CHAPTER ONE

INTRODUCTION

Background of the study

Agriculture is an integral part of science. It involves the cultivation of land, raising and rearing of animals for the purpose of production of food for man, feed for animals and raw material for industry. It involves cropping, livestock, forest, fishery, processing and marketing of agricultural products (Wikipedia, 2013, Baraja, 2013). According to Onazi (2013). Agriculture is right regarded as the oldest human occupation and its development is inextricably tied with the social and economic evolution of man. Managing a field or a fishing ground, so as to gain reasonable harvest while minimizing economic and environmental cost has been the oldest of resources management since the time of creation. Agriculture is also regarded as the life blood of a nation's domestic economy and the mother of all business. Occupation and professions. Agriculture has continued to shape man's social and economic history.

According to Onazi (2013) in Abdu (2017) Vocational agricultural education reduces school dropout rate by providing training opportunities for persons who are not satisfied with other forms of education that are distinct from the realities of the world of work. Persons who would have become otherwise compelled to wither receive forms of education which do not bring the best in them or drop out and become liabilities to the nation and agents of destruction of live and properties are provided with alternatives which suit their interest and ability.

Agricultural education is the systematic and organized teaching instruction and training (theoretical as well as hand-0n real world field-based) available to students farmers or individuals interested in the science, business and technology of agriculture (animal and plant production) as well as the management of land, environment and natural resources Mathews (2022).

Mathematics is an area of knowledge that includes the topic of numbers, formulas and related structures, shapes and the spaces in which they are contained, and their changes. These topics are represented in modern mathematics with the major sub disciplines of number theory, Oxford University Press. (2012).

Most mathematical activity involves the discovery of properties of abstracts and the use of pure reasons to prove them. These objects consist of either abstractions from nature or in modern mathematics entities that are stipulated to have certain properties, called axioms. A proof of a succession of applications of deduction rules to already established results. These results include previously proved theorems, axioms, and in case of abstraction from nature some basic properties that are considered true starting points of the theory under considered Hipolito, Ines Viega (2015).

Mathematics is essential in the natural sciences, engineering, medicine, finance, computer science and the social science. Although mathematics is extensively used for modeling phenomena, the fundamental truths of mathematics are independent from any scientific experimentation. Some areas of mathematics, such as statistics and game theory, are developed in close correlation with their

application and are often grouped under applied mathematics. Other areas are developed independently from any application (and are therefore called pure mathematics), but often later find practical applications. The problem of integer factorization, fro example, which goes back to Euclid in 300 BC, had no practical application before its use in the RSA (Rivest, Shamir, Adleman) cryptosystem, now widely used for the security of computer networks.

Mathematical application can enhance agricultural development is many ways. Through simple measurement, the farmers can estimate the number of hectares cultivated per annum, his profit and loss margin per annum etc, and from these data, he can be appropriate decisions for future investment. The farmers can adopt appropriate spacing of crops for optimal yield and right drug administration for farm animals. The benefit of appropriate management through basic mathematics application are increase in production and profit. This will in turn increase investment in agriculture and increase agricultural produce for food security (Mitchel, 2012).

According to Ale and Adetula (2009) Argues that mathematics is a key to productivities and fulfilling life. They continuous to say "what all these means is that solutions to human problems such as hunger, sickness, thirst, transformation security of money, shelter, education all reside in mathematics method as presence in the following diagram. In fact, the application of mathematics in scientific concepts in solving various problems or man is what translates directly or indirectly development (Ale and Adetula, 2008).

Formal agricultural education started in the united state in 1917, when congress passed the smith Hughes Act (Anderson and Anderson, 2012). According to them, this piece of legislation put agriculture in the classroom to pre-pare, students for the work force, from that point agricultural education had its role in the formal education system. Agricultural education in the public school system has grown tremendously, since its inception at the turn of the last century. Agricultural education courses teach way beyond the boundaries of production agriculture (Anderson & Anderson, 2012).

According to Dave in Anderson and Anderson (2012) pointed out some of the areas of mathematics that developed agriculture this include "the forestry contest, there is another one where we do angles, need to figure out the height of a tree, figure out how par p you can get a logout of it. They have got to do pacing and figure out what actually means as to the angle they are looking at on the tree to figure out how tall is really is and use the measurement that way too" agricultural education teachers have shown that there were a lot of content areas that they used to integrate mathematics these include agricultural mechanics, and horticulture, however, the agricultural education teachers state that a teacher should no by all means make a collection with the students until after the fact.

Agricultural educators are now preparing their students for future careers as biologist, business and industry leaders, political officials and many other advanced careers. No wonder, study conducted in Virginia, agricultural educators indicated that mathematics was a component of the agriculture curriculum, and they believed that mathematics was a component of the agricultural education would lead to higher academic achievement (Anderson, 2006). According to Parr, Edward Liaising and Head (2006) stated that in order for secondary agricultural education to remain effective in prosecuting well

prepared and highly qualified graduates, program must provide a strong emphasis on traditional academic skills. To corroborate this Newcomb (1995) states that "the need to have agricultural education students graduate with the demonstrated capacity to think at the high levels of bloom's taxonomy is more urgent than ever.The nature of the world we live in demands it" (p.4). It is essential that the modern secondary agricultural education, curriculum develop well round individuals who are capable of adapting to ever expanding and increasingly, complex, agriculture and food system in which they may be employed national Research Council in (Parr, Ed Ward Liaising and Head 2006).

Statement of the Problem

In the second quarter of 2023, the agricultural sector generated about 21% of Nigeria's Gross Domestic Product. The largest contribution was from crop production, which covered nearly 19% of the GDP. Agriculture account for a significant portion of Nigeria's GDP as a key activity for the country's economy after oil. Nevertheless, agricultural activities provide a livelihood for many Nigerians, whereas the wealth generated by oil reaches a restricted share of people. (Doris DokuaSasu 2023).

This was not because the industrial sector increase its quota but due to neglect of the agricultural sector (Ekpo&Umoh, 2013). Today the situation is even worst, with a gross dependence on imported food, the question that calls to mind is “can mathematical application agricultural development in Kwara State, Nigeria.

Many related studies had been carried out in various areas such as: the effect of mathematical applications on agricultural development in Abioa State, Nigeria. (Uwaeuoke 2014). It is however noted that the research studies cited were carried out in the area of effect mathematics application on agriculture development in Abia State, Nigeria, thus the study cited not examine the position of mathematics in agriculture produce in a nation building in Kwara State., Nigeria. Hence, these hare some of missing gap this study will covered. The fact that the little has been investigated on the effective of mathematical application on agricultural development in Abia State, Nigeria and this prompt the researcher to focuse her study on the position of mathematics in agricultural produce in a nation building in Kwara State, Nigeria

Purpose of the Study

The main objective of the study was to determine the position of mathematics in agriculture produce in a nation building a case study of Kwara State, Nigeria. The specific objective include to determine the effect of;

1. The basic skills in mathematics on agricultural production and practice
2. The appropriate skills in measurement on agricultural production and practice
3. The mathematical modeling of agricultural systems on stakeholders’ interest and action for agriculture.

Research Questions

1. What are the basic skills in mathematics on agricultural production and practice?

2. What is the position of appropriate skills in measurement on agriculture production and practice?

3. What is the position of mathematical modeling of agricultural systems on stakeholders interest and action for agriculture?

Research Hypothesis

The following hypothesis were formulated to guide the study

1. There is no significant relationship between basic skills in mathematics on agricultural production and practice in Kwara State, Nigeria.

2. There is no significant relationship between appropriate skills in measurement on agricultural production and practice in Kwara State, Nigeria.

3. There is no significant relationship between of mathematical modeling of agricultural systems on stakeholders in Kwara State, Nigeria.

Significant of the study

This study will bring awareness of the importance of mathematics in agricultural produce in nation building in Kwara State, Nigeria. This research study when completed will be a great benefit to federal Ministry of Agriculture, State Ministry of Agriculture, researchers, government, farmers and the national at large.

This study will enable federal ministry of agriculture and state ministry of agriculture to position of effective measurement and percentage that ministry will use to orientate the farmers in the state and nation toward the application orf fertilizer to their crops. Also help both ministry and the farmers on how to calculate the fertilizer that will distribute for available farmers in the nation so that the ministry will able to propose for fertilizer that will be efficient for the farmers in the country.

This study will also serve as guide to researchers that want to investigate on the position of the mathematics in agriculture produce in a nation building and related topic in the future so as to be able to improve new ideal in area of the study.

This study will help the government to determine the fertilizer and other farm materials that will be distributed to the farmers in the country that enable to reduce the agriculture production price in the country so that the country economy will be improve and standard of living will be improved in the nation.

Lastly the study will help the farmers to know the accurate percentage of fertilizer that will be apply to their crops in the farm enable to grow well so that the farmers will be able to achieve their goals.

Scope of the Study

The geographical scope of this study is limited to both Federal Ministry of Agriculture and State Ministry of Agriculture in Nigeria. However, in order to get accurate and reliable result for this study, the sample scope will be limited to the federal ministry of agriculture and state ministry of agriculture in Kwara State, Nigeria. Where fifty (50) staffs will be selected from federal ministry of agriculture in Kwara state and fifty (50) staffs will be selected from state ministry of agriculture. The total will be selected making hundred (100) respondents. The subject scope of this study is the position of mathematics in agriculture produce in nation bui8lding in Kwara State. Nigeria.

The study will be delimited to descriptive research design of survey type and researchers-structured questionnaire. This study will also be delimited to hundred (100) staff in selected ministry in Kwara State. It will be delimited to a sample hundred (100) respo0ndents that will be selected through simple sampling procedures. Finally the study will be delimited descriptive statistics of percentage and inferential statistics of Pearson product Moment Correlation Statistics (PPMC) 0.5 alpha level using statistical package for social science (SPSS).

Operational Definition terms

Position: a change which is a result or consequence of an action

Mathematics:- is the science and study of quality. Structure, space, and change

Agriculture: The science, art, or practice of cultivating the soil, producing crops and raising livestock and in varying degree the preparation and marketing of the resulting products.

Produces: are crops and livestock that are raised and harvested

National Building: is a significant undertaking that government employ to devlop political, economic, security, and social institution in the country.

CHAPTER TWO

In this chapter, relevant concepts and studies are reviewed. The review has been carried out under the following sub-heading:

- Concept of Agricultural development
- Concept of Mathematics
- Application of mathematics to agricultural development
- Challenges of sustainable change in agricultural development
- Appraisal Review of Literature

Concept of Agricultural development

Agriculture is an integral part of science. According to Nworah (2015) it involves the cultivation of land, raising and rearing of animals for the purpose of production of food for man, feed for animals and raw materials for industry. Aboyade in Adedayo (2014) defined development as a continuous process of generating and more efficiently allocating resources for achieving greater socially satisfying needs. Although a number of views abound on agricultural development, Adegeye and Dittoh (2015) taking cognizance of a purely subsistence economy, pointed out that agricultural development would mean enough food for the people and a marketable surplus produced to increase the income of the peasants and that the increased income so generated would provide means for them to purchase other necessities of life which they cannot produce for themselves. By this means the standard of living of the peasants wilMncrease, and underemployment and unemployment will be reduced. They pointed out also that there would be an inerease in the Gross Domestic Product (GDP) since a large proportion of the population depends on agriculture.

According to Adedayo (2013) agricultural development could be viewed as:

a. Increased level of farm output where the benefits of such production are shared among those who work on the farm and those who otherwise contribute to the increased production.

b. Agricultural extension by way of additional lands, additional labour and additional capital.

c. Increases in income of people employed in the agricultural sector manifested by their acquisition of modern things.

Concept of Mathematics

Johnson and Rising (2012) described mathematics as a creation of the human mind, concerned primarily

with ideas, processes and reasoning. They view it as a way of thinking which makes it useful in the solution of all kinds of problems (including agricultural development), science and industry.

According to Onoja (2019), mathematics is therefore characterized with clarity and precision that enable us to perform computations, solve problems and complete proofs with ease. According Eredugba (2018) in Onoja (2019) mathematics is regarded as a 'tool subject' because it is useful in the breaking down of verbal arguments into concise and consistent forms. Supporting this, Idoko (2019) in a study maintains that mathematics provides a powerful technique of analysis which can be used to prove or disprove theories in economics and by extension, agricultural development.

Ngoka (2013) observed that mathematics as well as science and technology is an important sphere in learning which greatly influence the level, nature, scope and direction of development of any nation. This is From the foregoing the first view of Adedayo (2014) which centres on increased output is germane to this discourse. Hence, Adegeye and Dittoh (2015) had earlier viewed that for agricultural development to occur, the majority of farmers must experience significant improvement in their incomes and standard of living. This has underscored the significance of mathematics being a 'tool subject' for rapid development.

Requirements of Agricultural Development

According to Adedayo (2019), the following are requirements of agricultural development:

a) Marketing: There should be a high demand or consumption for agricultural product; marketing entails getting products from farmers to the consumers. It enlarges agricultural production as well as facilitating industrial growth and bringing greater wealth to the nation. Marketing involves transportation, storage, processing and packaging.

b) New Farm Technology: Agricultural development requires a research programme that is continuously

generating new agricultural techniques.

c) Purchasable Input: Agricultural inputs like seeds, fertilizers, etc should be available at affordable prices to farmers, it should also be supplied at the right time and in the right place.

d) Incentives to Farmers: Farmers should be motivated towards producing more through the provision of price subsidy, fair sharing of farm produce in case of share cropping and the goods and services required by farmers should be made available for improving their standard of living.

e) Production Credit: Credit to farmers is necessary to be able to procure and adapt necessary technologies. A major source of credit to farmers is by government and commercial banks which are usually not available to farmers because of lack of collateral security and default in repayment. These requirements demand one form of mathematics application 'or the other, especially in the area of new farm technology known to be the springboard of agricultural development. While acknowledging this fact,

Ajayi and Imoko (2011) pointed out that without mathematics there is no science, without science there is no modern technology and without' modern technology in our farms and farming activities, the society stands to suffer greatly (Enemali and Adah, 2015).

Applications of Mathematics for Agricultural Development.

Ochekliye (2014) in Enemali and Adah (2015) underscored the significant role of mathematics in

various human endeavours when he stressed that it is the foundation of science and technology without which a nation can never be prosperous and economically independent. In line with this, farm mathematics encompasses all forms of measurements on the farm, farm forecasts, farm accounts and record keeping,. all forms of business that have to do with farm and farm products (Enemali and Adah, 2015).

Field experimentation is another core area where mathematics applications are. used. According to Adedayo (2014) it is a systematic and logical process of comparing two or more factors on the field to identify the best in certain characteristics. It is an organized agricultural research endeavour aimed at gaining new facts and knowledge which will bring about increased productivity and agricultural development. It involves the conduct of field experiment, where the field work is actually carried out and the application of statistical method for collecting; organizing, presenting, analyzing and interpretihg data are employed. Here different fertilizers' effects on crops for optimum yields as well as plant population implications are studied. Soil suitability for crops and other various soil tests are carried out using field experimentation. All these are realizable through full mathematics applications.

More recent advances in the mathematical sciences have helped improve our ability to predict the weather, to measure the effects of environmental hazards and to study the origin of the universe (Aguele and Usman, 2017). This is very important in the current trend of climate change phenomena in the entire world today.

Okeke (2017) in Ajai and Imnoko (2011) pointed out that the applications of science and technology to agriculture, whose foundation is mathematics, have completely changed the face of agriculture through the introduction of mechanical devices for planting, tending, harvesting and processing of various food crops.

Researches have not only through hybridization by plant/animal breeders resulted in improved varieties of food crops and animals and other food products, but has boosted yields through the use of fertilizers and pesticides. All these have been possible courtesy of mathematical modeling, an aspect of computational mathematics.

Agricultural development is majorly about optimal results. Application of optimum spacing within and between rows of crops results in optimum yields in crop production. Apart from the yield factor, optimum spacing encourages formation of foliage canopy which helps in suppressing weeds emergence. Too staggered/close spacings therefore affect optimum yield as well. For the realization of

optimum yields in maize, rice, yam, cassava and cowpea for instance, the following spacings should adhered to:

Table 1: Recommended Crop Spacings for Optimum Yield.

Crop	Spacing
Maize	90cm X 30cm a tones seed per hole 75cmx 25cm at two seeds per hole
Rice	25cm – 30cm apart, depending on variety
Yam	90cm x 100xm, while yam mini-setts is 25cm x 100cm
Cassava	1m x 1m
Cowpea	25cm x 90cm for the spreading type; 30cm x 75cm for the erect type

Source: Iwena (2012).

Further to this, Akissani aŋd Muntari (2015) pointed out that overpopulation on the farm causes overcrowding, poor ventilationand reduction in yield as a result of competition for the environmental resources; and that low population densities is not desirable as there is emergence of weeds. Plants population is calculated using the formula:

$$\text{Plant population} = \frac{\text{Area of land}}{\text{Feeding area}}$$

Feeding area=Intra x Inter row spacing.

In fertilizer compounding and applications, mathematics is involved. This is because the recommended proportion of the component elements of the chemical must be used to avoid any harmful effect on the crops when applied. Again, its application to the field must be calculated as under and over applications are counter productive. For instance, if a farmer is applying 60kgN/ha, what quantity of sulphate of ammonia does he require for 6 hectares? The following is the solution to the problem: Ammonium sulphate has 21%N as active ingredient. This implies that 2 1kg of N is contained in 100kg of ammonium sulphate.

Therefore,

60kgofN=100/2 1X60/ 1ofammoniumsulphate

=285.7 14kg/ha of ammonium sulphate perhectare For 6

ha =285.7 14 x 6

= 1714.3kg

=1.71 tonnesofammoniumsulphate.

In animal or livestock feed formulation, mathematics is also applied. Table 2 shows the nutrient requirements of some farm animals which should be considered strictly in feed formulation.

Table2: Nutrient Requirements of Farm Animals

	Animal species	Protein (%)	Mekcal/kg	Fibre (%)	Ca (%)	P(%)
1.	Pullet chickens					
	a. 0-8 weeks	20.0	2640	6	1.0	0.50
	b. 9-20 weeks	15-16	2600	6	0.8	0.50
2.	Layers > 20 weeks	16	2500	6	2.75	0.50
3.	Broilers					
	a. Starter	23.0	3000	3-4	1.0	0.50
	b. Finisher	20.0	3000	3-4	1.0	0.50
4	Pigs					
	a. Growers	17.0	3500	NA	0.80	0.70
	b. Breaders	15.0	3300	NA	0.60	0.65
	c. Latching	16.0	3500	NA	0.90	0.45
5.	Rabbits					
	a. Growers	16.0	2400	14.0	0.40	0.30
	b. Lacatating	18.0	2500	12.0	1.10	0.80
	c. Pregnantdoe	16.0	2400	14.0	0.80	0.50
	d. Buck (resting)	13.0	2100	16.0	0.40	0.30
6.	Ruminants	12-16	2700	33.0	-	-

Metabolishable Energy Calcium Phosphorus

Source: Babayemi et al (2014).

In chemical control of pests, diseases and weeds, a lot but simple mathematics is involved. This is to avoid loss of crops that might occur during preparation (mixing) and application of such chemicals. A wrongly mixed and applied chemical could cause damping-off, burning and killing of the crop foliage.

Increased yield of agricultural products for local consumption and export is associated with the application of mathematics in protection strategies, evaluation of retailer performance, application rates,

to explain for more efficient travel are ideas outlined by persons piloting finance division and knowledgeable in mathematics (Malami, Ayyub and Halilu, 2013). The application of mathematics therefore, aids in enhancing efficient food supply for local and international appeal, thereby curtailing starvation to the teeming manpower that can enhance the development of other sectors of the economy with prospects of improvement in the standard of living being assured. Hence, Natasha in Akissani and Muntari (2015) stated that there are two very important elements within the broad concept to farming: time and. money. At the root of both is mathematics. Mathematics has enabled farming to be more economically efficient and has increased productivity. Farmers use numbers everyday for a variety of tasks, from measuring and weighing, to land marking.

Amoduand Okpanachi (2015) underscore the relevance and usefulness of various mathematics model For instance, the Malthusian model on population growth against growth in food production is still a guide for decisions on food security today. Likewise, mathematical model on economic growth against agricultural development can spur government policy and action on agriculture. Again, mathematical models on world population growth against food security have placed agriculture on the top list of global affairs. Crop and soil studies as well as pest life and disease control have found mathematical models to be very useful.

Fadare, Ayeni and Babatunde (2015) pointed out the use of mathematics for the following agricultural activities: plotting the demand and supply schedule and curve for decision making, amount of fertilizers to be applied per area of land and per stand of a crop, oestrus cycle, incubation period and gestation periods in livestock, loss and profit accounts and percentages, diameter of soil components, interest on agricultural loans and credit facilities, number of eggs laid by fowls, litres of honey harvested in a bee box, making of in-let and out-let in a fish pond and their correct depth and height, quantity of water to be used for vaccine(e.g. Lasota, Gumboro, Coccidiosis, etc.),the ratio of the weight of egg lobe to the whole fish so as to determine the amount of chemical to be applied on the female fish in the process of production of fingerlings. When to change fowls feed from growers feed to semi-layer finally to layers feed, is a measure of the percentage of egg collected in a poultry.

Farmers also estimate elements of time. According to Akissani and Muntari (2015) farmers know

approximately how many hours they will need to seed and harvest and can plan accordingly. These estimates of time are based on crop types and machine availability, as well as human resources. They added that farmers consider past trends of weather and moisture conditions to decide when to start seeding. Furthermore, farmers can estimate the time remaining until harvest by calculating growing degree days. this is the measurement of heat units needed by the plant to reach its full maturity. It also accounts for the ripening of the crop. An approximation is made of how many davs remain until the crop and can change numbers of growing degree days.

Concept of percentage is used by farmers to carry out seed germination test. To Akissani and Muntari (2015), this involves getting a uniform and representative sample of an entire seed lot, counting a more convenient sizeable number, 25, 50,100 or more seeds from the representative sample. The seeds are then sown in seed boxes, baskets or polythene bags filled with sterilized soil and kept at room temperature. The seeds are kept moist as often as possible. Account is taken as the seeds emerge. The principle is that viable seeds will sprout more br less at the same time while weak seeds usually sprout irregularly and they do not produce normal seedlings. The percentage emergence of the seeds is obtained as follows:

$$\text{Percentage emergence} = \frac{\text{Number of seed lings emerged}}{\text{Total number of seeds planted}} \times 100\%$$

Where a seed lot has less than 50% germination test, it is advisable that such seeds are not planted in order to avoid planting dead seeds. And if the seed lot will be used for planting, it is better to

double such seed rates for example, if 2-3 seeds are required per planting hole, 5-6 seeds should be planted per hole.

Calculus which is an advanced system of calculation that deals with continually changing values is used for agricultural development. For instance, Nworah (2015) revealed that in agricultural mechanics, calculus is used when adjusting aircraft that apply spray material to crops. It can be used to calculate amounts when the application has multiple variables.

In measuring discharge in irrigation, mathematics is also applied. The discharge of water from a pipe or a channel according to Uguru (2016) is the volume of water flowing per second. It is measured in cubic metre per second (m^3/s). Discharge (m^3/s) = area (m^2) x velocity of flow (m/s).The simplest means to measure discharge from a pipe or a channel according to Uguru (2016) is to use a container (bucket) of known volume. The bucket is placed directly in the channel and water is allowed to flow into it. The time taken to fill the bucket is recorded and discharge is calculated thus:

$$\text{Discharge } (m^3/s) = \frac{\text{Volume of bucket } (m^3)}{\text{Time taken to fill the bucket(s)}}$$

These are just few specific examples of mathematics applications for agricultural development. A lot more instances of other mathematics applications abound.

Implications for Agricultural Extension Delivery

Agricultural extension is said to be the fulcrum upon which all other fields of agriculture rest and so has a huge responsibility in achieving the desired agricultural development. Agricultural extension education according to Agbarevo and Obinne (2010) is an informal or out-of-school educational programme for adult learners, rural people or farmers designed to help them and their families learn, accept, adapt and adopt improved agricultural practices. It is designed to change the farmers' way of thinking, his attitude and habits, so that he becomes receptive to change or innovations in agriculture, leading to a more productive farming, and consequently, a higher standard of living. It also includes general education and some supportive services.

Agricultural extension has the objective of not only improving the farmers' farming methods and techniques, his production efficiency and income but, also, his social and educational standards leading to a higher standard of living. In the light of the above and for the realization of the desired agricultural development, the extension practitioners through study and training programmes such as Fortnightly Training(FNT)and Monthly

Technology Review Meeting (MTRM) should evolve pragmatic approaches for the dissemination of new farm technologies which might be beneficial to farmers. Success of any extension work depends on thorough training of extension workers and local leaders, Good intellectual training, technical skills and practical experience bring efficiency and effectiveness in the organization of local groups for attainment of groups goals. The extension staff should therefore be soundly trained to be able to cope

with the latest research findings and technologies from various research stations and institutes aimed at developing agriculture. The delivery of new technological packages should therefore be participatory and democratic in approach to allow farmers avail themselves the opportunities of identifying their needs and problems, prioritizing them, analyzing them, seeking alternative means of solving them, choosing preferred alternatives, experimenting and implementing a chosen course of action, monitoring and evaluation of programmes. Since extension is essentially communication (Ogunbameru, Undiandeye and Ani, 2018), a process whereby various participants are linked and exchange information, which is a critical requirement for sustainable agricultural development, government and all other stakeholders should take its business a very serious one to achieve good result and sustain them. This includes proper funding of the services.

Appraisal Review of Literature

The paper has highlighted the fact that mathematics is key to agricultural development especially in every sphere of research in agriculture as already x-rayed. The various requirements of agricultural development such as good marketing, new farm technology, purchasable input, incentives to farmers and production credit are critical to the development and should be put in place and sustained. Finally, extension delivery system should be pragmatic enough to contribute positively to the desired agricultural development. This is by making it both participatory and democratic in approach. Further to this government at all levels should adequately fund extension component of the agencies saddled with agricultural matters to achieve successful as well as sustainable agricultural development.

CHAPTER THREE

RESEARCH METHODOLOGY

This chapter represents the procedural steps involved in the collection and analysis of data which will be discussed under the following sub-heading:

Research Design

Population, Sample and sampling techniques

Instrumentation

Procedure for Data Collection and

Method of Data Collection

Research Design

The research design that was employed for this study is a descriptive survey reach the study emphasizes on the assessments of techniques and resources for position of mathematics in agricultural provide in a nation building in Kwara State, Nigeria. There are two variable which includes position of mathematics variable and agricultural provide the dependent variable.

Population, Sample and Sampling

The population for the study comprised the both state and federal ministry of agricultural staff inKwara State. Purposive sampling method was used to selected fifty staff (50) in Kwara state ministry of agriculture, and fifty staff (50) in Kwara state federal ministry of agriculture were selected from the ministry which make the total of one hundred (100) respondents. The purposive sampling method will be used as a result of frantic interest of researchers to arrive at a meaningful result from the study.

Instrumentation

A well structured questionnaire titled: “position of mathematics in agricultural produce in a nation. Questionnaire (PMAPNQ) will be used to collect necessary data for the purpose of the research. The instrument was administered to both federal and state ministry of agricultural in Kwara state, Nigeria. The instrument of the respondents such as section “A” and section “B” respectively, Section A deals with personal data of the respondents such as age sex. However, section B is made up of items on the problems of the study.

To ensure the validity of the instrument for the study, the draft questionnaire was given to my project supervision. His opinions, amendments and suggestions were incorporated into the final instrument.

Also, to determine the reliability, the questionnaire was subjected to test-retest method. The instrument was administered to one hundred (100) respondents in the selected ministry of agriculture and re-administered to the same groups of respondents after two weeks of the first administration.

Procedure for Data Collection

The instrument for the study was personally administered by the researcher to the respondents in the sampled institution. The researcher sought for proper approval from the appropriate authorities within the sampled institution where motive of the research would be explained, thereafter the instrument will be administered and collected back immediately completion.

Method Data Analysis

Simple Percentage was used to analyze the demographic data collected while Pearson product correlation statistics' (PPMC) was adopted test the hypothesis raised in this study.