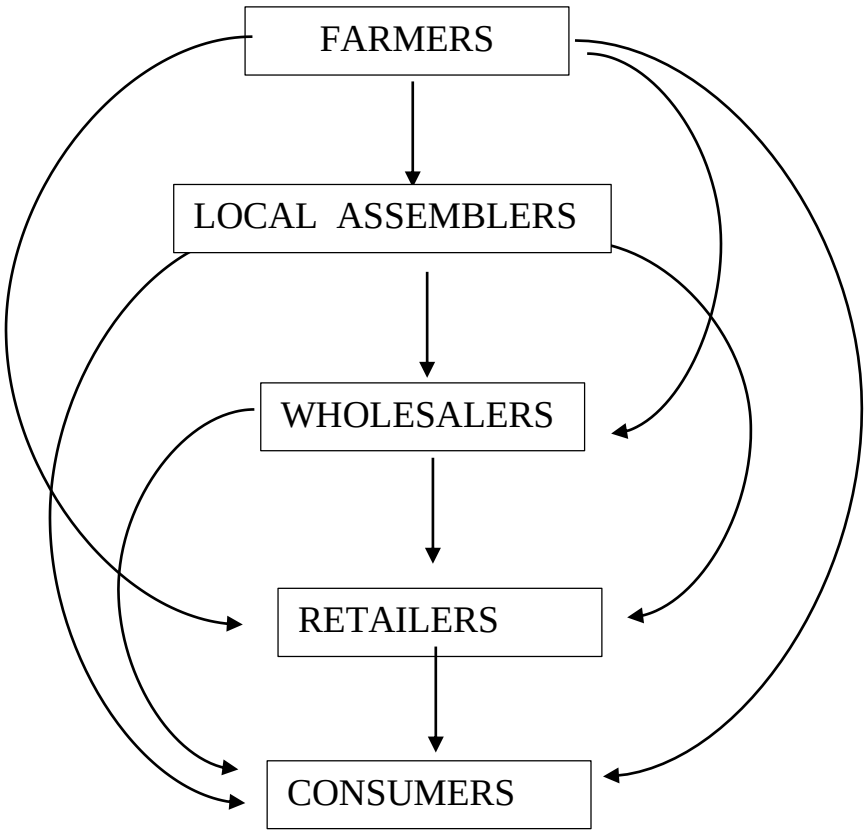


Figure 1: Marketing Channel for Yam in Kogi State, Nigeria

Source: Field Survey, 2014

Idachaba, Ibitoye, Akor and Shaibu (2016) analysed the effects of economic variables on the profitability of yam marketers in Kogi state, Nigeria. The study specifically descibed the marketing channel for yam, examined the market performance of yam, determined th effect of selected economic variables on the profitability of yam marketers, and identified constraints to yam marketing in the state. A sample size of 200 yam marketers were proportionately selected from the four agricultural zones (A, B, C and D) in the state for questionaire administration.Data obtained from these respondents were analysed using descriptive statistics, OLS regression anslysis and mean score from a three point linkert type of scale. Results showed that yam marketing in the state had decentralized distribution channel (Figure 1). Markets in agricultural zones B and C had significant correlation coefficient in their marketing performance. Tranportation cost, rent/levies/commission, and quantity of yam purchased influenced yam marketers'profit at 5% level. Futhermore, yam marketers in the state were constrained with inadequate market infrastructure, lack of uniform measure, long chain of distribution and seasonality of the product.

Similarly, Ibitoye and Attah (2012) assessed the utilization and profit level of yam mini-sett in Kogi State of Nigeria. A multi-stage random sampling technique was used in the selection of six Local Government Areas, twelve communities and 240 yam farmers for the study. A structured questionnaire was used to obtain information from the respondents on their socio-economic

characteristics. Major areas of investigation are the knowledge and utilization of yam mini-sett, profit level and constraints to yam mini-sett production. The data collected were analyzed using descriptive statistics, mean score and gross margin analysis. The results revealed that majority (71%) of the yam farmers in the state are males with most of them (85%) having at least 10 years' experience in yam production. About 63% of the respondents cultivated between 1.0 and 3.0 hectares of farmland and 76% are with annual income of not more than ₦100, 000.00. About 96% of the respondents are aware of yam mini-sett technology, but only 11% of them used the technique. The major constraint to the use of the technique was the inability of the farmers to fully understand the practice of the technology. The result further showed that the gross margin for yam mini-sett production was ₦16, 300.00 per 1,000 mini-sett and benefit-cost ratio was 1.47. This implies that yam mini-sett production is profitable in Kogi State. It was recommended among other things that Kogi State Agricultural Development Programme should embark on massive transfer of yam mini-sett technology to yam farmers.

Nigeria is currently the largest producer of cassava (*Manihot* spp.) in the world with an average annual output of over 35million metric tons of tuberous roots, which is about 19% of total world production. Cassava is produced in Nigeria largely by small-scale farmers using simple farm implement. The average land holding is less than two hectares and for most farmers, land and family labour remain the essential input. Land is held on communal, inherited or rented basis. Cases of outright purchase of land are rare. Capital is a major limitation to cassava farming, only few farmers have access to rural credits. Almost all farmers in main cassava belt of the south-west, south east and central regions of the country grow cassava. Cassava is typically intercropped as a main or minor crop.

Cassava production has been increasing for the past 20years in area cultivated and in yield per hectare. The rapid growth in cassava production has been primarily due to population growth, large internal market demand complemented by the availability of high yielding improved varieties of cassava and the existence of improved processing techniques. The average yield of cassava for the country was 12.23 metric tons per hectare in 2002 while it was 14.31 metric tons per hectare in 2007. This shows an increase of about 1.99 metric tons per hectare or 16.12%. There were similar increases in the yield of cassava during the same period for Kogi State. The progressive increase in the production of cassava witnessed in the recent years was as a result of its adaptation to shorter fallow period, relative drought tolerance, ability to thrive in soils of low fertility and its ability to store in the soil. Cassava multiplication, distribution and adoption of improved varieties have increased significantly in Nigeria over the years. Cassava is the most widely grown root crop in the country because it plays vital role in the food security of the rural economy. Cassava is easy to cultivate and maintain compared to yam where a lot of time and resources are expended on its production.

There are many improved cassava cultivars under cultivation in Kogi State, notable among them are the TMS varieties developed by the International Institute for Tropical Agriculture (IITA) and the NR varieties developed by the National Root Crops Research Institute (NRCRI). Some of those TMS varieties are the TMS 30001, TMS 30211 and TMS 30395. Those of NR varieties are NR7721, NR7734 and NR8208. The local names of those varieties among the farmers in the state are: Governor, Omotoso, Oko-iyawo, Agric, New Agric and Enugu respectively.

These improved varieties along with the local varieties can be distinguished from each other by their morphological characteristics such as leaf size, colour and shape, branching habit, plant

height, colour of stem, shape of tuber, and time of maturity. However, the desired attributes preferred by farmers are; low level of hydrocyanic acid (HCN) in its products, pests and diseases resistance, early maturity, ability to suppress weeds, high yield, resistant to drought, storage.

Cassava production in Nigeria is hindered by a wide range of constraints which include:- pests and diseases, agronomic problems, land degradation, shortage of planting materials, food policy changes, limited processing options and inefficient extension delivery. Socioeconomic factors affecting cassava production relates to inadequate resource allocation which include – land, labour, capital, and infrastructural facilities. Some of the problems associated with adoption of improved cassava varieties include; vegetation of the area, population density of the farmers, relative competition with other carbohydrate crops, availability of planting materials and farmers perception of overall benefits of improved cassava varieties relative to local varieties. Farmers are generally aware of the benefits of inorganic fertilizer, but the commodity is scarce which constitute another major hindrance in cultivating improved varieties of cassava.

Cassava is an important food in the tropical areas of Africa, Asia and Latin America. It is estimated that cassava provides about 40% of all calories consumed in Africa. In Nigeria most of the cassava produced is consumed locally. It is an important staple food and account for about 70% of the daily calories intake of over 50 million Nigerians.

Ibitoye (2011) examined the influence of socioeconomic variables of farmers on their choice of cassava varieties in Kogi state of Nigeria. A total of 360 cassava farmers were selected through multi-stage random sampling procedure. Data collected through structured questionnaire were analyzed using descriptive statistics, customer-buying behavioral model and dynamic programming model. The results showed that TMS cassava variety (Variety A) is more popular among the college-graduate farmers, farm experience of above 20 years, farm size of 3-5 hectares and farm income of ₦50, 000-100,000. Similarly, the educational status of farmers, farm size, farming experience and farm income also influenced the choice NS variety (variety B) and local variety (variety C). The small scale farmers, illiterates and farmers with small farm income dominated the use of local variety. The study then recommends special credit scheme for small scale farmers and education of illiterate farmers on the advantages of using improved cassava variety. The cost of farm production are payments made to inputs employed on the farm. The farmers pay wages to labourers, rent for land, interest for borrowing capital, prices for seeds, herbicides, feeds, fertilizers and other inputs. All these payments are included in his cost of production. These direct payments to the factors of production are called explicit cost of production. The farmer invests a certain amount of his own money on his farm. If this money is invested elsewhere, it would earn a certain amount of dividends or interest. Moreover, the farmer devotes his time to his farm business and the wages the farmer would have earned if he had sold his services to others. This cost is referred to as implicit cost and is included in the cost of production like explicit cost. Therefore, implicit cost refers to the value of the inputs owned by the farm which is used by the farm in its own production processes. Explicit and implicit costs of farm production constitute private cost. Farmers take private cost into consideration while making decisions with respect to prices of outputs of their enterprises.

Explicit costs are categorized into variable and fixed costs depending on the durability of inputs on which the costs are incurred. Variable costs are those which are incurred in the employment of variable factors such as fuel, seeds, fertilizers and feeds. The amount of the variable costs can be altered in the short run and they are incurred only if the farmer engages in production. Fixed costs

are those costs which are incurred on fixed inputs such as farm buildings, borehole, tractor and salary of permanent workers. These costs are fixed amount which must be incurred by a farmer in the short – run. Even if a farm is closed down temporarily in the short – run but remain in business, fixed costs have to be borne by it. The total cost of production is the sum of total variable cost and total fixed cost. All other costs are derived from these two cost concepts.

Efficiency study has assumed important dimension in agricultural production because scarce resources are combined to produce outputs. The success of any farm business depends on the ability of the farmer to combine the scarce resources in the right proportion. The ability of a farmer to produce the maximum level of output possible with a minimum quality of inputs under a given technology is known as his technical efficiency while his allocative efficiency measures the degree of success in obtaining the best combination of inputs in producing a specified level of output having regard to the relative prices of the inputs. Cost efficiency is the ability of a farmer to produce the maximum level of output possible at a minimum cost outlay under a given technology. Cost efficiency results from technical efficiency and allocative efficiency. A cost efficiency operation results in large profit for the farmers.

In line with this, Audu, Otitolaiye and Ibitoye (2013) carried out a stochastic frontier approach to measurement of cost efficiency in small scale cassava production in Kogi State, Nigeria. The study was carried out in Kogi State of Nigeria in 2011. A multistage random sampling was used to select 360 small scale cassava farmers in the study. The survey instrument was a structured questionnaire. Information was collected on their socioeconomic characteristics and inputs used in cassava production and their prices. The data were analyzed with the use of stochastic frontier Cobb-Douglas cost function. The parameters of the function were estimated by the maximum likelihood method using the computer program frontier version 4.1. Results indicated that all the cost elements included in the cost function positively influenced the total cost of cassava production and the influence of each was statistically significant at the 1 percent level of probability. Age of the farmers, educational attainment of the farmers, household size, farming experience, extension visit, access to credit and membership of farmers association were significant determinants of cost efficiency at different levels of probability.

4.1.3 Economics of Tree Crop Production

The oil palm sub-sector of agricultural sector of the economy presented itself as a potential productive sector that could be used to diversify the economy after years of neglect. Historically, this subsector has been a source of growth in a stagnant economy because of the numerous economic potentials of the oil palm. From 1964 to 2010, there has been rising production (supply) and consumption (demand) of palm oil in Nigeria. However, in the last 10 years, demand had grown faster than the supply leading to an increasingly widening gap. It is difficult to assess the specific gap because of incomplete information and lack of statistical data.

Ibitoye (2014) examined the economic analysis of palm oil marketing in Dekina local government area of Kogi state, Nigeria. A total of 125 palm oil marketers were randomly selected from a purposively selected five major markets for the study. The data for the study were collected with the aid of questionnaire. Statistical tools such as simple statistics, shephered futrel model, bivariate correlation, gross margin and a five point likert type of scale were used for data analysis. The study indicates that females form the greater proportion of palm oil sellers in the area (96%). From the

findings, the palm oil market was highly integrated. A gross margin of ₦568,000.00 per 20,000 liters of palm oil was recorded. Thus the business was found to be profitable. Furthermore, the market showed a low marketing efficiency of 18.73%, this is due to high marketing cost associated with palm oil marketing. The study recommends among others that the policy that improves rural infrastructure and marketing incentives, be encourage by government to reduce the costs associated with the business. It was also recommended that financial institutions should be strengthened by government to give loan to mitigate the problem of inadequate capital and price stabilization policy to bring about perfect market performance.

Nigeria has enormous potential to increase her production of palm oil and palm kernel oil through application of improved processing techniques. This oil palm fruit processing enterprise is mainly dominated by rural farmers who are confronted with low returns from palm oil due to involvement in traditional processing which seriously limit the quantity of oil that can be processed. Modern small scale oil palm processing machines that can be more efficient and effective are now available. However, not many of the small scale oil palm processors have adopted it in Dekina local government area despite the fact that oil palm processing is a major farming activity in the area. It is in view of this that Ibitoye and Onje (2013) investigated the economic analysis of oil palm fruit processing in Dekina local government area of Kogi state, Nigeria. A total of 100 oil palm fruit processors were selected through purposive sampling procedure comprising 25 processors from each of the four districts. Data collected through structured questionnaire were analyzed using descriptive statistics, multiple regression analysis, gross margin and mean score. The results revealed that the oil palm fruit processing in the study area is generally practiced by females with the mean age of 33 years. Majority (71%) were married with average family size of 8 persons per household. Multiple regression analysis showed age, family size and labour cost to be positively and significantly associated with output of palm oil. The result also showed that the average gross margin was ₦4, 309, 750, indicating that oil palm fruit processing is profitable in the study area. Manual processing method was the predominantly used method of processing. This study recommends that government should construct roads, in the area where they do not exist and maintain the already existing ones for easy access to oil palm fruit. It will also reduce transportation cost in order to boost the revenue of the processors.

Cashew is one of the most important tree-nut crops in the international trade. Cashew has a great potential as a foreign exchange earner and source of industrial raw materials with the prospect of becoming one of the major commercial tree crop in Nigeria. During the last decade, the production of cashew nuts in Nigeria has increased almost six-folds from 30,000 tonnes In 1990 to 176,000 tonnes in 2000. An increasing awareness of the economic potentials of cashew kernels in the global market has further led to the influx of farmers, government and non-governmental organizations into the business of cashew production.

Cashew nut production in Kogi state is mainly a small holder activity but is a source of income to the producers and other stakeholders involved in its production, processing and marketing. In cashew nut production, resources such as labour, capital, herbicides and land are required. Resources used in any production activity are regarded as the inputs that drive the production process. A resource is said to be efficiently utilized when it is put to the best use at minimum cost.

It is in the light of this that Akor, Ibitoye and Ayoola (2014) carried out a study to determine the efficiency of resource utilization for cashew nut production in Kogi state, Nigeria.

A multi-stage random sampling technique was used to select cashew farmers from the four (4) Agricultural zones of the state. Two local government areas were selected from each of the Agricultural zones making eight (8) local government areas. Two cashew communities were purposively selected from each of the LGAs making sixteen (16) communities. Twelve (12) cashew farmers were randomly selected from each of the sixteen (16) communities making a total of 192 cashew nut producers. In all, 192 questionnaire were administered. The data collected were on farm size, household size, years spent in school and cashew farming experience and other aspects.

Model specification

(i) Production function

Production function analysis was used to determine the efficiency of resources utilization in cashew nut production in the study area. The production function was implicitly specified as:

$y=f(X_1,X_2,X_3,X_4,X_5,X_6,X_7,X_8,X_9 \ldots U)$

Where Y = output of cashew nut (kg)

X_1 = Farm size (ha)

X_2 = labour used (man days)

X_3 = capital invested (₦)

X_4 = Herbicide application (ltr)

X_5 = age of farmers (yrs)

X_6 = sex (male or female)

X_7 = household size (No of persons)

X_8 = years spent in school

X_9 = cashew farming experience (years)

U = random disturbance

Data were fitted to three (3) functional forms using ordinary lest square techniques (OLS). The estimated functions were evaluated vis-*á*-vis the statistical significance of R^2 as expressed by the F- ratio, the significance of the coefficients as attested to by the t-values, the plausible signs and magnitude of the coefficients.

The apriori expectation is that these variables are assumed to influence the efficiency of resource utilization of the producers.

(ii) Efficiency ratio

Efficiency ratio was used to determine the efficiency of resources used in cashew nut production. The estimated coefficients of the relevant independent variables were used to compute the marginal value products (MVP) and their corresponding marginal factors costs (MFC) the equation is

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

Where r = efficiency ratio

MVP = marginal value product of a variable input

MFC = marginal factor cost

The value of MVP was computed using the regression coefficient of each input and the price of the output as expressed below:

$MVP = b_i X P_y$

Where P_y= price per unit output

b_i = regression coefficient of input (I = 1,2….n)

MVP_{xi} = marginal value product of input $_{xi}$

The prevailing market price of inputs was used as the marginal factor cost (MFC).

The values of the ratios are interpreted thus:

If r < 1 means that the resources in question was over utilized therefore, if the quantity of such input is decreased, profit will increase.

If r > 1 means that the resources was underutilized. If the quality of such input is increased, profit will be raised.

If r = 1, it means that the resources was being utilized efficiently.

The optimum utilization of inputs required that marginal value product (MVP) be equal to inputs unit price i.e. MVP = MFC.

To ensure maximum profit and efficiency of resources, a cashew farmer must utilize resources at the level where marginal value products is equal to marginal factor cost (MVP = MFC).

Table 15: linear regression for the estimation of resources use efficiency in cashew nut production

Variable	Coefficients	Std error	t-value	P-value
Farm size	198.89	71.488	2.78	0.006***
Herbicide	55.9324	30.478	1.84	0.068*
Labour	32.143	7.9031	4.07	0.000***
Capital invested	.0294305	00559	5.26	0.000***
Years in school	23.783	7.1606	3.32	0.001***
Farming Exp.	-4..41197	6.2568	-0.71	0.482
Household size	9.90503	13.9542	0.71	0.479
F (7,184) =	52.33			
Prob>F =	0.0000			
R^2 =	0.6656			
Adj R^2 =	0.6529			

Source: Field Survey, 2012

The regression results in Table 15 showed that farm size, herbicide, labour, capital invested and years spent in school were observed to affect cashew nut output significantly. This implies that these variables are strong determinants of cashew nut production in the study area. Farm size, labour, capital invested and years spent in school were significant at 1% while herbicide is significant at 10%. The R^2 value for the regression is 0.6656 indicating that 66% of the variations in cashew nut output are explained by included explanatory variables.

The F-ratio (52.33) in the regression results also showed that the overall regression is significant at 1% level which means that at least one of the explanatory variables significantly affect cashew nut output.

Table 16 represents the estimated resource use efficiency in cashew nut production in the study area.

Table 16: Estimated Resource use efficiency in cashew nut production in Kogi State

Farm Input	Coefficient	Py	MVP	MFC	r=MVP/MFC
Farm size	198.89	50	9,944.5	500	19.9
Herbicide	55.95	50	2,796.5	900	3.1
Labour	32.14	50	1607	500	3.2
Capital	0.0294	50	1.47	210	0.0007

Souce: Field Survey, 2012

Efficiency of resource utilization was determined by equating the marginal value product (MVP) to the marginal factor cost (MFC) of the resources. A resource is said to be optimally allocated if there is no significant difference between MVP and MFC.

Table 16 showed that the ratios of the MVP to the MFC were greater than unity for farm size, herbicide, and labour while that of capital invested was less than unity. This implies that farm size, herbicide, and labour were underutilized by 19.9, 3.1 and 3.2 proportions respectively while capital invested was over utilized by 0.0007. This means that cashew nut output would have increased if more of such inputs (farm size, herbicide and labour) had been utilized efficiently.

The comparison of the ratio of marginal value product (MVP) to marginal factor cost(MFC) showed that farm size, herbicides, and labour have rartios that are greater than unity. This indicates that the inputs were under-utilized in relation to other inputs. This implies that increasing the utilization of those resources will increase profit. All the inputs were not utilized to optimum economic advantage. A resource is said to be optimally allocated if there is no significant difference between the MVP and MFC that is, if the ratio of MVP to MFC=1

Apart from efficiency of resource utilization in cashew production, Ibitoye & Audu (2012) also carried out research work on marketing of cashew nut.

The study examined the economic analysis of cashew marketing and profitability in Yagba Area of Kogi state, Nigeria. A total of one hundred and twenty (120) cashew sellers randomly sampled from six major cashew markets, were used for the study. Data collected through structured questionaire were analysed using descriptive statistics, mean score, gross margin analysis and bivariate correlation. The results revealed that female form the greater proportion of cashew sellers in the area (77%). The result also showed that cashew markets were highly integrared as shown by high levels of price correlation coefficients. From the result of the study, an annual gross margin of ₦102,020 was recorded, thus the business was profitable with Benefit-cost ratio of 1.41. Furthermore, the result showed a low marketing efficiency due to high cost of cashew procurement. The study therefore reccomends that government should improve the infrastuctural and marketing facilities in cashew business. Government should also encourage the local processing of cashew nut to boost the economy of Nigeria.

Nigeria is the second largest producer and marketer of Gum arabic in the world after sudan. Gum arabic is one of the economic tree crop commonly found in sahelian and savannah of tropical zones. There are over 1,000 different varieties of the plant. Three of these are of economic value due to the role they play in manufacturing industries worldwide. Haliru and Ibitoye (2014) analysed the profitability of Gum arabic marketing in the North- East, Nigeria using gross margin model.

The result as presented in Table 17 indicates a total of 626,465 kg of gum arabic was sold by the respondents; which generated a total revenue of ₦ 392,729,630.00. The total gross margin was ₦ 351,969,121; and the gross margin per marketer was ₦2,346,461.00; while the Gross Margin per kilogramme of gum arabic sold was calculated as ₦ 3.74.

Table 17. Gross margin and profitability anaiysis of gum arabic maketing.

Variables (items/activities)	Tatal value (₦)/ marketer
(A) Depreciated Fixed Cost:	
(i)Scales	3312.34
(ii)Head pans	1216.33
(iii)Mudus (measures)	233.34
Total fixed cost	4,762.0
(B) Variable Cost:	5962.89
(i) labour cost	3910.17
(ii) operating cost	261,863.67
(iii) purchasing cost	271;736.73
Total variable cost	
(C) Total Cost	276,498.73
(D)Total Revenue(TR)	2,618,197.533
(E) Gross Margin (GM) (D-B)Gm/Kg	2,346,461.00
(E/H)	3.74
(F) Net profit (NP) (D-C)NP/Kg	2,341,698.8
(F/H)	3.74
(G) Total respondents	150
(H) Total quantity of gum arabic sold	626,465.00kg

Source: Calculated from data collected on fied survey, 2012

On the other hand, the total net profit calculated was ₦351,254,821.00, and the net profit per marketer was ₦ 2,341,698.8. This implies that gum arabic marketing was highly profitable in the study area as the respondent made net profit of ₦ 2,341,698.8 each, giving a profit per kilogramme of gum arabic sold of ₦ 3.74 ,

Table 18 showed that before engaging in gum arabic marketing, 64% of the respondents were below poverty line as they could not earn up to $1.00 per day. There were only 17% of respondnts that earned above $2.00 and are considered rich. On the other hand, the table showed a drastic change in the income status of the repondents which indicates only 6% of the repondents that were below poverty line, 22% moderately poor and majority (69.3%) earn above $2.00

The perecentage change in mean income status among the respondents was 172% (20.85-7.63÷7.63X100). This implies that gum arabic marketing in the area had positive impact on poverty alleviation.

Table 18. Income Status of Respondents Before And During Engaging In Gum Arabic Marketing

Income status $/day (₦)	**Before**		**After**	
	Frequency	%	Frequency	%
0.1-09.999 (15-149.9)*	96	64.00	9	6.00
1.00- 1.999 (150-299.9)	15	10.00	33	22.00
2.00-2.99 (300-449.9)	13	8.69	4	2.67
3.00 andabove	26	17.13	104	69.30
Total	150	100.00	150	100.00
Meam($)	7.630		20.85	

Source: Calculated from field survey,2012

*figures in parentheses are naira value equivalent.

Table 19 shows the expenditure range of the respondents before and during engagement in gum arabic marketing. Before engagement in gum arabic marketing the result indicated about 79% of the marketers spent less than $1.00 per day (extreme poverty) and less than 1% spent above $3.00 a day (the rich). After engagement in gum arabic marketing the result depicts about 53% of the respondents spent between $1– 2 per day implying that they were moderately poor, while about 15% spent $3.00 and above per day, leaving only about 7% still in extreme poverty as they spent less than $1.00 a day.

Tabel 19 Expenditures Status of Respomdents Before And During Engaging In Gum Arabic Marketing

Expenditurestatus (₦)	Before		After	
	Freq.	%	Freq.	%
0.1-0.999 (15-149.9)*	119	79.33	11	7.33
1.00- 1.999 (150 – 299.9)	27	18.00	79	52.67
2.00-2.99 (300-449.9)	3	2.00	38	25.33
3.00 and above	1	0.67	22	14.67
Total	150	100.00	150	100.00
Means ($)	0.85		2.44	

Source: calculated from field survey, 2012

*figures in parentheses are naira value equivalent.

The percentage change in the purchasing power of the respondents as calculated in this study was 187% (2 .44– 0.85÷ 0.85 X 100). This implies that the gum arabic marketing has increased the purchasing power of the respondent greatly. This is an indication of poverty alleviation among the respondents (*ceteris paribus*).

The perception of Edo state rubber farmers on rubber production technologies developed in Rubber Research Institute of Nigeria (RRIN), Iyanomo, Benin city, Nigeria were examined by Umar, Ibitoye and Imarhiagbe (2012). Data were collected from 100 rubber farmers randomly selected from 5 communities in lpoba-okha Local Government Area (LGA) of the State. Descriptive statistics, logistic and multiple regressions were used to analyze the data. The result showed that the respondents had high perception of the usefulness of rubber technologies developed by RRIN especially bi-annual weeding (mean=3.94) and pruning (3.80). Their knowledge of the benfits of implementing improved rubber production practices was high (84.2%) especailly with respect to increase in output (mean =3.95) and being able to grow more crops (3.90) and 55.9% of them showed a fovourable disposition to the use of improved rubber technologies. Despite these however, their level of adoption of rubber technologies developed by RRIN was low. The highest adoption score was recorded in bi-annual weeding (27.7%). Major reasons for the low adoption include high labour cost (mean score = 3.82) and lack of funds (mean score = 3.41). Significant factors affecting farmers perception of the usefulness of rubber technologies were age ($\beta = 0.728$), farming experience ($\beta = 0.067$), household size ($\beta = 0.67$) and farming status ($\beta = 2.553$). other important factors include education($\beta = 0.741$) and contact with extension agents ($\beta = 0.959$). The study suggested to rubber farmers to form cooperative societies in order to be more recognized by government so as to have easier access to extension services from Rubber Research Institute of Nigeria for acquisition of up to date farm technologies and inputs.

4.1.4 Economics of Vegetable Production

Tomato production requires a high level of management, large labour, capital inputs and close attention to details. Tomato production is subject to the variations that occur in weather, which may result in severe crop damage and losses. Labour requirements for production, harvesting, grading, packaging and transporting are very intense.

Major tomato producers in Kogi State are small scale farmers who could hardly produce enough to meet the demand of consumers. Tomato produced in the state is done mostly during the dry season, that is, October to May. The period between July to September coincides with severe tomato scarcity because of high incidence of pests and diseases to which growing or fruiting of tomato is succesptible. During this period, there is the general labour reshuflement of tomato producers to production of grain crops.

The failure of tomato farms to meet demand in Kogi state has raised concern over the ability of these farms to increase tomato output. In view of the growing demand for tomato in Kogi State, improving the efficiency of resource use would be the key to increased tomato production in the state. Thus, for the state to thrive in tomato production, it needs to achieve a high level of efficiency which is essential for competativeness and profitability. It is against this background that Ibitoye, Shaibu and Omole (2015) studied the technical efficiency of resource use among tomato farmers as well as the factors influencing the output of tomato in Kogi State, Nigeria.

Data were collected from 240 tomato farmers through purposive sampling in 2014. Questionnaire design was the instrument used for data collection. Data collected were analysed through the use of simple descriptive statistics, OLS regression analysis and efficiency ratio. The result of the study showed that majority of tomato farmers in the Stae were married males with an average family size of 7 members. Farmers' educational status, farming experience, contact with extension workers, and farm size were positively significant at 1% in influencing the output of tomato produced in the state. Quantity of pesticide, seed and fertilizer were over utilized while labour and farm size were underutilized. It is recommended that government should implement policies that will facilitate the efficient utilization of agricultural resources among tomato farmers in Kogi State.

4.2 Economics of Livestock Production Research

Livestock play a vital role in the agricultural and rural economies of the developing world. Not only do they produce food directly, they also provide key inputs to crop production. Most farms in the developing world are too small to justify owing or using a tractor, and the alternatives are animal power and human labour. For many rural farmers, livestock are the only ready source of cash to buy inputs for crop production-seeds, fertilizers and pesticides. Livestock income also goes towards buying those household items that the farmers cannot make for themselves, for instance, paying for school fees, medicine and taxes. Unlike cropping whose income is highly seasonal, small stock with their high rates of production and growth can provide a regular source of income from sales. Milk and milk products like butter and cheese also provides regular source of income. Larger animals such as cattle are a capital reserve, built up in good times to be used when crops are poor or when the family is facing large expenses such as the cost of wedding or hospital bill.

The livestock sector is one of the fastest growing segments of the agricultural economy, particularly in the developing world. As demand for meat and dairy products in the developing world continues to increase, questions arise as to how this demand will be met and by whom. Parts of the sector, particularly poultry and pig production, have followed a trend similar to that in developed countries, where large-scale production units dominate output. The expansion of such trends across the whole livestock sector will have major implications for poverty reduction and food security. As at now, the transformation of the livestock sector has occurred largely in the absence of sector-specific policies, this gap need to be addressed to ensure that the livestock contributes to equitable and sustainable development.

The study by Ibitoye and Onimisi (2013) examined the influence of training on the productivity of poultry farmers in Kogi State, Nigeria. The data used for the study were obtained using structured questionnaire and was administered to 200 poultry extension contact farmers. Descriptive statistics, percentage, sigma scoring and multiple regression models were used to analyze the data. The study revealed that majority of the poultry contact farmers were males (95.50%). The average birds per farmer was found to be 380 birds, while the mean age, farming experience and farm income were 46 years, 9 years and ₦185,000.00, respectively. Frequency of participation in training programmes revealed that extension training has the highest level of frequency followed by formal education. The sigma scores recorded for both extension training (5.950) and formal education (5.974), confirmed the high level of usage of the two training programmes. The regression results to determine the effect of the training programmes on the production of poultry farmers showed that all the training programmes were positively related to farmer's income. Only

extension training (β =7.305) and formal education (β = 3.310) were significantly related to farmer's income. It was therefore recommended that government should organize regular training for rural farmers as a way of improving their productivity.

The study of Ibitoye (2011) also determined the profitability of producing 250 broilers and 250 layers in Lokoja area of Kogi State, Nigeria. Twenty commercial poultry farms were used for the study. Structured questionnaire were used to obtain information from the poultry farmers on inputs used, their costs, output and the revenue obtained. Gross margin analysis was used to calculate the profit margin. The result showed that the gross margin for broiler enterprise in Lokoja area was ₦38,800, and the benefit-cost ratio was 1.27. Similarly, the gross margin for 250 layers was ₦ 163,500 with benefit-cost ratio of 1.46. The result showed that both broiler and layers production are profitable in the area. It was then recommended that farmers should be encouraged to go into poultry production through the provision of loan facilities.

Ibitoye and Onje (2011) investigated the attitude of poultry farmers towards agricultural credit in Lokoja area of Kogi state, Nigeria. Twenty commercial poultry farms were used for this study. A structured-questionnaire was used to obtain information on the attitude of the poultry farmers towards agricultural credit. The attitudinal scale used was carefully constructed. A Likert type of scale was used to measure attitudinal disposition of farmers. The study generally revealed that poultry farmers in the area of study have positive attitude towards agricultural credit. It was recommended that both government and financial institution should make loan available to poultry farmers.

The study of Ibitoye, Shaibu, Sanda and Oshadare (2017) investigated the economic analysis of swine production in Kabba-Bunu local Government area of Kogi State. Specifically, the study described the socio-economic characteristics of swine farmers, determined the effect of some selected socio-economic variables on the farm income of swine producers, estimated the cost and return of swine production, and identified the problems faced by swine farmers in the study area. A total of 50 swine farmers were purposively selected from; Iyah, Otu, Kakun, Ogbagba, Ayegunle-Igun, Odo Ape, and Okebukun areas in Kabba-Bunu LGA. Data collected through structured questionnaire were analyzed using descriptive statistics, multiple regression analysis, gross margin analysis and mean score. The results showed that swine production in the study area was generally practiced by farmers in their active labour age of 48 years and an average swine farming experience of 10 years. Access to extension services was low. The regression analysis showed that education and stock size were directly related to income of swine farmers and significant at 5% and 1% respectively. Swine production in the area was profitable with a positive gross margin of ₦ 44, 171 and a benefit cost ratio of ₦2.49k. The major problems affecting swine production in the area are: cost of feed (M = 2.84), high cost of veterinary drugs (M=2.82), parasitic infection (M=2.70), inadequate capital (M=2.42) and inadequate extension services (M=2.4). It was recommended that adult education be provided to swine farmers. Also, veterinary and extension services should be provided to expand the scale of business and for swine farmers to take advantage of economies of scale in their production activities.

Audu, Ibitoye and Faseki (2013) used a stochastic frontier approach to estimate the technical efficiency in Bee-keeping. This study was carried out in Ondo State, Nigeria to determine the effects of inputs used in beekeeping on the output of honey and the influence of the socioeconomic characteristics of the bee keepers on their technical efficiency. Structured questionnaires were used to collect data from randomly selected 50 bee keepers, quantity of honey produced, inputs used

and their prices. The data were analyzed with the use of stochastic frontier Cobb-Douglas production function. Results indicate that knives, extractors, labour and hives were positively related to the output of honey while protective suites and smokers were negatively related to the output of honey. Age, education and beekeeping experience had negative relationship with the technical inefficiency of the bee keepers. The bee keepers operated in the stage of decreasing return to scale, but none was technically efficient. Recommendations made to encourage bee keeping include education of farmers on modern techniques of bee keeping, making inputs available to the farmers at cheap prices and extension of loan to the bee keepers to expand the business.

4.3 Policy Institution Research

The Vice Chancellor Ma, my research efforts in the field of agricultural policy and institutions have been focused on agricultural credit with emphasis on both formal and informal credits. My works in this area also span the various aspects of agricultural institutions. I have worked on institutions like Agricultural Development Project, Fadama Project, Agricultural Insurance Scheme, Community and Social Development Agency, and Cooperative societies among others.
Agricultural credit is essential in agricultural development. If we want farmers to adopt new methods such as the use of improved seeds, higher producing livestock, simple hand operated machines, fertilizers and other agro-chemicals, there must be credit.

It is against this background that Ibitoye (2010) determined the optimum credit need of small scale farmers in Kogi state using linear programming model. The model was used to obtain an optimum farm credit for farmers engaged in four farm enterprises in the study area Viz: Yam and Cassava mix, Maize and Sorghum mix, Yam and Sorghum mix, and Cassava and Maize mix.

The algebraic expression of the linear programming model developed for this study with the objective to determine the optimum credit need is expressed as follows:

Maximize Z= $\sum_{j-i}^{n} C_j X_j$---------(i)

Subject to

$\sum_{j-i}^{n} a_{ij} X_j - bi$----------(ii)

i = 1 ……. M ; j = 1 ……... n

bi _ 0 and Xj _ 0 …….. [iii]

where,

Z = Total Net Revenue from all the crop enterprises [Cassava, Yam, Sorghum and Maize]

Cj = Net Revenue from cassava/yam, maize/sorghum and cassava/maize

Aij = the level of inputs (land, farm credit, cash reserve, debt) required per unit of the production activity.

Xj = Level of cassava, yam, sorghum and maize production.

bi = The amount of farm credit available

N = the number of possible activities (i.e. four activities-cassava, yam, sorghum and maize).

M = the number of constraints (i.e. land, labour, farm credit, cash reserve, debt, cassava, yam, sorghum and maize).

Disposal/slack activities of the model includes:- Borrowed Cash, Wages for labour, Sale of Cassava, Sale of Yam, Sale of Maize, Sale of Sorghum and loan repayment.

The data for the analysis of this model was taken from the costs and returns analysis prepared for the four farm enterprises – Cassava, Yam, Maize and Sorghum. These crops are chosen for this model because they are the most popular farm enterprises in the area of study in terms of output and the number of farmers engaged in their production.

The average farm size for the area is 2.10 hectares. The total sum of ₦100,000 farm credit per farmer at 20 percent interest rate was provided for in the model. A borrowing activity was also provided for in the model, which enable credit to be obtained and used when the need arises. The model was constructed with the objective to maximize net revenue from the farm enterprises subject to the available resources.

The results showed that ₦31,533.00 was obtained as the optimum farm credit. This optimum solution further showed that farmers can only cultivate a total of 2.1 hectares of land from which a total of ₦321,035.00 can be generated as net revenue for the farm. The optimum farm credit determined for this model is subject to be influenced by socio-economic variables such as farm size, cash, household size and education status of farmers.

The effects of socio-economic variables on credit needs of farmers in Kogi state was investigated by Ibitoye and Orebiyi (2009). A set of structured questionnaire was administered on 240 respondents randomly selected from eight communities in the state. The socio-economic variables considered in this study include: age distribution, farm size, farming experience, educational status, family size and farm income. The result showed a positive relationship between socio-economic variables like: age, farm size, family size and credit required by farmers. Variables like educational status and farm income showed negative relationship with credit need.

Ibitoye, Omojola, Omojeso and Shaibu (2015), assessed the use of informal credit in mobilizing funds for agricultural production in Ijumu Local Government Area of Kogi State, Nigeria. A multistage random sampling technique was used to select 120 respondents for the study. The result showed that 63.3 percent of the sampled respondents were literate with an average farm size of 1.5 hectares. The major source of informal credit available in the area was 'Esusu'. The result also showed that 64.2 percent of the respondents demanded for ₦30,000 and below from informal source of credit while 21.3 percent of the available loan was invested on agriculture. The average loan volume per respondent recorded in the study area was ₦23,080.00. Amount of credit obtained from informal source of credit, farming experience, educational status, household size and non-farm income significantly influenced agricultural production in the study area. High interest rate, low lending level, inadequate number of financial agents and mode of payment were the major constraints militating against the use of informal credit.

Ibitoye (2010) examined the utilization of informal sources of credits for agricultural production in Yagba area of Kogi State. A set of structured questionnaire was administered to 105 respondents. The result showed that only 22.9% of the available loan was invested on agriculture. The average loan volume per respondents was ₦15,142.8. An increase in the amount of loan per

beneficiary to take care of both the production and consumption needs of the rural farmers was recommended.

Ibitoye (2008) evaluated the sources, procurement and utilization of agricultural credit by rural farmers in Kogi State, Nigeria. Multi-stage random sampling method was used in the selection of 120 credit user's respondents. The study revealed that there were five sources of formal agricultural credit available to rural farmers in the state. The common objectives for procuring agricultural credit were to:- acquire farm assets, increase farm size and increase stock of livestock. The study further revealed that the total amount of agricultural credit received by all the respondents for crops, livestock and non-farm uses was found to be ₦4,460,660.00.

Credit is a very important factor in the management of enterprises because it plays catalytic role in raising productivity of other resources. Audu, Ibitoye and Isah (2014), examined sources and accessibility of credit by small scale farmers in Kabba-Bunu Local Government Area of Kogi State, Nigeria in 2013. Primary data used for the study were collected from 150 farmers who were randomly selected. Information collected from the farmers was on their socio-economic characteristics, informal and formal sources of credit patronized by them, loan extended to them and their ratings of the degree of accessibility of these sources of credit. The data were analysed with the use of descriptive statistics such as frequency distribution, mean, percentages and mean score. Results show that most of the farmers were in the active productive age group with mean age of41 years. Most of the farmers were male. The mean farm size was 2.4 hectares. Most of the farmers (73%) did not go to school. Paltry sums of money were available as loan from informal and formal financial markets. Relatives, friends, produce buyers, merchants and cooperative societies were rated as easily accessible sources of credit. Government Poverty Alleviation Programme, Micro Finance Banks, Bank of Agriculture limited and Commercial Banks were rated as not easily accessible sources of credit.

The study by Orebiyi, Eze Henri-Ukoha, Akubude and Ibitoye (2011), was designed to investigate the demand for institutional credit among small scale farmers in Imo State. A sample of 40 livestock and 50 food crop farmers were selected respectively using multistage random sampling technique. Data were collected with a well-structured questionnaire administered to a total of 90 randomly selected farmers. Data collected were analyzed using descriptive statistics, inferential statistics and ordinary least square multiple regression technique. Results showed that farm income, interest rate, household size, distance to the bank, expenditure on labour, level of education and farming experience are important factors influencing the demand for institutional credit by farmers. It is recommended that in order to raise the level of farmers' income and their standard of living, there is need for credit demand and utilization for farm production.

The model of Markov chain analysis was employed by Ibitoye (2012), to predict the future impact of Kogi Agricultural Development Project (KADP) on farm income and profit levels of contact farmers in Kogi state of Nigeria. A structured questionnaire was designed to capture the farm income and expenses for the 2008/2009 and 2009/2010 farming seasons. In all, 200 contact farmers were involved in the analysis. This comprised of one contact farmer in each of the 200 extension circles in the state. The result showed that the current income as well as the profit levels were found to be very low. A five year projections into the future income shows that the future income of the farmers is low. If nothing is done to address this low income, about 77.50 percent of the farmers will earn less than ₦100,000 per annum in 2015. The future profit derivable by these farmers were also found to be almost insignificant to move the farmers from subsistence level to

commercial level. It was then recommended that in addition to the extension services provided by Kogi Agricultural Development Project, the project should also establish commercial ventures to provide essential farm inputs to farmers at affordable rates.

A study by Ibitoye (2012) was carried out with the aim of appraising the impact of rural road programmes of National Fadama II Development Project on Agricultural Produce Marketing in Kogi State of Nigeria. The research methodology involved the selection of a total of 200 sample farmers. The farmers were randomly selected from communities in the eleven rural road projects carried out between 2006 and 2010. The study revealed that the road construction work of the National Fadama II Development Project in Kogi State has led to less dependency on head porter age as a major means of transporting agricultural produce prior to the road work. The study further revealed that there was an increase in the transportation cost of agricultural commodities despite the road network. This study then suggests that the rural road construction programme could be effectively and better handled by both the Ministry of Works and Rural Development Board because they are better equipped to handle it.

Ibitoye, Shaibu and Akwu (2012) investigated the influence of Fadama users groups' membership on farm income in Bassa LGA of Kogi State. The purpose of the study was to evaluate the influence of Fadama Users Groups (FUG) membership on farm income in Bassa Local Government Area of Kogi State. The study was conducted among three Fadama users groups which include Sokowojin, Sokoyembo and Pan Christian cooperative. Stratified random sampling technique was used to select 30 respondents from each FUGs. Data were obtained through the administration of structured questionnaire. Data collected were analysed using descriptive statistics and t-test. The Fadama users consented in varying degrees that warehouse, fishpond, wells, and milling machines were facilities provided for them by the Fadama Development Project. The result of the t-test showed that fadama users had higher income after joining the fadama users groups. It was observed that the major factors limiting the performance of Fadama Users Groups in the study area were poor coordination/planning of cost sharing programme, dishonesty/corruption among facilitators, high cost of production service, late distribution of inputs and inadequate fund.

The study by Ibitoye and Saliu (2019), evaluated the performance of Nigeria Agricultural Insurance Scheme in Kogi State, Nigeria. A multi-stage random sampling technique was used to select 300 insured farmers. Primary and secondary data were used for the study. Data obtained were subjected to statistical analysis using both descriptive and inferential statistical tools. The services provided by the scheme include; subsidized livestock, subsidized crops, commercial livestock, commercial crops, multiple cover, motor liability, fire, and special peril, general accident, engineering and bonds, and special risks. However, the study showed that insured farmers in the state were only engaged in subsidized crops (94.7%), subsidized livestock (44.3%), multiple covers (17.7%), and commercial crops (1.7%). The findings further showed that 92.7% of the insured farmers used the scheme occasionally. Commercial banks (99.3%) and cooperative societies (92%) were the major sources of information on agricultural insurance among the insured farmers. The study showed an improvement in the income of insured farmers after the scheme, though the marginal increase was not significant. Conclusively, the insurance scheme has not brought about the desired increase in farmers' income.

Similar study by Ibitoye (2012), investigated the levels of awareness and use of agricultural insurance scheme in Kogi State of Nigeria. A total of 240 respondents from eight communities

were selected through a multistage random sampling technique. Data collected through structured questionnaire were analyzed using descriptive statistic, percentages and sigma scoring model. The results revealed that farmers in the State are mostly males (95%) with low levels of education and an average farm size of 3.2 hectares. The study further revealed that majority of the farmers belong to low income group with about 55 percent earning less than ₦100,000.00 per annum. The sigma score of 5.04 for the level of awareness showed a high level of awareness of agricultural insurance scheme among the rural farmers in the state. However, the sigma score of 3.26 reported for the level of use revealed a low level of agricultural insurance usage in the area. The major sources of information of agricultural insurance scheme to the farmers were cooperative societies (66%) and extension agents (65%). The major problems preventing the usage of agricultural insurance by the farmers in the State were fear of failure to honour agreement (75%), high insurance premium (66%), inadequate financial resources (65%) and non-coverage of many crops (61%).

The study by Ibitoye and Odiba (2015), analyzed the impacts of community based poverty reduction project on farming communities in Kogi State, Nigeria. A multistage random sampling technique was used to select 180 farmers, consisting of 90 farmers for each project intervention and non-project intervention communities. Descriptive statistics, FGT model and multiple regression models were used to analyze the data collected. Results showed that most of the farmers were males and married. The average Per Capita Expenditure (PCE) was ₦85.21 ($0.54) and ₦62.28 ($0.4). The poverty line of the farmers was ₦56.81 and ₦41.52 for farmers in the communities with and without project intervention respectively. The multiple regression result showed that age, gender, secondary occupation storage system, electricity, household income, farming experience and educational level were the factors affecting the poverty level of farmers. FGT index of poverty incidence showed that majority of the farmers fell below the poverty line. It was recommended that farmers and non-governmental organizations should initiate poverty alleviation programmes to reduce poverty trend in the rural areas.

Shaibu, Ibitoye and Saliu (2014), focused on community participation and agricultural development in Ankpa Local Government Area of Kogi State, Nigeria. The study described the socio-economic characteristics of the respondents, assessed the extent of community participation in agricultural development in the study area, determined the effect of socio-economic variables on community participation in agricultural development, and identified the major factors affecting community participation in agricultural development initiatives in the study area. A multistage random sampling method was used. Firstly, all the three districts in the Local Government Area were selected. Secondly, two communities were randomly selected from each district. Finally, twenty respondents were randomly selected from each of the six communities. A total of 120 respondents were used for the study. Data were gathered through questionnaire administration. Data collected were analysed using descriptive statistics such as frequency, percentages and mean. Logit regression analysis was used to determine the effect of socio-economic variables on community participation in agricultural development initiatives. The logit regression revealed three major factors that appear to determine participation in agricultural development projects in the study area namely: family size, marital status and average income. The major constraints to participation identified by the respondents include: lack of general information, low socio-economic status, poor communication, and time constraint. The study concludes that without meaningful participation, sustainable agricultural development in rural areas will elude those who attempt to achieve it.

Ibitoye (2012) also analysed the performance of agricultural cooperative societies in Kogi state of Nigeria. A simple random sampling technique was used in the selection of 28 Agricultural cooperative societies and 280 members. A structured questionnaire was used to obtain information on the membership and activities of the cooperative societies. The study showed that there are five major types of registered agricultural cooperative societies in the area. The study further showed that cooperative societies in the area engaged in crop, livestock, processing and storage enterprises. The farm produce of the societies include: rice, maize, yam, cassava, and livestock and farm inputs procured are: improved seeds, fertilizers, agro-chemicals and farm implements. The average capital accumulated per member was ₦6,556.71 while the average loan disbursement per member was ₦6,451.00. Only 67 percent of the total loan from the societies went to the agricultural sector. It is suggested in the study that government should increase the supply of credit to cooperative farmers and embark on enlightenment campaign to increase the participation of rural farmers in cooperative activities.

The study by Ibitoye (2006) was designed to analyse the impact of Cooperative Societies on rural development in Ankpa Local Government Area of Kogi State. The survey involved the random selection of 30 cooperative officers and 150 members. The study showed that there were 32 registered cooperative societies in the area with a total of 3,930 members. The total money accrued from members was found to be ₦1,818,015.15. This money assisted them to invest in projects like agriculture, education, feeding and purchase of durable goods. It is recommended among others that cooperative education, training and public enlightenment at all levels should be intensified to further increase the expected impacts of cooperative societies on rural development.

Audu, Ibitoye and Umar (2010), conducted a similar study in Dekina Local Government Area of Kogi State, Nigeria in 2008. Data for the study were collected from 50 cooperative farmers and 50 non - cooperative farmers who were randomly selected for the administration of structured questionnaire. The data were on socioeconomic characteristics of the farmers and their adoption levels of 12 improved technologies. The socioeconomic data and the farmers' adoption levels were analyzed with the use of frequency distributions and percentages. Adoption scores for the improved technologies were computed by using sigma method. The t-test was used to test the difference between the adoption scores of the cooperative farmers and the non- cooperative farmers. Results indicate that majority of the farmers were male and they operated mainly small scale farms. All the respondents combined personal savings with funds from other sources to operate their farms. Several sources of information about improved technologies were opened to the respondents. The gross adoption score and the mean adoption score of the cooperative farmers were 66.46 and 5.54 respectively while those of the non-cooperative farmers were 53.29 and 4.44 respectively. There was significant difference between the adoption scores of the cooperative and the non- cooperative farmers at 5% level of probability.

5.0 CONCLUSION

The Vice-chancellor Ma, I have in this lecture tried to remind this audience about the several agricultural policies and programmes put in place by the past governments, some of these notable policies and programmes identified include: Farm Settlement, Marketing Boards, Operation Feed the Nation, Green Revolution, Agricultural Development Programme, National Land

Development Agency and Fadama Project. The major aim of these projects is to revolutionize agriculture through employment generation, enhancing agricultural output and income and stemming the tide of rural-urban migration. But most of the programmes failed to produce the desired results due to programme inconsistency, poor implementation, corruption of government officials and public servants, poor targeting mechanisms, and failure to focus directly on the poor.

I have also shown the adverse effects of corruption, terrorism and the conflict between farmers and herdsmen on agricultural productivity in Nigeria. And in line with this is the observation made by Idachaba (2006),
According to him "much more disturbing, was the finding from my case studies on the persistence of policy mistakes, the fact that policy mistakes tended to re-occur from year to year, from state to state and from one regime to another, whether military or civilian, as if Nigerian policy makers were incapable of learning from their previous mistake or from past mistakes of their predecessors. When men and women who are otherwise gifted with considerable wisdom allow policy mistake to recur from year to year and from regime to another and they allow unintended beneficiaries to corner the benefits of agricultural policies to the exclusion of the publicly announced intended beneficiaries, we are entitled to ask if these are truly genuine mistakes, whether these are mistakes of the heart or mistakes of the head" I totally agree with this position and further stress that before we can achieve the desired agricultural revolution, we must find solution to corruption in the agricultural sector which Idachaba referred to as mistakes of the head.

6.0 RECOMMENDATIONS

Based on this conclusion, The Vice-Chancellor Ma, I would like to make the following specific recommendations in moving Nigerian agricultural sector forward:

i. Establishment of Community Agricultural Development Agency (CADA)

Agricultural revolution can only be achieved through the active involvement and organization of rural people at the grass root level. The direct involvement of ordinary people in design, implementation and evaluation of planning, governance and overall development programme at the grass roots level has become an integral part of democratic practice in the past two decades. It is very clear from evidences in existing literature that the concept of community participation has not brought the results expected of it due to marginalization of the intended beneficiaries as a result of high level of corruption.

Community and Social Development Agency (CSDA) is a poverty-focused project that was approved by the World Bank Board of Directors in December 2000 and became effective on September 28, 2001 in Nigeria. The CSDA ensure project ownership in the beneficiary communities by employing the Community Driven Development (CDD) approach through which the beneficiary create, implement and maintain projects. Due to high level of success recorded by this model all over the country especially in reducing to the barest minimum level, the mistakes of the head, I will strongly advocate for the establishment of a similar programme in the agricultural sector tag "Community Agricultural Development Agency (CADA). The agency will be in charge of all government interventions in agriculture.

ii. Establishment of Farm Settlement Scheme for National Youth Service Corp (NYSC) Members

NYSC once proposed to establish Farm Settlement Scheme for Corp Members. The scheme was designed to allow agricultural graduate participating in the scheme to practice their noble professions. I want to support the idea and advise that the scheme should cover crop production in the rural areas where there are enough land and livestock production especially poultry in the urban centres. The farms should be located in a safe and secure environment with adequate protection. Apart from the Corp members serving their primary assignment on the farm, others located near the farm should be made to do their Community Development (CD) on the farm.

iii. Establishment of School to Land Programme

As part of efforts to improve agricultural production in Nigeria, government both at the federal and state levels should popularize agriculture among the primary school pupils and secondary school students. This can be done by providing incentives to schools to establish farms and actively engage the pupils and students in the management of the farm. There should be regular visits from all the agricultural agencies for advice and award of prizes to the best participating schools.

iv. Restructuring of RUGA Programme

In order to prevent conflict between herders and farmers, a grazing bill was presented to the legislative arm of government; the sponsors of the bill wanted the federal government to designate grazing routes and reserves in non Fulani communities for the Fulanis. Thus, Fulani herders can graze along the routes and in the reserves as of right, without getting into conflict with other Nigerian groups. The main reason for opposing this bill is that it would deprive other people of their land, more so that the herders may seek to acquire more land contrary to the express purpose of the bill.

In order to find a permanent solution to this problem, Nigeria must follow the rest of the World by making cattle rearing a sedentary occupation. This was one of the major achievements of the agricultural revolution in Europe. With enclosures, lands for crop farming and animal farming were separated and land was used more efficiently for both crops and livestock production. It is advisable for government to make livestock production a sedentary occupation. Herdsmen should manage ranches only on land owned or leased to them. Seizing land for herders in the name of "RUGA" cannot stop the conflict.

REFERENCES

Akor, A., **Ibitoye, S.** J. and Ayoola, J. B. (2014). Analysis of Socio-Economic and Profitability in Cashew Nut Production in Kogi State, Nigeria. *International Journal of Agriculture and Rural Development. Federal University of* Technology, Owerri, Nigeria.17(2); 1739 – 1745.

Akor, A**., Ibitoye, S. J**. and Ayoola, J. B. (2014). Efficiency of Resource Utilization in Emerging Economies: A case study of cashew nut production in Kogi State, Nigeria. *The International Journal of Entrepreneurial Studies (IES),*University of Abuja, Nigeria. 6(2); 37 – 49.

Audu S. I**., Ibitoye S. J.** and Isah S. E. (2014). Evaluation of Accessibility of Credit by Small Scale Farmers in Kabba-Bunu LGA, Kogi State, Nigeria. *The International Journal of Entrepreneurial Studies (IES),* University of Abuja, Nigeria. 6(2); 108 – 116.

Audu, S. I**., Ibitoye, S. J**. and Faseki, O. O. (2013). A Stochastic Frontier Approach to Estimation of Technical Efficiency in Bee-Keeping in Ondo State, Nigeria. *International Journal of Applied Research and Technology (IJART).* Esxon Publishers, USA. 2 (1); 38–43.

Audu, S. I., Otitolaiye, J. O. and **Ibitoye, S. J**. (2013). A Stochastic Frontier Approach to Measurement of Cost Efficiency in Small Scale Cassava Production in Kogi State, Nigeria. *European Scientific Journal* (ESJ). United Kingdom. 9(9); 114-122.

Audu, S.I., **Ibitoye, S.J**. and Omar, H. Y., (2010). Comparative Economic Analysis of Cooperative and Non-Cooperative Farmers in the Adoption of Improved Technologies in Dekina Local Government Area of Kogi State, Nigeria. *International Journal of Agricultural Economics, Management and Development (IJAEMD).*Kogi State University, Anyigba.1 (1): 49-57.

Ayoola, G.B. (2001). Essays on Agricultural Economy. A Book of Readings on Agricultural Development, Policy and Administration in Nigeria. Ibadan. TMA Publishers

Bivan, G.M., Alkhilomen, L.O., Augustine, A.J. and Rahman, S.A. (2013). Comparative Analysis of Linear and Grafted Polynomials in Forecasting Sorghum Production Trend in Nigeria. *Middle-East Journal of Scientific Research* 15(10): 1411 – 1414

Central Bank of Nigeria (CBN) (2012). Annual Reports. Retrieved from http//www.cenbank.org/macroindicationsfinal.asp. Accessed May 11, 2019

Dike, V.E. (2011). Corruption Control: ANre Paradigm for Effective Control in Nigeria. Retrieved from http//www.NigeriaWorld.com/featurearticle/corruption.html. Accessed June 11, 2019

Food and Agriculture Organization (FAO). Website: http//faostat.fao.org/desktopdefault.aspx? Accessed December 31, 2018

Haliru Y. U., **Ibitoye S. J**. and Ebenuwa C. I. (2014). Evaluation of Gum Arabic Marketing and Propensity to Save Among Gum Arabic Marketers in Nigeria. *International Journal of Agricultural Policy and Research.* University of Science and Technology, Jordan. 2(4); 185 – 190.

Haliru Y. U. and **Ibitoye S. J.** (2014). Evaluation of Market Structure and Efficiency of Gum Arabic Marketers in North-Eastern Nigeria. *Asian Journal of Management Sciences and Economics.* Multidisciplinary Journals. Pakistan. 1(1); 1 – 11.

Haliru Y. U**., Ibitoye S. J**. and Otitolaiye J. O. (2014). Economies of Gum Arabic Marketing; A Panacea for Poverty Alleviation in North-Eastern Nigeria. *International Scholarly Journals. Greece*. 2(1); 14 – 22.

Ibitoye S. J. (2014). Economic Analysis of Palm Oil Marketing in Kogi State, Nigeria.*Asian Journal of Social Sciences, Arts and Humanities.* Multidisciplinary Journals. Pakistan. 2(1); 1 – 19.

Ibitoye S. J. (2014). Rural Livestock Farming and Poverty Alleviation in Nigeria in the 21st Century. *Journal of Politics and Society*. Dept. of History and International Relation, Kogi State University, Anyigba, Nigeria. 2(2);1– 20.

Ibitoye S. J., Idoko D. and Shaibu U. M. (2014). Economic Assessment of Rice Processing in Bassa Local Government Area of Kogi State, Nigeria. *Asian Journal of Basic and Applied Sciences.* Multidisciplinary Journals, Pakistan. 1(2); 8 – 17.

Ibitoye, S. J. and Attah, E.S. (2012). An Assessment of Yam Mini-sett Utilization and Profit Level in Kogi State, Nigeria. *International Journal of Applied Research and Technology (IJART).* Esxon Publishers, USA. 1 (5); 4–11.

Ibitoye, S. J. and Odiba, J. (2015). Analysis of the Impact of Community Based Poverty Reduction Project on Farming Communities in Kogi State, Nigeria. *Journal of Economics and Sustainable Development*. The International Institute of Science, Technology and Education, USA *6(4) ; 18 – 24.*

Ibitoye, S. J. and Onimisi, J. A. (2013). Economic Assessment of Yam Production in Kabba-Bunu LGA of Kogi State, Nigeria. *Journal of Development and Agricultural Economics*. Academic Journals, Italy. 5(11);470-475.

Ibitoye, S. J. and Onimisi, J. A. (2013). Influence of Training on Farmer's Productivity in Poultry Production in Kogi State, Nigeria. *International Journal of Poultry Science.* Asian Network for Scientific Information, Pakistan. 12(4); 239 – 244.

Ibitoye, S. J. and Onje, S. O. (2013). Economic Analysis of Oil palm Fruit Processing in Dekina LGA of Kogi State, Nigeria. *Journal of Academia Arena,* Marshland Press, USA. 5{11}; 65-73.

Ibitoye, S. J. and Shaibu, U. M. (2014). The Effect of Rainfall and Temperature on Maize Yield in Kogi State, Nigeria. *Asian Journal of Basic and Applied Sciences*. Pakistan. 1(2); 37 – 43.

Ibitoye, S. J., (2006). The Impact of Cooperative Societies on Rural Development in Ankpa Local Government Area of Kogi State, Nigeria. *Journal of the National Association of Science, Humanities and Education Research (NASHER).* Benue State University, Makurdi. 4(2): 193 – 198.

Ibitoye, S. J., (2010). Influence of Farm Size, Educational Status and Farm Income on the Adoption of Maize Varieties in Kogi State, Nigeria. *American-Eurasian Journal of Sustainable Agriculture*, Pakistan. 4(1): 20-25.

Ibitoye, S. J., Omojola, D., Omojeso, V. B. and Shaibu, U. M. (2015). Assessment of Informal Credit in Mobilizing Fund for Agricultural Production in Ijumu LGA of Kogi State, Nigeria. *Asian Journal of Agricultural Extension, Economics & Sociology*. Science Domain International, UK 7(1); 1 - 8.

Ibitoye, S. J., Shaibu U. M. and Omole B. (2015). Analysis of Resource Use Efficiency in Tomato *(Solanum lycopersicum*) Production in Kogi State, Nigeria. *Asian Journal of Agricultural Extension, Economics & Sociology*. Science Domain International, UK 6(4); 220 - 229.

Ibitoye, S. J., Shaibu, U. M. and Akwu, O. C. (2014). Influence of Fadama Users Groups' Membership on Farm Income in Bassa Local Government Area of Kogi State, Nigeria. . *International Journal of Agricultural Economics, Management and Development*. Kogi State University, Anyigba. 4{1); 27 – 38.

Ibitoye, S. J.,(2012). An Impact Assessment of the Rural Road Programme of National Fadama II Development Project on Agricultural Produce Marketing in Kogi State, Nigeria. *International Journal of Applied Agricultural Research* [IJAAR]. Research India Publications, India. 7(2):129 – 136.

Ibitoye, S. J., Orebiyi. J. S. and D. I. Ekime., (2012). Socioeconomic Variables of Farmers and their Profitability Levels in Maize Production in Kogi State, Nigeria. *International Journal of Agricultural and Rural Development (IJARD)*. Federal University of Technology, Owerri. 15(2):1008 – 1013.

Ibitoye, S.J. (2008). Principles of Farm Management. National Open University of Nigeria (AEA 308).

Ibitoye, S.J. (2012). Assessment of the Levels of Awareness and Use of Agricultural Insurance Scheme among Rural Farmers in Kogi State, Nigeria. *International Journal of Agriculture, Science, Research and Technology (IJASRT)*. Islamic Azad University, Rasht, Iran 2(3):143 – 148

Ibitoye, S.J. (2012). Survey of the Performance of Agricultural Cooperative Societies in Kogi State, Nigeria. *European Scientific Journal (ESJ).* United Kingdom 8(8):98 – 114

Ibitoye, S.J. (2014). Rudiments of Agricultural Production Economics. Kaduna. Euneeks & Associates Publishers.

Ibitoye, S.J. and Audu, S.I. (2012). Economic Analysis of Cashew Marketing and Profitability in Yagba Area of Kogi State, Nigeria. *The International Journal of Entrepreneurial Studies (IES).*University of Abuja, Nigeria. 5(2):13-24.

Ibitoye, S.J. and Saliu, O.J. (2019). An Evaluation of the Performance of Nigeria Agricultural Insurance Scheme in Kogi State, Nigeria. *Asian Journal of Agricultural Extension, Economics & Sociology* 33(2):1 – 9

Ibitoye, S.J., Eti-Ukwu, A.I., Okeme, S. and Arojo, A. (2016). Assessment of the Awareness and Use of Information Communication Technologies (ICTs) among Small Scale Farmers in Akure North Local Government Area of Ondo State, Nigeria. *International Journal of Agricultural and Veterinary Sciences*, 2(2):62 – 72.

Ibitoye, S.J., Shaibu, U.M., Sale, F.A. and Frank, O.E. (2016). Assessment of the Influence of Urban Agriculture on Household Income: Evidence from Kogi State, Nigeria. *International Journal of Agricultural and Veterinary Sciences*, 2(3):107 – 115.

Ibitoye, S.J., Shaibu, U.M., Sanda, M.E. and Ajayi, B. (2016). Effect of Malaria on Farm Household Income in Ifedore Local Government Area of Ondo State, Nigeria. *International Journal of Agriculture and Rural Development*, 19(1):2386 – 2391. Published by Federal University of Technology (F.U.T) Owerri.

Ibitoye, S.J., Shaibu, U.M., Sanda, M.E. and Ochadare, D. (2017). Economic Analysis of Local Swine Production among Small Scale Farmers in Kabba/Bunu LGA of Kogi State, Nigeria. *Gashua Journal of Irrigation and Desertification Studies* 2(2):1 – 11.

Ibitoye, S.J., Orebiyi, J.S. and Shaibu, U.M., (2012). Economic Effect of Inorganic Pesticide use on Fadama II Rice Farming in Ibaji Local Government Area of Kogi State, Nigeria. *International Journal of Agricultural and Rural Development (IJARD).*Federal University of Technology, Owerri. 15(2) : 1063 – 1070.

Ibitoye, S. J., (2008). Evaluation of the Sources, Procurement and Utilization of Agricultural Credit by Rural Farmers in Kogi State, Nigeria. *National Association of Science, Humanities and Education Research Journal*. Benue State University, Makurdi. 6(2) :28-36.

Ibitoye, S. J., (2011). Indigenous Technology and Agricultural Production; The Case of Poultry Incubator. *International Journal of Poultry Science.* Asian Network for Scientific Information, Faisalabad- Pakistan. 10(6):493-495.

Ibitoye, S. J., (2011). Attitude of Youths Toward Career in Agriculture in Kogi State, Nigeria. *International Journal of Applied Engineering Research.* Research India Publication, *India.* 6(14) :1683 – 1693.

Ibitoye, S. J., (2012). Economics of Utilizing Informal Sources of Credit for Agricultural Production in Yagba Area of Kogi State, Nigeria *International Journal of Agricultural Economics, Management and Development*. Kogi State University, Anyigba.2(1): 141-147.

Ibitoye, S. J., (2012). Predicting the Future Income and Profit Levels of Kogi Agricultural Development Project Contact Farmers in Kogi State, Nigeria. *International Journal of Applied Agricultural Research [IJAAR]*. Research India Publications, India. 7 (2): 99-109.

Ibitoye, S. J..(2011). The Influence of Socio-economic Variables of Farmers on their Choice of Cassava Varieties in Kogi State, Nigeria. *International Journal of Agriculture, Science, Research and Technology (IJASRT).* Islamic Azad University, Rasht, Iran. 1(4) :185-193.

Ibitoye, S.J. and Idoko, D., (2011). Developing Youth Organizations for Improved Agricultural Production in Nigeria. *National Association of Science, Humanities and Education Research Journal (NASHER).* Benue State University, Makurdi.9 (1):80-84.

Ibitoye, S.J. and Orebiyi, J.S., (2009). The Effects of Socio- Economic Variables on Credit Need of Small- Scale Farmers in Kogi State, Nigeria. *Global Approaches to Extension Practice; A Journal of Agricultural Extension in, Nigeria*. Department of Agricultural Extension, Federal University of Technology, Owerri. 5 (2):54-59.

Ibitoye, S.J., (2010). Linear Programming Optimum Farm Credit Need of Small Scale Farmers in Kogi State, Nigeria. *International Journal of Agricultural and Rural Development*. University of Abuja. 1 (1): 67-74.

Ibitoye, S. J., (2010). A Survey of Land Acquisition Method for Agricultural Production in Yagba Area of Kogi State, Nigeria. *International Journal of Agricultural Economics, Management and Development*. Kogi State University, Anyigba.1(1): 128-135.

Idachaba, F.S. (2006). Good Intentions are not Enough: A Collected Essays on Government and Nigerian Agriculture. Ibadan University Press

Idachaba, H.E**., Ibitoye, S.J.**, Akor, A. and Shaibu, U.M. (2016). Analysis of the Effect of Economic Variables on the Profitability of Yam Marketers in Kogi State, Nigeria. *International Journal of Agricultural Economics, Management and Development (IJAEMD)*, 6(1)92 – 103. Published by Department of Agricultural Economics and Extension, Kogi State University, Anyigba, Nigeria.

Mohammed, I.A**., Ibitoye, S.J**. and Okpanachi, P.O. (2016). Technical Efficiency and Elasticity of Resource among Cowpea Farmers in Ofu Local Government Area of Kogi State, Nigeria. *Dutse Journal of Agriculture and Food Security (DUJAFS)*, 3(1): 104 – 119. Published by Federal University Dutse, Jigawa State.

Mundi, N.E. and **Ibitoye, S.J.** (2001). Introduction to General Agriculture. Lagos, National Open University of Nigeria (CCP 621).

Ohajianya D. O., J.O. Otitolaye, O. J. Saliu, **S. J. Ibitoye,** *et al,* (2014). Technical Efficiency of Sweet Potato Farmers in Okene LGA of Kogi State. *Asian Journal of Agricultural Extension, Economics & Sociology*. Science Domain International, UK 3(2)108-117.

Olayide, S.O. and Heady, E.O. (1982). Introduction to Agricultural Production Economics. Ibadan University Press Ltd.

Onuche, U**., Ibitoye, SJ**. Anthony, T (2020). Profitability and Efficiency in Bambara Groundnut Production in Nigeria; A Case Study. *Review Journal of Agricultural and Applied Economics (RAAE)*. Vol. XXIII{2}; 92 – 101.

Onuche, U., **Ibitoye, S. J**. and Akor, A. (2015). Forecasting Wheat Production in Nigeria; A Comparative Analysis of Grafted Polynomials and Linear Functions. *International Journal of Agricultural Economics, Management and Development*. Kogi State University, Anyigba. 5{1); 161 – 166.

Orebiyi, J. S.,Eze, C. C.,Henri – Ukoha, A., Akubude, F. and **Ibitoye, S.J**.,(2011). Demand for Institutional Credit from the NACRDB by Small Scale Farmers in Imo State, Nigeria. *International Journal of Agriculture, Science, Research and Technology (IJASRT).*Islamic Azad University, Rasht, Iran. 1(2): 47-54

Shaibu, U. M**., Ibitoye, S. J.** and Saliu, O. J. (2014). Community Participation and Agricultural Development in Ankpa Local Government Area of Kogi State, Nigeria. *Confluence Journal of Economics and Allied Sciences.* Department of Economics, Kogi State University, Anyigba, Nigeria. 1(1); 128 – 136.

Shaibu, U.M., Onuche, U. and **Ibitoye, S. J.** (2015). Effect of HIV/AIDS Prevalence on Farm Income of People Living with HIV/AIDS in Kogi State, Nigeria. *Journal of Advances in Biological and Basic Research*. ASD Publisher, India. 1(1); 47 - 52.

Umar, H. Y., **Ibitoye, S. J**. and Imarhiagbe, P. (2012). Analysis of Farmers' Perception of Rubber Research Institute of Nigeria's Developed Technologies; A Case Study of IkpobaOkha LGA of Edo State. *Journal of Agricultural Production and Technology*. University of Ibadan, Nigeria. 1(1); 52 – 65.

ACKNOWLEDGEMENTS

I want to sincerely appreciate God for my Life. What if the LORD had not been on my side …… (Psalm 124). This is a long story that started right from when I was two years old and continues till today. My testimonies are uncountable. I thank God Almighty for His faithfulness, kindness, love, mercy, blessings and unusual favour which he has bestowed on me and members of my family on a daily basis. To this I give God the Glory, praises, honour and adoration forever, (Amen).

On this note, I wish to thank the management and staff of this University especially my colleagues in the Faculty of Agriculture. I want to specially appreciate the entire members of the Department of Agricultural Economics and Extension for their loves, cares and cooperation. I couldn't have achieved much without your supports. May God bless you all (Amen).

My parents: Pa Abel Ibitoye and Mrs. Abigail Ibitoye (both of blessed memory), who toiled day and night to ensure they gave me the best available education. Thank you for your sacrifices in making me a better person.

I wish to appreciate my sister like a mother; Late Mrs. Comfort Olufunke Abraham, words cannot express my gratitude for your support at various levels of my education.

My friends and family members who have stood by me all these years especially Mr. P.K. Ibitoye, Mrs. A. Moses, Mrs. M. Fabola, Prof. J.S. Orebiyi, Dr. J.A. Onimisi, Mr. B. Eli-Ake, Mrs. R.O. Ehinlafa, Mr. A. Gbadamosi, Mr. G.S. Adeniyi, Prof. O.J. Saliu, Dr C.U. Idoko, Engr M. Owolabi and others too numerous to mention individually.

I appreciate my teachers both at primary, secondary and tertiary levels as well as my students at College of Education Azare, College of Education Oro, Kogi State College of Education Ankpa, and Prince Abubakar Audu University Anyigba.

To my children; Mrs. Titilayo Awokoya, Mr. Wilson Adewale Ibitoye, Mrs. Olushola Adetoye and my son from another father Mr. Ufedo Monday Shaibu. I pray that you will all be greater and better than your parents in Jesus name (Amen).

Finally but by no means the least, I want to appreciate my wife Mrs. Comfort Ebun Ibitoye, for your support, love, hard work, and most importantly for maintaining a conducive and peaceful home over the years of our marriage. May God continue to bless and prosper our union in Jesus name (Amen).

The Vice Chancellor Ma, Ladies and Gentlemen, thanks for your patience and God bless.

APPENDIX 1
Statistics about reported attacks by Fulani
(2017-7th May 2020)

	ATTACKS	KILLED	WOUNDED	KIDNAPPED	RAPED	HOMES	CHURCHES
2020	**141**	**335**	**46+**	**137**	**2**	**176+**	
MAY	2	4	5				
APRIL	33	107	16+	28	2	166+	
MARCH	23	102	2+	24			
FEBRUARY	16	33+	23	3		10+	
2019	**169**	**524**	**84**	**75**	**3**	**606**	**23**
DECEMBER	7	2	1	1	1		
NOVEMBER	4	5	3	1			
OCTOBER	11	12		18			
SEPTEMBER	12	32	1	16			
AUGUST	14	17	3	15			
JULY	16	10	2	9		75	2
JUNE	8	14	1	3	1	232	2
MAY	53	165	20	2		12	15
APRIL	14	80	12				
MARCH	19	105+	37+	10	1	247	4
FEBRUARY	6	68	2			40	
JANUARY	2	14					
2018	**245**	**1,478**	**230**	**29**	**7**	**300**	**1**
DECEMBER	5	13	5	12			
NOVEMBER	2			5			
OCTOBER	3	31+	4				
SEPTEMBER	8	44	51				
AUGUST	17	24	4+		1	95	
JULY	10	63	3			16	1
JUNE	12	132	40	4+		45+	
MAY	19	289	14+	1	3		
APRIL	36	296	49+	1	1	82	
MARCH	33	174	24+	1		50+	
FEBRUARY	41	118	6	4			
JANUARY	54	294+	30+	1	2	12+	
2017	**99**	**202**	**33+**	**12**	**4**	**6,500**	
DECEMBER	18	65	14+			3,000	
NOVEMBER	5	4+	1+	1+			
OCTOBER	2	7+		1+			
SEPTEMBER	6	22	10	1			
AUGUST	7	3+	1	3			
JULY	1						
JUNE	6	2	1	1	1		
MAY	19	26			3		
APRIL	8	42	2+	1		3500	
MARCH	6	14		1	1		
FEBRUARY	10	4					
JANUARY	11	13+	4+	3			
TOTAL	**654**	**2,5539+**	**393+**	**253+**	**16**	**7582+**	**24**

Source: BAZAN, Jose Luis, Fulani militias' terror: 2017-2020, Working Paper, Brussels, 16 May 2020