FACTORS INFLUENCING ADOPTION OF IMPROVED SOYABEAN PRODUCTION TECHNOLOGIES AMONG FARMERS IN TWO LOCAL GOVERNMENT AREAS OF KOGI STATE

BY

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A DISSERTATION SUBMITTED TO THE SCHOOL OF POSTGRADUATE STUDIES AHMADU BELLO UNIVERSITY, ZARIA, IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF MASTER OF SCIENCE IN AGRICULTURAL EXTENSION AND RURAL SOCIOLOGY

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DECLARATION

I hereby declare that this dissertation titled **"Factors Influencing Adoption of Improved Soyabean Production Technologies among Farmers in Two Local Government Areas of Kogi State"** has been written by me and it is a record of my research work. No part of this work has been presented in any previous application for another degree or diploma in this or any other institution. All borrowed information have been acknowledged in the text and a list of references provided.

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CERTIFICATION

This dissertation **"Factors Influencing Adoption of Improved Soybean Production Technologies among Farmers in Two Local Government Areas of Kogi State"** by Sunday, OMODONA meets the regulations governing the award of the Degree of Master of Science in Agricultural Extension and Rural Sociology of Ahmadu Bello University, Zaria and is approved for its contribution to knowledge and literary presentation.

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DEDICATION

This dissertation is dedicated to my wife, Mrs. M.O. Omodona. Also, to my late brother, Mr. Bamisho Omodona for his contribution to my academic achievement. May his gentle soul rest in peace Amen.

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ABSTRACT

This study determined the factors influencing adoption of recommended soyabean production in Ijumu and Kabba Bunu Local Government Areas of Kogi State, Nigeria. A Combination of purposive and simple random sampling technique were used to select a total of one hundred and sixty four (164) farmers for this study. Analytical tools used were descriptive statistics and regression analysis. The result of the analysis show that majority (76%) of the respondents were within the age range of 20-49 years; majority (90%) were literate; about 38% had farming experience of 11-20 years with a mean of 16 years. The majority of the farmers (57%) had contact with extension agents; majority (56%) were married, and majority (82%) were male. However, majority (60%) of the respondents had farm size that ranges between 0.1-2.0 hectares; 77% were members of cooperative associations while majority (55%) had no access to credit and therefore financed their production through their personal savings. The results also show that majority (87%) of the farmers were aware of planting healthy/viable seeds. Majority (76%) of the respondents obtained information on the recommended soyabean practices through extension agents in the study area. The relationship between selected socio economic institutional factors and the adoption of recommended soyabeans production practices show that out of nine variables, six variables had significant influence on adoption of the technologies. The results also indicate that there was high adoption of some practices, planting date, planting on flat ground, recommended weeding time and recommended harvesting time which may be due to the simplicity of the practices and the attribute of not requiring too much money on labour to implement. However, there was low adoption of improved practices like planting on ridges, herbicides application, recommended processing method and recommended soyabean planter. Finally, the most severe constraints faced by farmers in the adoption of recommended soyabean production practices were high cost of labour (62%), high cost of the technology (53%) and low access to credit about 36% of the respondents. It is thereby recommended that government and non-governmental organizations dealing with extension agent should therefore embark on the facilitation techniques of delivery. This will enable the farmers to identify their problems, determine their need and discovered their potentials rather than always feeding them with information.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Soybean (Glycine max) is relatively new crop in Africa. Until recently, it was seen as being appropriate only for large- scale commercial farming for production of seed that are used in making livestock feed. The major soybean producing countries in the world are the United States, Brazil, China, Nigeria, India, Argentina, South Africa and Uganda (IITA, 2009).Soyabean cultivation in Nigeria starts in May / June with land clearing, and its harvesting normally done in October through November. The crop is harvested 3-4 months after planting, depending on the time of sowing and the variety. Benue state is the dominant soybean producing area but several other states, such as Kaduna, Plateau, Nasarawa are increasing in production. Soybean can contribute to the enhanced sustainability of intensified cropping systems by improving soil fertility through nitrogen fixation, permitting a longer duration of ground cover in the cropping sequence, and providing useful crop residue for animal feed (Rolling and Wagemater, 1998).

Over the last two decades, International Institute for Tropical Agriculture (IITA) has made substantial effort to improve the productivity of the crop by developing high yielding, early maturing varieties capable of nodulating in association with the local rhizobia, and possessing and other good agronomic traits. The improved soybean varieties released in Nigeria include TGX 306-036c, TGX 1485—IED, TGX 53-02D and TGX 440—1E. The identification of seed collected from farmers revealed that farmers were planting the following varieties: M351- 1E, TGX 1448-2E, TGX 306-036C and TGX 1485-lED IITA, 2009.

Uses of soybean

Soybean has a diversity of uses which include human consumption and animal feed. **Human consumption:** Soybean are now widely consumed and are readily used in the production of soy-milk, soycake, soy yoghurt and fortification local carbohydrate-based Nigerian food staples. Dawa- dawa, a local food seasoning is also produced from soybean. Direct human consumption of soybeans is significant in Nigeria, especially among rural low groups that cannot really afford animal protein sources such as meat, fish and eggs. Beginning in the early 1990s, the International Institute of Tropical Agriculture (IITA) promoted the use of protein—rich soybeans in everyday foods to cub malnutrition (International Finance Corporation, 20 13).

The importance of soyabean according to FAO in 2004 includes soybean oil, yoghurt, magi, local paint, cosmetics and soap making. Soybean has been used as an important source of protein and rich in oil (Osho and Ayodele, 2004). It is also a good source of essential vitamins and mineral. Recently, soybean production has been expanded beyond the traditional producing areas to none—native areas. Improved varieties of soya bean that are non-shattering and high yielding have been developed (Musa *et al,* 2002).

In line with this, Iwena (2001) added that soybean as a leguminous crop is a dual purpose crop, which means that it can be cultivated as an oil crop, as protein, rather than a pulse. The industrial products of soybean include soybean cake, soya oil, soya milk, beverages and snack food bakeries (IITA, 2009).

Other Uses: Soybean is also considered to be a significant crop for animals feed like soybean cake and is also used in industries, soybeans are processed into flour and soybeans oil is used in the local paint, cosmetics, and soap making industries. Food processors such as bakeries, dairies, beverage manufacturers and snack producers are now incorporating soy products in their production processes largely on account of the nutritional and health benefits and cost effectiveness as protein substitutes and extenders. At present, soybean oil is a major complement to palm oil in the domestic supply equation for edible vegetable oils and the major producers have reported a rise in demand for soybean oil as Nigerians became more familiar with the higher quality and health benefits of soybean oil (Michael, 2011).

Health Benefits: A great deal of research is being conducted to investigate possible health benefits of soy. Foods containing soy protein nay reduce the risk of Coronary Heart Disease (CHD). It has also been observed to produce protection and by lowering serum cholesterol by 33%. Studies have also shown that regularly soy food consumption can reduce the risk of rectal cancer by 80% mammary tumour by 40% and breast cancer by 50%. For this reason, consumption of 25 gramms of soy protein a day was approved by the US Food and Drug Administration in 1999 as a means to reduce the risk of heart disease. Countries whose diets are based on soybean such as China, Japan and Korea are known to have long life expectancy and experience minimum eases of cancers (Collison *et al*, 1994).

1.3 Statement of problem

There is insufficiency of data or empirical analysis on how rural farmers adopted and combine improved crop production technologies to increase farm production and ensure

sustained survival of their households and communities. Many efforts have been put into assessing the factors that affect the rate and levels of adoption of improved technologies (Vanklay, 1992; Ani and Undiandeye, 2001). However, little effort has been put in analyzing how and why these technologies are combined by rural farmers. Rural farmers are also continuously searching for options including risks management strategies that will complement and strengthen their technological capacities and poverty reduction, but this has not been sufficiently documented.

The objective of the Nigeria food security programme of increasing agricultural production for food self sufficiency is still far being realized (Agbaje *et al*, 2005). This is even more so with soyabean production. In fact, available statistics show that the supply of soyabean fall short of its demand. For instance, Ijere (1992) asserts that while the average growth rate of the Nigerian population is between 2.5 – 3.0% per annum, domestic food production lags behind at a growth rate of less than 2% per annum thereby creating food supply gap. Agbaje *et al*. (2005).

Acquah and Evange (1991) attributed high cost of planting materials, high labour cost, intensive and laborious cultural practices, inadequate capital and high cost of input as factors contributing to decreased agricultural production. Furthermore, not much has been adequately unravelled regarding how rural farmers' technical knowledge can contribute to an increase in their agricultural productivity in Nigeria. Nweke *et al.* (1991) however, identified planting materials and high labour requirement as major constraints to increased farm production. The decreased output of agricultural produce over the years may not only be connected with deviations of farmers' practices from technical recommendations but also with the use of resources at sub–optical levels

which ultimately leads to technical and allocative inefficiencies (Coelli and Battese, 1996).

This necessitated the need to assess the adoption of improved production technologies by farmers in the study area with a view to proffering appropriate policy recommendation that revolutionalize soyabean production in Nigeria. This study has therefore been carried out in Kogi West zone of the Kogi State Agricultural Development Project to find answers to the following research questions regarding the adoption of improved soybean production technologies:

i. What are the socio–economic characteristics of farmers in the study area?

ii. What is the level of knowledge of recommended technologies among farmers in the study area?

iii. To what extent have the farmers in the study area adopted recommended soyabean production technologies?

iv. What are the factors influencing adoption of recommended soyabean production technologies by farmers in the study area

v. What are the constraints to adoption of recommended soyabeans technologies in the study area?

1.4 Objectives of the Study

The general objective of the study is to determine factors influencing adoption of recommended soyabeans production technologies among farmers in the study area. The specific objectives of the study were to:

i. describe the socio–economic characteristics of farmers in the study area.

ii assess the level of knowledge of recommended soyabeans production technologies among farmers in the study area.

iii. determine the extent of adoption of recommended soyabeans production technologies by farmers in the study area.

iv. determine factors that influence adoption of recommended soyabean production technologies by farmers in the study area.

v. identify the constraints to adoption of recommended soyabean production technologies in the study area.

1.5 Justification

The findings of this study provide information on farmers' socio–economic characteristics that influence soyabean farmers' decision. This study reveals not only the level of adoption of the improved soyabeans production technologies but also expose the factors that influence it among farmers. For instance, if the complexity of the technology found to be an issue in the adoption of the practices, the type and extent of the needed education to improve the understanding of the farmers would be ascertained. Knowledge connotes possession of clear definite and factual information of an idea or event.

The study will equally reveal the constraints militating against adoption and expose the knowledge level of soyabeans production technologies among farmers. It will also

suggest how the identified constraints can be addressed as well as how best the knowledge of the package can be enhanced so that significant uptake of the practices can be attained among farmers in the study area. It will be also be useful to researchers and extension agents in fashioning out the best means for farmers to adopt relevant innovations. Furthermore, this study will seek to show the relationship between adoption and various independent variables considered in attaining its desired change in farmers for increased productivity. Finally, the findings will assist the change agents and policy makers as an analytical frame of reference that can be used in planning, executing and evaluating present and future agricultural development programmes in the area of adoption of new strategies. This study determined factors that favour or promote the use of these technologies by soyabean farmers. Furthermore, the study examined the manner and why soyabean farmers combine indigenous and improved technologies in agricultural production.

1.6 Hypothesis of the study

Ho_i: There is no significant relationship between farmers' socio-economic /institutional characteristics and the level of adoption of improved soyabean production technologies.

CHAPTER TWO

LITERATURE REVIEW

2.1 Empirical findings on Socio–economic Characteristics of Farmers

Farmers in Nigeria vary greatly in their socio–economic characteristics. These variations in their demographic characteristics play a great role in their disposition, willingness to acquire information and to seek knowledge and ultimately their adoption characteristics. Most Nigerian farmers can be described as resource–poor because they practice subsistence farming with little or nothing to sell to meet other family needs at home. According to Ogungbile and Olukosi (1991), there is abject poverty among the majority of farmers as they do not have the required amount of financial resources with which to embark on agriculture profitably. Previous studies have also revealed that farmers socio–economic indices do play a great role in awareness, knowledge and adoption of new practices.

Farming in Nigeria is characterized by small holdings of less than one to two hectares. This is partly due to the fact that most farmers operate at subsistence level and are peasants (FAO, 2003). The major concern of most farmers is to feed their families and they will only sell their produce to meet some basic necessities at home. Tologbonse and Adekunle (2000) observed that majority of the rural farmers in Benue State had less than one hectare of farmland.

Agbongiarhuoyi and Daniel (1997) however, reported a mean farm size of 2.3 hectares among farmers in Nigeria. This small farm size, which is usually attributed to their low economic power and tenural system, further limits their willingness to adopt new

practices as most of the farmers do face difficulties in meeting the financial challenges associated with new technology.

Agriculture is the basic and fundamental economic activity of most developing nations; this is coupled with providing man's immediate needs in the area of food, cloth and shelter. Thus, in most parts of the world, agricultural production is being encouraged in order to reduce food insecurity and improved the standard of living (Amusa and Iken, 2004). In Nigeria, studies have revealed that agriculture has primarily been a rural-based occupation, engaged in by multitudes of small-scale farmers characterized by small holdings ranging from 0.05 to 3.0 hectares of farm land, rudimentary farming systems, low capitalization and low yield per hectare (Kolawole and Ojo, 2007).

Government efforts over the years to improve food production has not yielded sufficient desired results as the country still witnessed increasing high cost of food, a general high cost of living and perpetual poverty. The food problem has been heightened by the relatively low- level of productivity of resources used by farmers in the country (Ojo, 2004). Although, farming has always been complemented by non–agricultural employment in craft activities during slack period in the agricultural year.

The role of agriculture remains significant in the Nigerian economy despite the strategic importance of petroleum as a major contributor to Gross Domestic Product (GDP), agriculture provides employment for Nigerians and account for more than one third of total GDP and labour force (FAO, 2003; World Bank, 2003). Agricultural sector contributes about 41% of the GDP and employs about 65% of the total population and about 80% of the rural population (CBN, 2002). Agriculture also provides about 90% of

the nation's total food requirements and merits priority attention from policy makers not only because of its economic significance but also because of its importance in the war against poverty (Ruma, 2008). Ruma (2008) laments the apparent decline of agriculture over the years and blamed it on low productivity and the relative unattractiveness of agriculture to the younger generation. Though, the sector is equally responsible for the provision of food for the citizens, generation of employment for about 60 – 70% of the country's population, production of raw materials for local industries, markets for industrial goods and a major foreign exchange earner through export of cash crops (FMA, 2011).

Agriculture has the potential to do more than it is doing if the resources are used more effectively and efficiently. From this study, it can be deduced that if the productivity of farmers will improve, efforts would need to be made by concerned authorities and stakeholders in agriculture to find means through which farmers efficiency in the use of modern/improved farm implements would be enhanced, as to make the farmers more productive (Ihekoronye, 2007). Achieving this fact of enhanced productivity may continue to be a mirage if the resources are not used in a sustainable way. Land and water are the most important resources required for agricultural productivity. Since all forms of life including plants, animals, macro and micro organisms depend on the land for sustenance, the soil must be continuously kept fertile and productive (Seppannen, 2004). Increasing population pressures and consequent increase in food demand have necessitated the introduction of improved technologies to increase agricultural productivity.

Improved technologies are various new "technical know–how" for the promotion and development of agriculture. Unfortunately, in developing countries, some of these improved technologies have been rejected by rural people (IFAD, 1998). Today, it has become clear that there are no blanket strategies for addressing the needs of rural farmers and in regards to new technologies. For instance, it is important to examine technologies used by rural farmers in a particular locality so as to identify and meet their needs in that locality (IFPRI, 2009). Agricultural extension can be defined as an advice and assistance given to the farmers and his families through educational procedure on new thrilling methods and technology in order to improve their production efficiency and income to better their social living either individually or collectively' (SELN, 2006). According to Food and Agricultural Organization FAO (2004), agricultural extension is an informal out of school education service for training farmers and their families to adopt improved practices in crop and livestock production, management and conservation on his farm business and homes.

2.1. 1 Age

The age of an individual is believed to be capable of influencing the perception views, interest and conduct of the person (Chianu and Tsuji, 2004). Osuala (1997) revealed that the impact of mass media on adoption of agricultural innovations depends on farmers' socio–economic factors such as age, household size, formal education, farm size, income, cosmopolitanism and community status, which were related to adoption.

Many studies have linked innovativeness with young age (Voh, 1982; Atala, 1980 and Akpoko, 2004). Young people are thought to be more receptive to modern ideas than older ones which implies a negative relationship between age and adoption. Similarly,

Okwuoche *et al.* (2012) in their study of sorghum farmers reported that 37.68% of the respondents were between 30 and less than 40 years old, while 30% of the farmers were between 20 and less than 30 years. The implication of the foregoing result is that sorghum farming in the study area has higher patronage among people who are energetic enough to withstand the stress involved in the agricultural activities. Furthermore, this is consistent with the findings of Abdullahi *et al.* (2012) which reported that in Ikara LGA of Kaduna State, majority of the respondents were middle - aged farmers. Age can be regarded as the youthful and active period when farmers can make vital impact in agricultural production and technology development generally (Fapojuwo, 2010).

2.1.2 Marital status

Most farmers in Nigeria are married; this is mainly due to the fact that farming requires the provision of labour for attending to the various farm operations. Ayanda *et al.* (2008), in a study of rice farmers in Jigawa state, observed that 85.3% of the farmers were married. Tolugbonse and Adekunle (2000) also discovered that 98.5% of the farmers in Benue state were married. This led credence to the fact that farmers prefer to be married and have children that will provide large labour than to remain single. (Ndanitsa and Umar 2008, Nwaru, 2004). It is thus, preferable to get large household which can serve as proxy to cheap family labour in the farm.

2.1.3. Membership of cooperative societies

Membership of groups and association is another factor that can influence the farmers' adoption level and their disposition towards a programme. This is due to the bandwagon effect that it has on members. Where farmers do not belong to any association, they

become too individualistic as each person becomes confined in his cocoon and convincing them to follow a particular order may be difficult.

Thus, a numbers of studies have been conducted on the influence of cooperative membership on adoption, for instance, Deji (2005), has observed a significant relationship between membership of cooperative societies and the adoption of improved cassava variety in Oyo State. The results further indicate that the number of children assisting in farm work and source of credit were positively related to membership of cooperative societies. Jibowo (2004), also reported a significant relationship between participation in social organizations, and adoption of improved agricultural practices.

Omotesho *et a*l. (2012), has similarly reported that members of cooperative societies, perform better in terms of gross margin than individual farmers. This could be as a result of better access of the co-operator cassava farmers to improved varieties, inputs, credit facilities and market for their products taking advantage of economy of scale which inadvertently may boost their gross income and eventually their margins.

Membership of cooperative societies is also very important since it is an avenue through people come together to achieve what they cannot achieve as an individual (Ijere, 1992). Membership of a cooperative can serve as a means to access credit, labour and information on farming techniques and enterprises.

2.1.4. Farming experience

The farming experience of most farmers in Nigeria is usually long. This is because majority of the farmers were born by farmers and they therefore grew up in farming environments. Adeogun and Oluyole (2004) reported that majority of the cocoa farmers

in Oyo State had over 10 years experience in farming. This experience of farming over a long period of time sometimes acts as impediment to change. However, it is advantageous in many respects as younger farmers do benefit from the elderly farmers where there is a change in farming techniques and extension officers are not readily available.

2.1.5 Educational level

The educational attainment of Nigerian farmers varies widely. Thus, while many farmers do not have any form of education, some have elementary training while others have religious education of one form or the other. Olaleye (2000) submitted that education is an important characteristic especially in the adoption of innovations.

In the past few years, highly educated Nigerians have taken up farming either as a secondary occupation or as full-time business and are deploying their knowledge in the management of their farms. Oladeyi (2011) also opined that farmers have one form of education or the other. A study in Ghana by Emmanuel *et al*. (2006) indicated that farmers participating in irrigation project had some type of formal education and not all of them were illiterate. They conclude that farmers' level of education that will influence the rate of adoption of any available innovations that can assist the farmers in their farming practice.

Another study by Ojo (2009) in Mopa-Amuro Local Government Area, Kogi State, has revealed that about 27% of the women that adopted improved cassava technology has no formal education, while about 29%, 27% and 17% had primary, secondary and tertiary education respectively in the study area. This was contrary to Sokoya (1997)

and Fakoya *et al* (2001) who reported that many women in Ogun state had no formal education. Igodan and Jabar (1993) have also asserted that the more knowledgeable the individual, the more favorable attribute he/she had towards recommended technologies. Agbamu (1993) also found that farmers' knowledge of innovations made predominant contributions towards adoption.

2.1.6 Income

The income of most farmers in Nigeria in low. This is due to their poor resource base, small farms and inability to secure the required capital to expand their farming business. Namwata *et al.* (2010) reported that increased household income, sex, marital status, increased farming experience, access to credit and extension service were positively and significantly associated with overall adoption of improved agricultural technologies by farmers in Tanzania.

Furthermore, Badmus *et al.* (2009) reported that agriculture as a sector is dominated by small-holding farm families with most of them having low income and residing in rural areas. Omotugba *et al.* (2008), in their own studies of adoption of technology by cowpea farmers in Kaduna discovered that farmers' income in the area was between ₦ 16,000.00 – ₦ 20,000 per annum. This income is too small to meet the need of any household and it explains why there is great deal of poverty in most farming communities. And income is low, it impacts negatively on adoption of innovation.

Another study by Osuji (1983) revealed that the ability of farmers to adopt new farm practices depended on their financial position and nearness to extension personnel. Laogun (1993) also discovered that income level, family size, social participation,

extension contact, number of information sources used to introduce improved practices and extent of awareness were significantly related to adoption of recommended practices.

Ndanitsa *et al.* (2008) also found a significant relationship between income and adoption. This is so because processors with high income, and who enjoy the privileged position to acquire processing inputs will be more willing to adopt new technologies and accept higher risks than low income processors.

2.1.7 Contact with extension agent

This can be defined as the frequency of contact between farmers and with extension workers. This can be measured as the total number of times the farmer receives technical information on improved soyabeans production.

2.2 Knowledge of Soyabean Production

Soybean (*Glycine max* L. merv) has been variously described as a miracle bean because it is cheap and protein-rich grain. It originated from East Africa (Onasanya, 2007). It contains 40% high quality protein, 20% reliable vegetable oil and a good balance of amino acids (Singh *et al*. 1987; Weingartners, 1987) and therefore has tremendous potentials to improve the nutritional status and welfare of the families of resource-poor farmers.

Soyabeans can also contribute to the enhanced sustainability of intensified cropping systems by improving soil fertility through nitrogen fixation, permitting a longer duration of ground cover in the cropping sequence and providing useful crop residue for animal feed (Rahmianna and Nikkuni, 2002). In 2006, the population of Nigeria was

about 145 million, about 65% of which depended on agriculture for their livelihood (Onasanya, 2007). This underscores the importance of agriculture in the economy of Nigeria as well as the crucial role of the sector in feeding the large and growing population of the country.

However, soybean is a relatively new crop in Africa. It was seen as being appropriated only for large-scale farming where the crop can be used for industrial processing (Shannon *et al.*, 1998). World production statistics on soybean show that Nigeria is second to Zimbabwe; the leading producer of soyabean in tropical Africa. Soybean is now grown in all ecological zones of Nigeria. F.A.O. (2006)

For farmers to effectively integrate extensive production of soybean into their farming operation, they must be knowledgeable about the practice. This is because knowledge acquisition is one of the basic means through which behavioural patterns in agriculture can be changed. Thus, governments and authorities use promulgation of laws, decrees and other subtle methods such as subsidies to achieve their goals under different conditions, farmers will only change their practices or behavioural pattern if they are sufficiently knowledgeable about a new practice and are convinced of its superiority, compatibility and profitability. Rogers, (2003)

Though local farmers have developed numerous farming systems through a process of trial and error; innovation and adaptation with each system fitting into their ecological economic, socio-cultural and political environment, current demands have necessitated that some of these practices be changed. This anticipated change cannot take place if farmers are not knowledgeable about the new practices.

Audi (2003) opined that knowledge can be gained either directly by abstracting the defining traits of a subject or phenomenon or by deducing new facts from those already known in accordance with the rules of logic. Knowledge is the process by which attempts are made to pass an idea from one person, institution or nation to another. In his study on the effect of television farm programme on farmers' knowledge of improved farm practices in Oyo state, Nigeria, Olowu (1991) identified some areas in which he tested the farmers' knowledge and discovered a significant relationship between knowledge and education. The study also revealed a significant relationship between knowledge and television viewership.

2.3 Factors Influencing Awareness and Adoption of Improved Soybean Production

The level of adoption of an innovation is determined by a combination of factors. Socio-economic factors are the demographic variables of the farmers such as age, sex, education, farm size, level of income, etc. The institutional factors are the circumstances that prevail around the farmer, such as membership of organizations and effectiveness of the extension agents involved in the extension farmers – input–linkage services.

Okunade (2006) found that the communication ability of change agents has influenced the know-how and adoption of improved farm practices among women farmers in Osun State, Western Nigeria. The level of support in form of subsidies and loans that the farmers enjoy also go a long way in influencing the willingness of the farmers to seek for information about any practice with the aim of adopting it.

The characteristics of an innovation are other factors that determine the adoption level of such innovation. These include observability, cost, relative advantage, compatibility,

trialability and complexity of the recommendation (Omokore, 2009; Van den Ban and Hawkins, 1988). Technologies such as modern methods of soybean production cannot lead to increase in food productivity, if the farmers are not knowledgeable in the various component areas of the package and are not ready to adopt the practices.

Another study by Maiangwa (2006) revealed that socio-economic variables associated with adoption of agro-forestry in northwest zone of Nigeria include level of education, labour availability, farm size, land tenure security and access to credit. Furthermore, the adoption of an innovation can be likened to abandoning the known for the unknown and therefore, involves some level of risk on the part of the farmers. The extent to which this risk could be taken will largely depend on the level of formal education of the farmer and his income since resource poor farmers will not invest their finance on practices that they are not thoroughly knowledgeable about.

Onyibe *et al.* (2003) revealed that high yield potential of the extra–early maize variety, its maturing characteristics and compatibility with traditional cropping practice were the major factors responsible for its acceptance. However, Idris *et al.* (2007) revealed that age of farmers, level of education, farming experience and farm size were related to adoption. Oladele and Kareem (2003) revealed that farmers' belief and preferences influenced the rate of the adoption of agricultural innovations. Asinobi (2005) found that access to loan facilities from informal sources was a major influencing factor in adoption of recommended cassava production practices.

2.3.1 Sources of information on improved practices

The world today is widely acclaimed to be information-driven. In the last one decade, the need to make information and communication about new methods of farming reachable and available to farmers has been a felt concern of development minded people in the area of improved soyabean production technologies (Idachaba, 2007)

Okunlola (2003) reported farmers obtained information on improved practice mainly through extension agents and radio. Yahaya and Aina (2007) found that most of the cassava farmers (97%) have access to information from extension agents. Okoosi (1990) also opined that extension agencies rely on the use of both electronic and print media to disseminate information to its target audience. Arokoyo (2003) had observed that, so far , the radio and TV has been the main tools used in agricultural extension delivery in Nigeria. Atala (2008) also opted that the quality and effectiveness of the extension messages by VEAs to the farmers need improvement.

2.3.2 Existing traditional and improved soyabean production

Knowledge goes a long way in influencing behavioural pattern of an individual. This is supported by Aderinto *et al* (2008) in their studies among maize farmers in Ogun State, Nigeria. They inferred that poor knowledge is a major contributor to low uptake of innovations among farmers. Jibowo (2004) identified four main methods through which knowledge can be acquired; these are authority, personal experience, reasoning and scientific methods .For farmers to effectively integrate improved soyabean production practices, into their farming operation, they must be knowledgeable about the practices. This is because knowledge acquisition is one of the basic means through which behavioural pattern in agriculture can be changed (Osuala, 1987), he also go further to explained that personal experience can be a source of knowledge when the individual

has proven the efficiency of an idea over a period of time. This is because men hold firmly to what they believe to be the truth because they have always known it to be so.

2.4 Constraints to Adoption of Improved Technologies.

The adoption of an innovation by farmers could be influenced by factors other than the farmers' socio-economic variables and the characteristics of the innovation itself. The Australian Centre for International Agricultural Research (ACIAR, 1986), in a study on tropical legumes improvement has observed that lack of incentive from the relevant authorities in terms of credit and subsidies as well as the low prizes of agricultural produce and poor market opportunities had limited the interest of farmers in the cowpea programme.

Obeta and Nwagbo (1991) have similarly found that adoption can be seriously hampered by poor distribution of technological inputs. Ifeanyi *et al.* (1990) also found that lack of access to certified seeds, farmers' limited knowledge and lack of sufficient funds are a serious constraint. I.A.R (2001) attributed unavailability of seeds and adulteration as constraints to adoption CGIAR (1998) found that failure to provide continuous sources of supply of seeds and other inputs like fertilizers limits maintenance of adopted innovations

The process of increasing the efficiency of agricultural production through agricultural modernization depends mainly on the extent to which farmers can incorporate improved agricultural practices into their farming operations (Ani and Undiandeya, 2001). Ondyenweaku (2000) revealed that farmers are usually faced with a lot of constraints that prevent them from adopting recommended practices. However, there are many

problems facing soybeans production in Nigeria, among which are; insecurity of land tenure particularly leasing arrangements, absentee ownership, small operating units and higher property taxes have been hypothesized to be institutionalized obstacles to adoption of recommended environmental management practices (Akpoko, 2014).

Rogers (1983) stated that the perceived cost and compatibility of innovations are key determinants in the innovation decision process model. Abalu *et al.* (1979 reported that when farmers find recommended farm innovations not technically feasible, economically viable and culturally compatible, they often reject such innovations.

Mokonnen (1991), in a similar view stated that when innovations are inappropriate or unrelated to their needs and problems of farmers, the adoption will be very low. Fujisaka (1991), went further to add some constraints to adoption as absence of the problem to be solved, inappropriate innovations, incorrect identification of adoption domains, local practices being better and poor extension.

2.5 Previous Studies on Improved Soybean Production Technologies.

An improved agricultural practice is any activity or package (material input or agricultural practice) that is voluntarily used by farmers to maintain or improve the productivity of the soil (Agbamu, 1993, Akpoko, 2004). It is considered that high level of adoption of research proven technologies by farmers is capable of increasing farmers' cash income, meeting their required daily food needs, and promoting general economic growth (NAERLS, 2000).

In general, technological change or adoption of improved agricultural practices will increase farmers' labour absorption, scale of production and productivity; reduction in drudgery of farming and tedious manual activities (Banji and Foluso, 1998). Similarly, Singh (1999) concluded that in India, the introduction of improved processing technologies increased the demand for women labour and their wages rose significantly. The choice of a good variety of crops grown in a particular locality is a prerequisite to achieving higher productivity (National Agricultural Question and Answer Service Newsletter, 2002).

The farmers' recommended varieties of improved soyabeans are: SAM-SOY I, SAM-SOY- II, TAX 306- 036c, TAX 1485- TED, TAX 536-02D and TAX 1440-TE. These varieties were introduced to farmers over a range of time following different channels. Early attempt to diffuse improved varieties started in the late 1970s with the introduction of Sam-soy I and Sam-soy II varieties that were released and introduced to farmers by Federal Department of Agriculture. It was not until the late 1980s that other improved varieties became available. The Benue State Agricultural and Rural Development Authority (BNARDA) introduced the variety TGX S36–02D that was developed by IITA for mass adoption.

TGX 536-02D and TGX 923-IE as improved varieties were considered in the study because they were introduced through the formal diffusion channels and could therefore be considered as innovations (Osho, 1998). The inherent agronomic qualities of these varieties are:

i. Resistance to shattering

ii. High yield

iii Large grain size

iv High quality oil content

v Tolerance to major pests and diseases

vi Early to medium maturity i.e (3-4 months).

According to Rolling et al (1998), improved soybean varieties are well+ known to be tolerant to poor soil and can be harvest between three(3) to four (4) months after planting, depending on the time or sowing and seed variety. The recommended agronomic practices are as follows:

2.5.1 Land preparation

Improved soyabeans require good seedbed preparation. Deep plough, harrow to fine tilth and one meter ridges or molds on straight line. Ridging or molding is necessary in soils that are hard or shallow or are poorly drained. Ridges facilitate root penetration, and facilitate farm operation like weeding, chemical application and harvesting (Nigerian agricultural question and answer services Newsletter, 2002).

2.5.2 Planting material, planting time

Soyabeans are propagated through seeds, which can be planted on ridges or on a well-tilled flat ground depending on the choice of the farmer; viable seeds can be obtained from a reputable seed breeders. Cultivation starts in May/June with land preparation and harvesting normally comes up in late October through November every year in Nigeria which makes harvesting easier, and maturity comes shortly and escaped shattering as a result of heat intensity and excessive dryness by harmattan. (IITA, 2009)

2.6 Theoretical Framework

A theory can be explained as a body of rules, ideas, principles and techniques that apply to a subject especially when seen as distinct from actual practices (Okodudu, 2007). Theories are also seen as a set of interrelated constructs, definitions and propositions that present a systematic view of phenomena in research. Theories help the researcher to navigate his way by aiding in the identification of relevant variables and providing focus of analysis. (Namwata, *et al*, 2010)

The theoretical framework employed in this study is based on the theories of social change, adoption Social change may be defined as the process by which alterations occur in the structure and functions of a social system (Rogers, 1995). Because of certain traditional beliefs, values or cultural practices, farmers are felt to be unconcerned with improvements, unwilling to take risks or unable to take advantage of existing opportunities (Sofranko, 1984). The necessary ingredient to agricultural modernization is a general orientation of farmers' beliefs, values and behaviours through education, training and exposure to information (Sofranko, 1984). Moreover, this research will also briefly use some of the ideas of these theories which are considered relevant to empower this study; they are:

i. Adoption – diffusion theory

ii. Knowledge gap theory

iii. Modernization theory.

2.7 Adoption – diffusion Theory

The focus of this study is to determine the adoption level of improved soybean production technologies among farmers in the study area. This relates to which components of the packages are being adopted, why they are adopted, at what rate they are being adopted and why the other components are not adopted or are being rejected. The adoption and diffusion of innovation theory is the foundation of agricultural extension outreach which seeks to explain how innovations are taken up in a population.

The theory seeks to explain how, why and what rate new ideas spread through cultures. It involves information flows regarding innovations, options and adoption procedures. Adoption theories in extension became necessary because economic models only focus on interest and profit maximization. Also, economic models fail to conceptualize the social dimensions of knowledge, information communication and rationality (Leuwis, 2003).

Furthermore, economic models have limited ability to explain decisions and to capture complexity of farmers' attitudes and behaviours. Hence, adoption theories try to fill these gaps. The understanding of the driving forces of adoption is important for the appreciation of recommended agronomic practices because the effectiveness of the recommendations will depend on where, when and how they are used. Early studies were based on the assumption that people were resistant to change and that resistance had to be overcome (Nowak, 1992).

There is a distinct difference, however, between a farmer who is unable to adopt versus one who is unwilling to adopt. The effectiveness of policies designed to improve crop

production through promoting the use of improved practices, will depend on an understanding of how farmers choose their production practices as well as the understanding of the recommended practices. The theory of behaviour modification (Albrecht *et al.* 1989) is more relevant to drive home the theoretical framework of this study. Albrecht *et al.* (1989) postulated that change in behaviour is as a result of the interaction between driving forces and inhibiting forces. This can be mathematically expressed as CB = DF – IF

where:

CB = change in behaviour

DF = Driving forces and

IF = Inhibiting forces.

The Adoption diffusion theory as earlier studied by Gabriel Tarde and Leo Fro Benis (2006) helps the researcher to understand individual behaviours or groups and the inherent differences among them (Rogers, 1995). This explains why *the* socio-economic variables of individual farmers such as age, educational level, sex, income as well as their knowledge, attitude, farm information and institutional variables would be investigated to determine their degree of influence on the adoption behaviour of the farmers.

While adoption refers to the acceptance and continuous use of an innovation, diffusion is the process by which such innovation is communicated through certain channels over time among members of the social system. Before an innovation can be adopted, the farmer must first of all be knowledgeable about it through the various extension methods. This will be followed by development of interest, evaluation process and the

trial stage before its full adoption. All the variables mentioned above will determine how individual farmers' go through the adoption process and their ultimate behaviour. This theory describes the patterns of adoption, explain the mechanism and assist in predicting whether and how new inventions will be successful. While the highly educated members of the social system and those of higher social status tend to receive information more quickly and adopt faster due to their openness to both mass media and interpersonal channels of communication as well as contacts with extension agents, others that are less educated and of lower socio-economic status tend to receive information late and are usually sceptical and traditional in their attitude towards new technology.

In the same manner, the theory explains how each stage of adoption requires different communication strategies. For instance; while mass media channels are relatively more important at the knowledge stage, interpersonal channels such as farm and home visits, telephone calls are more important at the persuasion stage. Though Clarke (1999) opined that earlier adopting individuals tend to be different in age, but have more years of education, higher social status and upward social mobility, the extent to which all these socio-economic variables influence adoption among the farmers in the study area was investigated. The stages of the adoption process described by Rogers (1987) as follows:

2.8 Stages of the adoption process

i. **Awareness:** At this stage an individual first hears about the innovation. This means that the individual is exposed to a new idea but is lacking detailed

information about it. This is somewhat like seeing something without attaching meaning to it.

ii. **Interest:** The stage that an individual is motivated to find out more information about the new idea. An individual wants to know what it is, how and what its potentials may be.

iii. **Evaluation:** The stage at which mental trial of new idea takes place. An individual considers the relative advantage of the idea over other practices/alternatives.

iv. **Trial:** the stage that an individual tests the innovation on a small scale for himself. An individual seeks information about technique and method of applying the new idea.

v. **Adoption:** If satisfied with trial an, individual will decide to use the innovation on a large scale in preference to old methods.

The duration and length of time between any two stages varies with each practice and individuals. The rate at which different individuals go through the different stages varies with personal characteristics of the individual and the nature of the group influences on him (Rogers, 1985).www.answers.com/topic/effect. The model comprises of three main component variables; viz – input, process and output (Sen, 1995).

2.9 Knowledge Gap Theory

This theory was proposed by the Trio of Tichenor, Donohue and Olien while working at the University of Minnesota, United State of America in 1970. They propounded that when there is increasing information in the society, this information will not be evenly acquired by the members of that society (Kleinnijenhus, 1991).

The proponents identified socio-economic factors as the factors that largely determine the extent of knowledge acquisition and its rate in any given social system thereby creating knowledge gap in the society. They submitted that members of the society that are of high socio-economic status will have greater access to information and use it better and faster than their counterparts who are of low socio-economic status. (Olaleye, 2000).

The three scholars identified five reasons why socio-economic factors determine the rate of knowledge acquisition among members of the same society. These are reproduced below:

i. Members of a society that have higher socio-economic status tend to have better communication skills and have the capacity to read, comprehend and remember information faster.

ii. Those with high socio-economic status have the ability to store information easily;

Iii The mass media is generally skewed towards members of the society that have higher socio-economic status;

iv People of higher socio-economic status are more exposed and always ready in accepting information and can retain information better.

From the proposition above, it can be deduced that there is a gap that usually exists among a given people in their level of knowledge, how it is acquired and how this knowledge is deployed in their day-to-day activities and interaction. The germane socio-economic factors that are usually responsible for this gap are level of education, income, farm size and access to information.(Adekunle *et al*.,2005)

This theory is related to this study in the sense that there exist among farmers a disparity in their socioeconomic status and this affects their behavioural tendencies. For instance, while many farmers are old and less interested in information with the aim of changing their old practices, some are young and are more adventurous and would go extra length to source for information that may be advantageous to them in their farming operations. In the like manner, education plays a great role in determining the extent of access to information and knowledge that an individual has. A farmer who is well read can access information through different sources such as personal contacts with extension agents, radio and television, print media, telephone contacts and internet facilities. This automatically places a seal on the type and depth of information that this type of farmer will have. Income is another variable that limits access to information and knowledge.

Also a farmer who is well off in the society can use his economic power to seek for information so as to enrich his knowledge. This he can do by acquiring gadgets such as electronics and computers apart from regularly reading newspapers and participation in training such event as seminars and workshops where issues of concern to him are

discussed. However, a poor farmer cannot afford such gadgets and may not be in a position to sponsor himself to any forum outside his domain where knowledge may be shared.

To further aggravate the situation, the variation in socio-economic variables is often explored by government agencies, intervention agencies and multinational companies such as the United African Company (UAC), Unilever Plc, and Shell Petroleum Development Company (SPDC) in selecting the contact farmers or out growers within a particular target groups. This occurs when such farmers who are highly placed in the socio-economic continuum are so selected, not only do they benefit maximally from such programmes, their knowledge base is also broadened and hence, the gap that exists between them and other farmers is further widened. The extent to which this theory was applied in this study were determined by the hypothesis.

The impact of this theory is that it reorganizes the barriers of different dimensions (social, economic, policy, technological, institutional, cultural and personal) to adoption of innovation by farmers. However, the theory failed to recognize that the interaction among the three phases of interaction will not necessarily remain stable, especially depending on the technology and the environment in question. It also considers the element of time in the position of equilibrium achieved while the inhibiting and driving forces interact. Also, the theory assumes that driving forces will always be greater than the inhibiting forces, thus, assuming a perfect society where all things are functioning normally. The adopter categories described by Rogers (1987) are highlighted below:

2.10 Categories of Adopters

Diffusion researchers believe that a population can be broken down into five different segments based on their propensity to adopt a specific innovation: Innovators, early adopters, early majority, late majority and laggards. Each group has its own "personality" at least as far as its attitude to a particular innovation is concerned. It is not an easy job to shift people from one segment to another. It doesn't work that way. It is best to think of the membership of each segment as static. Innovations spread when they evolve to meet the needs of successive segments.

a. **Innovators:** the adoption process begins with a tiny number of visionary, imaginative innovators. They are also known as venturesome. They often lavish great time, energy and creativity on developing new ideas and have network plus considerable risk capital. Unfortunately, their one–eyed fixation on a new behaviour or idea can make them seem dangerously idealistic to the programmatic majority. Yet no change programme can thrive without their energy and commitment.

b. **Early adopters:** Known as respectable, once the benefits start to become apparent, early adopters leap in. They are on the lookout for strategic leap forward in their lives and farming businesses and are quick to make connections between clever innovations and their personal needs. Early adopters are vital for another reason; they become an independent test bed, ironing out the chinks and reinventing the innovation to suit mainstream needs. They don't need much persuading because they are on the lookout for anything that could give them a

social or economic edge. When you call a public meeting to discuss new farming methods, they are the ones who come along.

c. **Early majority:** The early majority are pragmatists, comfortable with moderately progressive ideas, but would not act without solid proof of benefits. They are the "deliberate". They are followers who are influenced by mainstream fashions and wary of facts. They are cost sensitive and risk averters. They are looking for simple, proven, better ways of doing what they already do. They hate complexity. They have not got time to think about the product or project.

d. **Late majority:** They are conservative pragmatists who hate risk and are uncomfortable with would-be new idea, practically their only driver is the fear of not fitting in, hence they will follow mainstream fashions and establish standards. They are often influenced by the fears and opinion of laggards.

e. **Laggards:** Meanwhile, laggards hold out to the bitter end. They are the traditionalists. They are people who see a high risk in adopting a particular product or behaviour.

2.11 Theory of Social Change

Social change in a social system can be referred to as a major change in behavior pattern, norms and values over time. Otaki (2005) viewed social change as the alteration in the social structure or its component part over a period of time. Change involved time and space which determined the direction in which society is going from a particular spot. Ekong (2005) summed up his definition of social change as a modification in

human attitudes and behaviour patterns as a result of education (such as extension activities), and alteration in social conditions as a result of changes in the policies of a social organization, including consequences and manifestation of such changes.

However, the concept of social change has been defined by Miles (1964) in Ekong (2003) as "the process by which alteration occurs in the structure and function of a social system". Herton and Hunt (1980) stated that social change is the transformation of social structures and social relationships in society.

Social change may be planned or unplanned. Planned change entails the direct human interaction in the shaping and direction of change towards a defined goal (Salawu, 2007). For instance, the Institute for Agricultural Research (IAR), Samaru has developed and recommended some sorghum varieties as well as production practices for farmers as a planned change for the improvement of the traditional method of sorghum production with the objective of increasing yields and income of sorghum farmers in Nigeria.

Furthermore, social change can be viewed as a state of dynamism which preclude stagnation and if well managed and directed, always implies progress, development and functioning of a social system (Adekoya and Tologbonse, 2005). So also social change theorist believe that for change to take place, societies have to move from traditional ways of doing things to modern levels (Ake, 1988). This theory has provided useful insights for understanding the social changes that have taken place in the lives of the rural farmers covered by the study and their families.

2.11.1 Modernization Theory

Modernization is the process whereby societies or social institutions change from traditional or less developed ones to those that characterize the developed ones. It also denotes the economic and social change that is brought about by introduction of industrial mode of production into a pre–industrial society (Robertson, 1983). In terms of transforming agriculture in Nigeria, there has been the expressed concern to modernize the agricultural sector by using improved technologies.

One of the strategies is the use of improved technologies on the view that these technologies would improve the level of productivity of farmers. The modernization perspective, for instance, has been widely used to formulate and execute guided change on social programmes for people in many countries especially in developing countries (Gefu, 1986). It is assumed that development could be achieved by allowing the proliferation of techniques and technologies in order to bring about the needed impact of development. The perspective was used in this study to explain the introduction of improved soyabeans production technologies to rural farmers.

This theory is based on social change, is a process in which new ideas and alterations occur in the structure and function of social systems (Rogers and Shoemaker, 1971). This theoretical framework is used in most developing countries in the formulation and execution of planned programmes. Ega (1988) stated that the modernization strategy is based on the assumption that programmes designed to increase agricultural production would resolve the problem of welfare or social justice and that increase in agricultural production would lead to the solution of the problem of social equity through some "trickle -down" effect.

To achieve the desired goals of a planned change programme such as that of modernizing agriculture, Rogers and Shoemaker (1971) reasoned that it would depend on the attributes of the innovation (i.e. the cost, returns to investment, efficiency of the innovation, the risk and its availability) and the socio-economic characteristics of the farmers. Therefore, these factors act as an incentives or disincentives to adoption of recommended practice among soyabeans farmers

2.11.2 Complexity

This refers to the degree to which an innovation is relatively difficult to understand or use and the length of time spent on each technology when used. Technologies that are relatively simple to understand and use tend to be readily adopted than those that are complex.

2.11.3 Compatibility

For technologies to be adopted, they should be consistent with the existing values, norms, and past experience of the adopter. Incompatibility may result in acceptance–rejection experience. The role of farmers in decision making and benefits they can derive from a technology will also be the factor that can affect adoption.

2.11.4 Use of organic manure

Application of organic manure to the soil is a means through which fertility can be maintained. Organic manure can either come in form of animal manure or from crops that the farmers grow or those that grow on their own (voluntary crops) when plants and animals decompose, the nutrients held in this tissues are released to the soil to become useful to the plants as manure, IIRR (1998) opined that optimum result can only be

derived from manure if it is allowed to mature for several weeks or months before it is applied to the field.

2.11.5 Crop rotation

Crop rotation is the planting of different crops on the same piece of land in successive years in a scientific sequence. In the view of Anthony *et al.* (1986), crops can be classified into heavy feeders and light feeders. Heavy feeders are crops that require many nutrients, e.g. cassava and yam while millet and vegetables are examples of light feeders as they require fewer amounts of nutrients. In practice, it is advisable to follow deep rooted crops such as cassava with shallow rooted crops such as maize and soybeans.

Other principles of crop rotation include incorporation of legume crops such as soybeans to boost soil fertility and alternating crops not affected by the same pests and diseases. Hingues and Philippe (2003) asserted that the yield of a newly cleared field which only supplies nutrients from its own natural fertility resources is greater when different crops are grown in sequence.

2.11.6 Effective ridging method

Ridging means forming the soil into raised lines called ridges. The hallowed out rows between the ridges are called furrows. Ridging methods vary from place to place but the method chosen is largely determined by the soil type, type of slope, type of crops, cropping plan and type of implements used. Ridges can either be manually or mechanically done. To achieve its aims, tillage is supposed to be done when the soil is

neither too dry nor too wet. If the soil is too dry, working on it will be difficult as the soil crust will be hard to break and ploughing will not be deep.

2.11.7 Concept of technology

Technology, according to Swanson (1996) is the application of knowledge for practical purpose, which is generally used to improve the condition of the human and natural environment, and in carrying out some other socio-economic activities. It is also considered as a complex blend of materials, processes and knowledge. In another definition, Norabhoompipat (1982) defines technology as the knowledge of how to do things. Technology extends to all the skills, knowledge and procedures for making, using and doing useful things (Maril, 1980). It entails all the new methods that increase agricultural production. Technology is meant to help production, augment outputs and make possible management of resources and products.

Some technologies are in vogue over a long period of time, while others are changing or being replaced wholly or partly by improved ones for better use of resources. Technology is a dynamic concept thriving with betterment of techniques and embodies simple techniques to composite ones. Agricultural technology can be grouped into indigenous and improved technologies (Adeniji, 2002).

Technology can also be expressed as the systematic application of scientific knowledge to practical purposes. It includes inventions, techniques, innovations, practices and materials (Okereke, 1983). In Nigeria, the components of improved crop production techniques are:

i. high yielding varieties

ii. timely planting

iii. fertilization

iv. improved cultural practices

v. minimum tillage and

vi. use of pesticides (Ume *et* al. 2006)

In view of this, successful transfer and adoption of new technologies in the traditional farming systems depend largely on prior identification of the attributes of the system one is attempting to change (Chatherton and Chatherton, 1985). These technologies should be acceptable and adoptable by farmers so as to enable them achieve higher productivity on their farms.

2.11.8 Concept of effects

Effect is a change or changed state that occurs as a direct result of action by somebody or something else (www.answers.com/topic/effect. accessed, 2010). The literature on effects of adoption of agricultural technologies has shown that not every technology brings about the expected outcome (Williams, 1982). The concept has provided useful insights for understanding the effect of adoption of improved soybean production technologies on farmers' yields and income.

In order to motivate the farmers to adopt any farm technology, the extension agencies should make concerted efforts for the transfer of the technology to the farmers' fields.

For popularizing and enhancing the rate of adoption of the new technology by the farmers, a conceptual model of extension system has been developed on the basis of field experience and empirical research. The model comprises of three main component variables; viz – input, process and output (Sen, 1995).

The technology generated through research (based on the consideration of national community and individual priorities as well as feedback from the farmers) acts as "input" to activate the "process" consisting of policy options, organizational characteristics and extension education efforts so as to produce the desired "output", i.e. satisfaction for the farmers. Access to information through different sources such as personal contacts with extension agents, radio and television, print media, telephone contacts and internet facilities can be added advantage. This goes a long way in widening a farmer's horizon and enriching his knowledge base, On the contrary, an illiterate farmer is limited to sources such as extension agents and radio which may not offer much of the information that such farmer needs due to the inherent disadvantages or limitations associated with such.

2.11.9 Conceptual model

A model is a figurative representation of a perceived object used to guide one in the pursuitt of knowledge. The model for this study posits that the socio-economic characteristics of soybean farmers, institutional variables and attributes of the improved practices would influence adoption of improved soyabean production practices(figure 2.1). Similarly, this model posits that adoption of improved soybean production technologies may lead to an increase or decrease in yields, income and improvement of level of living of soyabeans farmers.

The independent Variables

i. Age

ii. Level of education

iii. Farming experience

iv. Farmers' previous knowledge of innovation

v. Marital status

Vi Farm size

Vii Knowledge gap

The expected outcome or effect of adoption of the improved technologies were assumed to include:

a. Crop output
b. Crop yields
c. c . Income from soybean production
d. Level of living

Dependent variable of the model was adoption of improved soyabean production technologies that include:

i. Land preparation
ii. Planting materials
iii. Planting date

iv. Planting spacing

v. Nutrient requirement

vi. Weed control

vii. Ecological requirement

viii. Improved soyabean varieties:

a. Samsoy I

.b. Samsoy II

c. TGX 306 -036c

d. TGX 536 –02D

e. TGX 1440 – IE

f. Harvesting time

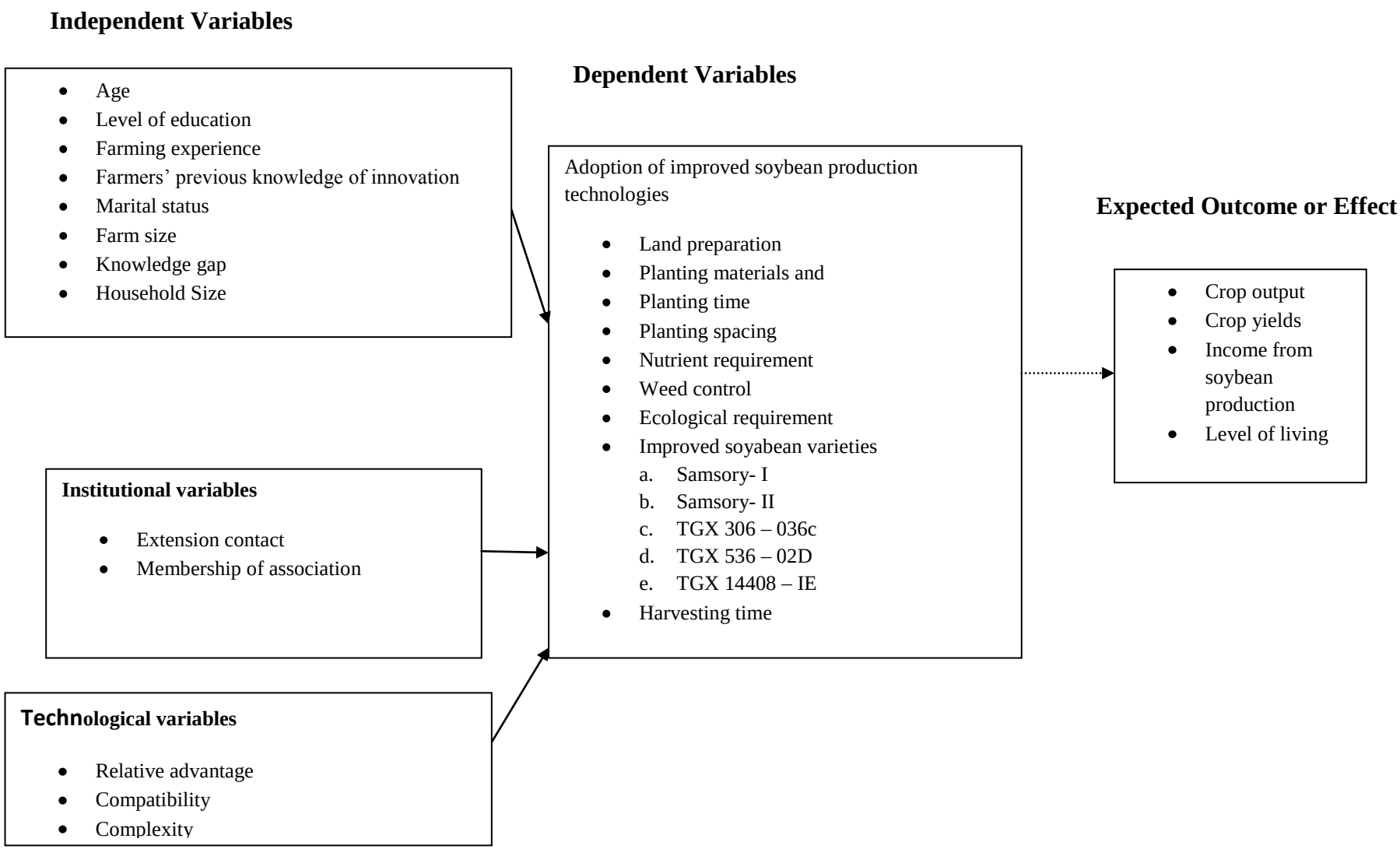

Figure 2.1: Model of factors influencing adoption of improved soyabean production technologies by farmers

CHAPTER THREE

METHODOLOGY

3.1 The Study Area

The study was conducted in Kogi West zone of the Kogi State Agricultural Development Project. Kogi West is made up of five (5) local government areas, namely; Ijumu, Kabba/Bunu, Mopamuro, Yagba East and Yagba West. This state has 21 local government areas with land area of 28,313.53 square kilometres and a projected estimated population of three million, five hundred and ninety five thousand, seven hundred and eighty nine (3,595,789) people, (Census,2006) with a projected population in 2015 using annual growth rate of 2.5% of 4,221,052 people. About 90% of the populations are practicing farmers. Kogi state is in the southern guinea savannah ecological zone. It lies between latitude 7^{O}N and 8^{O} 31'N and longitude 3^{O} 41'E (NPC, 2006).

The wet season falls between the month of April and October while the dry season falls between November and March. The annual rainfall ranges from 1100mm to 1300mm and temperature of 28–32^{O}C. The field survey covered the whole three districts that made up of the zone. These districts are Yagba, Ijumu and Kabba/Bunu. Majority of the people in this study area engaged in the farming activities. Prominent among the crops grown include yam, maize, cassava, sorghum, melon, pepper, cowpea, soybean and vegetables. Apart from crop farming, livestock are also reared such as sheep, goat, pig, duck, dog, and chicken. The major tree crops grown by the farmers are citrus, cashew, cocoa, coffee, and oil palm. The cropping pattern is mainly mixed cropping with few farmers practicing sole cropping. However, there are some other income earning

activities which are carried out by the people such as hunting, trading, and other domestic activities.

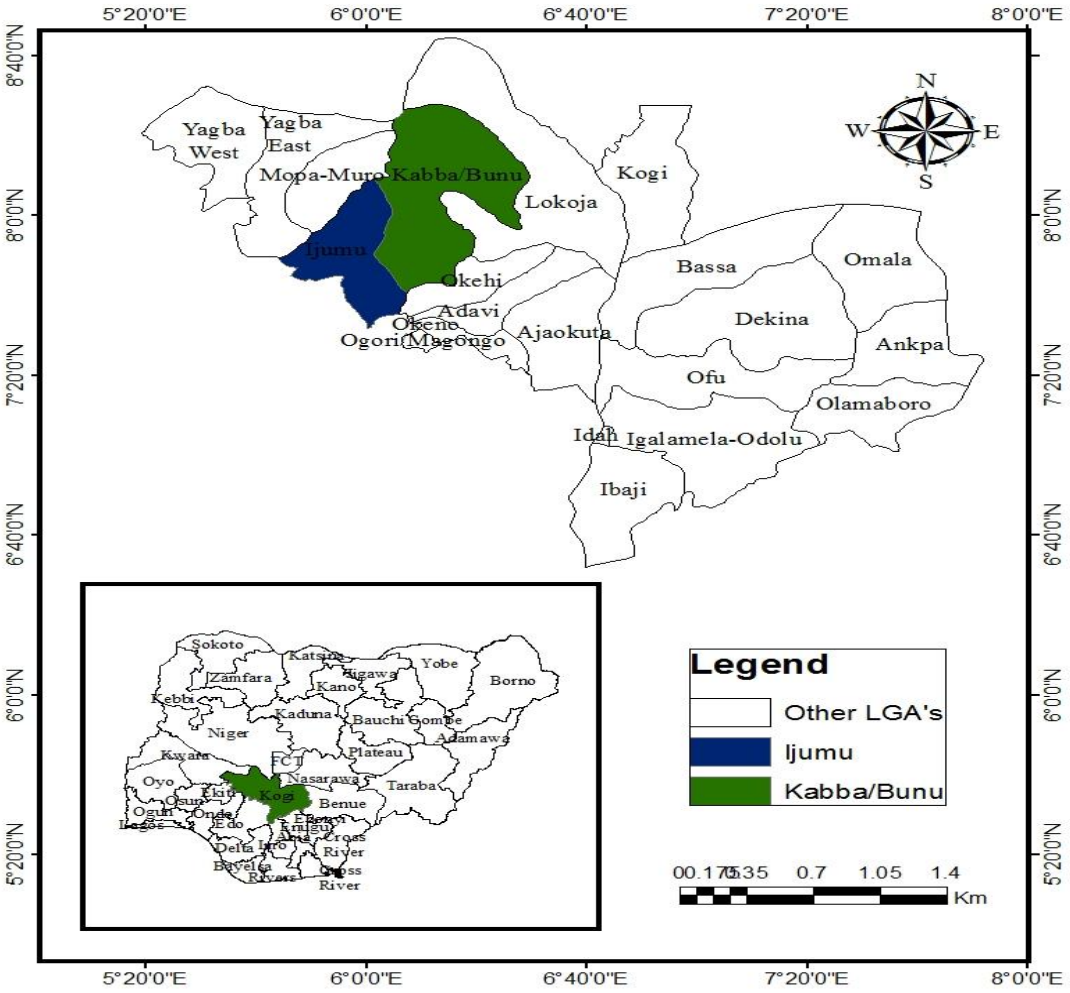

Figure 3.1: Map of Kogi State showing the study area

3.2 Sampling Procedure and Sample Size

Multi-stage random sampling technique was employed in the selection of respondents for the study. The first stage involved purposive sampling of two (2) Local Government Areas (LGAs) out of the twenty one (21) L.G.As. in the state due to their high involvement and relative importance in soyabean production. Five villages were

purposively selected from each of the two LGAs for their high prevalence in soyabean production. Finally, simple random sampling was employed to select soyabeans farmers from each of the villages. At this stage, 10% of the total sampling frame was selected to get the sample size of 164 respondents.

The population for this study comprised of farmers who are involved in the production of soyabean in Kogi West zone of Kogi state ADP.

Table 3.1: Sampled soyabeabs farmers in the study area

L.G.A.	Village	Number of soybeans farmers	Sample size (10%)
Ijumu	Ayere	161	16
	Iyara	184	18
	Ekinrin Adde	195	20
	AyetoroGbedde	157	16
	Ogidi	166	17
Kabba Bunu	Egbeda Kabba	150	15
	Okedayo	194	19
	Okebukunu	136	13
	Ode-Ape	158	16
	Kakun	143	14
Total		**1649**	**164**

Source: Reconnaissance survey, 2014.

3.3 Data collection

The primary data for the study were collected through the use of a structured questionnaire which was developed and used to elicit information from the farmers. Secondary data sources include published and unpublished reports of the Kogi Agricultural Development Project (KADP), textbooks, journals and existing literatures relevant to the study and the internet.

Information that were collected from the respondents focused on socio–economic variables such as age, educational level, years of farming experience, marital status, membership of cooperative societies, type of farming system, etc. Data were collected on improved soyabean production technologies such as land preparation, planting time, and manure application, weed control method, harvesting method, etc. and improved processing equipments such as threshing, winnowing and grading systems etc. as well as crop yields and income of farmers in the study area.

3.4 Data Analysis

Descriptive statistics such as percentages, means and frequency distributions, were used to achieve objectives i, ii, iv, and v of the study. These tools were used to summarize the socio–economic variables such as age, educational level, years of farming experience, level of adoption of improved soyabean, production technologies e t c.

Regression and correlation analysis were used to determine the relationship between such socio-economic characteristics of the respondents and level of adoption of improved soybean production technologies. The regression analysis was used in estimating the contribution of each variable to the dependent variables so as to

determine the best variables that best predict adoption of the technologies by farmers. Logit regression analysis was also used to test the hypothesis for this study.

The correlation coefficient gives the degree of association between any two variables under consideration. The value of correlation coefficient denoted by r is between -1 and +1. The general model for the regression analysis is in a linear form as given below:

$Y = a + b_1x_1 + b_2x_2 + b_3x_3 - - - - - - - - - - - - - - - - - - + b_n(x_n) + e$..... (1)

Where;

Y = adoption level (measured as the number of technologies adopted)

a = constant

X_1 = farmer's age (years)

X_2 = farming experience (years)

X_3 = educational level (years of formal learning)

X_4 = extension contact (number)

X_5 = household size (number)

X_6 = marital status (married/single)

X_7 = (male or female)

X_8 = farm size (hectares)

X_9 = membership of cooperative societies (number)

X_{10} = compatibility of technology

X_{11} = access to credit (₦)

$\beta_1 - \beta_{10}$ = regression coefficient

e = error term

Farmers were categorized into two (2) adopter groups based on the adoption score.

High adoption farmers are those that used above 3 technologies while farmers whose adoption scores below 3 were considered as low adopters. Similar methods were been used by Ume *et al*, (2006), Ojemade (2010) and Okezie (2006).

3.5 Definition and Measurement of Variables

3.5.1 Dependent variables

The level of adoption of improved soyabean production technologies is the dependent variable of the study. This was measured by first asking the respondents to indicate which of the technologies they have ever used by providing them with 'Yes' or 'No' options. For items to which 'yes' is the response, farmers were asked to state their frequency of use based on a 3–point Likert Scale of Always, Occasionally and Seldomly with Always attracting 3 points, occasionally 2 points and Seldomly 1 point.

3.5.2 Independent variables and their measurements

The independent variables include:

i. **Age:** This refers to the approximate chronological age of the respondents as given at the time of data collection; youthfulness is associated with adoption of innovation (Atala, 1980). It was measured as actual age given in years, i.e. the age of the respondents was determined by the number of years from birth.

ii. **Farming experience**: The more the experience in farming activities, the more the ability to adopt the innovation. It can also influence efficiency in farm production. Farming experience were determined by the number of years engaged in farming.

iii. **Educational level:** Education is a variable which tends to increase one's access and it was determined by the number of years spent in formal schools. This enable opportunity to diverse knowledge such as the use of agricultural innovations and utilization of credit opportunities to improve their farming activities. It simply refers to ability to read and write. The higher the level of education, the better the chance of adopting innovations (Chianu and Tunji, 2004). Each respondent were asked to give the number of years he/she spent in primary, secondary or post–secondary school. These were measured by the total number of year spent in school.

iv **Extension contact**: Agricultural extension can be defined as an advice and assistance given to the farmers and his families through educational procedure on new thrilling methods and technology in order to improve their production efficiency and income to better their living either individually or collectively' (SELN, 2006).

Farmers' contact with agricultural extension agents has been reported to improve adoption of improved technologies (Smith *et al*, 1994). This is defined as the frequency of contact of farmers with extension workers. Contact with extension agents enables the farmer to be aware of new technology which will improve his production. This was measured as the total number of times a farmer receives training or information on improved soyabean production and processing from the extension personnel in the study area.

v **Household size:** This is the total number of people in the household. Most farmers depend on the strength of the family labour to boost productivity. In this study, respondents were asked to state the number of persons they have as dependents within their household including their spouses. Household size was thus, measured in number to include the husband, the wife (wives), the children and other dependants in the respondent' home. Meanwhile, labour demanding technologies will be easily adopted in a large family (Dvorak, 1996).

vi **Marital Status:** Respondents were asked to indicate the option that describes their marital status among the following options: (a) married (b) single (c) widowed (d) divorced. Respondents who are married were scored 2 while respondents that are single, widowed or divorced were scored 1.

vii **Sex**: Respondents were asked to indicate their sex, i.e., male or female. This can also determine the type and level of practice of the soyabean production activities, e.g., cultivation, harvesting and processing. Men and women react differently to innovations because they are differently affected in their production roles and socio-cultural environment. Schwltz (1988) found that women are more constrained than their male counterparts in terms of access to, and effective costs of information technology, capital inputs and credit; thereby leading to a depressed productivity of women. In the same vein, Saito and Weidermann (1990) concluded that because men have comparatively greater opportunity than women, it is essential to understand the nature of the special constraints that women face as well as the implication for technology development and extension as to effectively help women farmers. The perception of men and women

about specific technologies might also be influenced by the specific gender roles, whether productive, reproductive or community roles performed by each category.

viii **Farm size:** In this study, farm size refers to the size of farm cultivated by the respondent in hectares. Farmers with large farm size farmers can easily adopt improved innovations (Feel *et al*, 1985). Farmers were asked the total number of hectares of land they cultivated in the previous years.

ix **Membership of cooperative societies**: This refers to whether the respondent belongs to one cooperative group or another. For the purpose of agricultural activities, farmers may constitute themselves into cooperative groups, the total number of cooperative groups the farmers belongs to will make up his/her score for the variable.

x **Cost of innovation**: This is the total cost of implementing the technologies. It is believed that less expensive technologies aid quick adoption while costly technologies do not attract high rate of adoption. This variable was measured by asking the respondents whether the improved technology in use is costly to them or not. 'Yes' represented costly while No (0) represented less costly on the scoring during data collection.

xi **Farmer's knowledge of innovation:** Knowledge of an innovation has an influence on adoption. This was determined by the use of Perception Index as adopted from the work of Likert which involves a lot of perception statements with scores based on the expected responses from the respondents. Each response to the perception statement were completed with a mean perception score.

xii **Access to credit**: Access to credit helps in financing the adoption of innovations and lack of credit may affect farmers' adoption of improved agricultural practices. Access to credit was measured in naira as per credit obtained.

xiii **Compatibility of technology:** This is the level to which a technology is perceived to meet the need and values of the respondent. This was measured by the use of a 5-point scale: Not compatible = 1, Fairly compatible = 2, Compatible = 3, Very compatible = 4 and Highly compatible = 5.

3.5.3 Measurement of the Expected Outcome

i. **Yield:** This were measured as total weight in kg/ha of the harvest of the soyabeans grown by a farmer. For this study, yield referred to the total quantity of soybean obtained by the respondent in the previous year. It was measured in 100kg/bags obtained by individual farmers. This was further divided by the respondent total land area to obtain the yield per hectare.

ii. **Income:** This refers to the money realized from the sale of soybean. Income was measured as the total estimated revenue from soyabean in naira as given by the respondents.

iii. **Standard of living**: In this study, the level of living refers to all things contributing to the quality of human life (durable goods, farm equipment and livestock). Therefore, standard of living was measured as the value of durable goods, livestock as well as farm equipment in the possession of an individual respondent. The durable goods items considered were radio,

vehicle, motor cycle, and house. The livestock considered include cattle, goat, sheep, horses and poultry, while farm equipment include ox–plough, and hand–plough, sprayer, hand hoe and tractor.

Respondents were asked to indicate the price of each item at the time of the interview and whether item can be sold to obtain real monetary value. Amount of all items were summed up and added to obtain individual income in Naira (₦) in order to evaluate their level of living. This method easily revealed the materials the farmers would be able to purchase with their income from their farm including savings after adoption of improved soyabean production technologies these were summed up, valued in naira and compared with the farm income in the years before adoption.

3.6 Extent of Adoption of Recommended Soyabean Production Practices

The soybean recommended production practices include planting healthy/viable seeds, herbicides application, planting on ridges, recommended planting date, recommended harvesting time, recommended planting spacing, inter- planting, recommended weeding interval, planting on flat ground, recommended processing method and use of recommended soy bean planter. These components of recommended production practices were adopted by the farmers in varying degrees. Adoption in this study was based on the number of recommended practices constantly used by the respondents. The adoption level represents the number of respondents using the practices as a percentage of the total number of the respondents studied (Ojo, 2009).

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Socio-economic Characteristics of Soyabean Farmer

4.1.1 Age of soaybean farmers

The result in Table 4.1 shows that majority (76%) of the soyabean farmers were within the age range of 20-49 years of age with a mean of 40 years. The minimum and maximum years of the farmers were 20 and 71 years of age. The implication of this finding is that large proportions of the farmers were adults, young and can adequately be regarded as active, agile and physically disposed to farming activities. Age is expected to have negative influence on respondents' participation in improved crop production that is why younger farmers are more active in the production of this crop. This agrees with the finding of Nwanko *et al.* (2009) and Institute for Agricultural Research (2001), who reported that the most active farmers' age group engaged in agricultural production is within 31- 50 years.

Table 4.1: Age distribution of soybean farmers (n=164)

Age (years)	**Frequency**	**Percentage**
20-29	31	19.1
30-39	54	30.8
40-49	43	26.3
50-59	24	14.6
60-69	9	7.6
≥70	3	1.5
Total	**164**	**100**
Mean	**40**	

4.1.2 Educational level of soyabean farmers

Education helps to facilitate adoption as it makes one to be more objective in evaluating innovations which would influence his/her production. However, low levels of education usually affect people's ability to view and comprehend new ways of doing things that can improve their living condition. The result in Table 4.2 revealed that a high proportion (48%) of the respondents had secondary education, about 24% had tertiary education, about 9% had no formal education, about 15% had primary school education while 3% had post-graduate education. This implies that majority of farmers were literate. High level of literacy among the respondents may facilitate better adoption of improved technologies on soyabeans production and better ability of impacting knowledge and skills for adoption of an innovation. This finding supported Nweke (1981) who has observed that an educated farmer is less skeptical of a new idea and is more able to evaluate information on improved practices. It is also similar to the report of Olaleye (2000) who revealed that education is an important characteristic especially in the adoption of innovations. It is also in support of the findings of Ray (2001) which revealed that adoption of innovation is enhanced by high rate of literacy and formal education, as literate farmers can understand the innovation efforts of the extension agents and their implication better than illiterate farmers.

Table 4.2: Distribution of soyabean farmers according to level of education (n=164)

Education	Frequency	Percentage
No formal education	14	8.5
Primary education	27	14.6
Secondary education	78	47.5
Tertiary education	40	24.4
Post graduate education	5	3.0
Total	**164**	

4.1.3 Marital status of farmers

The results in Table 4.3 show that majority (56%) of the respondents were married, about 35% were single while about 9% were either widows, widowers or divorced. This agreed with Sabo (2006) who found that majority of the participants and the non-participants in a community-based agricultural and rural development programme in Zaria local government area were married. However, married farmers may have larger household sizes which may encourage them to adopt many improved agricultural technologies in order to raise their income and level of living.

It is expected that family labour would be more available where the household heads are married (Amaza *et al.,* 2009). This result is also in agreement with Agbamu *et al.* (1996) who found that married farmers adopted new varieties of maize and cassava more than farmers that are single.

Table 4.3: Marital status of soyabeans farmers(n=164)

Extension visit	Frequency	Percentage
Married	92	56.1
Single	58	35.4
Widow	11	6.7
Widower	2	1.2
Divorced	1	0.6
Total	**164**	**100**

4.1.4 Sex of farmers

The results in Table 4.4 show that majority (82%) of the farmers were male while the females constituted about 18%. This indicates that most of the improved technologies on soyabean production may be more widely adopted by male farmers in the study area. It also indicates that there were more male-headed households engaged in farming than male-headed households in the study area. The finding agrees with that of Achike (2002) who found that more men were involved in farming than women in Enugu State. It is also in agreement with Saito and Werdermann (1990) who reported that men have comparatively greater opportunity than women in farming activities due to special constraints that women face as well as the implication for technology development and extension information services

Table 4.4: Distribution of respondents based on their sex

Sex	Frequency	Percentage
Male	134	81.7
Female	30	18.3
Total	**164**	**100.0**

Source; survey data (2015).

4.2 Extent of Adoption of Recommended Soyabean Production Practices

The results in Table 4.5 revealed that the planting of healthy/viable seeds had a high adoption (55%). Healthy and viable seeds help in improving the output of the farmers and that is probably why the adoption rate is high. The use of treated seeds is also a good practice that leads to better crop growth and productivity. Seed treatment is known to enhance good germination and protect crop seedlings from mortality due to pest attack, root rot and fungal infection soon after emergence.

Other practices with high adoption rate are, planting date, planting on the flat ground and recommended weeding. The results have further revealed that about 68% of the respondents planted their seeds from early June to early July which are the recommended dates for planting in the study area. Farmers' adherence to this planting date is high as revealed by the study. Planting on ridges however, recorded a low adoption rate (39%). This is due to extra labour involved on this farm operation.

The results further revealed that about 40% of the respondents have applied the plant spacing of 75cm between rows and 10cm between stands. The rate of adoption of planting spacing was therefore low. Maintaining appropriate spacing between plants enhances growth and development of soybean thus reduces the competition from other crops if intercropped, and reduces built up of pests and diseases.

The level of adoption herbicides application by the farmers was very low(37%). In order to have a good yield of the crop and maintain the soil fertility under intensive and continuous cropping, it is important to have a proper fertilizer rates for soyabean at different ecological zones. This would facilitate efficient fertilizer usage to enhance

better development of soyabean. The results also revealed that low percentage of the respondents applied fertilizer at recommended rate. This may be because of the high cost of fertilizer in the study area coupled with farmers' belief that soyabean does not really need fertilizer.

Planting on flat ground was another recommended production practice that recorded a high percentage of the respondents that adopted it. About 56% of the respondents had adopted planting soyabeans on flat ground.This is due to the fact that ridges need harrowing which is labour and cost intensive.

The adoption of recommended weeding interval was high (61%) among the respondents. The type of weed control measures adopted should be based on the nature of the problem and the resources available to the farmers. A properly timed weed control programme can minimize the effects of weeds. Weed control in soyabean could be manual or chemical or both.

Soyabean requires timely harvesting to check excessive yield losses due to shattering of its pods. Losses in yield may also occur from other sources if harvesting is delayed. The findings of the study also revealed that about 58% of the respondents harvested their soyabeans 3-4 months after planting when the pod is straw coloured or when 85% of the pods have turned brown for non-shattering varieties and 80% for shattering varieties. This helps in preventing losses.

The high adoption practices like planting date, planting on flat ground, recommended weeding interval and recommended harvesting date may be due to the simplicity of the

practices and their attribute of not requiring too much money or labour to implement high adoption of their recommended practices could also be attributed to their contribution to profitability of the adoption Ajayi and Okunlola (2005) have similarly attributed to high adoption of improved root crops technologies to the financial gains from the technologies.

However, the low adoption of recommended practices like planting on ridges, herbicides application, recommended processing method and recommended soyabean planter could be probably due to the fact that the practices are tedious and costly to carry out. This is in line with the findings of Ajayi and Okunlola (2005), in which there was low adoption of agronomic aspects of root crops technologies in Ondo State as a result of high cost of labour on the land preparation.

Table 4.5: Distribution of respondents according to level of adoption of improved soyabeans production technologies

Technology	Number adopters	Percentage	Level
Planting healthy/viable seeds	90	54.9	High
Recommended planting date	111	67.7	High
Planting on ridges	64	39.0	Low
Herbicides application	61	37.2	Low
Planting on flat ground	92	56.1	High
Recommended spacing	65	39.6	Low
Recommended weeding interval	101	61.6	High
Recommended processing method	76	46.3	Low
Recommended soy bean planter	80	48.8	Low
Recommended harvesting time	94	57.3	High

*Multiple responses

4.2.1 Farming experience

The results in Table 4.6 show that considerable proportion of the soyabean farmers (about 38%) had farming experience that ranges from 11-20 years, about 33% of the respondents had 1-10 years of farming experience, while about 21% had 21-30 years of farming experience. This means that the soyabeans farmers had vast experience in their production with an average 16 years of experience. The long farming experience shows that the farmers will be able to make sound decisions as regards resource allocation and general management of their farms. This finding is in line with Ajani (2000) in his study on productivity in food crop farming in northern area of Oyo State where he found that years of farming experience increased agricultural productivity among farming households.

Table 4.6: Distribution of crop farmers according to farming experience

Farming Experience (years)	**Frequency**	**Percentage**
1-10	56	33.1
11-20	62	37.8
21-30	34	20.7
31-40	11	6.7
≥40	1	0.6
Total	**164**	**100**
Mean = 16		

4.3 Factors Influencing Adoption of Recommended Soyabean Production Practices

Factors influencing adoption of recommended soyabeans production practices are presented in Table 4.7. The adjusted R^{-2} value was found to be 0.63, implying that the independent variables explained 63% of the variation in the dependent variable. The

results revealed that the nine (9) variables included in the regression model age, farm size, education, amount of credit received, farming experience and extension contact were the factors influencing adoption of soyabeans recommended production practices in the study area

The coefficient of age was 0.9153 and found to be positive and significant at 1% level of significance. Age is therefore important in influencing the adoption of recommended soyabeans production practice. Older farmers are assumed to have gained knowledge and experience over time and are better able to evaluate technology information than younger farmers. Alexander and Van Mellor (2005) have also found that adoption of genetically modified maize increased with age for younger farmers as they gain experience and increase their stock of human capital but declines with age for those farmers closer to retirement.

The coefficient of farm size (1.3677) was also found to be positive and significant but at 10% level. Thus, farm size is soyabeans important in influencing the adoption of recommended production practices. Farm size has bearing on the capacity of farmers to adopt recommended practices. This is because farmers with large farm size can afford to devote part of their farms for soyabean production without significantly affecting the total land left for the production of the staple food crops while small land holders cannot. Land size is also one of the indicators of the level of economic resources available to farmers (Ajibefun, 2006).

The coefficient of education (0.5388) was similarly found to be positive and significant at 1% level. Education is thus and important in influencing the adoption of

recommended soyabeans production practices. Education level of a farmer increases his ability to obtain, process and use information relevant to adoption of a new technology in soyabean production and other crops too. This is in tandem with the findings from a study conducted by Okunlola *et al.* (2011) on adoption of new technologies by fish farmers and Ajewole (2010) on adoption of organic fertilizers. They both found that the level of education had a positive and significant influence on adoption of the technologies. This is because higher education influences respondents' attitudes and thoughts making them more open, rational and able to analyze the benefits of the new technology (Waller *et al*., 1998). This eases the introduction of a new innovation which ultimately affects the adoption process (Adebiyi and Okunlola, 2010).

Furthermore, the coefficient of amount of credit received (3.5021) was found to be positive and significant at 10% level. Access to credit is therefore in influencing the adoption of recommended soyabeans production practices. Most farmers fear trying improved technologies because they do not have the necessary financial resources to adopt the technologies. This is partly explained by the fact that most agricultural technologies require complementary inputs such as fertilizers and pesticides. These complementary inputs are difficult to come by due to the cash-strapped nature of farmers (Idrisa and Ogunbameru, 2008). Access to credit received helps farmers out of this predicament thereby influencing them to adopt innovations. This explains why access to credit received is often observed as an important determinant of the adoption of improved technologies (De Castro and Teixera, 2006; James *et al*., 2006).

The coefficient of farming experience (0.2889) was found to be positive and significant at 1% level. Farming experience is thus important in influencing the adoption of recommended soyabeans production practice. Farming experience has been recognized

by Bamire *et al. (*2002) to play a vital role in the adoption of any particular technology or farm practice. The longer the farmer is in farming, the more is his experience and the quicker his adopting new practices. This is because it is assumed that the farmer knows the benefits of such improved practices. This can affect the level of use of technologies in terms of quality of management decision on the technology in question. Furthermore, farming experience has the effect of encouraging farmers to improve their earning capacity, therefore, it puts such famers in a financially advantageous position to have more resources for investment in improved farm practices (Agbamu, 2006), including the adoption of recommended soyabeans production practices.

The coefficient of extension contact (0.7313) was found to be positive and significant at 1%. This indicates that extension contact is important in influencing the adoption of recommended soyabeans production practice. Extension contact determines the information that farmers obtain on production activities and the application of innovations through counseling and demonstrations by extension agents. The effect of exposure to extension programmes is thus, enormous. For instance, Onu (2006) found that farmers who had access to extension adopted alley farming technologies more than farmers who had no access to extension. This could be because increased farmers' interaction with extension personnel in the form of multiple visits by extension agents, and technical support to farmers greatly increases farmers' knowledge of available technologies and their potential benefits, hence acting as a trigger for intensive adoption. The result agree with the findings on adoption of improved cassava in southwestern Nigeria (Polson and Spencer, 1991) and on adoption of research results and agricultural technologies among cocoa farming households in Oyo State, Nigeria

(Lawal and Oluyole, 2008) and improved maize in northern Tanzania (Nkonya *et al.*, 1997).

Table 4.7: Analysis of factors influencing adoption of recommended soyabean production practices

Variable	Coefficient	Standard Error	T –Statistics
Constant	59.6827	10.4104	5.7330***
Age	0.9153	0.1764	5.1874***
Farm size	1.3677	0.7753	1.764*
Education	0.5388	0.0336	16.0429***
Marital status	-6.9897	5.0673	-1.37936
Credit availability/received	3.5E-05	1.9E-05	1.82428*
Farming experience	0.2889	0.0346	8.3448***
Extension contact	0.7313	0.0606	12.0637***
Sex	-0.0710	3.6107	-0.0196
Cooperative	0.2264	0.1593	1.4146
R Square	0.68		
Adjusted R Square	0.63		

Note: *** P< 0.01, and * P< 0.10

4.3.1 Extension contact

The results in Table 4.8 revealed that about 12% of the soyabean farmers had no contact with extension service; majority (57%) had extension contact that ranges from 1-3 contacts while about 32% had 4-6 contacts. The average extension contacts observed was 4 times per year. Extension contact is expected to enhance soyabean farmers' ability to efficiently utilize their resources through the adoption of new and improved methods used in soyabean production. According to Obwona (2000), extension contact is very essential to the improvement of farm productivity and efficiency among farmers. Umar, Ndanitsa and Olaleye (2009) also argued that higher extension contacts would increase adoption of improved farm production technologies. He further asserted that

the frequency of extension contact is very essential as it guides the farmers from awareness to the adoption stage.

Table 4.8: Extension contact of soybeans farmers

Extension visit	Frequency	Percentage
No contact	19	11.6
1-3	93	56.7
4-6	52	31.7
Total	**164**	**100**
Mean = 2		

4.3.2 Farm size

The results in Table 4.9 show that majority (60%) of the farmers have farm size ranging from 0.1-2.0 hectares, about 26% had farm size of between 2.1-4.0 hectares while 14% had farm size of more than 4 hectares (>4.1). The maximum farm size observed was 7.5 hectares while the minimum was 0.5 hectares with a mean of 2 hectares. This shows that majority of the farmers had small farms, which prevents them from enjoying economy of large-scale in production. Similarly, small farm size is an impedement to agricultural mechanization because using farm machineries like tractors will be difficult. The small farm size might be as a result of the fact that most of the farmers got their land through inheritance, which is assisisted with fragmenting and sharing land of deceased persons to their heirs.

Table 4.9: Distribution of soyabean farmers according to farm size

Farm size (hectares)	Frequency	Percentage
0.1-2.0	99	60.4
2.1-4.0	42	25.6
>4.0	23	14.0
Total	**164**	**100**

4.3.3 Membership of cooperative societies

Membership of cooperatives societies influences the adoption of improved technologies which may lead to higher farm productivity and poverty alleviation. The results in Table 4.10 revealed that about 23% of soyabeans farmers do not participate in any cooperative association. However, majority (77%) were members of cooperative societies with years of membership ranging from 1-30 years with a mean of 2 years. This implies that farmers had the opportunity of interacting with other farmers who is a member of their cooperative groups which enhance diffusion and adoption of innovations among the farmers. According to Oladele (2003), cooperative groups ensure that their members derive such benefits from the groups that they could not derive individually. This is expected to translate into quick and easy awareness of new ideas that could help the farmers in their soyabean farming activities in terms of inputs, access to loans and easy access to information that can improve their production. Cooperative membership among farmers also has the advantage of augmenting access to the management information needed for prediction of increased soyabean output, as well as enhances ability to adopt innovations (Ironkwe, 2005).

Table 4.10: Distribution of soyabean farmers according to years spent in cooperative associations(n=126)

Membership of cooperative association (years)	**Frequency**	**Percentage**
1-5	40	31.75
6-10	35	27.78
11-20	30	23.81
21-30	21	16.67
Total	**126**	**100**
Mean	2	

4.3.4 Access to credit

The results in Tale 4.11 indicate that the majority about (56%) of the farmers had no access to credit to finance their crop production activities while about 45% had access. Adequate funding is required by farmers to finance all crop production activities. Soyabean farmers are at the disadvantage of getting free and direct access to the many sources of credit in the study area. This implies that, the farmers had low access to credit facilities to improve in their farming activities. Farmers with limited access to credit are less likely to adopt technologies that require huge capital outlay (Awoyemi, 2005).

Table 4.11: Distribution of crop farmers according to access to credit.(n=164)

Credit access	**Frequency**	**Percentage**
No access	91	55.5
Access to credit	73	44.5

Total	164	100

4.3.5 Awareness of recommended soyabean production technologies.

Awareness is the first stage of adoption process and involves the farmers learning of the existence of an innovation. To determine the level of awareness of recommended soyabean production technologies there is need to know if the farmer is aware of the programme and sources of awareness. For a successful adoption of any new technology, farmers must not only know about it but must be able to follow the recommendations given. This then means that they must have the knowledge before they can follow the recommendation (Ganpat and Seepersad, 1996). It is a well known fact that not all farmers adopt technologies at the same rate due to differences in behavior to the technologies (Van den Ban and Hawkins, 1996).

4.3.6 Awareness of improved soyabeans production technologies

Farmers' level of awareness of improved soybean production technology practices is presented in Table 4.12. The results reveal that majority (87%) of the respondents were most aware of the recommended planting healthy/viable seeds, about 78% were aware of the recommended planting date, about 70% were aware of planting on ridges, herbicides application (60%) and recommended harvesting time (51%).The recommended technologies that recorded low awareness among the farmers include recommended spacing (about 42%), recommended weeding interval (28%), planting on flat ground (22%), recommended processing method (17%) and recommended soya bean planter (14%). The results therefore show that the famers were aware of the components of the recommended soyabeans production practices in varying degrees.

The finding is at variance with Yahaya and Olayide (2006) who claim that the level of awareness of associated technologies was high among cassava farmers in Nigeria.

Table 4.12: Distribution of soyabean farmers based on awareness of recommended practices

Awareness of the technology	*Frequency	Percentages	Rank
Planting healthy/viable seeds	143	87.2	1st
Recommended planting date	128	78.0	2nd
Planting on ridges	116	70.7	3rd
Herbicides application	99	60.4	4th
Recommended harvesting time	84	51.2	5th
Recommended spacing	68	41.5	6th
Recommended weeding interval	46	28.0	7th
Planting on flat ground	36	22.0	8th
Recommended processing method	27	16.5	9th
Recommended soyabean planter	23	14.0	10th

***** Multiple responses was allowed

4.3.7 Sources of information on recommended soybean production technologies

Farmers' sources of information on recommended soyabean production technologies are presented in Table 4.13.The result reveal that most (76%) of the farmers received information on the technologies through extension agents. The agents were therefore ranked as the most important source of information for the farmers. Radio was the second widely used information source as indicated by about 56% of the respondents, while about 47%, 25% and 23% of the respondents got to know of improved soybean production practices through friends and relatives, television and newspaper respectively. This implies that the extension agents are the major source through which information is disseminated to the soybean farmers in the study area. However, information obtained from friends and families may often be misleading as it may

contain a lot of misconceptions. This finding is in consonance with reports obtained from Josaphat *et al*, (2006) who also ranked extension agents as the major source of information on environmental management practices among crop farmers.

Table 4.13: Distribution of farmers according to sources of information on recommended soyabean production technologies(n=164)

Information source	***Frequency**	**Percentage**	**Rank**
Extension agent	124	75.6	1st
Radio	92	56.1	2nd
Friends and relatives	77	46.9	3rd
Television	41	25.0	4th
Newspaper	38	23.2	5th

***** Multiple responses were allowed

4.4 Constraints to adoption of recommended soybean production practices

Table 4.14 shows the problems encountered during the process of adoption improved soyabeans production practices by farmers. Majority (62%) of farmers indicated high cost of labour as the most important problem encountered which was ranked 1st, high cost of technology (53%) was lack of credit (36%) was the 3rd constraint while lack of awareness (20%) pests and diseases(14%) complexity of the technology (9%) and lack of market(5%) were ranked 4th, 5th, 6th and 7th respectively.

These problems suggest the difficulties found by the soyabeans farmers in the area of study in the course of producing soyabean. This implies that the technologies still require more effort to educate a large percentage of small-holder farmers in the study

area since majority are small holder farmers with average farm size of 2 hectares, who are yet to adopt these technologies.

Pests and diseases were responsible for pre-harvest and post-harvest losses suffered by crop producers. The damage cause by pests and diseases makes it difficult for the farmers to preserve their produce and force them to sell the produce at the point of harvest. This problem also contributed to the lack of good market because soyabean produce are mostly scarce in the mid-year and during the planting time. This finding is in line with Abdulrahman *et al.* (2015) who observed that pests and diseases were severe constraints militating against crop production, as well accounting for both pre- and post-harvest losses.

Poor access to credit availability was also cited as very severe constraint to soybean production in the study area. This may account for the reason that most of the respondents are small- scale farmers and also that is why majority (56%) of the farmers were not having access to credit facilities. It is also implies that availability of credit contributed significantly to technology adoption because credit is necessary for the purchase and use of new technologies by low capital base farmers. This finding agree with Akpoko (2004) who reported that amount of credit received by farmers positively and significantly influenced the adoption of recommended soil management practices in Kaduna state.

Table 4.14 Constraints to soyabean production recommended practices

Constraints	**Frequency**	**Percentage**	**Rank**
High cost of labour	101	61.6	1st

High cost of technology	87	53.0	2nd
Lack of credit facilities	59	36.0	3rd
Lack of awareness	33	20.1	4th
Pests and diseases	24	14.6	5th
Complexity of the technology	14	8.5	6th
Lack of market	8	4.9	7th
Total	**326**		

4.5 Result of Tested Hypothesis

4.5.1 Hypothesis

It was hypothesized that there is no significant relationship between socio-economic characteristics of the farmers and their level of adoption of improved soyabean production technologies. The socio-economic characteristics of respondents considered her include; age, marital status, educational level, family size, sex family size, farming experience, and membership of cooperative societies. The hypothesis tested for significant relationship between farmers' socio-economic characteristics and adoption of improved soyabean production technologies. The instrument that was employed for this test was logit regression analysis. This particular instrument was test as it is capable of indicating the impact of a number of independent variables on a single dependent variable. It can also show that the contribution of each of the stated independent variables to the number of practices.

Figure presented in Table 4.15 show the result of the analysis, from the result, only farming experience and marital status had a negative but a significant relationship with adoption. It give a coefficient of .433 This makes it significant at .835 level of probability. This implies that the shorter the farming experience, the lower the number of recommended practice adopted. The result of the test also indicated the coefficient for the marital status was .548 and this makes it significant at 737. This implies that marital status had no effect on the adoption of improved soyabean production practices. Therefore, the null hypothesis was accepted, this implies that there is no significant relationship between farmers' socio-economic characteristics and the level of adoption of improved soyabean production technologies.

Table ;4.15 Logit regression analysis result of the relationship between farmers' socio-economic characteristics and level of adoption of improved technologies

Variable	B	SE	Df	Sig	Exp. B
Farm size	011	049	1	820	1.011
Farming Experience	067	086	1	433	.935
Age	007	023	1	758	993
Family size	123	122	1	315	1.131
Marital status	306	509	1	548	737
Sex	326	279	1	244	1.385
Level of education	.063				
Constant	.272	1.737	.4	878	1.312

Field survey, 2015

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.2 Summary

This study determined the factors influencing adoption of recommended soyabean production practices by farmers in Ijumu and Kabba-Bunu Local Government Areas of Kogi State, Nigeria. A combinations of purposive sampling and simple random sampling technique were used to select a total of one hundred and sixty four (164) farmers for the study. Data was obtained from primary sources. Analytical tools used were descriptive statistics such as percentages, mean, frequency distributions and regression analysis.

The results of the analysis show that majority (76%) of the respondents fall within the age range of 20-49 years; majority (90%) were also literate; about 38% had farming experience of 11-20 years with mean of 16 years. The majority of the farmers (57%) had contact with extension agents, majority (56%) were married and majority (82%) were male. However, majority (60%) of the respondents had farm size that ranges between 0.1-2.0 hectares; 77% were members of cooperative associations while majority (55%) had no access to credit and therefore financed their production through their personal savings.

The results further show that majority (87.2%) were aware of the recommended soyabeans production practices of planting healthy/viable seeds. Majority (76%) of the respondents obtained their information on the soyabean recommended practices through extension agents in the study area. The relationship between selected-socio-economic/institutional factors and adoption of recommended soyabeans production

practices show that out of nine variables, six had significant influence on adoption of technologies. These were age, farm size, education, access to credit, farming experience and extension contact.The results also indicate that there was high adoption of some practices like planting date, planting on flat ground, recommended weeding interval and recommended harvesting date which may be due to the simplicity of the practices and the attribute of not requiring too much money or labour to implement. However, there was low adoption of recommended practices like planting on ridges, herbicides application, recommended processing method and recommended soyabeans planter.

Finally, the most severe constraints faced by farmers in the adoption of recommended soybean production practices identified include high cost of labour (62%), high cost of the technology (53%) and low access to credit among (36%) of the respondents.

5.2 Conclusion

The study indicated that the adoption level of soyabean production technology was on the average in the study area. The socio-economic/institutional factors that positively affected the adoption of soyabean production technologies were age, farm size, level of education, amount of credit received, farming experience and extension contact. However, the major constraints against the adoption of the technologies include high cost of labour, high cost of the technology and low access credit among others.

5.3 Recommendations

Based on the findings of the study, the following recommendations were made:

i. Government and other stakeholders need to invest more on extension service delivery to sensitize soyabean on the recommended soyabeans production practices. This strongly has the potential to increase level of awareness and adoption of the practices as well as raise farmers' productivity, income, and level of living.

ii. The factors influencing the adoption of recommended soyabean production practices were age, farm size, education, access to credit, farming experience and extension contact. These factors should be given due consideration in extension campaigns for promoting the adoption of recommended soyabeans production practices.

iii. It is also recommended that government and non-governmental organization dealing with extension agent should therefore embark more on the facilitation techniques of extension delivery. This will enable the farmers to identify their problems, determine their needs, and discover their potential themselves rather than always feeding them with information and easy adoption of a technology.

iv. The study had identified some constraints such as high cost of labour, high cost of technology and low access to credit that affect adoption of recommended soyabeans production practices. It is recommended that government and non-governmental organizations as well as other intervening agencies in agriculture should ensure that strong institutional linkages and facilitation are established among farmers, input suppliers, credit institutions and market for effective service delivery and ease of technology adoption.

5.4 Contribution of the study to knowledge

i. The result of this study shows that the adjusted R^{-2} value was found to be 0.63, implying that the independent variables such as age, level of education, farming experience, marital status, farm size, and household size largely explained 63% of the variations in the adoption of improved soyabeans production practices.

ii. The study also found that majority (87%) of the farmers were aware of the recommended practices of planting healthy/viable seeds. Majority (76%) of the respondents obtained their information on the soy bean recommended practices through extension agents in the study area.

iii. The most severe constraints to the adoption of recommended soyabean production practices were high cost of labour (62%), high cost of the technology (53%) and low access to credit (about 36%).

iv. The most influencing factors to the adoption of recommended soyabeans production technologies are; sex, extension contact, and farm size.

v. The adoption of recommended practices was not influenced by the socio-economic variables of the farmers but by extension information services through the contact with the farmers in the study area.

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APPENDIX I: QUESTIONNAIRE FOR SOYABEAN FARMERS

Section A: Socio-Economic Characteristics

1. Age:_____years
2. Family Size: _____
3. Village / Town:_____
4. Sex: Male ( ) Female ( )
5. Marital Status: Married ( ) Single ( ) Widow ( ) Widower ( ) Divorced ( ) Separated ( )
6. How many members of your family assisted you in your soybean farming in the last growing season? (a) Adult (over 15 years) _____(b) children (below 15 yrs) _____
7. Do you usually hire labour for your soya bean production activities? Yes ( ) No ( )
8. If yes to question 7 above, how many people did you hire for soybean?_____
9. If yes, how much did you spend on hired labourers for soybean production in the last growing season in naira?_____
10. Education:
    (a) No formal education ( ) (c) Secondary School ( )
    (b) Primary School ( ) (d) Post-secondary school ( )
    (c) Others (specify) _____
11. Do you own land for agricultural production? Yes ( ) No ( )
12. If yes, how many hectares of land do you have?_____
13. How do you acquire these lands?

S/N	**Items**	**Hectares**
a.	Inherited	
b.	Lease	
c.	Purchase	
d.	Rent	
e.	Gift	

f.	Others (specify)

14. What is the total farm size allocated to soybean production?_____

15. How long have you been into soybean production? _____ years

16. Did you obtain credit for soybean production in the last two years?

    Yes ( ) No ( )

17. If yes, what was the source of your credit?

    (a) Relatives ( )
    (b) Friends ( )
    (c) Local money lenders ( )
    (d) Agricultural agencies ( )
    (e) Cooperatives ( )
    (f) Banks ( )
    (g) Others (specify)_____

18. In what form did you receive the credit?

    (a) In form of cash ( )
    (b) In form of inputs ( )
    (c) Others (specify):_____

19. If cash, how much was the total cash? N_____

20. If in the form of inputs, list them and their value in naira.

Inputs	**Value (~~₦~~)**

21. If you did not borrow, give reasons. Tick from the options below:

    (a) The interest rate is too high ( )
    (b) I tried to borrow but it was difficult ( )

(c) If have enough money ( )

(d) I don't like borrowing ( )

(e) Others (specify):_____

22. Are you a member of any cooperative society? Yes ( ) No ( )

23. If yes, give total number of cooperative societies you belong to _____

Section B: Agricultural Extension and Adoption of Improved Soybean Production Technologies

24. Have you had any visit with extension agents in the last growing season?

Yes ( ) No ( )

25. If yes, how many times were you visited by the extension agents during the last farming season?

(a) Twice in a month 3 ( )

(b) Once in a month 2 ( )

(c) About six times in a year 1 ( )

26. If yes, how often did you visit the extension agent during the last farming season?

(a) Twice in a month 3 ( )

(b) Once in a month 2 ( )

(c) About six times in a year 1 ( )

27. Are you satisfied with the visits?

Yes ( ) No ( )

28. If yes, give reasons:_____

_____

_____

29. If no, give reasons:_____

_____

_____

_____

_____

30. Are you aware of any improved soybean varieties in your area?

Yes ( ) No ( )

31. If yes, give name of the improved soybean varieties that you know in local dialect.

_____

_____

_____

_____

32. Are you aware of any improved methods of soybean production?

Yes ( ) No ( )

33. If yes, tick from the list below:

Recommended Improved Methods of Soyabean Production Being Aware of

S/N	METHOD	YES	NO
a.	Planting healthy / viable seeds		
b.	Recommended planting time ( )		
c.	Recommended Planting Spacing (___ x ____ cm)		
d.	Planting on ridges		
e.	Planting on a flat ground (broadcasting)		
f.	Recommended weeding time at 2-3 weeks after planting (WAP), 6-7, and 10 WAP		
g.	Herbicide application		
h.	Interplanting		
i.	Recommended harvesting time (2-4 months after planting)		
j.	Recommended soybean planter		
k.	Recommended processing method		
l.	Others (specify):_____		

34. Through what sources do you obtain information on recommended soybean production technologies?

S/N	Improved Soybean Production Technologies	Sources of Information
I		
Ii		
Iii		
Iv		
V		
Vi		
Vii		
Viii		
Ix		
X		
	Newspapers, Radio, Television, Extension Agents, Relatives / Friends, Sales Agents / Market, Cooperative Leaders, Research Institute / University etc.	

35. Did you receive extension training / advice on improved soybean production technologies? Yes ( ) No ( )

36. If yes, on what were you trained / given advise?

_____

_____

_____

37. How often have you benefited from this training / advice?

(a) Very often ( )

(b) Often ( )

(c) Rarely ( )

(d) Never ( )

38. Which of the improved soybean seeds do you use? Please give the names in local dialect.

_____

_____

_____

39. For how long have you been using the improved soybean varieties ? _____ years

40. Which of the improved soybean production methods did you use? Please tick from the list.

S/N	Recommended Improved Methods of Soybean Production	Yes	No
I	Planting healthy seeds / viable seeds		
Ii	Recommended planting time ( )		
Iii	Recommended planting spacing (____ x _____cm)		
Iv	Planting on ridges		
V	Planting on flat ground / broadcasting		
Vi	Recommended weeding time 2-3 weeks after planting (WAP) 6-7 and 10 WAP		
Vii	Herbicide application		
Viii	Intercropping		
Ix	Recommended harvesting time (2-4 months after planting)		
X	Recommended soybean planter		
Xi	Recommended processing method		
Xii	Others (specify):		

41. For how long have you been using the recommended improved soyabean production technologies? _____ years

Section C: Technological Variables Influencing Adoption of Improved Soyabean Production Technologies

42. What are the factors that influence your decision to use the improved production technologies? Please tick from the following list using the option below to complete the table :

A = Agreed = 3

UD = Undecided = 2

D = Disagreed = 1

S/N	(A) Relative Advantage Index	A	UD	D
I	The improved technologies have higher yield than the old ones			
Ii	The improved technologies provide higher income that the old ones			
Iii	The improved technologies are cheap / economical to adopt			
Iv	The skill required to use the improved technologies can be easily acquired			
V	The improved technologies require less labour			
Vi	The improved technologies make use of less input to give the same output as the old practices			
Vii	The improved seeds mature earlier than the old cultivars			
Viii	The improved seeds are resistant to pest and disease infestations			
S/N	**(B) Compatibility Index**	**A**	**UD**	**D**
I	The improved technologies are similar to the existing practices			
Ii	The innovation meets my needs			
Iii	The improved technologies gives me satisfaction			
Iv	The improved technologies fit well into the existing farming system			
S/N	**(C) Risk Level Index**	**A**	**UD**	**D**

I	The market for the products is not certain			
Ii	The price of both fresh / processed products are not favourable			
Iii	There is no guarantee of at least breaking even with the improved technologies			
Iv	There is no guarantee that the improved technologies will work			
S/N	**(D) Complexity Index**	**A**	**UD**	**D**
I	It is difficult to use the improved technologies correctly			
Ii	The level of skill required to use the improved technology is too high			
Iii	The improved technologies are too technical			
Iv	Training is required to correctly apply the improved technologies			

Section D: Others

43. What is the estimated weight of soyabean harvested in bags or kg/ha in the last growing season?_____

44. What is the estimated amount in naira realized from the sales of harvested soyabean product?_____

45. Is there any difference in your output as a result of adoption of improved soyabean production technologies? Yes ( ) No ( )

46. If yes, how? Decrease ( ) Increase ( )

47. What are the problems faced in the adoption of improved soyabean production technologies?_____
_____
_____

48. What suggestions will you give that can help improve soyabean production in this area?_____
_____

Thank you very much for your contribution