THE DIFFUSION AND ADOPTION OF RECOMMENDED AGRICULTURAL PRACTICES AMONG FARMERS IN THE NORTHERN STATES OF NIGERIA

by

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Dedicated to the memory of my beloved mother

Cathrine Omonijon Arokoyo and to my three sons

Yomi, Dapo and Seyi Arokoyo.

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THE DIFFUSION AND ADOPTION OF RECOMMENDED AGRICULTURAL PRACTICES AMONG FARMERS IN THE NORTHERN STATES OF NIGERIA

Johnson Olatunji Arokoyo

Under the Supervision of Professor Walter T. Bjoraker

Problem and Purpose

Nigeria has been experiencing a serious decline in agricultural production since the early 1970s despite great advances in agricultural research, mainly because of the slow adoption of recommended farm practices by the country's estimated 13 million peasant farmers.

The purpose of the study was to determine the Nigerian farmers' awareness and application knowledge of recommended agricultural practices and what major factors influence their adoption of such practices.

Methodology

Data were collected from 205 randomly selected farmers in the northern states of Nigeria using a pretested, structured interview schedule. Five hypotheses guided the analysis of the data. Data analysis employed frequency distributions, analysis of variance, Pearson correlation, and a stepwise multiple regression analysis.

Findings

Farmers were characterized by some degree of awareness and adoption, and partial application knowledge of recommended practices.

The most important sources of agricultural information were the extension agent, the agricultural shows and result demonstrations, the radio and other farmers.

Although the farmers did not perceive the recommended agricultural practices as highly relevant to their situations, they nevertheless perceived themselves as substantially involved in extension programming.

The major reasons hindering their adoption were: lack of capital, credit and labor; unavailability of inputs and lack of sufficient information and application knowledge. The major reasons motivating adoption included: the desire to improve production and standard of living and the availability of inputs, subsidies and incentives.

The variable most highly predictive of adoption was awareness of recommended practices.

Recommendations

Recommended agricultural practices must be developed with the active participation of the farmers so as to ensure the practices are relevant to the farmers' situations.

Farmers must be involved in all phases of programming designed to diffuse the recommended practices.

There is need for a more efficient system of procurement and distribution of inputs. The government should also provide adequate credit facilities and improve the tractor hiring services.

The "research people" should interact more with the farmers, opening the way more for a two-way communication system and laying the foundation for a more humanistic extension philosophy.

APPROVED BY.

\

DATE

CHAPTER ONE

INTRODUCTION

The Purpose of the Study

The purpose of the study is to determine how knowledgeable the peasant farmers in the ten Northern States of Nigeria are about recommended agricultural extension practices developed by the Institute for Agricultural Research and disseminated by the Agricultural Extension and Research Liaison Services, both of Ahmadu Bello University, through the extension workers in the field who are States' Ministry of Agriculture personnel. Further the study is to determine the importance of diffusion channels, and some of the factors influencing the adoption or rejection of the recommended practices by farmers. In addition, the study is to seek knowledge on how farmers' involvement in extension programming and their perception of the relevancy of recommended practices affect their adoption/rejection behavior. Knowledge of these factors are assumed to be useful in the modification and improvement of the present extension services and also in the planning and implementation of rural and agricultural development programs.

The Problem

A perenial problem in the less developed nations has been the problem of finding efficient and effective means of successfully transfering improved agricultural technology to peasant farmers, that is of course assuming the technology is both available and relevant to the peasant farmers' situations. In Nigeria, after nearly two decades of experience with an apparently improved extension service and personnel, a vigorous agricultural research program, and massive resource investments in rural development projects, the country still has not attained the goals and objectives of a strong economic and social development in the agricultural sector. Of major concern particularly, is the fact that food production, on account of extremely low yields, is not keeping pace with the population growth. What then are the major problems responsible for this situation?

According to most observers in and outside agriculture, and including the Nigerian Food Production Task Force (1), the main reasons are:

(i) decreasing soil fertility with limited use of fertilizer;
(ii) unimproved crop varieties and breeds of livestock;
(iii) lack of credit;
(iv) inadequate extension services;
(v) use of very simple manually operated tools;
(vi) occasional drought, and
(vii) losses due to diseases and pests in the field and storage (1).

Apart from reason (vi), which is a natural disaster, all the other

problems have to do with the development, communication and adoption of improved agricultural technology. However, Onazi (2) observed that Nigeria's research knowledge and output are nearly "twenty years ahead of extension and farmers' practices." Thus, the major problems apparently then, are the lag in the diffusion of recommended agricultural practices and the apparently slow adoption or complete rejection of the practices by the estimated 13 million peasant farmers in Nigeria who are primarily responsible for the country's food production.

Doubtless, the solution to the national problems of food supply, economic and social growth depend on achieving increased productivity on the vast numbers of small farm holdings throughout the country. The concern and urgen tneed to focus attention on peasants in Nigeria and in the less developed countries of the world generally in order to reduce and control world hunger, was highlighted by MacNamara (3) then president of the world bank, in his warning:

> without rapid progress in smallholder agriculture throughout the developing world, there is little hope either of achieving long-term stable economic growth or of significantly reducing the levels of absolute poverty.
>
> The fact is very little has been done over the past two decades specifically designed to increase agricultural productivity of subsistence agriculture.

Agricultural development defined in the context of increased food production, is dependent then to a large degree on the extent to which the ordinary peasant farmers incorporate recommended research

findings into their farming practices. However, these research findings, assuming they are both available and relevant to the farmers' situations, must first of all be communicated to them, the primary consumers of the information.

The critical elements in the introduction and diffusion of an agricultural innovation according to the diffusion process are "1) the innovation, 2) which is communicated through certain channels, 3) overtime, 4) among members of the social system" (4). The adoption process has been conceptualized as consisting of five stages: 1) the awareness stage, 2) interest stage, 3) evaluation stage, 4) trial stage, and 5) the adoption stage (4).

It can be assumed that it is because the diffusion and adoption model under the traditional extension system has not worked in Nigeria that we have the serious "lag" between research and extension, and the farmers' practices that Onazi (2) alluded to above. Several reasons can be advanced for this. For one thing, peasant farmers' information level about recommended practices has been found to be minimal in the third world countries. According to Shultz (5), information about improved farm practices rarely reach subsistence farmers in many less developed countries. Further, communication when it does occur is invariably in one direction, top-down, from the research institutions through the extension workers in the field to the farmers.

There are also several inherent false assumptions in the model. The first and perhaps the most significant one is the model's negative view of the peasant farmer as being "ignorant", "stupid and resistant to change" but that he may change based on being provided with information only.

Other inherent but nevertheless false assumptions in the Nigerian context are enumerated below:

1) that there are available for diffusion, agricultural innovations which are relevant, practical and economic to the peasants' farming, personal and social situations;

2) that the farmer is not only aware of the innovations but also possesses an application knowledge of the practices;

3) that the farmer has a free choice about the practices and that he is not subjected to a government-imposed project or campaign as is always the case in the third world countries;

4) that the farmer has the economic power to purchase the necessary resources for the trial and adoption of the recommended practices;

5) that the inputs necessary for adoption are not just available only but available timely;

6) that the farmer has adequate access to further information and guidance about the new agricultural technologies; and

7) that the peasants' social system is favorably disposed towards innovations.

It is sad to note that most of these false assumptions are taken for granted in our planning and implementation of national and

state agricultural and rural development projects and programs. Consequently, despite the fact that about two thirds of the country's population is involved in various phases of agricultural production, Nigeria still has to import large quantities of food. Agricultural production still remains traditional, characterized by small holdings, low inputs and minimum returns in the face of giant advances in agricultural research. This writer maintains that the failure of a great many farmers may probably be less a fault of their own than a disadvantage of their condition. It is from this perspective that this study has been designed to really determine how aware the farmers in the ten Northern States of Nigeria are about the recommended agricultural practices and if indeed they are aware, examine some of the factors affecting their adoption or rejection of the practices. It is presumed that the development and diffusion to farmers of a continuing flow of new and improved agricultural technology is central to the transformation of Nigeria's peasant and traditional agriculture into a modern one capable of eliminating the present inadequacies in the country's food production.

Background to the Problem

The Federal Republic of Nigeria has witnessed some dramatic changes politically, socially, and economically in the past two decades. This period was marked by remarkable expansion in facilities and numbers of universities, agricultural research institutions, and gigantic river basin development authorities. Although there was

also a significant improvement in the standard of living, the agricultural sector, unfortunately never kept pace despite a high level of resource investment. The country's food import situation is a testimony to this.

The Nigerian food import bill which was about ₦88 million in 1971, sharply shot to a high of ₦297.9 million in 1975 and a staggering ₦438.9 million in 1976(1), (See Table 1).

Table 1

Nigeria: Food Imports 1971-76

Year	Food Imports (₦* Million)
1971	87.910
1972	95.104
1973	126.260
1974	155.708
1975	297.863
1976	438.927

Adapted from: Food Production in Nigeria (Report of Statistical Task Force).

*(₦1.00 = $1.73 at time of writing. The International exchange rate fluctuates daily.)

The irony of the situation is that Nigeria is now importing food items it used to export. For example, the country exported ₦25.648 million worth of groundnut (peanut) oil in 1973 but imported ₦7.886 million in 1976 to meet her needs (8).

Another major concern during this period was the warning issued by a study group organized by the Federal Ministry of Agriculture and Rural Development in 1971. In effect, the group warned that unless drastic measures were taken by the government, there would be a short fall of about 16 million tonnes of the various food crops grown in the country by 1985. This prediction has been further substantiated by the latest projections of the Food Production Task Force (1) as shown in Table 2. Despite concerted efforts by the federal and state governments, the rather grim situation remains, and where and when importation of food items have been prohibited so as to encourage local production and processing, shortages have usually been the result.

Although the complimentary role of food imports to the local production is recognized and accepted, the ratio of one to the other becomes crucial when national security and prestige are considered. This is especially so in the case of Nigeria, the most populous black independent nation in Africa, where close to 80 percent of the country's population is engaged in one phase of agricultural production or the other. The government's view of the situation was clearly stated at the alunching of the Operation Feed the Nation

Table 2

Nigeria: Estimated Food Balances (1,000 Tonne)

Commodity	1980	1985	Percentage Change
Maize	-407.784	-833.889	104.49
Millet	-15003.621	-2946.225	95.94
Sorghum	-2435.849	-4753.344	95.14
Wheat	-52.778	-101.329	91.99
Yams	-2784.377	-5621.761	101.90
Groundnuts	-117.772	-230.730	95.99
Vegetables	-561.829	-1168.408	107.97
Poultry	-32.472	-67.621	108.24
Milk	-472.028	-959.091	103.19

Adapted from: Food Production in Nigeria (Report of Agricultural Statistical Task Force), 1979.

(OFN) program when the then Head of State, General Olusegun Obasanjo said that a nation that was not self-sufficient in food production, could not claim to be truly independent. Unfortunately though, the operation Feed the Nation program did not make any impact and the warning contained in the country's Third Development Plan (6) still remains very real today:

> The conclusion to be drawn is that at the present rate of growth of supplies, Nigeria will not be able to feed its people in the next decade unless there is a radical departure from existing attitudes to investment in agriculture.

The Setting

Location

Nigeria is situated on the west coast of Africa and it lies entirely within the tropics between latitudes 2°N and 15°N. It is bounded on the west by the Republic of Benin, on the north by the Republics of Niger and Chad, on the east by the Republic of Cameroun and on the south by the Gulf of Guinea. It has a total land mass of 94,849 sq km (7), approximately the size of Oklahoma and Texas States combined.

Climate

Although the entire country lies within the tropics, there are distinct variations between the climates and vegetations of the southern and northern regions. It is hot and humid in the coastal belt with a mean maximum temperature of about 30.55°C (87°F) and hot and dry in the north with a mean maximum temperature of 34.44°C (94°F). The average rainfall is about 50 cm in the north stretched over a period of 3-4 months, while rainfall in the south could be as high as 400 cm and stretched over a period of 11 months.

Vegetation

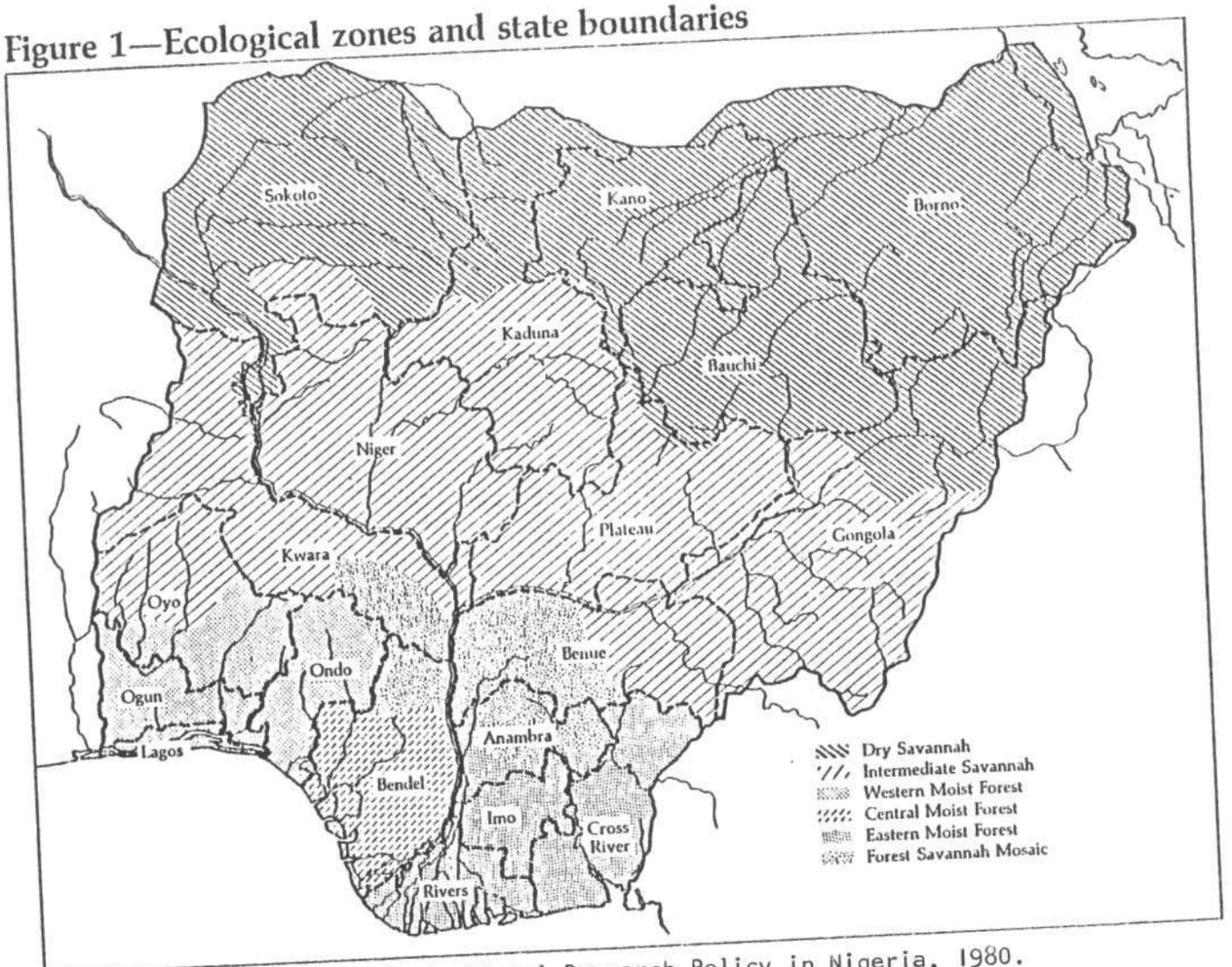
Because of the climatic variations, eight main vegetation zones are recognizable (8) (See Figure 1) and these have dictated to a large extent, the types of agricultural production carried on in these zones.

The vegetation exterts both a direct and indirect influence on the country's agriculture. For example, apart from its influence on utilization, the vegetation, directly influences the size and number of farm holdings by the ease with which it can be opened up for farming and by the rate at which it regenerates in form of weeds during cropping. Consequently, farms tend to be smaller in the thick forest zones than in the more open savannahs. Further, in a country where mechanization is still at its infancy, both land clearing and weeding become major factors in agricultural production.

Political Background

Nigeria, as it is known today came into being with the amalgation of the Protectorates of Northern and Southern Nigeria by the British in 1914. The country remained under colonial rule until independence, October 1st, 1960. Meanwhile both the Western and Eastern regions achieved self-government in 1957 while the Northern region reached this milestone in 1959. The Federation resulting from the October 1st independence was declared a Republic three years later.

Figure 1—Ecological zones and state boundaries



From: Idachaba, F.S. Agricultural Research Policy in Nigeria, 1980.

The military government that took over power as a result of the July 29, 1975 coup created seven more states from the existing 12, bringing the total to 19. Ten new states were thus carved out of the six northern states which were created originally from the single former northern region of Nigeria. The Ahmadu Bello University, although now a federal government institution was originally a Northern Nigerian establishment and it has survived the political and administrative changes and remains a strong unifying element among the ten states of the region.

The Population

According to the 1963 national census, the population of Nigeria was 55.1 million. With an estimated annual rate of growth of 2.7 percent, the population is currently placed at 80 million. This is the largest population of any country in the whole of Africa.

Economic and Agricultural Background

Prior to the oil boom of the early 1970s, the dominant force behind the Nigerian economy, has been the agricultural sector, accounting for no less than 60 percent of total exports. The major revenue was derived from the export crops - cocoa, cotton, groundnuts, oil palm products and rubber. The oil boom has significantly changed the economic, political and social life in Nigeria. Currently, petroleum accounts for about 80 percent (9) of the value of total export and it does not only dominate the export trade and the foreign exchange sector, it has relagated the agricultural sector

completely to the background. This period marked the downward trend in the country's agricultural prodcution (Table 3).

Table 3

Nigeria: Share of Agriculture (Using Total GDP Including Minerals)

	1970/71	71/72	72/73	73/74	74/75	75/76
Proportional Share	0.44	0.41	0.36	0.33	0.30	0.28

Adapted from: Food Production in Nigeria (Report of Agricultural Statistical Task Force), 1979.

Despite the oil boom, agriculture, nonetheless, still remains the basis of life in Nigeria with about 80 percent of the people living, working or having livelihoods dependent on the land (10). It is ironic that although blessed with vast land resources, less than 40 percent (11) of the country's estimated total arable land is currently being farmed and consequently she has been experiencing food shortages that should never occur.

The most important features of the Nigerian agriculture are the low technological level and the relatively small holdings of the majority of the peasant cultivators. The agricultural system and practice are "characterized by the practices of shifting

cultivation, or land rotation, subsistence farming, low minimum inputs, low productivity and inability to meet the challenge of increasing population and increasing demand in quality and quantity of food and raw materials" (11). Production is primarily by a predominantly illiterate, rural population. Under this system, the country's agricultural research and extension services become crucial in bringing about needed agricultural development, self-sufficiency in food production and a self-reliant economy. It is thus the combined objective of the states' Ministry of Agriculture and Natural Resources, the Institute for Agricultural Research, the Agricultural Extension and Research Liaison Service, (AERLS), and the field extension workers to bring about the transformation of the region's traditional agricultural system to one which incorporates modern technology.

The AERLS and the Extension Services in Nigeria

It will be most appropriate here to give a brief historical review of the agricultural extension service in Nigeria in order to bring the problem and objectives of this study into proper contextual perspective.

The philosophy which established and directed agricultural extension services in Nigeria during the colonial era is extremely different from what it is today. Under the British, the main objective was to undertake the experimental production of export crops to

provide raw materials for the industries in England. The extension system which then evolved was patterned along the lines of the British Agricultural Advisory Service and carried out by the Ministries of Agriculture which were established by the Richards Constitution of 1921 in then Northern, Western and Eastern Regions. By the same proclamation, each regional ministry had a Regional Research Station, a School of Agriculture and a Field Services Division. The Research Stations were charged with research on the principal export crops - groundnuts, cotton, cocoa and oil palm, while the schools of Agriculture were to train extension personnel who would teach farmers improved practices in the field services division for the production of these crops.

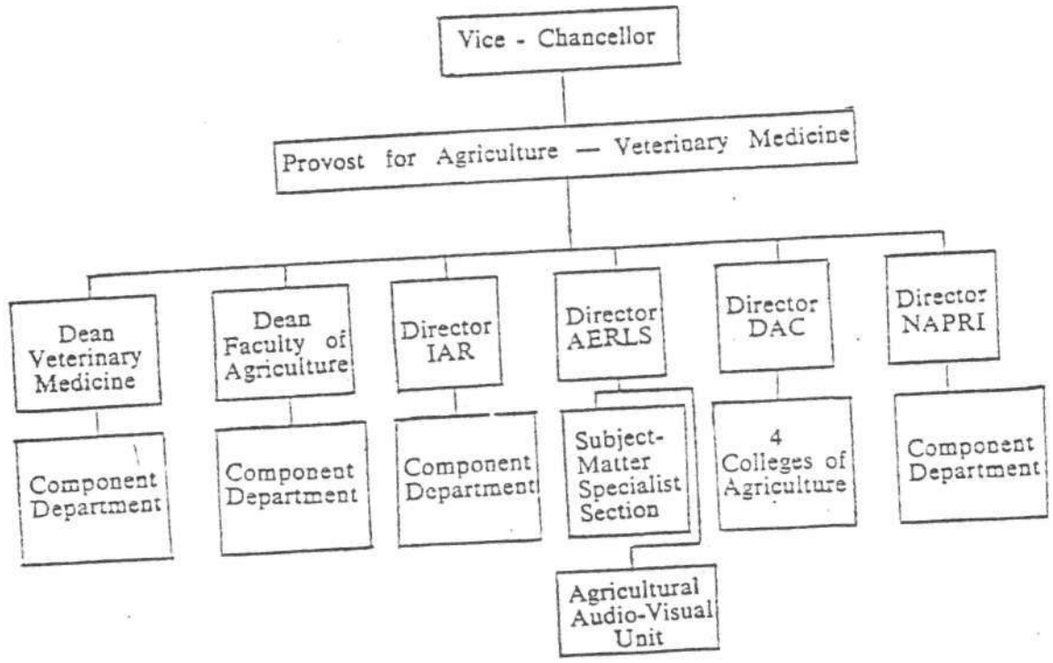
With the exit of the British and the British Agricultural Advisory Service - patterned extension at Nigeria's independence in 1960, came the first major change in philosophy and system of extension -- enter a modification of the world-famous Cooperative Extension Service of the U.S. under the auspices of the United States Agency for International Development technical assistance. Under the arrangement, special relations were established between Ife University and the University of Wisconsin; between the University of Nigeria and Michigan State and between the Ahmadu Bello University and Kansas State. The program among other things, provided for the training of man-power at all levels and all fields in agriculture.

It was during this period that the Agricultural information Section of the Field Services Division of the then Northern Nigeria Ministry of Agriculture was created and attached to the Regional Research Station - the Institute for Agricultural Research (IAR) in Samaru. The section was to act as a conduit for transferring research results to the Field Services Division of the Ministry and at the same time provide a feedback to the Institute on the problems in the field. Later the section was renamed the Extension and Research Liaison Section and made an integral part of iAR. Both were later transferred from the Northern Ministry of Agriculture to the Ahmadu Bello University in 1965. This new arrangement of university teaching, research and extension modelled after the United States Cooperative Extension Service is a complete departure from the "Standard British Model" as described by Aximn and Thorat (12) in their comparative study of agricultural extension systems. By a Statute of the Ahmadu Bello University (Statute No. 19), ERLS was constituted into an autonomous institute - the Agricultural Extension and Research Liaison Services within the Ahmadu Bello University (13), (See Figure 2).

Agricultural extension in the Nigerian context today, is the provision of practical, problem-oriented education and advisory services in all areas of agriculture to the farmers and their families through the diffusion of recommended agricultural practices from the various agricultural research institutions in the country.

Figure 2

STRUCTURE OF AGRICULTURAL EXTENSION AND RESEARCH LIAISON SERVICES (AERLS) WITHIN AGRICULTURAL COMPLEX OF AHMADU BELLO UNIVERSITY



NOTES

1. Scheme of service for AERLS staff is the same as that for Research Fellows in the University Research Institutes and as well as Lecturers in the University Faculties
2. IAR — Institute for Agricultural Research
3. DAC — Division of Agricltural Colleges
4. NAPRI — National Animal Production Research Institute
5. AERLS — Agricultural Extension and Research Liaison Services

From: AERLS, Ahmadu Bello University, 1978.

There are currently 13 such research institutions in Nigeria established under the Agricultural Research Institutes Decree No. 35 of 1973 (7). The major emphasis thus, has been on activities designed to provide farmers with production — increasing information. This type of production-oriented extension program has three primary objectives according to Mellor (14):

(i) initiating and stimulating a framework of farmer attitudes and aspirations so as to be favorably disposed towards technological innovations;
(ii) the diffusion of production-increasing research results from research and experiment stations and a feedback of farmers' problems to the research institutions; and
(iii) the provision of training and guidance for farmers in their farming decisions.

These objectives however are still ideals rather than realities in Nigeria.

The States' Ministry of Agriculture, Field Services Division, have the primary responsibility for extension delivery to the farmers directly. In addition to the dissemination of production-increasing agricultural information, the extension services are also responsible for the procurement and distribution of essential agricultural inputs, and also for other extension-related activities like seed multiplication, tractor hiring services and land development schemes. However, the extension services no longer have any regulatory functions. Unlike in most developed countries, the extension services in Nigeria cover an extremely wide scope of activities. This, coupled with inadequate and poorly trained staff has affected the services adversely.

During the 1962-68 development plan period, it was the intention of the then Northern Nigeria Ministry of Agriculture to have an extension worker to every 2,000 farmers (15). This modest target was considered by Rowat (16) as unsatisactory for an efficient extension service and instead he recommended that:

> an objective of one full-time extension worker per 1,000 farm families is a practical one which will give reasonable coverage and be within the country's resources to maintain.

This objective was carried over into the ministries of agriculture of the newly created states in the north following the political and administrative changes in the country between 1966 - 1970. Such was the optimism in the states that a target date of 1975 was set for achieving the objective but as Prawl (17) predicted in 1971, "this goal cannot be achieved ..." He observed however that concrete steps were on the way to significantly improve the situation. Today, about a decade later, sadly, the ratio of extension workers per farmers is still "one to 3,000 and often it is very much worse than that" (10).

Since its creation in 1963, the Agricultural Extension and Research Liaison Services (AERLS), has been in the forefront in the delivery of agricultural extension services in the northern states. Its main objective is the dissemination of new and improved technology emanating primarily from the Institute of Agricultural Research, Ahmadu Bello University, to its immediate clientele - the extension personnel of the ministry of agriculture in the ten

northern states of Nigeria (Figure 3). It also has the responsibility of bringing back field problems from the states to IAR and using the information in helping decide research priorities in the institute. Its information dissemination activity is primarily through the publication of extension materials in form of recommended practices, guides, bulletins, posters and flipcharts, etc. Logistic support is also provided for the states' extension personnel through in-service-trainings, workshops, field visits and farm broadcasts.

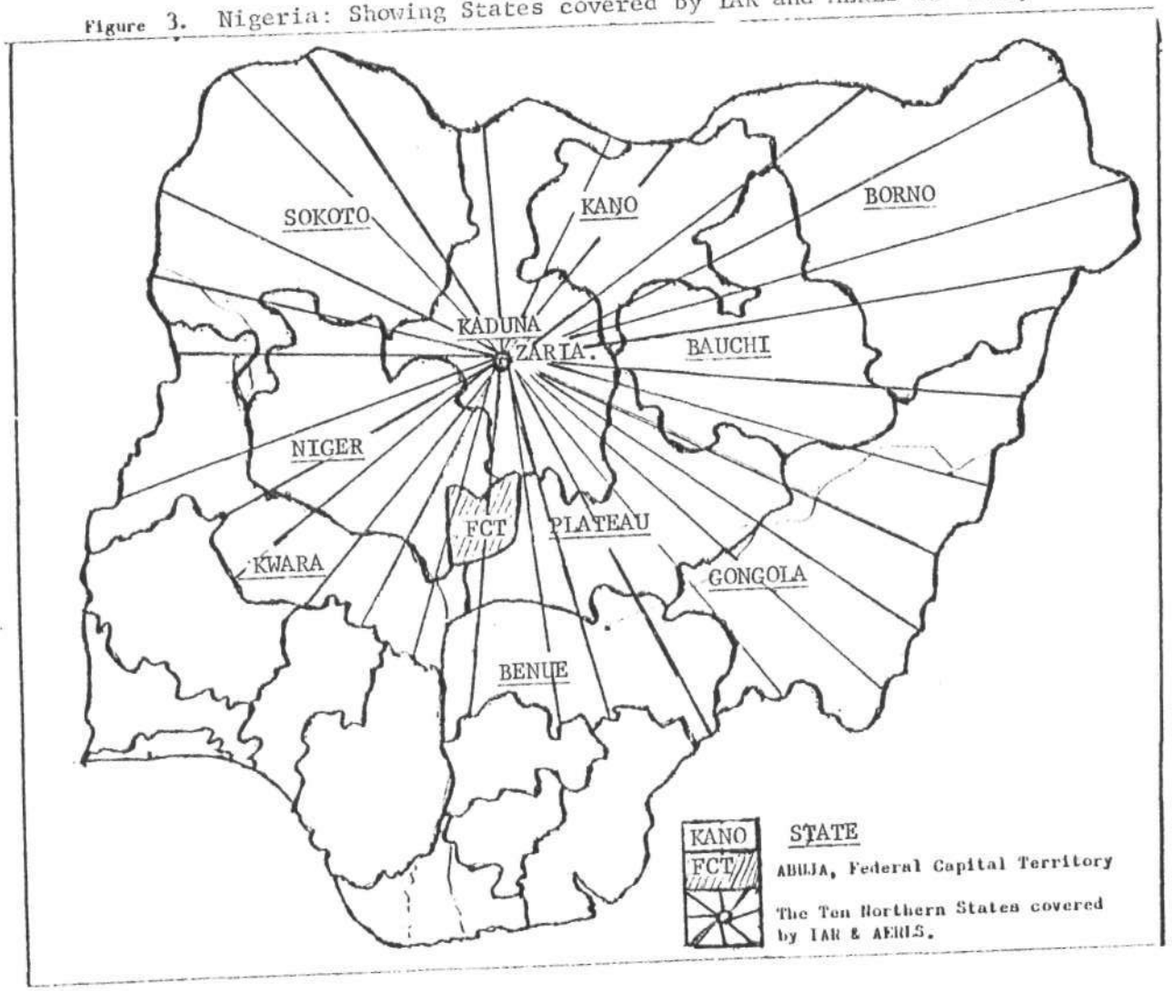
Presumably the combined efforts of the AERLS specialist staff and the states' ministry of agriculture will with a new orientation, approach and extension philosophy, appreciably make the farmers more receptive to new and improved agricultural technology. A new approach with a more humane philosophy will make the extension services more people-oriented than program-oriented, and thus more successful.

The Study

Recommended Practices

It is the considered opinion of this writer that the quickest way to increase agricultural productivity significantly in Nigeria, would be through the adoption of recommended practices by the masses of peasant farmers. Four of such practices were selected for a detailed study of awareness, communication sources, farmers' perceptions of improved practices and extension programming, and the

Figure 3. Nigeria: Showing States covered by IAR and AERLS of ABU, Zaria.



overall farmers' adoption-rejection behavior. These practices are considered crucial for increased agricultural production but nevertheless involve only simple management practices unlikely to exceed the comprehension of a majority of the peasant farmers. Further, these practices are considered neutral to scale and can be used quite profitably on existing small holdings (18).

Use of Improved Seed Varieties

There is still as yet no seed processing industry in Nigeria and as such the states' ministry of agriculture, have the responsibility for multiplication and distribution of improved seeds and seedlings to farmers. According to the Task Force on Food Production (1), less than 10 percent of the farmers are benefitting from the use of improved varieties. Thus a majority still depend on local, low yielding varieties for the agricultural production practices. This horrible situation certainly calls for an investigation. It is beyond argument that increased yields cannot be obtained without the supply and use of certified and high yielding varieties.

Use of Fertilizers

Despite the tremendous fertilizer importations into the country lately (1), and the establishment of a fertilizer production plant, fertilizer use in Nigeria (measured as per hectare consumption), is still extremely low when compared to other developed and less developed countries (19).

Although no reliable data on aggregate yearly consumption of fertilizer exists in Nigeria (20), it would be hazardous to estimate use by the yearly import figures. Certainly, import figures do not directly reflect use "since there are usually stock carry-overs from year to year (1).

Results of previous studies (20) revealed that the major constraints limiting fertilizer use in Nigeria in the past were:

1. The cultural practice of shifting cultivation
2. The unavailability of fertilizer responsive varieties (particularly of food crops).
3. Moisture stress (particularly in the drier areas of the North).
4. Unfavorable price relationship
5. Lack of credit
6. Lack of adequate information; and
7. Deficiencies in the procurement and delivery system.

Because of the advances in crop breeding at IAR and the heavy government subsidy of prices, some of the constraints mentioned above have become less limiting in Nigeria today.

Use of Crop Protection Chemicals

Just as is the case with fertilizers, reliable data on the consumption of crop protection chemicals are scanty. Although reliable import data are available, these do not reflect consumptio at all(1). There has been a steady rise in the quantities of insecticides imported unlike the fungicide imports which have been rather erratic.

According to the report of the Agricultural Statistics Task Force(1), over 50 percent of the total insecticides imported is used on cocoa as a major cash crop "with the remainder going into pest control on cotton, yams, sugar-cane, miscellaneous crops and into teetse control." The Task Force (1) also noted that 80 - 90 percent of the fungicides imported "is also absorbed by cocoa spraying for black pod control, with only little quantities going into seed dressing, small grain treatment, vegetables and oil palm." Various reasons have been suggested for the limited use of agrochemicals on food crops. Among these is the lack of suitable agrochemicals and the package of technology necessary for their utilization(1). Hopefully this study will shed some light on this and other factors influencing farmers' adoption or rejection of these packages.

Objectives and Hypotheses

The primary objective of this study is to determine how knowledgeable farmers in the ten northern states of Nigeria are about recommended practices generated by the Institute for Agricultural Research and disseminated by the Agricultural Extension and Research Liaison Services both of Ahmadu Bello University, through the extension workers who are states' ministry of agriculture personnel in the field. Further, the study will determine the importance of diffusion channels and some of the factors influencing the adoption or rejection of the practices by farmers. In addition, the study is to determine how farmers' perceptions of the relevancy of the

practices and their involvement in extension programming, affect their adoption behaviors.

Specifically, the study has the following objectives:

1) Determine the level of the Northern Nigerian farmers' awareness and application knowledge of recommended agricultural practices, and other relationships, if any, between these and their adoption of the practices.

The following hypotheses have been formulated to test this objective.

Hypothesis Ia: There is no significant correlation between farmers' awareness of recommended agricultural practices and their application knowledge of such practices.

Hypothesis Ib: There is no significant correlation between farmers' awareness of recommended agricultural practices and their adoption of such practices.

Hypothesis Ic: There is no significant correlation between farmers' application knowledge of recommended practices and their adoption of such practices.

2) Determine the relative importance to the farmers, of the various sources of agricultural information.

Hypothesis II: There is no significant difference in importance, as rated by the farmers, of the various sources of agricultural information.

3) Determine the farmers' use of the various sources of agricultural information and the relationship, if any, between this (utilization)

and farmers' socio-economic status:

Hypothesis III: There is no significant difference among the various socio-economic groups of farmers and their use of the various sources of agricultural information.

4) Determine the personal, farming and extension service exposure characteristics of farmers and what effects, if any, these have on farmers' adoption behavior. Three specific hypotheses were formulated to test this objective:

Hypothesis IVa: There is no significant correlation between farmers' individual characteirstics and their adoption of recommended agricultural practices.

Hypothesis IVb: There is no significant correlation between farmers' farming characteristics and their adoption of recommended agricultural practices.

Hypothesis IVc: There is no correlation between farmers' extension services exposure and their adoption of recommended agricultural practices.

5) Analyze the farmers' perceptions of the relevancy of recommended practices, their perceptions of their involvement in extension programming, and determine whether there is any relationship between these and farmers' adoption behavior. Two hypotheses were formulated for this objective:

Hypothesis Va: There is no significant correlation between farmers' adoption of recommended agricultural practices and their perceptions of the relevancy of the practices to their

situations.

Hypothesis Vb: There is no significant correlation between farmers' adoption of recommended agricultural practices and their perceptions of their involvement in extension programming.

The study will also attempt to answer the following research questions for which no hypotheses have been formulated:

i) Information use: What do farmers do, when they become aware of a recommended farm practice?

ii) Motivators and inhibitors of adoption: What are the major reasons that motivate or hinder the Northern Nigerian farmers in the adoption of recommended farm practices?

Importance of the Study

It is hoped that this study will greatly improve our knowledge of the northern Nigerian farmers' behavior and problems regarding the adoption or non-adoption of recommended agricultural innovations developed by IAR and extended by the AERLS. This is especially important since agricultural and rural development in Nigeria depend to a great extent on the degree to which the ordinary farmers are able and willing to incorporate research findings into their farming practices.

This study will also serve as a useful feedback for both the IAR which developed the practices and the AERLS which is responsible for their dissemination. No doubt, the feedback will provide a more rational basis for determining research priorities at IAR and in

selecting more practical, effective, and efficient communication channels by AERLS. Further, it will give AERLS and the ministries' extension workers some useful ideas about which practices are more likely to be readily accepted by farmers. Overall, the meagre extension services' resources in terms of inadequate and poorly trained staff, minimum equipment and funds would be more effectively applied.

Useful and important information will also be provided in this study for the officials of the states' ministry of agriculture who are responsible for planning agricultural projects and delivery to farmers. Considered to be especially important in this regard, is knowledge of farmers' perceptions of their involvement in extension programming and the relevancy of the recommended practices they are expected to adopt. A thorough knowledge and understanding of the farmers' constraints and factors motivating their adoption of modern agricultural technologies, are crucial in formulating policies and planning for both short and long term agricultural development projects which are relevant to local needs.

It is hoped humbly, that in some little way, this study would provide some useful information for the Federal Government of Nigeria to correct some of the anomalies, misconceptions and imbalances regarding the agricultural sector in the country's historic N30 billion Third Development Plan in the next plan period.

This study is viewed as also important for other governmental agencies involved in rural development, the mass media and agri-business concerns, all who have very vital roles to play in the development of Nigeria's agricultural sector on which the economy is founded.

Overall, it is hoped that this study will contribute in some way to the gigantic task of reversing the country's present decline in agricultural production through modernization and expansion.

Limitations of the Study

The two most important limitations of the study were financial and time constraints. On account of these, it was not possible to give the Agricultural Assistants who collected the data as intensive a training as was originally planned. For the same reasons the researcher was not able to supervise all the interview sessions.

Apart from these and the other limitations normally inherent in a research based on the interviewing techniques and structured interview schedules, this study was further limited by the fact that most of the respondents were illiterates and as such, interpreters were used for the translation of the questions and reporting of answers. It can only be assumed that interviewers were capable of correctly interpreting the meanings of the questions for the farmers and were similarly capable of correctly recording their responses. Closely related to this was a major concern that AAs might view the farmers' responses as a reflection or measure of their own

competency and performance and thus manipulate the responses. The best solution to this limitation would have been to use "neutral" recorders but this was not feasible.

Most peasant farmers in Nigeria have always been negative towards government personnel asking questions about their socio-economic status thinking such are for use in tax assessments. So a major limitation in this study was the possibility of farmers giving false answers to certain questions despite the explanations of the purposes of the study before the interview.

Although the use of a structured interview provides ease of data handling and analysis, this is however a limitation in that it precludes in-depth interviews which would otherwise provide important discriminating details in information. There is of course the tendency for questions in structured interviews to have different meanings for different people. This was further complicated in this case by the use of interpreters.

The fact that many villages in the survey area were inaccessible to a motor-vehicle automatically eliminated them from the survey sample. This in effect limited the representativeness of the sample. This limitation makes it more difficult to generalize the findings. It is however assumed that respondents were typical small-scale farmers in Northern Nigeria.

Further, much of the data sought was dependent on the recall ability of the farmer. Normally this ability would vary with

different farmers, thus constituting a limitation.

Finally, because of the large population and geographical area covered, it was not possible to obtain one truly randomly selected sample, rather, randomly selected samples were used in the analysis.

Definition of Terms

Awareness Knowledge: Knowledge that an innovation or idea exists. It is conceptualized that this occurs in an individual due to random or non-purposive activities (21).

Application Knowledge: Consists of information necessary for the proper application and incorporation of a practice, i.e., information necessary for adoption of an innovation by an individual.

Recommended Practice: An agricultural practice or package developed by the Institute for Agricultural Research of Ahmadu Bello University and approved by the Professional and Academic Board of IAR, and disseminated as such by AERLS. As Norman (22) pointed out:

> Care is taken in making recommendations that they are both profitable and involve minimal risk as far as the farmer is concerned. As a result, before being accepted as recommendations, the proposed improvements are subjected to exhaustive testing over large areas for more than one growing season.

Recommended practice is used synonymously in this study with "extension innovation", "improved farm practices", "agricultural innovation", "new improved technology", and "recommended extension package".

Adoption: The acceptance, incorporation and continued ose of a recommended practice by a farmer.

Rejection: This is the non-acceptance of a recommended practice by a farmer as distinct from "discontinuance" which is the rejection of a recommended practice that has been previously adopted.

Innovativeness: The degree to which a farmer is relatively earlier in adopting recommended practices as compared to other farmers in his social system.

Perception: This is the meaning an individual gives to the way he views others, places, ideas or things e.g. recommended practices, extension programs, etc. It is structured by the individual's knowledge, past experiences, attitudes, motives and values. Often the meaning for the individual is totally independent of scientific facts. According to Ariffin (23), perception has the following characteristics:

1. It is a personal matter so there may be as many different perceptions as there are individuals.
2. It is usually considered and dealt with in terms of what the individual has experienced or is experiencing.
3. It involves perceiving, interpreting, and describing stimuli in terms that are meaningful for the individual concerned.
4. The reception and interpretation of the stimuli are influenced by both internal and external factors.
5. The phenomenon is dynamic and so it's ever changing within the individual.

Agricultural Assistant (AA): A village level extension worker who has completed five or six years of secondary school and a two year training course at the School of Agriculture. He is an employee of the States' Ministry of Agriculture. Used synonymously in this study with "extension agent", and "change agent".

Agricultural Instructor (AI): A village level extension worker who has completed six or seven years of primary school education and has undergone a nine month course at a Farm Institute; usually an employee of the local government. He is also an extension agent or a change agent.

Groundnuts: Peanuts.

Guinea-corn: A type of grain sorghum

Cross-tying: "The practice of building small bunds at certain intervals in the ridge furrows" (24).

Local Government Area (LGA): An administrative unit of local government in Nigeria which is equivalent to a county in the United States.

Ministry of Agriculture (MOA): A state government department/agency responsible for the promotion and development of agriculture in the widest possible sense i.e., it covers extension, livestock, cooperatives, fisheries, forestry and irrigation. In some states it is referred to as the Ministry of Agriculture and Natural Resources

(MANR) while in others the livestock and forestry responsibilities are divorced from the other activities and constituted into a Ministry of Animal Health and Forest Resources (MAH & F).

Naira: A unit of Nigerian currency equivalent to about $1.73 U.S. dollars at the time of writing.

Peasant: A traditional northern Nigeria farmer with holdings of about four hectares or less, with hand labor as his principal source of power, whose production is basically subsistence, sells or exchanges only a minor part of his total farm production and who views security or risk minimization as important criteria in his farming decisions. He is nevertheless an "economic man" capable of making rational economic decisions (25).

ABBREVIATIONS

ABU: Ahmadu Bello University, Samaru, Zaria.

AERLS: Agricultural Extension and Research Liaison Services, Samaru.

IAR: Institute for Agricultural Research, Samaru.

MOA: Ministry of Agriculture.

MANR: Ministry of Agriculture and Natural Resources.

MAH & F: Ministry of Animal Health and Forestry.

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CHAPTER TWO

THEORETICAL FRAMEWORK AND REVIEW OF LITERATURE

The Diffusion and Adoption of Innovations

The vast majority of the early research on the diffusion and adoption of agricultural innovations was done in the United States, particularly in the midwestern land-grant universities. Prior to 1960, research in this area, in the developing countries, was insignificant. Rogers(1) pointed out that out of the 405 empirical studies completed before 1960, only 9.3 percent was done in the third world countries. This figure however, had risen to 26.8 percent of all documented studies in the field by 1965.

A recent bibliography by Rogers and Thomas(2) revealed that the annual frequency of diffusion research publications increased until about 1968 and has since taken a downward trend.

Although the early diffusion adoption research studies covered such diverse fields as rural sociology, anthropology, education, industry, and the medical sciences, the major bulk of the studies have come from the rural sociology discipline. It should be pointed out however, that the rural sociology work on the diffusion and adoption of innovations, is traceable to two significant antecedents viz: the felt need of the newly established United States Cooperative

Extension Service in 1914, to evaluate its activities in terms of changed behavior of farmers as a measure of their adoption of the recommended farm practices by the extension service; and secondly, the work of anthropologists interested in investigating the spread of cultural traits between different cultural groups. (2)

There is no doubt that a voluminous body of literature exists in the area of diffusion and adoption of innovations. Rogers(1) in his Bibliography on the Diffusion of Innovations, listed over a thousand studies. With such volume and diversity it would be impossible to do a comprehensive literature review, rather, a selective review as it relates to the variables of this study will be carried out. For ease of handling, the division of diffusion-adoption research into four major problem areas by the sub-committee on diffusion and adoption of farm practices of the Rural Sociological Society(4) will be used.

However, in order to fully appreciate and understand the review, it might be pertinent at this juncture, to briefly examine the diffusion-adoption theory.

The diffusion and adoption of an innovation is a multidisciplinary theory of planned social change which is brought about by the spread of new ideas, practices or technologies throughout a social system. The classical diffusion-adoption theory is made up of two components - 1) the diffusion process and 2) the adoption or innovation-decision process.

The Diffusion Process

According to Rogers and Shoemaker(5), the diffusion process comprises of four critical elements: 1) the innovation, which is defined as an idea, practice or technology that is perceived as new by an individual; 2) its communication through various channels, 3) over time, 4) among members of a social system. Thus, the process then involves the transmission of information about an innovation from an originating source to the ultimate or potential users. In this study the innovations to be examined are recommended agricultural practices and the originating source is the Institute of Agricultural Research of the Ahmadu Bello University, Zaria, Nigeria; the ultimate or potential users are the peasant farmers in the ten northern states of Nigeria.

The Adoption Process/Innovation-Decision Process

A farmer's decision about whether or not to adopt a recommended agricultural practice has been recognized to occur over a period of time in stages rather than instantaneous. The adoption process was postulated by the North Central Rural Sociology Subcommittee for the Study of Farm Practices(4) as consisting of five stages:

1. Awareness Stage: whereby an individual becomes aware of the existence of an innovation;

2. Interest Stage: the individual develops an interest in the innovation and actively seeks more information about it.
3. Evaluation Stage: the individual makes a mental evaluation of the innovation relevant to his own personal situations and then decides whether or not to try the innovation.
4. Trial Stage: based on the individual's judgement of the worth of the innovation, he actually tries it on a small scale to determine the relevance and usefulness of the innovation for himself - a practical evaluation.
5. Adoption Stage: based on the individual's mental or practical evaluation he makes a final decision as to whether to adopt or reject.

The adoption-process can therefore be defined as the acquisition and processing of information about an innovation followed by a behavioral change.

The five-stage adoption process model has however been criticized as too simplistic because of the following deficiencies:

1. The model views the process as always ending in adoption whereas in reality rejection may be the final decision;
2. The lockstep approach gives the impression that the steps always occur in the sequential order whereas some of the stages may either be skipped or occur simultaneously. It is agreed that evaluation actually occurs throughout the process rather than forming a stage in the model.

3. It has been discovered that the process rarely end with adoption as there is always a further information seeking behavior to confirm or reinforce a decision which may lead to a different outcome.

To make up for these deficiencies therefore, Rogers and Shoemaker(5) has advanced the "innovation-decision process" which is conceptualized as consisting of four rather than five stages:

1. Knowledge: The individual is exposed to the innovation's existence and gains some understanding of how it functions.

2. Persuasion: The individual forms a favorable attitude towards the innovation.

3. Decision: The individual engages in activities which lead to a choice to adopt or reject the innovation.

4. Confirmation: The individual seeks reinforcement for the innovation-decision he has made, but he may reverse his previous decision if exposed to conflicting messages about the innovation.

For instance, a farmer may decide to discontinue a practice which he had previously adopted on acquiring more information about the practice. Rogers and Shoemaker(5) defined "discontinuance" as "a decision to cease use of an innovation after previously adopting it."

As far as can be determined from the literature of diffusion research, they have been only relatively few studies specially designed to investigate the nature of discontinuance. From the few studies though, it can be concluded that the rate of discontinuance is surprisingly high for many innovations so much so that Leuthold(6),

in his study of Wisconsin farmers concluded that the rate of discontinuance was just as important as the rate of adoption in determining the level of adoption of a farm practice at any particular time. Similarly, Rogers and Niehoff (7), working in the former Eastern Region of Nigeria, found that two high-adoption innovations, fertilizer and N.S.I. maize, were also high in discontinuance. It is important therefore for extension agents to recognize this phenomenon and pay particular attention to it. This present research has been designed to determine the rate of discontinuance of selected recommended practices among Northern Nigerian farmers and the reasons for the behavior.

The "Adopter"

As has already been stated above most of the diffusion research has focussed on the individual farmer as the unit of analysis rather than the social system. This in fact has been one of the major sources of criticisms of the classical diffusion-adoption model.

The "Adopters" Perception of the Innovation

One of the most important determinants of the outcome of the innovation-decision process, is the adopter's perception of the characteristics of the innovation. Perception here is defined as "the way an individual responds to any sense or impression which he

detects" (8). Perceptions not only vary with individuals, it may also differ widely from what is considered to be "real". Thus a recommended practice thought to be an excellent innovation, by the research scientist who developed it, may not be viewed similarly by the local farmer. Perception then is a function of situations. This study has been designed to investigate the Nigerian farmers' perception of the relevancy of recommended practices and their adoption of the practices.

Criticisms of the Classical Diffusion-Adoption Theory

This examination of the diffusion-adoption theory will be incomplete without looking at some of the major criticisms of diffusion research today which has been based on the classical diffusion-adoption theory. Among these criticisms are:

1. Because of its inclusion of the time dimension, there is a heavy dependence on recall data and this makes accuracy of data suspect at times. The problem is further worsened by the fact that recall ability varies with different individuals, the type of innovation and the length of time of introduction. This shortcoming is of crucial importance when collecting data from a highly illiterate and uneducated clientiele as was the case in this study.
2. Although viewed as a multidisciplinary theory, too much emphasis has been placed on the type of innovation as the basis for the different research disciplines. Consequently, it has been difficult

to exchange, standardize and generalize findings across the various disciplines.

3. The theory basically assumes "free or optional choice" among alternatives. So, most of the diffusion and adoption research studies have focussed primarily on optional innovation-decisions to the exclusion of the collective or authority innovation-decisions. In most developing countries, agricultural policies and programs are more often than not of the authority innovation-decision type, involving a series of government-determined and government-sponsored agricultural programs and projects.

4. There has been an overemphasis on the individual as a unit of analysis rather than the social system.

5. Although, only 31 percent of the empirical diffusion publications were undertaken in developing countries by 1960, (Rogers and Shoemaker (5)) nevertheless the resulting diffusion generalizations have been extended to these areas. The result is that the cross-cultural application of the diffusion principles to agricultural development in the developing countries, has been associated with undesirable consequences in certain instances due to institutional constraints and structural differentiation (9). In summary, the classical diffusion and adoption theory has been seriously criticized for its "insensitivity to contextual and socio-structural factors" (10).

The Diffusion and Adoption Literature

With an understanding and appreciation of the criticisms of the classical diffusion and adoption theory, we can now examine the relevant research literature on the theory.

According to the subcommittee on diffusion research (4), studies in this discipline, can be divided into four problem areas: 1) the differential acceptance of farm practices as a function of status, role and motivation; 2) the differential acceptance of farm practices as a function of socio-cultural systems; 3) diffusion as a study of culture change; and 4) diffusion as a problem of communication of information.

Differential Adoption as a Function of Status, Role, and Motivation

Most of the research studies on the diffusion and adoption of agricultural innovations have found that status factors such as, level of education, income, farm size and ownership, and social participation to be positively related to the adoption of recommended agricultural practices. This finding was reported by the subcommittee on the diffusion and adoption of farm practices (4) after a review of studies carried out prior to 1952, as follows:

> With few exceptions, the studies found that farm ownership, education, income, size of farm and social participation are positively associated with the adoption of improved farm practices (Coleman, 1951; Gross, 1949; Ryan and Gross, 1943; Hoffer, 1942).

Later studies in Nigeria, however have been less consistent. While

Alao (11) and Basu (12) reported no positively significant relationships between formal education and adoption, Voh (13), on the other hand, reported positively significant relations between the two. Still, Clark and Akinbode (14) reported only positively significant relationship between education and adoption for only one of the three farm practices investigated.

It would seem however, that there is either a negative correlation between age and adoption of improved farmer practices or else no significant relationship at all. A review of the literature reveals inconsistent findings between the variables. While several researchers, including Wilkening (15), Coughenour (16), Rogers and Burdge (17) found no significant relationship between age and the adoption of a recommended agricultural practices, others, including, Marsh and Coleman (18), and Dean et al (19), did find a negative and significant relationship between the two variables. The inconsistency in results is further amplified by the findings of Anderson (20), Lionberger and Coughenour (21) and more recently Francis (22) in Africa, all who found the relationship between age and adoption to be positively significant.

The Nigerian studies however, have been more consistent in findings in the relationship between age and the adoption of recommended practices. Although, Rogers et al (23) found a positively significant relationship between the two variables, all other researchers - Clark and Akinbode (14), Eteng (24), Alao (11) and

Voh (13) found no significant relationship between the two.

In his rather comprehensive review of the literature on the adoption and diffusion of agricultural practices, Jones (3), found that generally:

> the higher an individual's social status and prestige, the greater his participation in social activities, especially in those outside his immediate locality, and the more his interaction with other adopters, the earlier his adoption behavior tends to be.

Although Ryan and Gross (25, 26) reported a positive correlation between the degree of formal participation and adoption of improved agricultural practices, they however found no significant relationship between formal leadership and adoption. In contrast however, Wilkening (27) in his North Carolina study, reported that leaders of farm organizations tended to adopt more recommended farm practices than others. The findings of the only two Nigerian studies that investigated leadership status as an independent variable (Rogers et al (23) and Voh (13), are consistent with the findings of Wilkening (27).

Similarly, the results of the Nigerian studies on the social participation variable were consistent with the North American studies. Thus Rogers and his team (23) working in the former Eastern Nigeria, found a positively significant relationship between social participation and adoption. Other Nigerian researchers with similar findings included Basu (12), Clark and Akinbode (14) and Alao (11). Studies by Bose (20) in India, a developing country like Nigeria,

found that the more innovative farmers belonged to higher castes, were more educated and had higher social participation.

Morrison's (22) finding that achievement motivation is positively related to innovativeness is also supported by Rogers' and Neill's (30) study among Colombian peasants in South America. This psychological variable however is so far, conspiciously absent in the diffusion and adoption investigations in Nigeria. However, from his study of the motivational factors related to adoption of improved practices by Kano State farmers, Edache (31) concluded among other things, that, the motivation of small scale farmers to adopt recommended agricultural innovations was being constrained by lack of "production and technological inputs and inadequate extension contact." On the contrary however, Rogers and Niehoff (7), stated that motivation was not an important bottle-neck to agricultural development among farmers in the eastern states of Nigeria.

Differential Adoption as a Functionof Socio-Cultural Systems

There is no doubt that the community and groups to which an individual belongs shape his attitudes and social behavior. Thus the expectations for individual and social behavior in a given community, not only derived from the requirements of the social system of which the community and the individuals are part of but are also related to the values of the culture which is the context for the particular social system. It would seem therefore, that where the norms of the community are favorably disposed towards

change, a high degree of innovativeness is likely as compared to individuals in a wide social system which is less favorably disposed.

In a comparative study of two ethnic groups in Wisconsin- Polish and Danish, Pedersen (32) found that for every variable investigated, more Danish had accepted recommended dairy practices than their polisy counterparts. This according to Pedersen, was due to the fact that the cultural values of the Danish group were more favorably disposed toward change. The Danish farmers were known to have a healthy respect for intellectual pursuits and freedom of choice for individuals. All these thus facilitated the introduction and adoption of the recommended dairy practices. Their Polish counterparts however were less favorably disposed towards change having been accustomed to oppressive restrictions and economic deprivation in their homeland. Thus they placed a high premium on security and primary group conformity.

Another study in Wisconsin by a different researcher - Van de Ban (33) also found that the social structure and culture of the locality groups, are the major factors influencing the adoption of recommended agricultural practices. In fact, Van de Ban rejected the view that the differences in the level of adoption for the 47 townships he studied could be explained by the basic individual socio-economic characteristics like farm size, level of education, net-worth etc. His studies revealed that while the high adoption townships were predominantly Lutheran and characterized by generally

free individual freedom of action, the low adoption townships on the other hand, were predominantly Calvanistic Dutch and characterized by a very strict informal social control. Van de Ban therefore attributed the differential adoption levels to religious differences.

The hypothesis that differential adoption is a function of socio-cultural systems is further supported by an earlier work done by Duncan and Kreitlow (34) also in Wisconsin. The researchers found that among the 38 rural neighborhoods investigated, those that were heterogeneous ethnically and religiously, had significantly higher farm practice adoption scores than those which were homogenous.

Most of the Nigerian studies on diffusion and adoption of improved farm practices have largely ignored the socio-cultural systems aspect. Obibuaku (35) in his study of the introduction of the hydraulic oil-press in Gbedu village in former Western Nigeria, discovered a low adoption rate by the women, because of the incongruity between the accepted traditional norms governing the sharing of the proceeds of the oil-pals products between husband and wife and the new innovation which eliminated a significant proportion of the wife's share.

In general, results of the socio-cultural studies show far more consistency in explaining differential adoption than those of individual socio-economic characteristics. This being the case nevertheless, most of the studies on the diffusion and adoption of

recommended agricultural practices have investigated the farmer as an individual adopter. This can only be attributed to the fact that most of the studies have been conducted in North America where commercial agriculture is a predominant enterprise. A notable departure from this in Nigeria, is the work of Hursh et al (36) who focussed on the community as a unit of analysis. It would seem therefore, that an examination of both the socio-cultural structure and individual socio-economic characteristics would yield more meaningful results in diffusion studies.

Diffusion and Adoption as a Study of Cultural Change

The basic tenet of the diffusion and adoption theory is the dissemination of innovation information, the acquisition and processing of such information followed by certain behavior changes. However, the process of stimulating and motivating people to accept innovations which result in cultural changes is a complex one. The adoption of an innovation like improved farm practices is not a snapshot decision, rather, it occurs over a period of time, sometimes taking several years. The major factors influencing the time for such changes to occur include tradition and cultural factors, individual socio-economic characteristics and the type of innovation itself. In their study of the diffusion of hybrid seed corn in two Iowa communities, Ryan and Gross (35) discovered that it required about 13 years to obtain nearly complete adoption. It has been found that farmers adopt farm practices more quickly sometimes than

others due to the situation in which they were in when alternative courses of action became known. According to Kollmorgen (37) the diffusion process tends to be accelerated during periods of crisis.

From the review of the literature, it would seem that the more isolated a people are in terms of communicative exposure or contact with the outside world, the more resistant to change they are likely to be. The higher and more varied the contacts, the higher the adoption rates and hence the resultant cultural changes.

Diffusion as a Problem of Communication of Information

Information is an essential element common to both the diffusion and adoption processes. The diffusion process is defined as transmission of innovation information in a social system while the adoption process is defined as the acquisition and processing of such information, followed by behavior changes by the members of the social system. In operation, the diffusion of innovations involves communication between a change agency and the client system, and further communication within the client system, all resulting in individuals or groups making decisions as to whether or not to adopt a particular recommended farming practice. However, it is obvious that a farmer must first of all become aware and sufficiently knowledgeable about an innovation before he can adopt it, no matter how economic, useful and relevant the innovation is. Before adoption of a practice, of course is trial. Surprisingly however only few of the recent studies in diffusion research have investigated the

awareness - trial relationship empirically because it has been taken for granted that awareness affects trial (38). It is a recognized fact though, that awareness is no sufficient condition for trial. This present study will attempt to determine the relationships between awareness, trial and adoption.

It is apparent therefore, that in the diffusion of an innovation, the channels of communication between the change agency and the client system and within that system, are crucial. According to Jones (3) a vast majority of studies which have been concerned with factors related to the diffusion and adoption of improved farm practices have devoted some attention to the role of various channels of communication. This is no less true also for studies done in Nigeria. The present study will attempt to determine the relative importance of the various communication channels and information levels in relation to the adoption of recommended agricultural practices.

The common sources of agricultural information can be classified into three broad categories: 1) the mass media, which include radio, television, newspapers, farm magazines and bulletins, journals, leaflets and circular letters; 2) extension agents and sales agents, and 3) other farmers including neighbors and friends. It has been found that the information source used varies not only according to the adopter categories but also it is a function of both the stage of the adoption process and the socio-economic status

of the individual farmers. According to Jones' review (2), the mass media especially those involving the more scientific and technical information were found to be the most important channels of agricultural information for the innovator and the early adopters during the early stages of the adoption process. However, for the same group, professional advisers e.g. extension agents, were found to be the most important sources of information during the later stages of the adoption process. Characteristically, innovators and the early adopters

> have a wide range of contacts with the originating sources of farm information, and often do not wait for research findings to be published. They go directly to experiment station personnel to learn about the latest research being done. (39)

The late adopters however rely mainly on other local farmers and adoption leaders for their agricultural information. According to Rogers and Beal (40) impersonal sources e.g. the mass media, were found to be the most important at the awareness stage of the adoption process while personal sources took precedence at the interest, evaluation and trial stages.

With regard to the source of information and socio-economic status, Wilkening (41) discovered that farmers of the upper socio-economic levels gave agricultural agencies as their most important sources of farm information, while those of the lower socio-economic levels gave other farmers and dealers as their most important sources. The same study also revealed that income and education

were positively associated with the increased use of all communication channels.

To generalize about the three broad categories of the communication channels mentioned earlier, it can be said that the mass media are most useful as sources of initial information, while the agricultural agents are most important in the evaluation and trial stages. Other persons, neighbors and friends have been found to be most useful in the evaluation and trial stages especially for the late adopters. Based on the review of the literature it could be further stated that, personal source of agricultural information are more closely associated with the adoption of practices which are already in the social system, whereas, impersonal sources such as the mass media and the extension service are more closely associated with new farming practices.

The communication variable appears to be the most researched in the diffusion-adoption studies in Nigeria, the most extensive being the work of Rogers and team (23) in the former Eastern Nigeria. Although in most of the North American studies investigated, the communication variables included the "other farmers" as a communication channel, only few of the Nigerian studies have included this source which has been found to be crucial in the diffusion of farm innovations as pointed out by Lionberger and his colleagues (42).

In his study of the sources of information on improved farming practices in the former Western Region of Nigeria, Williams

(43) found that the three most important sources were the agricultural extension agent, fellow farmers and the radio, in decreasing order of importance. However, Yazidu (44) working in the Northern States of Nigeria, found radio to be the most important source of agricultural information for farmers. Williams' (43) western Nigeria study was nevertheless confirmed by Clark and Akinbode (14) who also, working in the defunct Western State, found that government personnel (extension agents), radio and cooperative union staff were the most regular sources of agricultural information for farmers. In view of these findings, the report by Kidd (46), that the number of farmers knowing the location extension agent was relatively low, is suspect.

Williams and Williams (47) found that, although both educated and uneducated Nigerian farmers relied on the radio equally as a source of agricultural information, the educated farmers however tended to use the extension agent far more than the uneducated farmers did. In the same study, Williams and Williams (47) also established that whereas the use of radio as an information source had some significant relationship with the age of farmers, demonstration plots as a source of farm information, had no relationship with the age, education, farming experience, and size and number of plots of farmers. The present study will attempt to establish the relationship between the socio-economic characteristics of farmers in the Northern States and their use of the various communication

channels and the relationship between these channels and the adoption of recommended agricultural practices. From the results of the Nigerian studies, it can be concluded that extension agent contact and exposure to farm broadcasts are positively correlated to the adoption of improved farm practices.

Rogers and Niehoff (7) vividly pointed out the importance of communication channels when in reference to their diffusion studies in the former Eastern Nigeria, stated that the inadequacy of communication channels was "the most significant bottle neck to agricultural development in Eastern Nigeria..." Obviously however, no matter how profitable or relevant an agricultural innovation, it cannot be adopted unless a farmer has knowledge about it. Most of the diffusion-adoption studies have dealt with "knowledge" as only one type i.e. awareness, defined as knowing that an innovation exists.

According to Rogers and Shoemaker (5) however, two other types of knowledge exist: 1) "how to" knowledge defined as "information necessary to use an innovation properly", 2) "principles knowledge" defined as knowledge dealing with the functioning principles underlying a particular innovation. The "how to" knowledge, now used synonymously and inter-changably with application knowledge, is regarded as very crucial in the adoption process by this writer because, if a farmer does not acquire adequate application knowledge prior to the trial and adoption of an innovation, rejection or discontinuance is likely to result.

As far as can be determined, only two Nigerian studies, Keith (48) and Daniel (49) have examined the "how to" knowledge. In his study, Keith (48) determined the variables correlated with fourteen agricultural innovations among peasant farmers in the former Eastern Region of Nigeria. He discovered that among other variables, innovativeness was positively related to constant information inputs and information level.

From his own findings, Daniel (49) concluded that farmers had definite problems in understanding and following the various recommended agricultural extension practices. This obviously must have affected the adoption of the practices. Dealing with such a highly illiterate and uneducated clientele, the findings of Daniels were to be expected. Opare (50), working in Ghana, a West African Country like Nigeria, found that although Ghananian Cocoa farmers on the average had correct application knowledge of three out of the five selected recommended practices, they only adopted two of the innovations. He concluded therefore that correct application knowledge does not necessarily lead to the adoption of a recommended agricultural practice.

This present study will attempt to determine the level of the average Northern Nigerian farmer's application knowledge of four selected agricultural practices and how this knowledege is related to the adoption of the practices.

Diffusion and Adoption Research Studies in Nigeria

The major bulk of all the diffusion and adoption research in Nigeria have been done in the Southern States, formerly the Western and Eastern Regions of Nigeria. These studies included: those of Obibiaku (35), Clark and Akinbode (14, 15), Ajaegbu (51), Williams (43), Basu (12), Alao (11), Anthonio and Patel (52), Eteng (24), Williams and Williams (47), Kidd (46), Patel and Ekpere (53) in the defunct Western Region; Rogers and Niehoff (7), Ascroft et al (54), Hursh et al (55), Keith (48) and Rogers et al (23) in the former Eastern Region.

Because of the vast cultural, historical and geographical differences, the results of the Southern Nigeria findings can only be generalized to the North with caution. One of the objectives of this present study is to generate additional data to the little already available and to provide better understanding of some of the factors influencing the diffusion and adoption of recommended extension practices among farmers in the Northern States of Nigeria. It is hoped also that, the study will provide some validation for some of the work already done inthe area.

Similar to the North American studies, the Nigerian diffusion and adoption studies have focussed primarily on the individual farmer, usually the male head of the household, as the unit of analysis rather than the social system and its institutions. A

noticeable exception though, was the study of innovations in the former Eastern Nigeria by Hursh and his associates which focussed on the community rather than the over-researched traditional individual farmer characteristics. Further, the most researched variable has been the communication variable.

The findings of the Nigerian studies have been less consistent as compared to the North American investigations. This however is not unexpected because of the great diversities in the cultural settings of the Nigerian studies. It is an accepted fact that the relative effects of variables change with different research settings and this is further magnified where language translations and interpretations are required in the research methodology. In such situations, one can only "resort to the level of conceptual equivalence in cross-cultural inquiry, rather than pursue the goal of operational equivalence which is an impossible objective ..." (5)

Although Copp (57) cautioned that the development of empirical generalizations in science is often hampered by the dissimilarities of results from different studies, a few generalizations could still however be drawn from the Nigerian studies despite the inconsistencies. Generally, the socio-economic characteristics of farm size, level of formal education, participation in formal organizations and leadership status are positively correlated to the adoption of recommended extension practices. Further, it can be generalized that the most important sources of agricultural information for

Nigeria farmers are the extension agents and the radio. This should be expected because of the rather high illiteracy level in Nigeria.

The Concept of Need and the Adoption of Improved Practices

As has been pointed above the diffusion and adoption of innovations involves behavioral changes by adopters. It must be recognized however, that the changes that are most important to human beings are those that meet their needs for biological, economic, social and moral well-being. But according to Leagans (58), the four-letter word need, "is probably the most deceptively complex, basically significant and far reaching in its implication of all major terms in the vocabulary of the adult education, extension or otherwise." Since the primary objective of the introduction and diffusion of recommended farm practices in Northern Nigeria, is to help peasant farmers improve their agricultural, social and economic situations, the recommended farm practices must of necessity therefore be in line with the farmers' needs. The central problem then in the introduction and diffusion of improved farm practices, is to accurately identify both what the extension clientele think that they need and what they actually need. Leagans (59), defined an individual's needs as "the gap between what is and should not be and what should and can be." Tyler's (60) definitions of need are similar. According to him there are two meanings of the term need:

> The first use of the term represents a gap between some conception of a desirable norm, that is, some standard of philosophical value and actual status. Need in this sense is the gap between what is and what should be. The other use of the term by some psychologists represents tensions in the organism which must be brought into equilibrium for a normal healthy condition of the organism to be maintained.

It is clear that Tyler's definitions overlap but are differentiated by the origin or basis of the gap. People's needs are variously categorized in the literature. Leagans (58) has suggested three categories for simplicity and practical purposes:

1. Physical needs - food, clothing, housing activity, and the like.
2. Social needs - group status, affection, belonging and so on.
3. Intergrative needs - the need to relate oneself to something larger and beyond oneself, a philosophy of life, and so on.

Galeski (61), on the other hand, analyzed needs in relation to quality-of-life and distinguishes between "absolute needs" and "relative needs". He defined absolute needs as those requirements which are necessary for the survival of the individual, such as food, water, air and sleep; and relative needs as those requirements which though are not necessary for individual's survival but nevertheless necessary for his "normal" functioning. The later according to Galeski (61), refer to "assumptions and criteria as to what is 'normal' or what is favorable or desirable for the organism." Galeski was careful to point out though, that these assumptions and criteria (relative needs) "do not, and cannot,

have the same universal and absolute characters as laws formulated in exact sciences ..." The implication here is that it is necessary to involve clientiele in program planning.

From a psychological standpoint, needs are generally classified into two broad categories: "felt" needs, defined as those which the individual consciously recognize and "unfelt" needs, defined as those which are unrecognized by the individual. According to Atwood and Ellis (62),

> a felt need may or may be a real need. Conversely, a real educational need may or may not be recognized as such by the person involved. It seems important for adult education to recognize this, for the adult learner acquires a concern for satisfying real educational needs only when he becomes aware that he has such needs.

To the extent that needs become motivating forces, they must be felt. Since adult learners may not be aware of some of their most important real needs, and for the successful introduction and diffusion of recommended practices, extension personnel must be able to identify not only the "felt" and real needs of the farmers, but also the "unfelt" ones and convert these into felt and real needs.

In relation to diffusion and adoption studies, there is some controversy in the literature as to which comes first - needs or awareness of an innovation. Many investigators conceptualize awareness of an innovation by an individual as a random or non-purposive activity. According to this school of thought, a farmer cannot seek out a farm practice he does not know exists. On the

other hand Hassinger (63) insisted that individuals tend to expose themselves to those ideas which are relevant to their personal situations and as such they would seldom expose themselves to information about innovations unless they first felt a need, for such innovations. According to Hassinger's thesis then, the need for an innovation usually precedes awareness knowledge, the first stage in the diffusion process. Rogers (5) however, postulated that both situations are possible because the introduction of an improved practice could also create a need when an individual becomes aware of the desirable characteristics of the innovation. The creation of needs among clientele is an important technique often used by change agents in bringing about change. The approach involves designing educational programs which cause people to recognize the gap between the actual, the desirable, and the possible and place value on attaining the desirable that is possible. Consequently an individual's knowledge of recommended practices becomes the motivating force for the adoption of such practices. The relationship between a farmer's awareness knowledge and the adoption of recommended farm practices will be examined in this study.

Clientele Involvement (Participation)

Although it has been understood or assumed that clientele participation in our extension delivery efforts is a necessary ingredient for program success, the questions of participation, on

whose terms and with what effects have not always been adequately addressed especially in the LDCs. As Cohen and Uphoff (64) cautioned, "no longer does it appear sufficient to regard as participation, people's doing just what they are told and having no influence on how the benefits of development efforts are to be distributed." Experience from rural development efforts in the less developed countries have shown that national success, measured in terms of both agricultural productivity and social welfare measures is strongly correlated with effective systems of participation in decision making and implementation (64).

By clientele participation, it is meant here, the involvement of our clientele in the decision making processes regarding the planning, implementation and evaluation of our extension efforts. As of now, in the Nigerian extension services, clientele participation in planning and implementation is rare and clientele involvement in evaluation occurs even less commonly. Indeed, clientele evaluation of extension programs and projects is a relatively rare activity.

Effective and successful extension programs are developed by identifying individual and group needs and arranging educational efforts to meet these needs. Just as important as accurate identification of clientiele needs is clientiele involvement in educational programming. This is based on the assumption that unless clientiele are involved in planning, they will not perceive

the resulting program as meeting their needs. In order to learn effectively therefore, the learners must have a say as to what they learn, why and how they learn. Learners' participation must be positive and the learning process must provide satisfying experiences which motivate further participation and lasting behavioral changes in the learners. As Carl Rogers (65) stated, "learning is facilitated when the learner participates responsibly in the learning process." Various other researchers have attested to the important need for learner involvement in the learning process. Dewey (66) advocated learner involvement so that the learner may feel free and gain the experience of directing his own life. Freire (67) in his approach, places a heavy emphasis on people involvement because of his conviction that the approach to dealing with societal problems should be dialectical. Freire (67) is most critical of traditional education because it does not provide adequately for learner involvement in the learning process. According to him traditional education is

> an act of depositing, in which the student are the dispositories and the teacher is the depositor. Instead of communicating, the teacher issues communiques and makes deposits which the students patiently receive, memorize and repeat.

There's no place for this sort of approach in adult and extension education which involve "free choice participation." Leagans (58) emphasized that "programs of 'free choice participation' are successful only to the extent that they focus on and help meet

recognized personal, family, group or community needs." Clientiele involvement in identifying these needs and planning programs to meet them ensures sounder decisions about objectives and clientiele participation in accomplishing the objectives. According to Porter (68), "there is practically unanimous agreement in all studies that the maximum involvement of potential and actual constituents in program building produces best results." Pesson (69) on the other hand asserted that clientele involvement speeds up the educational change process. According to him, clientiele involvement has a multiplier effect in the spread of innovations.

Despite the well documented advantages of clientiele involvement in extension program planning, it is a fact that the Nigerian farmers are rarely given the opportunity to get involved in the planning of the programs supposedly designed to meet their needs. This lamentable situation was mentioned by Kincaid (70) in his report on the strategies for the improvement of agricultural extension work in Nigerian. According to him, Nigerian peasant farmers were never given sufficient opportunity to participate in the preparation and management of some of the important extension programs, such as result demonstrations. This present study will examine and analyze the farmers' perceptions of their involvement in extension programming and the relationship of these to the adoption of recommended practices.

Relevancy and the Adoption of Recommended Farm Practices

Closely associated with the concept of need, is the concept of relevancy of a recommended practice. There is solid evidence in the literature to support the fact that the relevancy of an innovation package to the farmers' personal, social, economic and farming situations as perceived by the farmers, is a major determinant of the adoption of the farm practice.

An improved farm practice is deemed relevant when it meets the needs of the potential adopters. Relevancy includes but not limited to the two main attributes of an innovation - 1) relative advantage, which is an individual's perception of the degree to which an innovation is better than his current practice; 2) compatibility, which is the degree to which a new practice is consistent with existing beliefs, attitudes and cultural patterns. Relative advantage as a factor of relevancy of practice is illustrated by the Northern Nigerian farmer's persistence in engaging in crop mixtures under indigenous conditions despite low yields rather than in sole cropping under improved technological conditions. This according to Norman (71), is because "sole crops under improved technological conditions often suffer from the problem of a lack of flexibility in timing of the operations which can cause farmers difficulties in their adoption." He went on to suggest that

> the relevance of the improved technology could be greatly enhanced by research workers devoting some resources to making the improved technology more competitive and flexible by incorporating it into crop mixtures.

An important dimension of compatibility of a recommended practice is the degree to which it meets the needs of the clientiele. It is of course obvious that when felt or real needs are met, there would be a higher and faster rate of adoption.

The concept of relevancy is thus situational and client rather than researcher or change-agent-centered. Unfortunately, however, this concept does not hold true for the Nigerian situation when farmers' needs are often taken for granted in the development of improved agricultural technologies. The development of improved packages for farmers in the Northern States based mainly on sole cropping, is a disregard for the situational requirements for relevancy. As Norman (72) stated, the only new technologies that have been introduced to the Northern Nigerian farmers have been in reference to sole crop rather than crop mixtures and this has limited the acceptance of these new practices. He argued further though that

> farmers sometimes on their own initiative have used certain aspects of the new technology on crop mixtures and in doing so have recognied the potential benefits from doing so. The fact remains however that the new technology has not been introduced in a way that is immediately acceptable to farmers.

It must be realized therefore that an agricultural practice which

may prove to be viable and profitable under experimental research conditions may not be necessarily so under the lower technological conditions in traditional peasant agriculture.

Relevancy as it relates to a practice or technology is often referred to in the literature of developing nations as "appropriate technology." It is a technology or practice which provides

> technical solutions that are appropriate to the economic structure of those influenced; appropriate to their ability to finance the activity; appropriate to their ability to operate and maintain the facility; appropriate to the environmental conditions; appropriate to the management capabilities of the population (73).

Thus a relevant or appropriate farm technology must focus on the user and his situations - personal, social, economic and agricultural. It goes without question however, that relevant improved agricultural practices must be available before farmers can adopt. The question now is whether relevant improved farm practices are available to farmers in the Northern States of Nigeria. The answer according to Norman (71) is "yes." He however, advised that rather than a wholesale recommendation of practices for all the region, levels of improved technology presently recommended should be dependent on the conditons of any particular area. Based on his analysis of modern technology in relation to risk, managerial ability and level of extension input, Norman (74) recommended that

> high levels of improved technology should be considered where managerial expertise in the form of extension workers is available. Conversely lower level of improved technology should be advised where managerial expertise with respect to improved technology is low, i.e., where extension workers are few.

If indeed relevant improved agricultural technology is available to farmers in the Northern States of Nigeria, why then has the extension not made the needed impact of bringing about the transformation of traditional subsistence agriculture in the area to one which incorporates modern technology. This study is expected to provide at least a partial answer.

Extension Philosophy and the Diffusion and Adoption Theory

The Nigerian extension service may not be solely responsible for non-transformation of traditional agriculture into a modern one, but it goes without saying that it has a fair share of the blame. The minimal or non-involvement of the Nigerian peasant farmers in extension program planning and execution has already been alluded to elsewhere in this work. This is further attested to by Oluwasanmi (75) when he stated that in many developing countries, Nigeria inclusive,

> the farmer has no voice in making the decisions that affect his profession. Decisions as to planting materials, method of operation, type of lending institution and the system of tenure considered suitable for improved agricultural production are made at national or state capitals and handed down to subordinate bureaucrats at provincial or divisional headquarters for implementation.

> The result of inadequate consultation at the local level with the prospective users of agricultural services or with their representative is misunderstanding of government motives and the mislabelling, by frustrated bureaucrats, of sensible but cautions farmers as conservatives who prefer their traditional ways to modern, scientific innovations designed to improve their output of farm products.

This represents the concept of the top-down (76) traditional agricultural extension model and philosophy which apparently is guided by the Theory X (77). Basically, Theory X views man as being lazy by nature; dislikes responsibility and prefers to be led; irrationally traditional and ignorant, and consequently resistant to change by nature; and lacking ambition but looking for security. This negative philosophy has helped establish a "superior-inferior" or "expert" - "ignoramus" relationship between the researcher/extension worker and the farmer in the traditional extension model. In the model, the extension worker/specialist perceives his role as that of informing and persuading the reluctant and ignorant farmers to adopt recommended practices. The model is also characterized by: centralized top-down decision making, a hierarchical and bureaucratic organizational structure, and having as its goals, the introduction of agricultural innovations to increase production. Thus the extension model and philosophy, implicitly or explicitly guided by theory X, does not consider the inclusion of the clientele in the planning and execution of programs as crucial. Consequently, programs for farmers are invariably predetermined for them and as

such, chances of success are eliminated or at least appreciably reduced.

The top-down, traditional extension model has been referred to in the literature as the problem solving approach and has been criticized on this basis because it presents the farmers with solutions to their problems as perceived by the "specialists" rather than analyzing and identifying the farmers' problems with them and evolving solutions cooperatively (78).

The concepts of modernization and development have been incorporated in the diffusion and adoption theory in the traditional extension model. This has been based on the assumptions that

> development will occur through diffusion of cultural elements from the modern to the traditional social system. This acculturation process spreads from the core of the developed sector to the key liaison points in the underdeveloped sector, and then in turn to the periphery in general (9).

These assumptions have been found not to be valid in the less developed countries -- a major criticism of the classical diffusion - adoption theory (9).

The relationship between farmers, the extension delivery agency and their representatives, no doubt, is a major consideration in the farmers' innovation-decision process regarding an improved agricultural technology. To be successful, a new, more positive and humanistic philosophy and approach which does not build a dependency relationship between agent and farmers is needed. Thus

the dialogical agricultural extension model and philosophy for the LDCs guided by Theory Y (74), began to emerge in the early 1970s. Basically Theory Y is the converse of Theory X. It asserts that man does not necessarily dislike work and that if work is a source of satisfaction to him, he would gladly do it; that man wants and will seek responsibility under the right conditions; and that man is intelligent and capable of critically viewing the world in which he lives. The dialogical model is thus characterized by: decentralized and interactive decision-making; decentralized and fledible organizational structure, and above all it has as its basic goals, development and satisfaction of human needs. It is problem-posing rather than problem-solving and both farmers and agents are involved in the learning process.

The traditional extension model with its faculty theory base that is still being used in the Northern States of Nigeria, no doubt, is a partial explanation of the farmers' behavior regarding the adoption/rejection of recommended agricultural practices. For the extension services to make an impact on the area's agricultural sector, a new extension approach and philosophy would have to be initiated.

The Subculture of Peasantry

Apart from the inefficient extension services guided by a negative philosohy, the peasants of the LDCs have been assigned their fair share of blame for non-adoption of recommended practices.

In fact, they have been viewed as the principal culprits by the western world researchers as vividly illustrated by Rogers' (79) thesis on the subculture of peasantry, and by some of the local experts. Other western world researchers have also subscribed to the notion of a peasant subculture, for example, Foster (80) stated that "the similarities in peasant life in the world around are so marked" as to support the universality of thesis of the subculture of peasantry. Redfield (81) went further to argue that "peasant society and culture has something generic about it. It is a kind of arrangement of humanity with some similarities all over the world." Rogers' (79) thesis on the peasantry subculture has been most significant. In his book Modernization Among Peasants: The Impact of Communication, he classified peasantry as a "subculture" by itself. According to him, there are ten characteristics of the subculutre which give someidea of the value orientation of the peasant farmers who belong to the class. These are: 1) a lack of innovativeness, 2) mutual distrust of interpersonal relations, 3) dependence on and hostility toward government authority, 4) limited time perspective, 5) familism, 6) limited aspirations, 7) lack of deferred gratification, 8) fatalism, 9) a lack of empathy, and 10) localiteness. These attributes it is argued, make it both extremely difficult for the extension workers to introduce and diffuse new ideas to and among peasants and that they also constitute formidable communication barriers for

researchers to obtain valid and reliable data from peasants. These very negative characteristics according to Rogers, are based on "available theoretical, speculative and empirical literature ---" (79). They are probably more speculative than empirical when applied to Nigerian peasants. Rogers' thesis could be criticized on a number of scores: 1) The relatively little knowledge about peasants to permit sweeping generalizations as Rogers (70) himself pointed out in this statement - "peasants are an audience we know relatively little about in any reliable, generalizable, or scientific way".

2) The thesis' neglect of obvious and significant cultural differences among peasants within a country and in different countries. Rogers' him alluded to this shortcoming of the thesis when he said that:

> One of the dangers in attempting to generalize about peasant life --- is the possibility that significant idiosyncratic features may be masked or obliterated. There is much cultural variation in peasant life styles both 1) among less developed countries and 2) within each such nation --- (79)

3) The non-distinction by the thesis between peasants in terms of the economic status when there is ample empirical evidence from diffusion research findings to show that a farmer's innovativeness is positively correlated to his economic status.

4) The thesis view of the nature of man as being non-responsive, non-self-directing, passive, dependent and distrusting.

With these shortcomings therefore, the usefulness of the thesis of the subculture of peasantry is questionable unless of course to propagate the west's negative and stereotypic views and exploitation of the less developed countries. If Rogers' thesis could be substantiated however, one could significantly explain the behavior of farmers regarding recommended agricultural practices. In view of the long history of the failure of numerous international and national agricultural development programs and projects, there is a need to determine the validity and usefulness of the subculture of peasantry thesis. The few works that available about the Nigerian peasants, seem to cast some doubts on Rogers' thesis as will be seen when the characteristics of the subculture which are relevant to this study are examined in detail.

Lack of Innovativeness

Innovativeness, as has already been defined, is the degree to which an individual is relatively earlier to adopt new ideas and practices than other members of his social system (5). According to his thesis on the subculture of peasantry, Rogers (79) argued that "peasants generally do not react to new ideas with a positive attitude. To say that peasants are tradition-oriented is to state a truism, not to offer an explanation of their behavior." He concluded by saying that "the norms of most peasant communities are negative toward change as a result of past generations of generally unfavorable conditioning toward innovations." On the contrary, Nigerian farmers

have been found to be quite innovative on occasions. According to Helleiner (82)

> The record in this respect is a curious one. On one hand, Nigerian (and other peasants) have, on occasion demonstrated considerable receptivity to innovations. Cocoa, after all, was a new crop which caught on quickly as soon as its profitability had been established. Para rubber was also successfully introduced into the Nigerian peasant economy earlier in the century... All these examples suggest that peasant farmers have been eager to adopt new procedures.
>
> Nor has the receptivity been confined to the introduction of new crops. In the 1950s cocoa farmers in the Western Region responded quickly to opportunities for increasing their productivity through the use of chemical fungicide and insecticide sprays against black pod and capsid ... (82).

Findings of studies about peasants from other third world countries also seem to cast doubts on Rogers' generalizations about peasants. For example, Roling (83), in his study of the non-innovative response of peasant farmers, concluded that peasants' non-innovative responses could be more usefully viewed as adaptation to frustration.

To accurately measure a peasant farmer's innovativeness, his needs as determined by him, the relevancy of the innovation as perceived by him and his ability to purchase the new technology must be taken into account. It is common practice in developing countries like Nigeria to develop a new practice exclusive of the farmer and then try to "sell" the new technology to him. Of course, this approach has often met with failure -- failure on the part of the change agents and their philosophy rather than lack of innovativeness on the part of the peasant. Further, there have been "instances

governments and extension services may have been 'pushing' innovations which would not, even in the best of circumstances pay off" (82) because the peasants "have weighed the relative value to them of the alternative forms of behavior and have decided against the new program or some part of it ..." (80). That the Northern Nigerian farmers are actually innovative can be seen from the fact that their adoption of an innovation may sometimes involve a pattern of usage different from that recommended by the research scientists and change agents. Reynolds (84) stated that:

> In Northern Nigeria, for example, fertilizer intended for the application to the groundnut crop was applied to the food crop with the indirect result that acreage devoted to groundnuts may have expanded. This sort of adaptability demonstrates both the sophitication of the small holder's decision making and the necessity of analyzing the entire farming (indeed the total socio-economic) system in which he operates rather than an isolated part of it, and of understanding his preference system.

Familism

Rogers (79) defined familism as "the subordination of individual goals to those of the family" and this attributes according to him, is in part responsible for the peasants' lack of innovativeness. He hypothesized that "when decisions to adopt ideas are made jointly by the entire family, often dominated by older, authoritarian patriarchs, little innovativeness is likely to result" (79). It cannot be denied that the attribute of familism may sometimes be a constraint in the adoption of recommended practices, but the

Nigerian studies, however, have shown this attribute to be more positive than negative. In the northern states of Nigeria, two types of family units are found: "a simple family or 'Iyali', which consists of a single married male with his wives and dependent children; and a composite family or 'gandu', which is composed of two or more adult males, usually married, together with their wives and children" (85). According to both Buntjer (86) and Goddard (87), the gandu or the composite family has been found to be the most preferred. Both studies agreed with Hill's (88) earlier study in the former Northern Nigeria which concluded that the "gandu" units were the ones that "were so far from suffering that they were in a position to render help to others, by gifts or loans". The same study also revealed that the gandu unit was an "efficient" farming unit and hypothesized that rather than being laggards, the gandu members who were "better-off farmers would only be too willing to respond to outside efforts to raise their standard of living" and that "their symbiotic relationship with the worse-off is such that they (the worse-off) would benefit" (88).

The importance of familism to peasants as expressed in the gandu system among peasants in the northern states of Nigeria can be appreciated when it is realized that land and labor constitute the major inputs in their agricultural production. Since the family labot is thus an important determinant of living standards, Buntjer (86) cautioned that the breaking up of the composite family unit

would result in significant labor shortages.

Familism among peasants has also given rise to communal tenure which according to Oluwasanmi (89) "acts as a strong cohesive force in agrarian society. The system affords the cultivator a stake in the major assets of the community and assures him a secure place in society." Thus the Northern Nigerian peasant farmers' behavior cannot be adequately explained by Rogers' subculture of peasantry thesis.

Limited Aspirations

One of the elements of the subculture of peasantry is limited aspirations defined as "desired future states of being, such as living level, social status, education and occupation" (79). On the contrary, it is my considered opinion, that it is the high aspirations of the rural Nigerians for the good things of life that has been responsible for the growing rural to urban migration in the country. In the Phillipines, another third world country with a substantial peasant population, Castillo (90) reported that, peasant aspirations were so high,

> that they would rather see their children become lawyers, doctors, teachers and government employees rather than farmers. Even farmer parents of vocational agriculture high school seniors would rather see their children go to college than go into farming immediately after graduation.

Lack of Deferred Gratification

Another characteristic that has been ascribed to peasants is that of lack of deferred gratification. This element has been viewed as related to the element of low aspiration of peasants. This characteristic, according to Rogers (79), is the inability of peasants to postpone immediate satisfaction for future rewards. The Northern Nigeria experience points to the contrary as demonstrated by the farmers' stubborn refusal to sell their grains to the government-established marketing boards but rather, store them over long periods at the risk of substantial storage losses due to pests in anticipation of better prices in the open market. It can however be argued that peasants are no more lacking in deferred gratification than the "modern man" in a credit-card-crazy society who lives now and pays later.

Implications of the Subculture of Peasantry Thesis

One of the most important implications of Rogers' thesis on the subculture of peasantry is that it presents

> a real danger that it may serve as a conceptual 'trap' with each element explaining away the other elements, with the likely consequence that change agents no longer need to look for facilitators and inhibitors of change outside of this subculture to explain underdevelopment. These ten 'negative' elements of peasantry might even serve as convenient scapegoat for the scientist who is developing innovation and the extension worker who is introducing new practices since usually no further arguments ensue after they declare that 'farmers are simply resistant to change.' We do not want them to get

> off that easily, for they are as much part of the development scheme as any subsistence farmer (90).

In the same vein, Byrnes (91) cautioned that

> some professionals may invent resistance to explain why farmers have not adopted a practice, just as uninformed or misinformed extension workers may develop imaginative explanations for the failure of rice

thereby making the farmers the scapegoat.

Lewis (92) on the other hand warned that although

> the concept of peasant society may be a meaningful or useful classification for comparative research but it is not sufficiently predictive in regard to cultural content and structure to take the place of knowledge of concrete reality situations especially in planning progrms of culture change.

Because of the shortcomings and inaccurate views inherent in Rogers' ten elements of peasantry, it is doubtful if the thesis could be used to satisfactorily explain peasant behavior in regard to the introduction and diffusion of agricultural innovations. The usefulness of the subculture thesis in programs of planned change is also questionable because of its negative views of the nature of potential clientele. As Castillo (90) observed, "the professional-journal-oriented scientist probably seldom entertains the thought that he might learn something from the so-called traditional farmers." Thus, the traditional extension model and philosophy, with its characteristic one-way flow of information -- from the research institutions, national and state headquarters to the farmers is continually being perpetuated.

Without knowing more about the peasants' preference structures and the innovations they are expected to adopt, it is difficult to really learn about their innovativeness or gullibility in diffusion studies (84). There is no doubt that "a great deal more knowledge is required on how exactly peasant and subsistence economic systems operate and change ..." (93). The only way this knowledge can be acquired is to adopt a multidisciplinary approach which allows the introduction of important new dimensions in the investigation of peasants and their environmnet. Therefore, for any extension or development programs based on the diffusion theory to succeed, there must be a thorough understanding of the social and cultural situations within which the rural farmers are operating. Further, their involvement in making decisions on the planned programs of change and the contribution of their resources are all essential in the development, diffusion and adoption of recommended agricultural practices. Hopefully, this then will lead to the needed transformation of the current subsistence agriculture to a modern one in Nigeria.

Peasantry in Nigeria

There are several and varied definitions of the term "peasantry" in the literature and as Klein (94) observed, there is significant disagreement in defining who really is a peasant. The available definitions are discipline-related and differences in the definitions have been mainly what they stress rather than what is

observed.

According to Kroeber (95),

> Peasants are defnitely rural -- yet live in relation to market towns; they usually form a class segment of a larger population which usually contains urban centers, sometimes metropolitan capitals. They constitute part societies with part cultures.

Kroeber's definition thus emphasizes culture -- an anthropological approach.

Stressing the economic and political relationships, Saul and Woods (96) defined peasants as:

> ... those whose ultimate security and subsistence lies in their having certain rights in land and in the labour of family members on the land, but who are involved, through rights and obligations, in a wider economic system which includes the participation of non-peasants.

Wolf (97) on the other hand was more agriculturally-oriented in his approach. He defined peasants as "farmers who grow crops and raise livestock in rural areas, but who are more concerned with satisfying the needs of the household than with obtaining a profit."

The typical northern Nigerian peasant farmer is characterized by his very small farm holding, low capital and technological inputs resulting in very low returns, and hand labor as his principal source of power. His production is thus subsistence in orientation i.e., "producing enough food for the family without resorting to purchasing in the market." Under these conditions, security or risk minimization becomes significant factors in the peasants'

farming decisions (74).

According to Falusi (98), more than 75 percent of the farming households in Nigeria cultivated less than four hectares of farmland during the 1973/74 cropping season. This points to the necessity of vigorously supporting the peasant farmers in order to boost agricultural production in Nigeria.

Tenancy Problem

A further critical factor affecting the Nigerian peasant's adoption behavior and thus his productivity, is the tenancy problem which impede re-investment in the land. According to Olayide (99)

> the various forms of usufructuary and other land tenure problems contribute substantially to wasteful and exploitative utilization of farmlands and a perpetuation of the bush-fallowing system of cultivation... The conflicting and highly litigious nature of inheritance and ownership rights magnify fragmentation and excessive parcelization of holdings ...

For the purposes of this study a peasant is defined as a traditional northern Nigeria farmer with holdings of about four hectares or less, with hand labor as his principal source of power, whose production is basically subsistence, sells or exchanges only a minor part of his total farm production and who views security or risk minimization as important criterion in his farming decisions. He is nevertheless an "economic man" capable of making rational economic decisions (100). The terms "peasant", "small holder" and "subsistence farmer" is used interchangeably in this study.

Summary

Most of the early research studies on the diffusion and adoption of innovations were carried out in the United States, particularly in the Mid-western land-grant universities. It has been noted that prior to 1960, diffusion research in the developing countries was relatively insignificant.

The classical diffusion--adoption theory is made up of two components - 1) the diffusion process, and 2) the adoption or innovation-decision process.

On account of several shortcomings inherent in the theory, it has been seriously criticizes as insensitive to contextual and socio-structural factors (10). The theory has also been criticized for its socio-cultural insensitivity for, although, only 31 percent of the empirical diffusion publications were undertaken in developing countries by 1965, nevertheless the resulting diffusion generalizations have been extended to these areas (5). Consequently, the cross-cultural application of the diffusion principles to agricultural development in the less developed countries has been associated with undesirable consequences in cerrtain instances (9).

For practical purposes, diffusion research studies have been divided into four major problem areas by the Rural Sociology's subcommittee on diffusion and adoption of farm practices:
1) The differential acceptance of farm practices as a function of status, role and motivation;

2) The differential acceptance of farm practice as a function of socio-cultural systems;

3) Diffusion as the study of culture change; and

4) Diffusion as a problem of communication of information.

In Nigeria, the bulk of the diffusion research has been done in the southern states. Findings of the Nigerian studies have been less consistent as compared to the North American investigations. Generally, the diffusion and adoption model has failed to work in Nigeria because of false assumptions although the tendency has been to blame the "poor ignorant" farmer who is just "resistant to change". This invariably is the negative view of peasants of the third world held by most scientists in the advanced countries as illustrated by Rogers (79) thesis on the subculture of peasantry. According to the thesis, there are ten characteristic elements of the subculture of peasantry which give some idea of the value orientation of peasant farmers who belong to the class. These are: 1) a lack of innovativeness, 2) mutual distrust of interpersonal relations, 3) dependence on and hostility toward government authority, 4) limited time perspective, 5) familism, 6) limited aspirations, 7) lack of deferred gratification, 8) fatalism, 9) a lack of empathy, and 10) localiteness. Solid evidence exists in the Nigerian studies to seriously question the usefulness and validity of the subculture of peasantry thesis and thus making it inadequate to explain farmers' adoption behavior.

Implicitly or explicitly, the negative views about the peasants have been major factors in our extension approach and philosophy. More often than not, farmers are never involved in program planning and implementation and yet they are expected to go along with our programs of planned changed whether or not these are relevant to their

Without knowing more about the peasants' preference structures and the innovations they are expected to adopt, it is difficult to really learn about their adoption behavior. For a start, it is important to understand who we are dealing with--the peasant, a term that has considerable variations in usuage in the literature. For this study, a peasant is defined as a traditional Northern Nigerian farmer with holdings of about four hectares or less with hand labor as his principal source of power; whose production is basically subsistence, sells or exchanges only a minor part of his total farm production and views security as an important criterion in his farming decisions. He is nevertheless an "economic man" capable of making rational economic decisions.

For any extension or development programs based on the diffusion and adoption theory to be successful, there must be a thorough understanding of the social and cultural situations within which the rural farmers are operating. Their involvement in making decisions on the planned programs of change and the contribution of their resources are all essential in the successful development,

diffusion and adoption of recommended agricultural practices.

Using the concept that the diffusion and adoption theory is a multidisciplinary theory of planned social change brought about by the spread of new ideas viz recommended agricultural practices in a social system, this study will attempt to determine some of the factors influencing the farmers' adoption behavior. It is presumed by this writer, that information of this nature is necessary for the planning of effective and efficient programs that will bring about the needed transformation of the present subsistence agriculture in Nigeria into a vigorous and dynamic one incorporating improved farm practices and thus, ultimating improving the standard of living of the peasant farmers.

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CHAPTER THREE

RESEARCH METHODOLOGY

Sources of Data

Data for this study were collected from a sample of peasant farmers in the ten northern states of Nigeria excluding those in the areas covered by the well established world bank-supported agricultural development projects in Funtua, Kaduna State, Gombe in Bauchi State, and Gusau in Sokoto State. Farmers under these projects, although typical of other northern Nigerian peasant farmers in most respects, have access to superior extension services, especially in terms of supply and timely distribution of agricultural inputs.

Although the ten northern states of Nigeria cover an extensive geographical area with different climatic and ecological zones, the study was designed to cover all because of their common historical, political and administrative backgrounds and their common bonds with the IAR and AERLS of the Ahmadu Bello University (Figure 3).

The Study Design

The original design of the study called for the presence and supervision by the researcher or an AERLS extension specialist

during actual interviews at each of the thirty locations in the ten states (Appendices B and D). On account of serious money and time constraints, it was not possible to remain and supervise the exercise at all the locations. Instead, copies of the interview schedule were taken to the selected LGAS and thorough instructions given to the AAs who were assigned to help in the data gathering exercise, about selection procedures, interview techniques and reporting of farmers' answers. A second trip was then made to the locations later to collect the completed copies of the schedule (Appendices C and D). The one week allowance given for the completion of the exercise was found to be inadequate for the ministry staff so a third trip was usually called for and this was a major limiting factor in the study.

The survey was conducted during the dry season, February to April, when agricultural activities were at a low ebb and so causing only minimum disruption in the respondents' normal activities. As far as was possible, interviews were conducted at the sites and times that were most suitable for the farmers - either in their homes or on the fields and either in the mornings or evenings.

In order to ensure ministry cooperation and assistance, official letters about the study (Appendices B and C) were sent to the state headquarters concerned. The ministries were also promised copies of the findings of the study. Respondents' cooperation was assured through the assistance of local ministry personnel. Before

each interview, the purpose of the study was explained to the farmers and special efforts were made by the extension workers to convince the farmers about the values of such a study.

Selection Procedures

With the assistance of an AERLS senior extension specialist and officials of the Ministry of Agriculture and Natural Resources in the ten states, six farmers were randomly selected in each of five randomly selected local government areas of each state, to give a total of 300 respondents for the study. However, due to the disqualification of some partially completed schedules and the inability of the researcher to collect those in Kano State locations and a few other locations in some of the other states, the adjusted total number of respondents came to 205. Random selection was achieved by writing names of LGAS, villages and farmers on pieces of paper and placing these in a container and then asking a neutral person to pick the required numbers. After each pick, the piece of paper was returned into the container so that every LGA, village or farmer had an equal chance of being picked.

Selection of the Local Government Areas

A list of all the LGAs in each state was prepared (Appendix D) and from this, five LGAs were randomly selected in each state to provide the villages from which the respondents were randomly selected. The selection of the LGAs was done by the author with

the assistance of an AERLS senior staff and then communicated to the states as stated in Appendices B and C.

Village Selection

This was done by the extension workers after instructions on random selection.

There were no official and comprehensive lists of all the villages in the LGAs, so extension workers were instructed to make a list of all the villages they covered in their normal extension duties in their LGAs and then to randomly select one from which respondents were chosen.

Respondent Selection

It was originally planned to use tax lists for respondents' selection but these were either not available, incomplete or were inacessible to the extension workers who helped in the data collection, so the extension agents' farmers' lists were used in randomly selecting the required six respondents in each of the five selected villages. In all cases, respondents were males and heads of their households. As a general rule, the male head of household is usually responsible for making the farming decisions of the family in Nigeria.

The Interview Schedule

A copy of the interview schedule is given in Appendix A. The assistance of Professor Richard Powers of the Department of Agricultural Journalism, fellow graduate students in the CAVE Department, and AERLS staff was sought in the development of the interview schedule. The final interview schedule consisted of the following types of questions:

1) Structured response items;

2) Unstructured or open-ended questions; and

3) interviewer ratings.

The schedule was made up of the following sections:

1) Questions aimed at determining the awareness and application knowledge levels of the farmers.
2) Questions aimed at determining the adoption levels of the respondents.
3) Items measuring the personal, socio-economic and farming characteristics of the respondents.
4) Items measuring the importance of the various communication channels for agricultural information.
5) Questions designed to determine factors motivating or hindering respondents' adoption of recommended practices.
6) Questions aimed at determining the respondents' perceptions of the relevancy of the recommended farm practices.
7) Questions aimed at determining the nature and extent

respondents' involvement in extension programming.

Selected Recommended Practices

Questions were asked about the following recommended extension practices:

1. The use of improved seed varieties of:
   (a) guinea corn (sorghum)
   (b) millet
   (c) maize
   (d) rice
   (e) groundnut (peanut)
   (f) cotton
   (g) cowpea
   (h) cocoa
   (i) vegetables
2. The use of seed dressing (treatment) chemicals
3. The use of fertilizers
4. The use of storage chemicals
5. Early planting and spraying of cotton
6. Cowpea sole-cropping and spraying
7. Use of recommended spacing and planting rates
8. Mulching of young seedlings (fruit trees)
9. "Rouging" for pest and disease control
10. Cross-tying (bunding)
11. Spraying cocoa for pest and disease control

12. Use of improved poultry stock for egg and meat.

The interview schedule was constructed in English and only translated for respondents at the time of actual interviews. Pretesting of the instrument was done with AERLS staff, CAVE graduate students and only five extension workers because of time constraints. B ased on the pretesting results, questions were either modified, changed or completely eliminated.

It took about 45 minutes to complete an interview schedule during pretesting and about one hour on the average during the actual data collection exercise.

Dependent Variables

Awareness Score

It was originally proposed to compute two awareness scores based (a) on the unaided recall of recommended agricultural practices by a respondent, and (b) on aided recall by respondents. However, data from the respondents' unaided recall were suspect and had to be discarded. The awareness score used in this study therefore was based on a respondent's aided recall of recommended practices and was computed as the sum total of an individual's recall over twenty selected recommended practices, so scores ranged from zero to 20.

Adoption Score

This was computed as the sum of all the practices an individual was currently using at the time of the survey, divided by total number

of practices less than those practices not applicable to an individual's farming situations. The computed value was then multiplied by 100 so as to avoid negative adoption scores. Scores were then reported as a percentile and ranged from zero percent to 100 percent.

Program: ADSCOR = (ADTOTAL/(20-NVALID))X10-

ADSCOR = Adoption Score

ADTOTAR = Total number of practices an individual currently using

NVALID = Total number of practices not applicable to an individual's farming situation

Application Knowledge Score

This was computed based on the number of correct responses an individual gave to the questions on the principles of the application of the four selected farm practices being examined in detail:

Use of improved seed variety

Use of seed dressing chemicals

Use of fertilizers

Use of storage chemicals

Three questions, each worth a point, were asked on the four selected recommended practices such that the scores ranged from 0 - 12, with a maximum possible of 12 points.

Independent Variables

The following variables were investigated to determine how they influence farmers' adoption behavior:

1. Age
2. Formal education
3. Literacy level
4. Family size
5. Acreage farmed in the current season
6. Socio-economic status
7. Income in the last season
8. Agricultural information sources, contacts and use
9. Participation in community organization
10. Relevancy of recommended practices to the farmers' situations - the farmers' perceptions
11. The nature and extent of the farmers' involvement in extension programming.

Measuring the Independent Variables

Since several items were included in the interview schedule regarding some of the independent variables, it was necessary to calculate an index or a composite score for some of these variables as shown below.

Formal Education

Because of the importance of education and the differences in the various levels, progressively increasing weighted scores were assigned to the various levels of formal schooling as indicated below

No schooling (0)

Primary school but did not complete (1)

Adult education classes (2)

Completed primary school (3)

Some college (secondary school or teacher training) (4)

Completed college (5)

Literacy Level (score)

A literacy score was calculated based on the farmers' response as to whether he could read English, his local language or the arabic script ("ajami"). Each level was assigned a point.

Family Size

This was computed based on the number of wives and children a respondent had living with him at the time of the survey.

Acreage Farmed

This was the total number of acres of all holdings being currently cultivated by a respondent whether owned, leased or rented.

Socio-economic Status

For this study socio-economic status was based on a composite index including education and literacy levels, income for the past season, length of farming experience, land ownership, acreage currently being farmed, participation in voluntary social organizations, possession of a radio and some form of transportation viz a

motorcycle, bicycle or a horse. All respondents were then slotted into one of three status groups - high, middle or low. The status groups however represent arbitrary breakdowns for ease of analysis.

Participation in Community Organization

Social participation was measured based on the individual's involvement in voluntary social organizations at four levels: 1) membership in the voluntary organizations, 2) attendance at meetings, 3) committee membership, and 4) whether or not the individual held an office at the time of the survey. All four levels were equally weighted - a negative answer earning a zero and a positive one earning a point.

Relevancy of the Recommended Practices to the Farmers' Situations

This was a measure of the farmers' perception of the relevancy of the recommended agricultural practices to their personal, social, economic and farming situations. Scores on this variable were derived from the farmers' responses to statements related to their feelings about the relevancy of the agricultural practices they had been exposed to. A respondent could either agree, disagree or be undecided about the statements presented. An agreement was scored 3 points, indecision 2 points and a disagreement was scored only a point. A high score was indicative of high relevancy to an individual respondent's situation. However, approximately half of the statements were presented in the negative form so a disagreement

received a score of 3 points and an agreement, a score of 1 point. An average relevancy score, indicative of a farmer's perception of the relevancy of the recommended practices to his situations was then computed for each of the four situations. A modified version of Ariffin's (2) instrument was used to solicit data on this variable.

The Nature and Extent of the Farmers' Involvement in Extension Programming

Again this is a measure of the farmers' perception of the nature and extent of their involvement in their states' agricultural extension programming processes. For the purposes of this study, involvement is operationalized as participation in all the various phases of extension programming viz: needs assessment, developing program objectives, implementation of program objectives, and evaluation. Measures of these variables presented and scored similarly to that of the farmers' perception of the relevancy of the recommended practices except for the measurement of the respondents' perception of their involvement in the implementation of program objectives (2). For this phase of programming, respondents were asked to indicate specifically the number of times or frequency they had actual opportunities in participating in learning experiences as a result of implementation of program objectives. A score was derived by summing up the total number of times a respondent was involved and an average score then computed. A high score was

indicative of high perception of involvement by the farmers while a low score indicated otherwise.

Statistical Anaylsis

The collected copies of the interview schedule were first examined and incomplete or improperly completed ones eliminated. A total of 205 respondents (making 68.33 percent return) provided the data for the study.

The data were then coded and punched on IBM cards for computer runs at the Madison Academic Computer Center (MACC). A major portion of the analysis was by means of the SPSS for Sperry Univ 1100 Computer System. The output from the program included:

1. frequency counts in tabular form,
2. tables of percentage distribution,
3. mean,
4. standard error,
5. standard deviation,
6. the Pearson Product-Moment correlation coefficient matrix.

Statistical Procedures

(i) Frequency distributions: provided for simple descriptive analysis of nominal data.

(ii) Pearson Product-Moment Correlation: Provided a means of determining the existence and strength of a relationship between a pair of variables. It should be noted that although there may be many

reasons for a relationship, the correlation coefficient does not necessarily indicate a cause-and-effect relationship but rather, it indicates whether or not there is a relationship between the two variable and if there is, whether the relationship is positive or negative.

The correlation coefficient "r is the ratio of the covariation to the square root of the product of the variation in X and the variation in Y" (3). The value of "r" may range from a low of -1.0 to a high of 1.0 if all points are on a straight line, depending on whether the relationship between the pair of variables is either negative or positive. A zero value is indicative of no relationship between the variables. In correlation analysis, it is assumed that the variables X and Y being analyzed are normally distributed and selection of the samples randomly done. The correlation analysis was thus used to determine the degree of relationship between the dependent variables -- Awareness, application knowledge and adoption with a number of selected independent variables. The technique also provided a means of determining which of the selected independent variables were more closely related to the dependent variables.

(iii) The Analysis of Variance: According to Wiersma (4), ANOVA is "a technique for partioning the variation in the observed data into parts, each part assignable to different causes or combinations of causes."

After employing the reliability analysis for scale program to determine the means of the importance of the various sources of

agricultural information on farmers' ratings, the ANOVA technique was used to test for significant differences in importance of the various sources. The technique was also used for testing for significant relationship between farmers socioeconomic groups and use of the various agricultural information sources. In each case, where significance was detected, a Newman-Kuel's test was employed to determine differences and categorize the means into subsets. The summary takes of the ANOVA and the Newman-Kuel's tasks were then presented.

(iv) Multiple regression analysis: This technique, which is useful for estimating variations in the dependent variable based on a linear combination of many independent variables was done to determine the best combination of variables predictive of adoption by farmers. By employing this technique, the individual contributions of the selected independent variables in predicting the dependent variable can be determined. The procedure involves the calculating of the partial correlation coefficient of each independent variable, one at a time, while holding constant, the influence of the other variables entered into the regression. From the list of the partial coefficients, the best predictor variables are the selected. The output of the analysis program include: 1) the cumulative multiple correlations (R), 2) the cumulative square of the multiple correlation (RSQ) and 3) the increase in the square of the multiple correlation (increase in RSQ).

The successive increase in the square of the multiple correlation is the percent of the variance in the dependent variable explained by each of the independent variable.

Test of Hypotheses

All hypotheses were stated in the Null form. "The Null hypothesis is a statistical proposition which states, essentially, that there is no relation between the variables (of the problem)" (5). Correlational Coefficient were used to determine the degree of relationship between variables in the study. A high correlation coefficient is indicative of a strong relationship while a small coefficient is indicative of a weak one.

Level of Significance

Since this study was both an exploratory and sample survey research involving many continuous variables, it was felt that the 95 percent level of probability was adequate, so the .05 level of significance was arbitrarily selected and used for the analysis. The small size of the sample when compared to the population of the area studied was a further reason for selecting the .05 level of significance.

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CHAPTER FOUR

ANALYSIS OF DATA AND DISCUSSION--PART I

Introduction

The main purpose of this investigation was to study the diffusion and adoption of recommended agricultural practices among farmers in the ten northern states of Nigeria. Data for the study were collected through a survey in the states between January and April 1981.

In Chapter I, the background to the study, a statement of the problems and rationale for the study were presented. Specific terms used in the study were also defined in the chapter.

Chapter II of the study comprised a selective but detailed review of the literature on diffusion and adoption research both in North America where the majority of the early work in this area was done, and in Nigeria. This review not only provided an appreciation of the problems of cross-cultural research, it also provided the concepts and many of the variables to be edamined in this present study.

The researchm ethodology chapter, Chapter III, described the research design, the data collection instrument and the procedures for collecting and analyzing the data.

The present chapter deals with the first part of the analysis of the data. Specifically the chapter attempts to provide answers to the researchquestion:

> What are the general characteristics and adoption behaviors of a typical northern Nigerian peasant farmer?

Descriptive Findings

The frequency distribution of the surveyed farmers by states is given in Table 4. There were a total of 205 respondents in the sample with no return from Kano State and only partial returns from six other states.

The Surveyed Farmer: A Description

The following descriptive findings are the general characteristics of the sampled farmers in the ten northern states of Nigeria. These characteristics are assumed to be those of a typical northern Nigerian peasant farmer who is representative of all farmers in the region.

Demographic Characteristics

Occupation

It was found that all respondents were either full time farmers or had farming as their most important occupation.

Table 4

Frequency Distribution of Respondents by States, 1981

States	No. of Respondents	Percent
1. Bauchi	22	10.7
2. Benue	27	13.2
3. Borno	22	10.7
4. Gongola	17	8.3
5. Kaduna	18	8.8
6. Kano*	0*	0.0*
7. Kwara	30	14.6
8. Niger	30	14.6
9. Plateau	30	14.6
10. Sokoto	9	4.4
Total	205	100.0

*Kano State interview schedules were administered but not collected in time to be included in the study.

Age

The frequency distribution of respondents by age is presented in Table 5. The majority of the farmers (34.1 percent), were found to be between 41 and 50 years old. The mean age distribution of all respondents was about 48 years which is a little higher than Voh's (1) finding among Giwa farmers, and Williams' (2) findings in western Nigeria. Apparently now, there are less young people entering farming than older folks retiring.

Family Size

Family size was computed based on the number of wives and children each respondent had at the time of the survey. Table 6 presents the frequency distribution of wives per household while Table 7 presents the number of children. The mean number of wives for respondents is 2, and about 7 children per household (Tables 6 and 7). In traditional societies, the primary source of labor for the peasant farmer is his immediate family and relatives. It is speculated therefore that family size would influence the adoption of recommended farm practices. A large family size then would then enhance the adoption of new farm technology especially those requiring additional labor. Both Clark and Akinbode (3) and Alao (8) working with farmers in the former Western State of Nigeria found positive and significant relationship between family size and the adoption of improved agricultural practices. Monu (9) however argued that although large families may enhance adoption, it could with the

Table 5

Frequency Distribution of Respondents by Age, 1981

Age in Years	No. of Respondents	Percent	Cumulative Percent
Below 20 (1)*	0	0.0	0.0
21 - 30 (2)*	15	7.3	7.3
31 - 40 (3)*	64	31.2	38.5
41 - 50 (4)*	70	34.1	72.7
51 - 60 (5)*	43	21.0	93.7
Over 61 (6)*	13	6.3	100.0
Total	205	100	
$\bar{X}$ = 3.878	S = 1.029	SE of Mean .072	

*Weighted scores assigned age groups

Table 6

Frequency Distribution of Respondents According to Number of Wives, 1981

No. of Wives	No. of Respondents	Percent	Cumulative Percent
0	2	1.0	1.0
1	67	32.2	33.7
2	69	33.7	67.3
3	40	19.5	86.8
4	27	13.2	100;0
Total	205	100.0	

$\bar{X}$ = 2.11 S = 1.039 S.E. of the Mean = 0.073

Table 7

Frequency Distribution of Respondents According to Number of Children, 1981

No. of Children	No. of Respondents	Percent	Cumulative Percent
0	3	1.5	1.5
1	8	3.9	5.4
2	11	5.4	10.8
3	9	4.4	15.2
4	19	9.3	24.5
5	21	10.3	34.8
6	33	16.2	51.0
7	16	7.8	58.8
8	20	9.8	68.6
9	11	5.4	74.0
10	6	2.9	77.0
11	4	2.0	78.9
12	9	4.4	83.3
13	7	3.4	86.8
14	4	2.0	88.7
15	15	7.4	96.1
16	3	1.5	97.5
18	1	0.5	98.0
20	2	1.0	99.0
24	1	0.5	100.0
Total	204	100.0	

$\overline{X}$ = 7.564 S = 4.499 S.E. of the Mean = 0.315

Table 8

Frequency Distribution of Respondents According to Family Size, 1981

Family Size (No. per Household)	No. of Respondents	Percent	Cumulative Percent
1	3	1.5	1.5
2	7	1.0	4.9
3	11	3.4	10.3
4	5	5.4	12.7
5	16	2.4	20.6
6	12	7.8	26.5
7	23	5.9	37.7
8	27	11.2	51.0
9	14	13.2	57.8
10	17	6.8	66.2
11	7	8.3	69.6
12	11	3.4	75.0
13	7	5.4	78.4
14	3	3.4	79.9
15	6	1.6	82.8
16	5	2.9	85.3
17	9	2.4	89.7
18	7	4.4	93.1
19	9	3.4	97.5
20	1	4.4	98.0
21	1	0.5	98.5
23	1	0.5	99.0
25	1	0.5	95.0
28	1	0.5	100.0
Total	204	100.0	

$\overline{X}$ = 9.672 S = 5.147 S.E. of the Mean = 0.360

introduction of Universal Free Primary Education in Nigeria (UPE) hinder adoption "because apart from the fact that the farmer is deprived of the labor of his children, he also has to provide for their school needs." The relationship between family size and adoption will be statistically determined in the next chapter of this study. From Tabe 8, however, it can be seen that the mean family size distribution for all respondents is about 9 persons per household. While 51 percent of the respondents had 8 or less persons per household, two percent had 20-28 persons per household.

Income

The North American studies have established that there is a positive and significant relationship between level of income and adoption of improved farm practices. Very few of the Nigerian studies have investigated this relationship. Clark and Akinbode (3) did however found similar results to the North American findings with cocoa and poultry farmers but not maize farmers in western Nigeria. The relationship between income and adoption will be determined in the next chapter of this study.

The frequency distribution of respondents according to their incomes is presented in Table 9. Respondents' income was based on the amount of money received for produce sold during the last harvest. As revealed in Table 9 over 80 percent of the farmers had an income of only ₦1,500 or below. This is certainly indicative of productivity characteristic of traditional and peasant

Table 9

Frequency Distribution of Respondents According to Income Levels (Last Cropping Season), 1981

Income Levels (Last Season) N**	No. of Respondents	Percent	Cumulative Percent
Less than ₦500.00(1)*	57	29.7	29.7
₦500 - ₦1000.00 (2)*	69	35.9	65.6
₦1,000 - ₦1,500.00 (3)*	29	15.1	80.7
₦1,500 - ₦2,000.00 (4)*	3	1.6	82.3
₦2,000 - ₦2,5 0.00 (5)*	16	8.3	90.6
Over ₦2,500.00 (6)*	18	9.4	100.0
Total	192	100.0	

$\bar{X}$ = 2.510 S = 1.585 S.E. of the Mean = 0.114

*Weighted scores assigned income levels

** ₦ = Nigerian Niara

(₦1.00 = $1.76 (at the time of survey) Jan.-April 1981)

agriculture. Characteristically too, while 29.7 percent of the respondents made less than a mere ₦500.00, only 9.4 percent of the respondents made over ₦2,500.

5 Socio-economic Status

This variable has been variously measured depending on the discipline and cultural setting. In this study, a socio-economic status score was computed for the surveyed farmers based on a multiple of weighted factors including: educational level (6 points), functional literacy score (3 points), incomes (6 points), length of farming experience (5 points), land ownership (5 points), income (6 points), length of farming experience (5 points), land ownership (5 points), size of farm (7 points), participation in voluntary social organizations (4 points), possession of a radio (2 points), and possession of a farm of transportation - motorcycle, bicycle or horse (3 points), all adding up to a score of 40 points. Farmers scores were then cross-tabulated into three groups - low (5.0 - 17.3), middle (17.5-26.9) and high (27.0-33.0). As revealed in Table 10, a majority of the surveyed farmers (66.8 percent) were in the middle group. While a substantial 18.6 percent of the respondents were in the low socio-economic group, only 14.6 percent were in the high socio-economic group.

An individual's socio-economic status level or score is indicative of his economic power, material possession, exposure and access to information, all of which have been found to be predisposing

Table 10

Frequency Distribution of Respondents According to Socio-Economic Status Score, 1981

Socio-Economic Status Score (group)	No. of Respondents	Percent	Cumulative Percent
5.0 - 17.3 points (Group I - low)	38	18.6	18.6
17.5 - 26.9 points (Group II middle)	137	66.8	85.4
27.0 - 33.0 points (Group III - high)	30	14.6	100.0
Total	205	100.0	

$\bar{X}$ = 22.130 S = 4.818 S.E. of the Mean = 0.336

to high adoption both in North America (Rogers, et. al., 1970), and in Nigeria (Voh, 1979 (1)). Similarly Alao (11), Keith (4) and Voh (1) have established that there is a positive relationship between cosmopoliteness and adoption of innovations. The relationship between socio-economic status level and adoption will be determined in the next chapter.

Educational Level

As was to be expected, the majority (60.0 percent) of the respondents were illiterates who have had no formal education. The frequency distribution of respondents according to their levels of formal education is presented in Table 11.

While Clark and Akinbode (3) found just more than half of their study group without any formal schooling, Voh (2) on the other had found that well over three quarters of his study group had never attended school. Voh's rather high percentage of non-formal school may be due to the fact that he never included adult education classes. In this study, 25.4 percent of all the respondents indicated they have attended adult education classes as compared to 6 percent in Clark and Akinbode's (3) study of 1968 in the Western State of Nigeria.

It is significant to point out that less than 2 percent of the respondents in this study had any college (secondary school or teacher training) level education.

Table 11

Frequency Distribution of Respondents According to Level of Formal Education, 1981

Level of Formal Education		No. of Respondents	Percent	Cumulative Percent
No School	(0)*	123	60.0	60.0
Uncompleted Primary Education	(1)*	18	8.8	68.8
Adult Education Classes	(2)*	52	25.4	94.1
Completed Primary Education	(3)*	9	4.4	98.5
Some College (Sec. Sch. or T.T.C.)	(4)*	2	1.0	99.5
Completed College (Sec. Sch. or T.T.C.)	(5)*	1	0.5	100.0
Total		205	100.0	

$\overline{X}$ = 0.790 S = 1.076 S.E. of the Mean = 0.075

*Weighted scores assigned the various levels of formal education.

Functional Literacy Level

In a developing country like Nigeria where educational levels are significantly low, the concept of functional literacy becomes important in the communication of innovations. It is probable that farmers being uneducated will have problems understanding instructions on a new practice presented to them through extension materials such as pamphlets, posters, etc. because they are unable to understand the contents and language of such materials. This problem, if not recognized by the extension personnel, will not only adversely affect the extension efforts but the farmers' confidence in the recommended farm practices. In the present study, functional literacy is operationalized as the ability to read extension materials in either English, the local language or in the Arabic script. Table 12 gives a frequency distribution of the respondents according to their functional literacy abilities.

More than half the farmers indicated they were literate in their local languages. This rather high figure is suspect and may be due to respondents trying either to hide their ignorance or merely trying to boost their ego. As expected, a rather high significant proportion of the farmers indicated they possessed no functional literacy ability in English, this is consistent with the findings under formal education. It also suggests that less emphasis should be put on English in the preparation of our extension materials, that are directed to farmers. Based on the findings on the functional literacy

Table 12

Frequency Distribution of Respondents According to Their Functional Literacy Abilities, 1981

Literacy Ability	No. of Respondents	Percent Yes	Percent No
Local Language Literacy	204	58.3	41.7
Arabic Script Literacy	205	23.9	75.6
English Literacy	204	6.4	93.6

abilities, an overall functional literacy score was computed for the study sample. Literacy in a language was scored a point and non-literacy was scored zero. The scores ranged from 0 -3 as shown in Table 13. The mean score distribution for all the respondents was 0.902 with 86.3 percent of the scoring only 1 point and less. This is again indicative of the need to examine the present channels of extension communication.

Awareness Knowledge

Awareness knowledge has been defined earlier as knowledge that an innovation or an idea exists, and for the purposes of this study, as knowledge that a recommended agricultural practice exists.

Awareness is generally considered the first step in the adoption of an innovation. Respondents in the present study were presented with twenty recommended agricultural practices and asked to recall which ones they had heard of. Based on this information, an awareness score over the twenty practices was then computed for the respondents as presented in Table 14. As shown in Table 14, most of the farmers are aware of at least some of the recommended practices and only 1% are not aware of any of the twenty practices. In an earlier study of eastner Nigeria farmers, Keith (4) found that 2 percent of the farmers were unaware of any of the 14 agricultural practices studied.

At the other end of the scale, only 1 percent of the respondents were aware of all the twenty practices. Less than half of the

Table 13

Frequency Distribution of Respondents According to Their Functional Literacy Scores

Functional Literacy Score	No. of Respondents	Percent	Cumulative Percent
0	51	25.0	25.0
1	125	61.3	86.3
2	25	12.3	98.5
3	3	1.5	100.0
	1	Missing	
Total	205	100.0	

$\bar{X}$ = 0.902 S = 0.651 S.E. of the Mean = 0.046

Table 14

Frequency Distribution of Respondents According to Awareness Scores on 20 Practices, 1981

Awareness Score	No. of Respondents	Percent	Cumulative Percent
0	2	1.0	1.0
2	2	1.0	2.0
3	1	0.5	2.4
4	14	6.8	9.3
5	3	1.5	10.7
6	12	5.9	16.6
7	21	10.2	26.8
8	15	7.3	34.1
9	13	6.3	40.5
10	13	6.3	46.8
11	16	7.8	54.6
12	13	6.3	61.0
13	18	8.8	69.8
14	9	4.4	74.1
15	19	9.3	83.4
16	9	4.4	87.8
17	7	3.4	91.2
18	13	6.3	97.6
19	3	1.5	99.0
20	2	1.0	100.0
Total	205	100.0	

$\bar{X}$ = 10.902 S = 4.447 S.E. of the Mean = 0.311

farmers (46.8%) had heard of half the practices being studied here. The mean awareness score distribution for all respondents however was 10.902.

Although the awareness scores of respondents seem fairly evenly distributed, marked differences in awareness emerge when the recommended practices are individually considered as revealed in Table 15.

The range of awareness on the three most basic and popular recommended practices - the use of fertilizers, seed-dressing chemicals and storage chemicals is from 84.4 percent to 97.1 percent. The 95.1 percent awareness for seed-dressing is very similar to Voh's (1) finding of 94.4 percent for the same practice. The next three most heard of recommended practices were the use of improved maize, ground nut and guinea-corn seed varieties. Surprisingly enough, only 42.2 percent of the respondents indicated their being aware of improved cotton varieties - a cash crop that has been vigorously researched and pushed since the colonial era. Unlike cocoa which is another important cash crop, that is strictly limited in its area of cultivation (with 11.9 percent of respondents being aware of it), cotton is widely grown in the area under study. Similarly, less than half of the respondents (43.9%) indicated being aware of improved millet. Millet is an important staple food crop which is extensively cultivated in the region and on which extensive research has been done. The unexpected cotton and millet findings combined with the fact that

Table 15

Frequency Distribution of Respondents' Awareness Knowledge According to the Recommended Practices, 1981

Recommended practices	No. of respondents	Percent aware
Application of fertilizers	205	97.1
Use of seed-dressing chemicals	205	95.1
Use of storage chemicals	205	84.4
Improved maize variety	204	81.9
Improved groundnut variety	204	74.5
Improved guinea-corn variety	203	73.9
Recommended spacing and planting rate	204	67.1
Improved rice variety	204	65.2
Improved vegetable varieties 2	204	53.0
Improved cowpea variety	204	49.0
Improved poultry stock for egg and meat	204	47.1
Mulching of young fruit seedlings	204	46.1
Rouging for pest and disease control (Ridging)	204	44.6
Improved millet variety	204	43.9
Improved cotton variety	204	42.2
Early planting and spraying of cotton	205	40.5
Cross-tying of ridges (bunding)	204	33.9
Cowpea sole-cropping and spraying	204	30.4
Cocoa spraying for pest and disease control	204	13.7
Improved cocoa variety	203	11.9

only nine out of the twenty practices had more than 50 percent awareness is suggestive of probable flaws in the delivery of research results by the extension services.

Application Knowledge

Possession of awareness knowledge of a practice is not a sufficient condition that a practice will be adopted. An important predisposing factor to adoption is the possession of application knowledge i.e. the "how-to knowledge" (5). This is defined as knowledge necessary for the proper and successful application and incorporation of a practice. Four practices were selected and three questions each were asked on these in order to determine the respondents' application knowledge. As revealed in Table 16, a majority of the farmers possessed only partial application knowledge of the practices: Improved seed (76.6%), Seed dressing (52.2%), Fertilizer application (86.8%), and use of storage chemicals (54.6%). These results are similar to Keith's (4) findings in the former eastern region of Nigeria. His studies revealed that 81.0 percent of the farmers in the region had partially correct information about fertilizers and 74.0 percent had some correct information on NS-I maize variety.

Although fertilizers have become extremely popular among Nigerian farmers, due to the Federal Nigeria government's "Operation Feed the Nation" and the "Green Revolution" programs, only 7.3 percent of the respondents had full application knowledge. This is probably

Table 16

Distribution of Respondents' Application Knowledge Level by Practice, 1981

Application knowledge	Recommended practices			
	Improved seed variety	Seed dressing	Fertilizer application	Storage chemicals
No knowledge (0 of 3)	8.8	3.9	5.9	9.3
Partial knowledge (1 of 3)	31.7)	12.7)	76.1)	18.5)
Partial knowledge (2 of 3)	44.9) 76.6	39.5) 52.2	10.7) 86.8	36.1) 54.6
Full knowledge (3 of 3)	14.6	43.9	7.3	36.1

N = 205

due to the several new varieties introduced during the campaign programs and the ineffectiveness of the extension services to communicate correct knowledge to the farmers. The few, but often-times significant negative comments about fertilizers especially on crop burns, can be attributed to lack of adequate application knowledge on the part of the farmers and the failure on the part of extension to impart this important knowledge successfully. This failure may be due to an error of commission rather than omission. For example, Daniels (6) in his study of the application knowledge of farmers in three villages in northern Nigeria found that farmers had problems comprehending messages in extension posters. According to him,

> there are two possible road blocks to comprehending the message in these posters. The first is the farmer's lack of acquaintance with pictorial representation; the second is the artistic quality of the poster in making clear what is to be conveyed.

Thus there is a serious challenge for the extension services to be both efficient by execution and effectively by choice of the right and appropriate communication methods.

Based on the results in Table 16, an overall application knowledge score, ranging from 0 - 12 was computed for the study group (Table 17). The mean application knowledge score was 7.073 percent with 10.7 percent of the respondents scoring four points or less and less than 2 percent scoring full points (correct application knowledge).

Most of the respondents (77.4%), scored only between 5 - 9 points, scores considered to be low to average and not very good for

Table 17

Frequency Distribution of Respondents According to Their Application Knowledge Scores Over Four Selected Recommended Practices, 1981

Application knowledge score	No. of respondents	Percent	Cumulative percent
0	1	0.5	0.5
2	5	2.4	2.9
3	6	2.9	5.9
4	10	4.9	10.7
5	21	10.2	21.0
6	34	16.6	37.6
7	38	18.5	56.1
8	37	18.0	74.1
9	29	14.1	88.3
10	17	8.3	96.6
11	4	2.0	98.5
12	3	1.5	100.0
Total	205	100.0	

$\bar{X}$ = 7.073; S = 2.126; S.E. of the Mean = 0.148

successful application and incorporation of an agricultural practice. It would seem therefore that more and effective learning experiences must be provided by the extension services for farmers to improve their application knowledge of the improved farm practices.

Adoption, Rejection and Discontinuance Behaviors

A farmer who is aware of a recommended agricultural practice and possesses partial to full application knowledge goes through the innovation-decision process (adoption process) leading to either adoption, rejection or discontinuance of the practice.

Adoption

In order to measure the farmers' adoption behavior, respondents were presented with 20 agricultural practices and were asked to indicate both the practices they were currently using and those that were not applicable to their farming situations. From the responses then, percentile adoption scores were then computed as the sum total of practices that an individual was currently using, divded by 20 less the sum total of practices not applicable to the individual's farming situations, and then multiplied by 100. The scores ranged from zero to 100 percent with a mean of 61.2 percent less than a third of the respondents had scores over 80.0 percent, and 2 percent of them scored a zero (Table 18).

Just as with awareness, marked differences are revealed in the adoption behavior of farmers when the different recommended

Table 18

Frequency Distribution of Respondents According to Their Adoption Scores on Applicable Recommended Practices, 1981

Percentile adoption scores	No. of respondents	Percent	Cumulative Percent
0	4	2.0	2.0
5 - 10	5	2.4	4.4
11 - 20	5	2.4	6.8
21 - 30	9	4.4	11.2
31 - 40	16	8.0	19.0
41 - 50	22	10.8	29.8
51 - 60	25	12.2	42.0
61 - 70	47	22.9	64.9
70 - 80	28	13.7	78.6
81 - 90	22	10.7	89.3
90 - 100	22	10.7	100.0
Total	205	100.0	

$\bar{X}$ = 61.21 S = 23.61 S.E. of Mean = 1.65

practices are individually considered. These are presented in Table 19. Although only the practices applicable to respondents' farming situations were used in determining their adoption behavior, this behavior followed a fairly close pattern to the respondents awareness knowledge scores especially for practices that are common for all or most of the respondents, e.g. the use of fertilizers, seed-dressing chemicals, storage chemicals and improved maize variety.

The adoption rates for fertilizer application (97.0%), seed-dressing (93.0%) and improved groundnut variety (72.1%) were found to be much higher than Voh's (1) findings among Giwa farmers of Kaduna State - 61.2 percent, 35.6 percent and 3.1 percent respectively.

Voh (1) however explained that the rather low adoption rate for improved groundnut variety may be due to the farmers' inability to distinguish between the improved seeds and the local varieties.

The regional speciality of cocoa cultivation showed up again here with only 14 respondents indicating applicability. That only 69.2 percent of the respondents were currently spraying their crops for pest and disease control was however unexpected because of the emphasis that had been placed on this practice since pre-independence when Nigeria was a top world exporter. Clark and Akinbode (3) had in an earlier study in western Nigeria, found only 59.0 percent of cocoa farmers following this practice.

Cowpea is a major cash crop that has received a major attention in the IAR's breeding program for the past several years but only

Table 19

Frequency Distribution of Respondents Adoption Behavior According to Practices, 1981

Recommended practices	No. of respondents	Percent adopting
Application of fertilizers	202	97.0
Use of seed dressing chemicals	201	93.0
Improved poultry stock for egg and meat	39	82.1
Improved maize variety	159	76.1
Use of storage chemicals	199	75.0
Improved cotton variety	40	75.0
Mulching young fruit seedling	52	73.1
Improved groundnut variety	140	72.1
Improved rice variety	117	69.2
Cocoa spraying for pest and disease control	13	69.2
Improved cocoa variety	14	64.3
Recommended spacing and planting rate	199	61.8
Improved vegetable varieties	73	58.9
Improved guinea corn variety	187	56.7
Early planting and chemical spraying cotton	45	53.9
Improved cowpea variety	110	40.9
Rouging for pest and disease control	198	36.9
Improved millet variety	131	35.9
Cross tying of ridges (bunding)	161	31.1
Cowpea sole cropping and spraying	108	17.6

50.9 percent of the farmers are currently using improved varieties and far less (17.6%), are cultivating it as a sole crop and spraying as recommended. This recommended practice has been criticized by Norman (7) as not being relevant to the farmers' farming situations. According to him "sole crops under improved technological conditions often suffer from the problem of a lack of flexibility in timing of the operations which can cause farmers difficulties in their adoption." Thus the Nigerian farmer stubbornly continues to engage in crop mixtures under indigenous conditions despite low yields.

As it was with awareness, the findings about the adoption of improved millet, a major crop that has received major attention in IAR research efforts, was unexpected. Only 35.9 percent of the respondents are currently using improved varieties of millet.

Despite the effectiveness, simplicity and compatibility of "rouging" as a cultural method for pest and disease control, only 36.9 percent of the surveyed farmers are currently using this practice. Because of the cost of chemicals and the undesirable side efforts of using them, farmers must be made aware of the importance of cultural control methods of pest control in their routine farm operations. The method is both safe, simple, inexpensive and compatible with other operations.

No one among the 39 respondents who indicated they had poultry were full time poultry keepers and the rather high rate of use of improved stock is a little suspect. Until recently, poultry has not

received a major emphasis in the extension services.

Rejection and Discontinuance

These respondents' behaviors are discussed fully under respondents' sources of agricultural information and information use later in this chapter.

A Demographic Characterization of the Surveyed Farmer

From the above description findings, the typical northern Nigerian peasant farmer can be described as full time farmer, about 48 years old, with about two wives and seven children. He is an uneducated illiterate with an income of less than ₦1,500.00 and belonging to the middle socio-economic level. He has an average level awareness knowledge of the recommended extension practices, a partial application knowledge and average adoption rate. His adoption/rejection behavior vary significantly depending on the type of practice.

Farm Characteristics

Certain farm characteristics have been found to be positively related to the adoption of improved farm practices both in the North American (Rogers, (12)) and Nigerian studies (Monu, (9)). Among the farm variables examined in the present study were: land ownership, number of crops cultivated, size and number of plots, and farming experience.

Food Production Sufficiency

Although most of the respondents derived very little income from selling farm produce as has been revealed above, most of them however (95.5%), produced sufficient food crops to feed their families. These facts again point to the peasant nature of the region's agriculture.

Land Ownership

Although it has been argued that a critical factor affecting Nigerian peasants' adoption behavior and thus his productivity, is the tenancy problem (13), it would appear however from the findings of this study that land ownership by respondents in the survey is not a major problem. As revealed in Table 20, 90.7 percent of the surveyed farmers owned their lands. Yoh (1) reported that over 72.0 percent of all farmlands operated by Giwa farmers of Kaduna State in northern Nigeria were directly owned by the operators through inheritance. He further pointed out that "very few farm lands were acquired on lease, pledge, or rented in kind or cash." Although land ownership is presently not a major problem in the northern states of Nigeria, major problems are bound to occur later with rapidly increasing population, the introduction and expansion of land development schemes by the various states governments, and the introduction and adoption of modern farm practices.

Table 20

Frequency Distribution of Respondents According to Land Ownership, 1981

Land ownership	No. of respondents	Percent	Cumulative percent
Yes	186	90.7	90.7
No	19	9.3	100.0
Total	205	100.0	

Acreage and Number of Plots Cultivated

Farmers were asked to indicate the size and number of plots they were currently cultivating at the time of the survey. Table 21 gives the frequency distribution of acreage cultivated while Table 22 presents the frequency distribution of respondents according to number of plots being farmed.

Although almost half of the respondents (49.5%) reported cultivating over 11 acres, most of the holdings were fragmented as revealed in Table 22 where it was determined that the average number of plots per farmer were 3 with a majority (32.7%) having about 6 plots. These facts are again indicative of the peasant nature of agriculture in Nigeria. Yoh (1) found a little over 22 percent of the farmers in his survey operating seven fields or more. There is a definite need to consolidate the present fragmented holdings in order to realize the relative advantages of modern agricultural technology. The budding land development schemes is a step in the right direction.

Number of Crops Grown

The frequency distribution of the surveyed farmers according to the number of crops being cultivated is presented in Table 23.

The mean number of crops distribution for all respondents was about 6.7 with a substantial proportion (37.3%), growing eight or more crops. Most of these crops are however under crop mixtures for which appropriate and relevant technologies have not been developed. The fact that the Nigerian farmer has persistently continued to engage in

Table 21

Frequency Distribution of Respondents According to Total Acreage Being Cultivated, 1981

Acreage cultivated	No. of Respondents	Percent	Cumulative percent
Less 1 acre (1)*	1	0.5	0.5
1 - 2 acres (2)*	7	3.5	4.0
3 - 4 acres (3)*	23	11.4	15.3
5 - 6 acres (4)*	28	13.9	29.2
7 - 8 acres (5)*	23	11.4	40.6
9 - 10 acres (6)*	20	9.9	50.5
11 acres and over (7)*	100	49.5	100.0
Total	202	100.0	

$\bar{X}$ = 5.599 S = 1.649 S E. of Mean = 0.116

*Weighted scores assigned acreages cultivated.

Table 22

Frequency Distribution of Respondents According to Number of Plots Being Cultivated, 1981

No. of plots cultivated	No. of respondents	Percent	Cumulative percent
1	4	2.0	2.0
2	28	13.8	15.8
3	37	18.3	34.1
4	30	14.9	49.0
5	37	18.3	67.3
6	66	32.7	100.0
Total	202	100.0	

$\bar{X}$ = 4.254; S = 1.598; S.E. of Mean = 0.112

Table 23

Frequency Distribution of Respondents According to Number of Crops Grown, 1981

No. of crops	No. of respondents	Percent	Cumulative percent
1	2	1.0	1.0
3	9	4.4	5.4
4	30	14.7	20.1
5	24	11.8	31.9
6	27	13.2	45.1
7	36	17.6	62.7
8	28	13.7	76.5
9	17	8.3	84.8
10	30	14.7	99.5
13	1	0.5	100.0
Total	204	100.0	

$\bar{X}$ = 6.730; S = 2.215 S.E. of Mean = 0.155

crop mixtures under indegeneous conditions despite low yields and the fact that "sole crops under improved technological conditions often suffer from the problem of a lack of flexibility in timing of operations" (7), point to the important need and urgency for the development of new agricultural technologies geared towards crop mixtures.

Most Important Cash and Food Crops

Tables 24 and 25 present the frequency distributions of the important cash and food crops grown by respondents. Not unexpectedly, guinea corn and yams top the list of most important crops for respondents at 43.8 percent and 32.5 percent respectively.

Although rice was very low on the list of food crops grown (2.0%) it was among the top three most important cash crops being cultivated by the surveyed farmers. It ranked second to groundnuts with 21.4 percent of the cultivators growing the crop for cash. There's no doubt that the newly established river basin authorities and irrigation projects have boosted, rice production in Nigeria, moving it outside the traditional production areas. Despite the fact that groundnut production has suffered adverse reverses from the rosettee disease and drought in recent years in Nigeria, it still topped the list of cash crops. Yams ranked high on both lists despite the fact that only minimum research work has been done on this crop. Its significant ranking makes it deserve more attention by the agricultural research institutes. Only 5 percent of the respondents indicated

Table 24

Rank-Order Distribution of Respondents According to the Most Important Food Crops Grown, 1981

Food Crops (Most important grown)	No. of respondents	Percent
1. Guinea corn	89	43.8
2. Yams	66	32.5
3. Millet	24	11.8
4. Cassava	11	5.4
5. Maize	8	3.9
6. Rice	4	2.0
7. Cowpeas	1	0.5
Total	203	100.0

Table 25

Rank Order Distribution of Respondents According to the Most Important Cash Crops Grown, 1981

Cash Crops (Most important grown)	No. of respondents	Percent
1. Groundnuts	47	23.4
2. Rice	43	21.4
3. Yams	35	17.4
4. Cowpeas	17	8.5
5. Maize	11	5.5
6. Cassava	11	5.5
7. Cotton	10	5.0
8. Cocoa	6	3.0
9. Vegetables	6	3.0
10. Sugarcane	4	2.0
11. Guinea corn	4	2.0
12. Citrus fruits	3	1.5
13. Soya beans	2	1.0
14. Potatoes	1	0.5
15. Bananas	1	0.5
Total	201	100.0

that cotton, a traditional cash crop since the colonial era, was their major cash crop. Apparently the crop has declined in its importance as a major cash crop. This is probably not unconnected with the current low price being paid (for picked clean cotton), as perceived by the farmers, for a crop that requires high labor input and sole cropping in order to be grown profitably. It must be pointed out however, that geographical, regional and cultural differences are important influencing factors on the types of crops grown either for food or cash.

Farming Experience

The two Nigerian studies that have investigated the farming experience variables, have come out with differing results. Basu (14) found no significant relationship between farming experience and adoption, while Clark and Akinbode (3) reported a positive relationship between the two variables for poultry farmers but not for either maize or cocoa farmers however.

As shown in Table 26, the mean length of time in farming for all respondents was about 21 years. A substantially large majority of the farmers (62.4%), had a farming experience of 21 years and over. Clark and Akinbode (3) reported a mean figure of about 24 years for maize and cocoa farmers. Only 12.7 percent of the respondents in the present study had a farming experience of ten years and under. These findings again, are indicative of the fact that less number of young people are going into farming than older people leaving.

Table 26

Frequency Distribution of Respondents According to Length of Farming Experience, 1981

Farming Experience in years	No. of respondents	Percent	Cumulative percent
Less than 5 (1)*	7	3.6	3.6
5 - 10 (2)*	18	9.1	12.7
11 - 15 (3)*	20	10.2	22.8
16 - 20 (4)*	29	14.7	37.6
21 and over (5)*	123	62.4	100.0
Total	197	100.0	

X = 4.234 S = 1.168 S.E. of Mean = 0.083

*Weighted score assigned farming experience

The Typical Northern Nigerian Peasant's Farm Characteristics: A Description

From the findings above, the typical northern Nigerian farmer can be described as being able to produce sufficient food for himself and his household on a land he ownes, but not enough to sell to earn a meaningful income. He farms approximately about 8 - 10 acres distributed over about four plots, and grows an average of about 7 crops on these. All these characteristics point to the traditional peasant nature of his agriculture and also indicative of a need to consolidate in order to realize the relative advantages of improved farming technology. Since the several crops he grows are in crop mixtures as he has done over the years, there's a need for the research institutes to be sensitive to his needs and develop improved recommended agricultural technologies that are adaptive to his different crop mixtures.

With over 21 years of farming experience, the typical northern Nigerian farmers grows a variety of crops for his home consumption and for cash. His most important food crops include guinea corn, yams, millet, cassava, maize and rice while the four most important cash crops are groundnuts, rice, yams and cowpeas. The production of these food and cash crops are however influenced by geographical, regional and cultural differences.

Extension Exposure

One of the problem areas in diffusion research as defined by the subcommittee on diffusion studies is: diffusion as a problem of communication of information. Thus, a major factor directly influencing the diffusion and adoption of recommended agricultural practices is communication. In the investigation of the communication variable, the main objectives of the studies have been to determine the extent to which the various communication channels have been used "during the individual adoption process and by farmers at various positions in the diffusion process" (14).

The degree of use of these channels by farmers is dependent among other things on their possession of essential communication materials, e.g. radio and contact with extension delivery agencies. Put in another way, the farmers' perceptions and use of the communication channels is dependent on their means and the nature and extent of exposure to the extension services.

Source of Agricultural Information and Information Use

In its simplest form, the diffusion/adoption theory is the dissemination of innovative information through certain channels leading ultimately to the adoption/rejection of the innovations. The channels of diffusion therefore become critical factor influencing the awareness and adoption of the new ideas.

In this study, the surveyed farmers were asked to specify the sources through which they first became aware of four selected recommended farm practices and what they did on becoming aware. They were then further asked to rate all the sources of agricultural information as these apply to their farming situations. Responses to these questions are considered important in the planning and delivery of extension programs.

Sources of Information

Table 27 presents the frequency distribution of sources from which agricultural information was first received by respondents classified by type of farm practice. It is important to note that Table 27 presents a frequency distribution of the sources through which the respondents first became aware of the selected farm practices and not a reflection of the overall importance of those sources as channels for agricultural information for all the phases of the adoption process (Table 28). Nevertheless, the findings do give some of idea of the insiginificance of newspapers and television as communication channels in the Nigerian agricultural scene. These facts are explained by the high illiteracy rate in Nigeria and cost of newspapers. The few numbers of agricultural programs on television and even fewer number of farmers possessing television sets. The extension agent was the most dominant source through which the farmers first became aware of the selected practices. This is followed distantly by "other farmers" and the radio.

Table 27

Sources of Agricultural Information for First Awareness Classified by Type of Farm Practice, 1981

Sources	Type of Practice							
	Improved seed varieties		Seed dressing		Fertilizer application		Storage chemical	
	No	%	No	%	No	%	No	%
Extension agent	169	85.8	156	78.4	165	80.5	149	81.9
Research people	1	0.5	0	0.0	1	0.5	0	0.0
Agric. salesman	1	0.5	1	0.5	0	0.0	2	1.1
Other farmers	12	5.9	19	9.5	13	6.3	11	6.0
Village head	0	0.0	0	0.0	1	0.5		
"Sarkin Gonna	1	0.5	4	2.0	4	2.0	3	1.6
Coop society	2	1.0	1	0.5	22	1.0	2	1.1
Radio	3	1.5	13	6.5	9	4.4	9	4.4
TV	1	0.5	0	0.0	0	0.0	0	0.0
AERLS publications	1	0.5	3	1.5	3	1.5	2	1.1
Newspapers	0	0.0	0	0.0	0	0.0	0	0.0
Result demonstrations	4	2.0	2	1.0	6	2.9	4	2.2
Agric. shows	2	1.0	0	0.0	1	0.5	0	0.0
NAFPP	0	0.0	0	0.0	0	0.0	0	0.0
Total	197	100.0	199	100.0	205	100.0	182	100.0
	NR* = 8		NR* = 6				NR* = 23	

*NR = Non-response/missing

Table 28

Respondents' Importance Ratings of the Various Sources of Agricultural Information, 1981

Sources	Ratings			
	Very important %	Slightly important %	Not important %	No opinion %
Extension agent	95.1	3.9	-	1.0
"Research people" (IAR/AERLS)	32.2	15.1	32.7	20.0
Agricultural salesman	23.4	27.8	37.1	11.7
Village head	22.0	22.0	39.0	17.1
"Sarkin Gonna"	25.4	23.9	35.6	15.1
Cooperative/Farmers' society	37.6	28.3	23.9	10.2
Radio	48.3	31.7	13.2	6.8
AERLS publications	23.4	14.6	41.0	21.0
Newspapers	7.8	20.5	53.2	18.5
Result demonstrations	58.0	17.1	17.1	7.8
Agricultural shows	59.0	29.8	5.9	5.4
NAFPP	36.1	33.2	19.5	11.2
Other farmers	35.1	33.7	23.4	7.8
TV	14.1	21.5	44.9	19.5

N = 205

The farmers' ratings of all the sources of agricultural information as these apply to their farming situations, are presented in Table 28. The findings provide conclusive evidence as to the insignificance of newspapers and television, referred to earlier, as sources of information on recommended practices for the average Nigerian farmers. Over half of the respondents (53.2%), rated newspapers as unimportant as sources for agricultural information. Rather than abandon these sources, the extension services could use with their resources permitting, use them affectively for selected audiences. The most important sources of agricultural information as identified by the respondents were: the extension agent, agricultural shows, result demonstrations and the radio followed by the NAFPP and other farmers. The prominence of agricultural shows and result demonstrations in these findings is contrary to Williams' (22) results which found neither of these sources being frequently used by farmers in the Western State. Williams (22) however, speculated that these important channels of agricultural information were not being effectively used by the extension services in the State. However, Daniels' (6) study found that result demonstrations were widely and successfully used in the Gusau Pilot extension project. The study thus lends much support to the present findings.

The extension agent was clearly identified as the most important source of agricultural information. Although this finding is in agreement with Williams' (22) findings in western Nigeria, it is contrary to Yazidu's (16) in northern Nigeria. Yazidu (16) reported

finding the radio to be by far the most important source of agricultural information. There are two possible explanations for the discrepancy. First, Yazidu's study was conducted when both the Nigerian Broadcasting Corporation (NBC) and the Broadcasting Corporation of Northern Nigeria (BCNN) were making farm broadcasts in the Northern States. The BCNN are especially powerful and transmitted on shortwave thus effectively covering the whole of the northern half of the country. Now all states' radio stations transmit on medium wave and effective range has been considerably reduced. The second reason is, the creation of more states and local governments and the increase in the outputs of the old and new schools of agriculture have brought more extension workers closer to the farmers. Further, there's also more competition among the various government agencies for air time. Until the present broadcasting facilities in the different states are upgraded, the government should give preferential and generous air time to the extension services for agricultural broadcasts. It should be recognized that the radio is a very powerful communication channel for reaching large numbers of people that could otherwise not be reached physically.

It is important to note that despite the fact that a considerable portion of the AERLS budget is on publications, a significant percentage (41.0%) of the respondents rated this source as unimportant for them for agricultural information. Further, the fact that there is very little direct contact and interaction between the research and extension staff and the farmers is evidenced by a sizeable

32.7 percent rating "the research people" as unimportant for agricultural information. Thereis a definite need for more direct contacts between the research, extension staff and farmers.

Agricultural Information Use: Adoption Behavior

As has already been pointed out awareness of an innovation does not necessarily lead to the adoption of the innovation; conceivably a farmer may become aware of recommended practices without doing anything. In order to determine farmers' adoption behavior therefore, respondents were asked what actions they took on becoming aware of four selected recommended agricultural practices.

Table 29 gives a frequency distribution of respondents according to actions taken, classified by type of practice.

Those who tried a practice and adopted soon afterwards could be referred to as the early adopters and for seed dressing and fertilizer use, this group ranged from 25.6 to 26.3 percent of the respondents. The group that tried but adopted much later, the laggards, ranged from 10.7 percent for improved seeds to 14.7 percent for fertilizer use.

The rate of non-adopters who nevertheless tried the practices ranged from zero for fertilizer and storage chemicals to 3.3 percent for improved seed varieties. Relatively, few studies have investigated the "discontinuance" variable in diffusion and adoption research (5). As revealed in Table 29, the discontinuance rate was fairly uniform among the selected recommended farm practices, ranging

Table 29

Actions by Respondents on Becoming Aware of Selected Recommended Practices, 1981

Actions taken	Type of practice							
	Improved seed variety		Seed dressing		Fertilizers		Storage chemicals	
	No*	%	No*	%	No*	%	No*	%
Discussed practice with other farmers	57	19.0	34	11.2	35	11.2	30	11.2
Asked AA for more information	120	40.0	133	43.8	135	43.3	133	49.6
Tried practice and adopted immediately	52	17.3	80	26.3	80	25.6	49	18.3
Tried practice and adopted later	32	10.7	37	12.2	44	14.1	35	13.1
Tried practice but did not adopt	10	3.3	2	0.7	-	-	-	-
Adopted practice then discontinued	17	5.7	14	4.6	14	4.5	14	5.2
Did nothing	12	4.0	4	1.3	4	1.3	7	2.6
	N = 199 NR* = 6		N = 199 NR* = 6		N = 203 NR* = 2		N = 182 NR* = 23	

*Number of responses (respondents could provide more than one response if more than one action was taken)

% = percent of responses, add up to 100.0

*NR = Non-response/missing

from 4.5 to 5.7 percent of the respondents. The higher discontinuance rate for improved seed variety use, may be partly due to the farmers' non-convictions about the superiority and relative advantage of the improved varieties as compared to the local ones.

The group of non-adopters, who though were aware but did nothing, was similarly highest for improved seed variety use. In this instance, a possible explanation may be due to the low output of the states' seed multiplication schemes and the resulting scarcity of the new improved varieties. The Food Production Task Force in Nigeria, presented a more serious picture of the situation when it reported that less than 10.0 percent of the Nigerian peasant farmers are currently benefitting from the use of improved seed varieties (22).

It can be inferred from the results in Table 29, that farmers generally take their time on becoming aware of a new practice and a majority of them usually seek for more information about the practice from the local extension agents. A lesser but uniformly distributed percentage discussed the new practices with other farmers in the community. The relative importance of the village level extension workers and the 'other farmer' as channels for agricultural information is further substantiated by these findings.

Reasons for Discontinuance and Non-adoption

In order to find out more about the farmers' adoption behavior, those who had adopted a practice and discontinued or were aware but did nothing were asked to give the most important reason for their

actions.

Improved Seed Variety

Table 30 presents a rank order of reasons why farmers either discontinued the use of improved seed varieties after adoption or did not adopt in the first instance. The most frequently mentioned reasons for discontinuance or non-adoption were the unavailability of the improved seed materials, either complete absence or untimely delivery, and the fact that the respondents did not perceive the improved varieties to be superior to the local ones in certain instances. Closely linked to the later, is the next most mentioned reason - the unsuitability of some of the recommended varieties to local conditions. The problem of seed multiplication and distribution is again evidence in these findings and can only be alleviated by the states establishing autonomous seed multiplication units responsible for production and distribution.

The farmers' perception that local varieties were better in some instances can be inferred as evidence of their non-involvement in the developmental stages. This was revealed by the fact that a sizeable percentage of the respondents did say that some of the recommended seed varieties were not suitable for their localities.

Seed Dressing

Well over half of the response (58.8%) for discontinuance or non-adoption of seed dressing was the unavailability of the material. The two other most important reasons given were 1) the material was

Table 30

Reason for Discontinuance and/or Non-adoption of Improved Seed Varieties, 1981

Reasons for discontinuance/Non-adoption	No. of Responses	Percent
Material unavailable	10	27.8
Local variety better	10	27.8
Not suitable to local conditions	6	16.7
Requires more labor	4	11.1
No application knowledge	2	5.6
Material too expensive	2	5.6
Poor market	1	2.8
Don't know where to obtain material	1	2.8
Total	36*	100.0

N = 35

*A respondent gave two reasons.

too expensive (17.6%), and 2) the practice was not perceived to be useful (17.6%). The additional labor required to apply the chemical was another reason given for either discontinuance or non-adoption (Table 31).

Fertilizer Use

Similar to seed dressing chemicals, the two most mentioned reasons for either discontinuance or non-adoption of fertilizers were the unavailability of the material (38.9%) and the cost (27.87%). Surprisingly enough some of the respondents (22.2%), still did not perceive the application of fertilizers as useful. The added labor needed for the incorporation of the practice was a further reason advanced for discontinuance and non-adoption (Table 32).

Storage Chemical Use

The most frequently mentioned reasons for the discontinuance and/or non-adoption of this practice were the unavailability of the materials and the fact that the practice was not perceived to be useful. Cost and danger of handling were the only other two reasons advanced by the concerned respondents (Table 33).

The two most prevalent reasons for discontinuance and/or non-adoption common to the four selected practices were the unavailability of materials and cost. Unlike in the developed nations where private commercial concerns play the major role in the procurement and distribution of agricultural inputs, the extension services in Nigeria has in addition to its disseminating functions, the added burden of

Table 31

Reasons for Discontinuance and/or Non-adoption of Seed Dressing Chemicals, 1981

Reasons for Discontinuance/ Non-adoption	No. of responses	Percent
Material unavailable	10	58.8
Material too expensive	3	17.6
Practice not useful	3	17.6
Practice requires more labor	1	5.9
Total	17	100.0

N = 17

Table 32

Reasons for Discontinuance and/or Non-adoption of Fertilizers, 1981

Reasons for Discontinuance and/or Non-adoption	No. of responses	Percent
Material unavailable	7	38.9
Material too expensive	5	27.8
Practice not useful	4	22.2
Practice requires more labor	1	5.6
No application knowledge	1	5.6
Total	18*	100.0

N = 17

*A respondent provided two reasons

Table 33

Reasons for Discontinuance and/or Non-adoption of Storage Chemicals

Reasons for discontinuance and/or non-adoption	No. of responses	Percent
Material unavailable	6	42.9
Practice not useful	4	28.6
Material too expensive	2	14.3
Material too dangerous	2	14.3
Total	14	100.0

N = 14

procurement and distribution, functions it has not been able to perform efficiently and effectively thus far. The private commercial sector in Nigeria should be encouraged to get more involved in the input supply business in agriculture. Presently, only fertilizer prices are subsidized in Nigeria. It is suggested that other essential inputs like improved seeds, chemicals and application equipments be subsidized too considering the economic situations of a majority of the farmers. This will encourage the farmers to be more receptive to recommended farm practices.

The Radio as Source of Agricultural Information

The use of radio as a major tool for reaching rural people started in Canada with the launching of the radio forum in 1939 (15). The practice was gradually copied later by the third world countries with Nigeria joining in 1962. The radio forum did not make much impact in Nigeria then probably because of the number of rural people possessing radio at the time. With the introduction of cheap transistor radios especially by the Japanese, the radio has become a very powerful channel of communication in Nigeria. Because of the very high illiteracy rate in the country, the radio has become especially important because it is equally effective with literates and illiterates alike. Almost 80 percent (79.8%) of the farmers surveyed reported possessing a radio in working condition and 58.1 percent of those without, indicated having access to listening somewhere. Thus, most of the respondents within range could be reached through the radio if the

broadcasts were suitably timed. In his study of the radio as a means of communicating agricultural information to farmers in the northern states, Yazidu (16) reported that 71.1 percent of the surveyed sample listened to the radio. Patel and Ekpere (17), working in the former Western State of Nigeria, reported a much lower listenership -- 57.0 percent.

Agricultural Programs on Radio

Respondents were asked to indicate which, if any, of the agricultural programs they have heard or listened to on radio. As revealed in Table 34, 92.6 percent of the surveyed farmers indicated having heard agricultural broadcasts but however, only a few could identify the agricultural programs by name as shown in Table 35.

A majority of the 60.5 percent who could not identify the farm broadcasts by their regular titles, were however able to recall specific subjects e.g. "How to apply supa fertilizer?" that they had heard on the programs. It is important to note that of the eleven programs identified, only one was in English "Back to Land" originating from the ministry of agriculture in Benue State. Conspicuously absent on the list were the AERLS English broadcasts. Many of the respondents pointed out that some of the farm programs heard originated from the agricultural development projects at Gombe, Gusau and Funtuna. In talking with the states' ministry of agricultural personnel, it was revealed that a major handicap in radio farm broadcasts were the absence of radio scripts on timely farm topics

Table 34

Frequency Distribution of Respondents According to Agricultural Programs Awareness

Heard agrcultural programs	No. of respondents	Percent
No	15	7.4
Yes	187	92.6
Total	202	100.0

Table 35

Rank Order Distribution of Respondents According to Agricultural Programs Heard and Identified, 1981

Agricultural program	No. of respondents	Percent
Himmadai manoma	15	7.3
Mukoma gonna	15	7.3
Filin manoma	15	7.3
Noma jushin arziki	13	6.4
Agbe 1'oba (Kwara State)	6	2.9
Back to land	6	2.9
Donku manoma (Niger State)	5	2.5
Mallam nomau	2	1.0
Noma yanke talauchi	2	1.0
Ukola amiluche	1	0.5
Cannot identify programs by names/titles	124	60.5
Total	205	100.0

and air time from the states' radio stations. The AERLS should work more closely with all the states' ministry of agriculture in the preparation and distribution of radio scripts especially in the local languages.

It is not immediately apparent why only so few could identify the regular farm broadcasts. It can only be speculated that the broadcast were either not often enough, transmission not reaching many farmers or else programs were not being broadcast at suitable times.

Respondents' Listening Habits to Agricultural Programs

Table 38 presents the surveyed farmers' listening frequency to farm broadcasts. Respondents were fairly distributed in their listening frequency to radio farm broadcasts though slightly more (36.2%) said they listened only occasionally. This group was further querried for the reasons why they listened only occasionally. Their reasons are tabulated in Table 37. As has been shown above that most of the agricultural programs identified by the respondents were in the vernacular, language barrier was not therefore a major reason for occasional listening. Only 1.4 percent of the farmers said they listened occasionally because broadcasts were not in the local language.

Table 36

Respondents' Listening Frequency to Farm Programs, 1981

Listening frequency	No. of respondents	Percent
All the time	61	33.0
Most of the time	57	30.8
Occasionally	67	36.2
Total	185	100.0

Table 37

Rank Order of Reasons for Occasional Listening to Agricultural Broadcasts, 1981 (N = 67)

Reasons	Percent of Responses	Percent of cases
Time Unsuitable (Engaged on the farm	47.9	52.2
No time at all	23.3	25.4
Time Unsuitable (Other business or conflict with other programs	12.3	13.4
No personal radio	12.3	13.4
Regular broadcast times unknown	2.7	3.0
Broadcasts not in local language	1.4	1.5
Total	100.0	109.0*

*More than 100% because respondents could give multiple reasons

Suitability of Broadcast Time

The surveyed farmers were asked whether the present times of agricultural broadcasts were suitable or not and to indicate their time preferences. As shown in Table 38, 64.2 percent of the farmers said the present broadcast times were suitable while a sizeable 35.8 percent thought otherwise. The farmers' choice of the most preferred broadcast times vary widely from 6.00 a.m. to 11.00 p.m. As revealed in Table 39, the most preferred broadcast period is in the evening beteween 6.00 p.m. and 8.00 p.m. This is the period when most of the farmers are home having their evening meal or resting after the day's work. The least preferred periods for farm broadcasts according to the farmers were late mornings (9.00 a.m. to 12.00 noon) and early afternoons (Noon to 3.00 p.m.). These were the periods when most of the farmers were either on their farms or on their way home. These findings agree with Patel and Ekpere's (17) earlier study in Western Nigeria. They reported that a majority of both radio owners and non-owners who usually listened to the radio preferred listening between 6.00 p.m. and 9.00 p.m. The findings are further confirmed by Yazidu's (16) study which found that a majority of the villagers he surveyed in the northern states preferred listening between 6.00 and 8.00 p.m. In order to reach the maximum possible audience therefore, it is recommended that agricultural radio programs should be broadcast in this time slot.

Table 38

Suitability of Present Broadcast Times of Agricultural Programs, 1981

Suitability	No. of respondents	Percent
Yes	124	64.2
No	69	35.8
Total	193	100.0

Table 39

Frequency Distribution of Respondents According to Their Most Preferred Times for Agricultural Broadcasts, 1981

Time period	No. of respondents	Percent
6:00 a.m. - 9:00 a.m. (Early morning)	21	10.2
9:00 a.m. - 12:00 noon (Late morning)	9	4.4
12:00 noon - 3:00 p.m. (Early afternoon)	9	4.4
3:00 p.m. - 6:00 p.m. (Late afternoon)	42	20.5
6:00 p.m. - 8:00 p.m. (Evening)	47	22.9
8:00 p.m. - 11:00 p.m. (Night)	44	21.5
No preference/No response	33	16.1
Total	205	100.0

Knowledge and Contact with the Extension Agent

There are no accurate figures to show the ratio of extension workers to farmers in Nigeria. While Norman (7) estimated the ratio to be one A.A. to between 2,000 - 3,000 farming families, Axinn and Thorat (18) put it at one extension agent per 1,260 farm families. Whatever the ratio, the Nigerian farmer's knowledge of the local extension agent and contact with him has definitely improved since Kidd's study (19). According to Kidd's earlier survey, the number of farmers knowing the local extension agent was said to be relatively low. As revealed by the findings of this study (Table 40), 93.6 percent of the farmers indicated having knowledge of the local extension worker. Knowledge of the local extension agent by farmers may not necessarily ensure contact or interaction between the two, so respondents were further asked about the frequency of their contacts with the agents. Table 41 is a tabulation of their responses. It would appear from these findings, that there was a high degree of contact between farmers and agents. Williams and Williams findings, which showed that 81.0 percent of farmers they surveyed had contact with the local extension workers is substantiated by this study. Extension agent contacts are assumed to provide learning opportunities for both the agents and the farmers. These learning opportunities conceivably, result in farmers becoming more receptive to recommended agricultural practices.

Table 40

Knowledge of the Local Extension Agent, 1981

Knowledge	No. of respondents	Percent
Yes	190	93.6
No	13	6.4
Total	203	100.0

Table 41

Frequency Distribution of Respondents According to Their Frequency of Contact with the Local Extension Workers, 1981

Frequency of contact	No. of respondents	Percent
Frequently (Once in two weeks)	168	84.4
Occasionally (Once in three weeks)	15	7.5
Seldom (Once in a month)	8	4.0
Never	8	4.0
Total	199	100.0

Participation in Agricultural Shows, NAFPP and Results Demonstrations

Other important agricultural extension methodologies which provide learning experiences for the adult farmers are agricultural shows, the National Accelerated Food Production Program (NAFPP) which is a new concept in extension in Nigeria, and result demonstrations. The surveyed farmers were asked to indicate to what degree they had participated in these learning experiences. Their responses are tabulated in Table 42. As shown in the table, agricultural shows are still popular with farmers and serve as important vehicles for the dissemination of agricultural information on improved farming techniques. Over 75 percent of the farmers reported attending the last show in their area. A sizeable number of respondents (24.5%) however did not participate in this important learning experience. Some of the reasons advanced for non-participation included: bad timing, location, cost of travel and food, and inadequate publicity. Some of these difficulties could be alleviated by involving the farmers more in the planning of the shows.

The NAFPP, a new concept in extension to rapidly increase the production of certain food items and being vigorously pushed by both the Federal and State Governments, has not caught on as shown by the level of farmer participation but nevertheless found to be an effective channel. Since this program is being used to replace the popular result demonstrations, it must be made more attractive to ensure higher farmer participation and acceptance. As the concept

Table 42

Respondents Participation in Agricultural Show, NAFPP and Result Demonstration, 1981

Participation	Attendance at last Agric. show		Attendance at last NAFPP farmers' Field Day		Ever visited result demonstration	
	No.	Percent	No.	Percent	No.	Percent
Yes	154	75.5	93	45.8	156	76.1
No	50	24.5	110	54.2	49	23.9
Total	204	100.0	203	100.0	205	100.0

Table 43

Frequency Distribution of Respondents According to Their Participation Score, 1981

Participation score/level	No. of respondents	Percent
0.00 - 0.37 (Low)	105	51.2
0.37 - 1.05 (Average)	80	39.0
1.05 - 3.20 (High)	20	9.8
Total	205	100.0

$\bar{X}$ = 0.710 S = 0.582 S.E. of Mean = .041

provides for active farmer participation in all the phases, acceptance of the program would certainly lead to a higher level of adoption of recommended extension practices.

Participation in Voluntary Social Organizations

Participation in voluntary social organizations provides access to information and also useful learning experiences. Participation is thus an important positive variable in the adoption of innovations. This has been confirmed by both the North American and some of the Nigerian studies which have found a positive statistically significant relationship between participation and adoption (Rogers et. al. (10), Clark and Akinbode (3), and Basu (21)). For this study an average participation score was calculated for all respondents based on their membership and activity in five community organizations. The four levels at which participation were measured were: 1) membership in the organization - 0/1, 2) committee membership - 0/1, 3) attendance at least meeting - 0/1, and 4) office held - 0/1. Based on the scores, the participants were then categorized into high, average and low participants as shown in Table 43. The scores ranged from 0.0 - 3.2 out of a possible 4 points. It can be seen in Table 43 therefore that only 9.8 percent of the respondents had a high participation score and about 39.0 percent moderately active. A clear majority of the farmers (51.2%), however, had a low participation score indicating that few are taking advantage of participation in voluntary social organizations as vehicles for exposure and access

to information and also as a means of gaining valuable learning experiences.

The low farmers' participation level is further reflected in their low membership in farmers' cooperatives which had been said to have become an important vehicle for the diffusion of recommended farm practices in Nigeria (9). Only 46.3 percent of the farmers indicated they were members of this important farm organizations. There is a definite need to make concerted efforts to encourage farmers' membership in cooperatives and other farmers' societies.

In summary, it can be concluded that the most important channels through which farmers had extension exposure were the local extension agent, the radio, the agricultural shows and result demonstrations. Easily the most important was the extension agent. It would seem that the importance of radio, has declined somewhat from earlier findings. Apparently, this is due to the creation of states and the setting up of new broadcasting units which have very small transmitters and thus of limited range. The stiffer competition for air time by government agencies in the new states without preferential treatment for the extension services is also a probable cause. The creation of more local government areas and the increase in output of AAs from the schools of Agriculture has also brought more extension agents in contact with farmers. The local agents, radio and the other farmer were the most important sources for first awareness.

Participation in social voluntary organizations which provide exposure and learning opportunities was found to be relatively low among respondents.

On becoming aware of a recommended practice, the typical farmer would generally ask for more information about the practice from the local extension agent, some innovative ones would however go ahead and try the practice immediately. The incidence of discontinuance and non-adoption was found to be generally low for the four selected practices.

Farmers' Perceptions of the Relevancy of Recommended Agricultural Practices to their Situations

One of the most important determinants of the outcome of the innovation-decision process, is the adopter's perception of the characteristics of the innovation. According to Jones (14),[67]

> this perception may differ widely from what the 'actual' characteristics are, although it can be argued that the characteristics are 'real' only in so far as they are recognized and in the ways which they are perceived by the potential adopters.

So the relevancy of a recommended practice to the farmers' situations can only be determined by the farmers' perceptions of the practice. A recommended practice is deemed relevant, when the potential adopter perceives the practice as meeting his needs. The concept of relevance is thus situational and adopter, rather than researcher or change agent-centered.

Four situations viz. personal, social, farming and economic were chosen to measure farmers' perceptions of the relevancy of the recommended practices they had been exposed to. Respondents were presented with statements related to these situations and asked to react to them. A respondent could either agree, disagree or undecided about the statements depending on his perceptions. An agreement was scored 3 points, in decision 2 points and disagreement only a point. Negative statements were scored in the reverse order - agreement 1 point, and a disagreement, 3 points. Thus a maximum of 3 points was possible and a high score was indicative of a high relevancy to an individual's situations.

An average relevancy score based on the scores of the four situations was also computed.

For all the situations, respondents were categorized by cross-tab into three groups of equal intervals - high, middle and low based on their scores (23).

Personal Situation

Table 44 presents the frequency distribution of respondents according to their relevancy perception scores for their personal situations. While a majority of the respondents (42.4%) perceived the recommended practices to be only moderately relevant to their personal situations, quite a sizeable number of them perceived the practices not be very relevant. Only about a fifth (20.5%) of the surveyed farmers perceived the improved farm practices to be highly

Table 44

Frequency Distribution According to Their Personal Situation Scores, 1981

Personal situation scores	No. of respondents	Percent
1.500 - 2.179 (Low)	79	37.1
2.180 - 2.531 (Middle)	87	42.4
2.532 - 3.000 (High)	42	20.5
Total	205	100.0

$\bar{X}$ = 2.355; S = 419; S.E. of Mean = 0.029.

relevant to their personal situations.

Social Situation

Table 45 summarizes the frequency distribution of respondents according to their social situation scores. Almost three-quarters of the respondents (71.7%) perceived the recommended agricultural practices as low to only moderately relevant to their social situations. It can therefore be inferred that most of the farmers generally perceived the recommended practice as less relevant to their social situations since more than a third of them had scores below the mean of the sample. Only 28.3 percent of the farmers were in the high score group.

Farming Situations

Respondents' farming situation scores ranged from 1.00 - 3.00 with a mean score of 2.372. A frequency summary of the distribution of the sampled farmers according to their farming situation scores is presented in Table 46. Unlike in the personal and social situations, about a third of the respondents perceived the recommended practices to be highly relevant to their farming situations. Although still low for an ideal, it is nevertheless a movement upwards when compared to the other two situations. Further, while more than a third of the respondents perceived the practices as moderately relevant, less than this number thought the practices were not very relevant to their farming situations.

Table 43

Frequency Distribution of Respondents According to Their Social Situation Scores

Social situation scores	No. of respondents	Percent
1.500 - 2.282 (Low)	74	36.1
2.283 - 2.620 (Middle)	73	35.6
2.621 - 3.000 (High)	58	28.3
Total	205	100.00

$\bar{X}$ = 2.451; S = 0.411; S.E. of Mean = 0.029

Table 46

Frequency Distribution of Respondents According to Their Farming Situation Scores, 1981

Farming situation scores	No. of respondents	Percent
1.000 - 2.023 (Low)	61	29.8
2.024 - 2.721 (Middle)	75	36.5
2.722 - 3.000 (High)	69	33.7
Total	205	100.0

$\overline{X}$ = 2.372 S = 0.591 S.E. of Mean = 0.041

Economic Situations

The mean score for respondents' economic situation was 2.033. Table 47 shows the frequency distribution of respondents according to their economic situation scores. Majority (42.9%) of the farmers surveyed perceived the recommended agricultural practices as moderately relevant to their economic situation while a sizeable 31.8 percent felt that the practices were highly relevant. Only about a quarter of the respondents perceived the practices to be not very relevant. It can be concluded from these findings that respondents generally felt that the recommended agricultural practices were generally relevant to their economic situations.

Relevancy of Recommended Practices

The overall relevancy scores based on the respondents' perception of the relevancy of the recommended agricultural practices as these relate to all their situations, are summarized in Table 48.

Less than half (43.9%) of the surveyed farmers felt that the recommended agricultural practices they had been exposed to, were highly relevant to their situations. Almost an equal percentage definitely perceived the practices not to be very relevant while only 18.1 percent rated the practices as only moderately relevant. From the data, it can be inferred that the respondents tended to perceive the recommended farm practices as not highly relevant to their situations because more than half of them were in the middle and low score groups, with scores ranging from 0.974 - 1.785

Table 47

Frequency Distribution of Respondents According to Their Economic Situation Scores, 1981

Economic situation score	No. of respondents	Percent
1.286 - 1.852 (Low)	53	25.9
1.853 - 2.214 (Middle)	88	42.9
2.215 - 3.000 (High)	64	31.8
Total	305	100.0

$\bar{X}$ = 2.033; S = 0.425; S.E. of Mean = 0.030

Table 48

Frequency Distribution of Respondents According to Their Relevancy Scores, 1981

Relevancy score	No. of respondents	Percent
0.974 - 1.687 (Low)	78	38.0
1.688 - 1.785 (Middle)	37	18.1
1.786 - 2.181 (High)	90	43.9
Total	205	100.0

$\bar{X}$ = 1.736; S = 0.222; S.E. of Mean = 0.015

(Table 48), with most scoring below the mean for the sample.

Farmers' Perceptions of Their Involvement in Extension Programming

A farmer's perception of the relevancy of recommended agricultural practices and his ultimate adoption behavior regarding those practices are strongly influenced by the nature and extent of his involvement in the development of those practices and programs designed to deliver the practices for his adoption. Experience from agricultural and rural development efforts in developing countries have shown that national success, measured in both agricultural productivity and social welfare measures, is strongly correlated with effective systems of participation in planning and implementation.(24)

Involvement in this study was conceptualized as consisting of farmers' participation in 1) needs assessment, 2) developing program objectives, 3) implementation of program objectives, and 4) evaluation. Just as for measuring farmers perceptions of the relevancy of recommended practices, a modified version of Ariffin's technique (23) was used in measuring the nature and extent of farmers' participation in extension programming. It involved the use of a three point scale to compute an involvement score for all respondents for each stage of programming except for the implementation of program phase. For that phase, respondents were asked to indicate specifically, the number of times they had the opportunity to participate in learning experiences deriving from program implementation by the

extension services. An overall involvement score was then computed for respondents based on their scores in all the programming phases. Respondents were again categorized into three groups of equal intervals — high, middle, and low based on their scores.

Needs Assessment Involvement

Table 49 presents a frequency distribution of respondents based on their needs assessment involvement scores. While 34.3 percent of the respondents felt they were highly involved in their needs determination, only 15.7 percent felt they were relatively uninvolved. Exactly half of the respondents perceived they were only moderately involved. But however, more than three quarters of this group (middle) score well below the inference from the data therefore, is that farmers generally perceived themselves as not very involved in their needs assessment.

Involvement in Developing Program Objectives

The scores for the farmers' perceptions of their involvement in the development of program objectives ranged from a low of 1.00 to a high of 3.00, with a mean of 2.324. Table 50 is a summary of the frequency distribution of the sampled farmers according to their involvement in program objectives development scores. Almost twice as many farmers who perceived high involvement in program objectives development felt they were less involved. A majority of the sampled farmers however, felt they were only moderately involved but more than two-thirds of these farmers had scores well above the mean of the

Table 49

Frequency Distribution of Respondents According to Their Needs Assessment Involvement Scores, 1981

Needs assessment involvement scores	No. of respondents	Percent
1.000 - 1.963 (Low)	32	15.7
1.964 - 2.351 (Middle)	102	50.0
2.351 - 3.000 (High)	70	34.3
Total	204	100.0

$\bar{X}$ = 2.157; S = 0.440; S.E. of Mean = 0.031

Table 50

Frequency Distribution of Respondents According to Their Involvement in Program Objectives Development Scores, 1981

Involvement in program objectives development scores	No. of respondents	Percent
1.000 - 2.153 (Low)	74	36.1
2.154 - 2.531 (Middle)	93	45.4
2.532 - 3.000 (High)	38	18.5
Total	205	100.0

$\bar{X}$ = 2.324; S = 0.435; S.E. of Mean = 0.030

sample. It can be concluded from the data therefore that a majority of the sampled farmers perceived themselves as being generally very involved in program objectives determination.

Program Implementation Involvement

Program implementation in extension is seen as the designing and providing of learning opportunities for farmers.

Table 51 summarizes the frequency distribution of the sampled farmers according to their program implementation involvement scores. A clearly majority 39.7 percent of the sampled farmers perceived themselves as highly involved in extension program implementation. Less than a third of the respondents thought otherwise. Over half of those who thought there were only moderately involved had scores above the mean score. It can be concluded from the data therefore that farmers generally perceived themselves as having high opportunities for learning experiences resulting from program implementation. These would therefore make them favorably disposed toward positive adoption behavior and also provide educational opportunities for grasping the application knowledge needed for adoption.

Program Evaluation Involvement

Table 52 summarizes the frequency distribution of the sampled farmers according to their program evaluation involvement scores. A majority of the respondents (41.7%) perceived themselves to be moderately involved in extension programs evaluation. The rest of

Table 51

Frequency Distribution of Respondents According to Their Program Implementation Involvement Scores, 1981

Program implementation involvement scores	No. of respondents	Percent
1.000 - 1.921 (Low)	61	29.9
1.922 - 2.297 (Middle)	62	30.4
2.298 - 3.000 (High)	82	39.7
Total	204	100.0

$\bar{X}$ = 2.109; S = 0.433; S.E. of Mean = 0.030

Table 52

Frequency Distribution of Respondents According to Their Program Evaluation Involvement Scores, 1981

Program evaluation involvement scores	No. of respondents	Percent
0.677 - 1.445 (Low)	60	29.4
1.446 - 2.673 (Middle)	85	41.7
2.674 - 3.000 (High)	59	28.9
Total	204	100.0

$\bar{X}$ = 2.059; S = 0.784; S.E. of Mean = 0.055

the respondents were about evenly split in their perceptions - 29.4 percent perceiving low involvement and 28.9 percent perceiving high involvement. With this type of distribution, only moderate involvement in evaluation can be inferred.

Overall Extension Programming Involvement

The overall extension programming involvement score is an indication of the farmers' perception of the extent of their involvement in all the phases of extension program development. The respondents' extension programming involvement scores ranged from 1.292 - 3.000 with a mean of 2.154. Table 53 presents a frequency distribution of the sampled farmers based on their programming involvement scores. Over two-thirds of the sampled farmers who felt they were only moderately involved in extension programming (middle) had scores well above the mean score for the sample. Forty percent of the respondents however perceived themselves as having only low involvement. On the other hand almost an equal number felt they had high involvement in the overall extension programming processes. Based on the complete data, it can be concluded that a majority of the sampled respondents generally felt they were substantially involved in programming.

Table 53

Frequency Distribution of Respondents According to Their Overall Extension Programming Involvement Scores, 1981

Extension program involvement score	No. of respondents	Percent
1.292 - 2.053 (Low)	82	40.0
2.054 - 2.255 (Middle)	45	22.0
2.256 - 3.000 (High)	78	38.0
Total	205	100.0

$\bar{X}$ = 2.154; S = 0.318; S.E. of Mean = 0.022

Factors Motivating and Hindering the Adoption of Recommended Practices by Farmers

In order to have more understanding of the farmers' adoption behavior, respondents were asked to give the major reasons motivating them to adopt recommended farm practices and those which hinder them from adopting those practices. Their reasons are summarized in Tables 54 and 55. The rank order of reasons motivating farmers to adopt recommended practices as revealed in Table 54, to a point, looked logical and naturally ordered. First, there was the desire to increase agricultural production (28.3%), then the belief that the recommended practices were generally superior to traditional methods (18.0%), followed by the desire to have the farm inputs necessary to adopt the practices (15.6%) available and timely. Availability of input does not necessarily result in possession for most farmers, so the next most frequently mentioned reason (14.0%) motivating adoption, was the availability of price sibsidies and incentives to bring the cost of inputs within reach of all farmers.

The adoption process can only be initiated if farmers have the necessary information and application knowledge of the practices. The need to have such information and knowledge, formed 12.3 percent of the reasons farmers mentioned as motivating them to adopt recommended practices.

Armed with the necessary farm inputs, information and application knowledge, the surveyed respondents considered the availability

Table 54

Rank Order of Reasons Motivating Farmers' Adoption of Recommended Farm Practices,1981

Reasons motivating adoption	Percent of responses	Percent of Cases
To increase production	20.3	53.6
Superiority of practices	18.0	47.5
Availability of inputs	15.6	41.3
Availability of subsidies and incentives	14.0	36.9
Possession of more information and knowledge of practices	12.3	32.4
Availability of tractor services	9.1	24.0
Improve standard of living	8.0	21.2
Personal interest	1.9	5.0
To support government programs	0.8	2.2
Total	100.0	264.2*

*More than 100 percent because of respondents could give several different reasons.

Table 55

Rank Order of Reasons Hindering Adoption of Recommended Practices

Reasons hindering adoption	Percent of responses	Percent of Cases
Lack of capital	20.5	69.1
Lack of sufficient labor	20.2	68.0
Unavailability of inputs	16.1	54.3
Lack of credit	14.4	48.6
Lack of awareness and application knowledge	10.9	36.6
Lack of marketing and storage facilities	8.0	26.9
Lack of government incentives	5.1	17.1
Natural disasters (weather, pests and diseases	3.7	12.6
Recommend practices not superior to local	1.0	3.4
Total	100.0	336.6*

*More than 100 percent because respondents could give several different reasons.

of tractor hiring services as the next most important (9.1%) reason motivating them to adopt recommended farm practices. Eight percent of the responses was to have a better standard of living which of course would be the overall and result of adopting recommended farm practices. Other less frequently mentioned reasons motivating adoption were: personal interest in farming and to support government agricultural program (the green revolution).

Overall, these reasons are certainly not indicative of a people with either low aspirations, lack of defined gratification or fatalism which are characteristics of peasants according to Rogers' thesis on the subculture of peasantry. Topping the list of the nine most frequently mentioned reasons hindering farmers' adoption of recommended practices was, lack of capital to implement the practices (20.5%). Old age, the universal primary education (UPE) and the lack of recommendations on herbicides for the different crop mixtures and systems have together taken their toll on the labor force; so almost as frequently mentioned as lack of credit was the lack of labor as a factor hindering adoption - (20.2% of the responses). Lack of input has already been seen as a factor influencing discontinuance and non-adoption by some respondents. Here again the unavailability of farm input, both complete absence or untimely delivery, ranked high (16.1%) among the most important reasons farmers considered as hindering their adoption of recommended agricultural practices.

As has repeatedly been pointed out, awareness and application knowledge are basic to the adoption process. A fairly sizeable

number of respondents mentioned the lack of awareness and application knowledge as a reason militating against their adoption of farm practices. Other reasons mentioned less frequently included: lack of marketing and storage facilities (8.0 percent of the responses), lack of government encouragement in form of subsidies and incentives (5.1%), and natural disasters (3.7%). The perception that recommended practices were not superior to traditional methods was the least most frequently mentioned reason hindering adoption.

Looking at Tables 54 and 55, one can conclude that the most important factors influencing adoption of recommended practices by farmers would appear to be: the desire to increase production, the farmers' conviction of the superiority of the practices, the availability of inputs, capital, adequate labor and the possession of application knowledge to incorporate the practices.

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CHAPTER FIVE

DATA ANALYSIS AND DISCUSSION - PART II

Testing of Hypotheses

As indicated in Chapter One, there were five objectives in this study for which hypotheses have been stated. There were thus, five main categories of variables on which the stated hypotheses were based:

(i) The personal characteristics of the farmers;

(ii) The farmers' farming characteristics;

(iii) The farmers' extension services exposure;

(iv) The farmers' perceptions of the relevancy of recommended agricultural practices, and

(v) The farmers' perceptions of the nature and extent of their involvement in extension programming.

The hypotheses were tested using the appropriate statistical techniques. The analysis was carried out by first using a simple correlation analysis to determine the relationship between the dependent variables — awareness, application knowledge, and adoption and a number of selected independent variables. Then a stepwise regression analysis was performed to determine the best combination of variables explaining the adoption of recommended farm practices.

The overall analysis, it is hoped, will provide a deeper understanding of the Northern Nigerian farmers' adoption behavior.

Pearson Product-Moment Correlation

Hypothesis 1

Hypothesis 1a: There is a significant relationship between farmers' awareness of recommended agricultural practices and their application knowledge of those practices.

The Null hypothesis being tested here is that there is no relationship between farmers' awareness of recommend farm practices and the application knowledge necessary to adopt the practices.

The Pearson Producer-Moment correlation analysis between awareness and application knowledge, yielded a coefficient of (r) of 0.214 which is significant at the .001 level, (Table 56). The Null hypothesis of no association is thus rejected. It can be concluded therefore, that there is a positive and significant relationship between awareness of recommended agricultural practices and the application knowledge necessary to adopt the practices as predicted. It would seem logical that a farmer who merely hears of a practice would need to know more (possession of application knowledge) about the practice in order to be able to incorporate (adopt) the practice into his farming operations.

Table 56

The Correlation Between Awareness and Application Knowledge, and Adoption, 1981

Dependent variable	Pearson correlation coefficients of the independent variable	
AWSCOR	APKNOW	ADSCOR
	.5007*	.2144*
	(205)	(205)
	P = .000	P = .001

(Coefficient/ (cases) / Significance)

*Significant at .05 level

AWSCOR = Awareness Scores

APKNOW = Application Knowledge Scores

ADSCOR = Adoption Scores

Hypothesis 1b: There is a significant relationship between awareness of recommended agricultural practices and the adoption of such practices.

The Null hypothesis being tested here is that there is no association between awareness and adoption. The correlation analysis yielded a coefficient (r) of .5007 which is significant at the .05 level, (Table 56). The Null hypothesis of no association between the two variables is thus rejected. So there is a positive and significant relationship between the farmers' awareness of recommended agricultural practices and their adoption of such practices as predicted. Alao (1) also found a positively significant relationship between awareness and adoption in his analysis of the factors influencing the adoption of farm practices among western Nigerian farmers. Although the relationship between the two variables may seem logical, nevertheless awareness may not necessarily initiate the innovation-decision process because the individual has only general information about the new idea. "He knows little or nothing about any special qualities, its potential usefulness, or how it would likely work for him." (2). However, awareness is a first and crucial step in the adoption process and being aware, facilitates the adoption process.

In both hypotheses Ia and Ib, application knowledge and adoption were used as the independent variables.

Hypothesis 1c: There is a significant relationship between farmers' application knowledge of recommended practices and their adoption of those practices.

The Null hypothesis being tested here is that there is no association between application knowledge and adoption. Application knowledge and adoption application knowledge is being used in this hypothesis as the dependent variable and adoption as the independent variable.

A correlation analysis yielded a value of $4 = .2577$ which is significant. The Null hypothesis of no association is thus rejected. It can therefore be concluded that there is a positive and significant relationship between a farmer's application knowledge of recommended farm practices and his adoption of the practices are predicted. It was further speculated that application knowledge was also a function of these other independent variables: functional literacy, formal education, participation in voluntary social organization, and farming experience. The relationships between these variables and application knowledge were also determined and found to be positive and significant (Table 57).

All these variables provide opportunities for farmers not only to become aware, but also to gain the application knowledge needed to facilitate their adoption and incorporation of the practices.

Table 57

The Correlation Between Application Knowledge and Adoption, Functional Literacy, Educational Level, Participation and Farming Experience, 1981

Dependent variable	Pearson correlation coefficients of the Independent variables				
	ADSCOR	LTSCPR	PASCOR	ED. LEVEL	FARM EXP.
APKNOW	.258*	.1291*	.203*	.178*	.132*
	P = .000	P = .033	P = .002	P = .005	P = .032

(Coefficient/ (Cases) / Significance)

*Significant at .05 level

APKNOW = Application Knowledge Scores

ADSCPR = Adoption Scores

LTSCOR = Functional Literacy Scores

PASCOR = Participation Scores

ED. LEVEL = Educational Level Scores

FARM EXP. = Farming Experience Scores

Hypothesis II

There is a significant difference in importance of the various sources of information on recommended agricultural practices as perceived by farmers.

The Null hypothesis being tested here is that all the various communication channels for agricultural information, are not all of equal importance to the farmers in all their farming situations. The main reason for this hypothesis was to be able to ultimately determine which channels of communication of recommended practices would be most efficient and effective with farmers.

The communication variables are probably the most researched in the Nigerian adoption studies (3). These studies have based importance of agricultural information sources on reported frequency of use. None however, has determined whether or not there are any significant differences in the relative importance of the sources as perceived by the farmers. In this investigation, farmers were asked to rate fourteen different sources of information for recommended practices as either; very important, slightly important or not important. A score of 3 points was assigned to a rating of very important, 2 points to slightly important, 1 point to not important and a zero if they had no opinion. A reliability analysis for scale program was then carried out on the ratings to determine the means of the importance of the various sources (Table 58). This was then followed by a one-way analysis of variance to determine significance (Table 59). A Newman - Keul's test was then used to determine which of the means differed significantly from which others and to categorize them into

Table 58

Reliability Analysis for Scale: Importance of Sources of Agricultural Information (N = 204), 1981

Sources	Means	Std. Dev.
Extension agent	2.93627	.34507
Research people (IAR/AERLS)	1.58824	1.13479
Agric salesman	1.62745	.97173
Other farmers	1.96078	.95124
Village head	1.48039	1.01448
"Sarkin gonna"	1.59804	1.02934
Coop/Farmers' societies	1.92647	1.01199
Radio	2.21569	.92185
TV	1.29412	.93733
AERLS publications	1.40686	1.06727
Newspapers and magazines	1.17647	.82345
Result demonstrations	2.25980	1.00057
Agricultural shows	2.43627	.81298
NAFPP	1.94608	1.00346

Table 59

Analysis of Variance

Source of variation	SS	DF	Mean Square	F	Prob.
Between people	964.39916	203	4.75073		
Within people	2228.42857	2652	.84028		
Between measures	638.46499	13	49.11269	81.51658	.000*
Residual	1589.96359	2639	.60249		
Total	3192.82773	2855	1.11833		

* Significant

Newman-Kuel's Test

$$\sqrt{\frac{\text{Residual Mean Square}}{\text{Number of cases}}} \times \text{Studentized Range Statistics (.05 level)}$$

subsets (Table 59).

As can be seen in Table 60, there are significant differences in importance of the various sources of recommended practices as perceived by the farmers. So, the Null hypothesis of no significant difference in importance is rejected.

While there is a significant difference in importance between the local extension agent and the other sources, there is no difference in importance between newspapers and the TV at the other end of the scale. No significant differences in importance were found between the "research people" (IAR & AERLS personnel), the "Sarkin gonna" (= the local 'chief farmer') and the "agricultural salesman" as sources of information for recommended practices. The lack of direct and frequent contact and interaction between the IAR and AERLS personnel and farmers was no doubt responsible for this finding.

Further, there was no significant difference in importance between the radio and result demonstrations but there was between these two sources and agricultural shows. The TV and AERLS publications, both relatively unimportant to the farmers as sources of agricultural information, were found to be nevertheless significantly more important than newspapers. The farmers' level of formal education is a most probable explanation for this. The TV, if and when available is equally effective for both literates and illiterates alike, and the AERLS publications directed to farmers are generally put out either in form of posters or printed in the arabic

Table 60

Test of Significance Between Means of Importance of Sources of Agricultural Information

V 47	V 45	V 46	V 41	V 38	V 42	V 39
1.17647	1.2914	1.40686	1.48039	1.58824	1.59804	1.92647

V 43	V 50	V 40	V 44	V 48	V 49	V 37
1.92647	1.94608	1.96078	2.2569	2.25980	2.43627	2.93627

Newman-Kuel's Test $= \sqrt{\frac{\text{Residual Mean Square}}{\text{Number of cases}}}$ x Studentized Range Statistic at .05 level

$= \sqrt{\frac{.60249}{204}}$ x Studentized Range Statistic at .05 level

Means connected by the same line are not significantly different.

V 47 = Newspapers and magazines (Mean of importance)
V 45 = TV (Mean of importance)
V 46 = AERLS Publications (Mean of importance)
V 41 = Village Head (Mean of importance)
V 38 = "Research People" (Mean of importance)
V 42 = "Sarkin Gonna" (Mean of importance)
V 39 = Agricultural Salesman (Mean of importance)
V 43 = Coop/Farmers Societies (Mean of importance)
V 50 = NAFPP (Mean of importance)
V 40 = Other farmers (Mean of importance)
V 44 = Radio (Mean of importance)
V 48 = Result Demonstration (Mean of importance)
V 49 = Agricultural Shows (Mean of importance)
V 37 = Extension Agent (Mean of importance)

script or the local language unlike most of the newspapers and magazines.

Concluding, for all the farmers' farming situations, the most important sources are: the local extension agent, the traditional agricultural shows and the demonstrations, the radio and the other farmers. All these sources of agricultural information except the radio involve interpersonal communication, which is more effective in providing for more than mere awareness. Interpersonal communications has been found to be most important in the trial, evaluation and adoption phases of the innovation - decision process, and the radio in the awareness and interest stages.

Hypothesis III

> There is a significant difference among the various socio-economic groups of farmers in their use of the different channels of agricultural information.

The Null hypothesis being tested here is that the use of the various sources of agricultural information has no significant relationship with the socio-economic status of a farmer. The intention of the hypothesis was to determine whether all the northern Nigerian peasant farmers have equal access, opportunity and ability in their use of the various communication channels used by the extension services, regardless of their socio-economic status. Wilkening (4) had reported earlier in a North American study that farmers of the upper socio-economic levels tended to use more of the formalized (institutionalized) channels for agricultural information, while

those of the lower socio-economic level tended to use those sources that were incidental to their "everyday" contacts to a larger extent.

In the present study, the importance ratings of the fourteen selected communication channels by respondents were utilized as the measure of use. A one-way analysis of variance program (sources by socio-economic status) was then performed followed by the studentized-Newman-Kuel's procedure for only the sources for which significantly probability had been detected (Tables 61, 62, and 63).

The data analysis did show that there was a difference among the various socio-economic groups in their use of the more formalized and technical sources - "the research people" (IAR/AERLS personnel), AERLS publications, newspapers and magazines. Therefore the Null hypothesis of no difference among the various socio-economic levels for use of these sources is rejected. For the other sources no significance was detected, therefore, the Null hypothesis for these is accepted.

Since the farmers in the higher socio-economic levels were better educated or more literate and had higher participation score, farming experience, income etc. they would generally be more enlighted and more ambitious and would tend to seek information on new farm practices on their own from the original sources ("research people") or sources closely associated with these (AERLS publication, newspapers and magazines). Farmers of the lower socio-economic-status would tend to be satisfied with using the local extension agent, the radio,

Table 61

One-way Analysis of Variance: Research People by Socio-economic Status

Source	DF	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between groups	2	13.2183	6.6092	5.336	.0055*
Within groups	202	250.1768	1.2385		
Total	204	263.3951			

*Significant at .05 level

Student-Newman-Kuel's Procedure

	Low socio-economic status	Middle Socio-economic status	High socio-economic status
Group Means	1.0541	1.7132	1.7188

Group means connected by the same line are not significantly different

Table 62

One-way Analysis of Variance: AERLS Publications by Socio-economic Status

Source	DF	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between groups	2	9.8139	4.9069	4.473	.0126*
Within groups	202	222.5812	1.0969		
Total	204	231.3951			

*Significant at .05 level

Student-Newman-Kuel's Procedure

	Low socio-economic status	Middle Socio-economic status	High socio-economic status
Group Means	.9459	1.4853	1.5937

Group Means connected by the same line are not significantly different

Table 63

One-way Analysis of Variance: Newspapers and Magazines by Socio-economic Status

Source	DF	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between group	2	5.3450	2.6725	4.079	.0183*
Within group	202	132.3330	.6551		
Total	204	137.6780			

*Significant at .05 level

Student-Newman-Kuels Procedure

	Low socio-economic status	Middle socio-economic status	High socio-economic status
Group Means	.8459	1.1618	1.5000

Group means connected by the same line are not significantly different

other farmers, agricultural shows, etc. - sources that are effective regardless of educational or literacy status, farming experience, income level, etc. It should be noted that where no cost was involved--("research people" and AERLS publications.) there was no significant difference between the middle and high socio-economic groups but both were significantly different from the low group (Tables 61 and 62); where there was substantial cost involved--(newspapers and magazines) the high socio-economic group differed significantly from the other two groups (middle and low) which were not different from each other (Table 63).

These findings substantiate the results of Wilkening's (4) earlier study of farm operators in North Carolina. The findings also lend support to Williams and Williams' (5) results in Nigeria that education and farming experience, which are socio-economic factors, are not significantly correlated to the use of radio as a source of agricultural information.

It can be concluded that the Nigerian farmers have equal access, opportunities and ability in the use of the various sources of agricultural information channels available to them regardless of their socio-economic status except the more formalized and technical ones--(IAR/AERLS personnel, AERLS publications, newspapers and magazines).

Hypothesis IV

> Hypothesis IVa. There is a significant correlation between farmers' individual characteristics and their adoption of recommended agricultural practices.

The Null hypothesis being tested here is that farmers' individual personal characteristics have no association with their adoption behavior.

The selected personal characteristics evaluated were: age, family size, income in the previous cropping season, socio-economic status, formal educational level, functional literacy level, and participation in voluntary social organizations.

From the data analysis, no significant relationships were found between adoption and all the farmers' personal characteristics except socio-economic status and participation, both of which were positively and significantly related to adoption(Table 64).

In his review of the Nigerian studies, Monu (3) found that the relationship between personal characteristics and adoption differed conspicuously from one study to another.

Among the six Nigerian studies reviewed, only Rogers et. al. (6) found a positively significant relationship between age and adoption. The results of the other studies Alao (1), Basu (7), Clark and Akinbode (8), Mabawonku and Osuji (9), and Voh (10) were consistent with the results of the present study. Not only was there no significant correlation between age and adoption,the relationship that existed was negative (Table 64).

Table 64

The Correlation Between Adoption and Selected Individual Personal Characteristic Variables

Dependent variable	Pearson correlation coefficients (of the independent variables), 1981						
	Age	Family size	Income	SES	Educ. Level	TSCOR	PASCOR
ADSCOR	-.030	-.0125	.025	.141*	.019	.012	.170*
	(205)	(205)	(205)	(205)	(205)	(205)	(205)
	P = .333	P = .430	P = .365	P = .022	P = .392	P = .432	P = .007

(Coefficient/(Cases)/Significance)

*Significant at .05 level

ADSCOR = Adoption Scores

SES = Socio-economic Status

LTSCOR = Functional Literacy Score

PASCOR = Participation Score

The non-significant relationship found in this study between adoption and formal education (Table 64), is also consistent with the findings of Alao (1) and Basu (7). Clark and Akinbode (8), however, found a significant relationship between adoption and formal education for only one of the three groups they investigated. Similarly Mabawonku and Osuji (9), found a positive and significant relationship between the two variables only in one of the four villages studied. At the other end, Rogers et. al. (16), and Voh (10), all found a definite, positively significant relationship between formal education and adoption.

Although the North American studies are more consistent and more conclusive about the relationship (positive), between formal education and adoption, the Nigerian studies are not. Considering all the Nigerian studies, it would seem that there is no relationship between formal education and adoption. With the rather significantly low level of education among Nigerian farmers, it would appear that the formalized and technical agricultural communication sources are neither important for farmers' awareness - the crucial first stage in the adoption process nor for the other phases in the process apparently.

Similar to Alao's (1) study, this investigation found no positively significant relationship between the adoption of recommended agricultural practices and farmers' literacy status. Three other Nigerian studies - Rogers, et. al. (6), Clark and Akinbode (8), and

Voh (10) did however found positively significant relationship between the two variables. The inconsistency in these results are similar to those on formal education and adoption. The possible explanations are also probably the same.

Since the traditional peasant farmers' primary source of labor is their immediate families, it was speculated that family size would have a positive effect on the adoption of recommended practices. However, no such effect was found in this investigation (Table 64). This result is supported by Clark and Akinbode's (8) findings with maize farmers, although the same authors did find a positive relationship among cocoa and poultry farmers. The present finding is further supported by Voh's (10) study among Giwa farmers in Kaduna State. A possible explanation for the non-significant relationship between adoption and family size could be that although a large family size may provide needed labor, conversely, it also stretches the peasant family's meagre budget so much that the family can no longer purchase the necessary inputs for adoption. The newly introduced universal primary education (UPE) in Nigeria, affording every school-age child an opportunity of going to school, may also have adversely affected the family's labor resources significantly.

This study like the other two in Nigeria, (Rogers et. al. (6) and Voh (10) which have investigated socio-economic status, found a positively significant relationship between this variable and adoption. The logical explanation is that high socio-economic status

provides for both exposure to relevant information and ability to purchase farm inputs necessary for adoption.

Participation in voluntary social community organizations, a factor in an individual's socio-economic status, provides for exposure to useful information and actual learning experiences. As was speculated, data analysis indeed showed a positively significant relationship between the adoption of recommended practices and participation in voluntary community organizations. This finding is supported by the works of Rogers et. al. (6) and Basu (7) in Nigeria and several of the North American studies (11).

Hypothesis IVb. There is a significant correlation between farmers' adoption of recommended agricultural practices and their farming characteristics.

The Null hypothesis being tested here is that there is no association between farmers' adoption behavior and selected farm characteristics. The selected farm characteristics investigated were: number of crops grown, number and size of plots cultivated and years of farming experience.

A summary of the analysis of the data is presented in Table 65. This shows that there is no positively significant relationship between adoption and farm characteristics unlike predicted. The Null hypothesis of no association is therefore accepted.

While Clark and Akinbode (8) found a significant relationship between farming experience and adoption in one of their three study groups, Basu (7) on the other hand like this researcher, found no

Table 65

The Correlation Between Adoption and Selected Farm Characteristics

Dependent variable	Pearson correlation coefficients (of the independent variables), 1981			
	No. of crops grown	No. of plnts farmed	Acreage farmed	Farming experience
ADSCOR	.102*	.036*	.024*	.015*
	(205)	(205)	(205)	(205)
	P = .073	P = .308	P = .366	P = .417

(Coefficients/(Cases)/Significance)

*Not significant at .05 level

ADSCOR = Adoption Scores

significant relationship between the two variables. Older farmers with several years of experience would seem to be more conservative.

The non-relationship between adoption and number of crops grown could be explained by the pattern of cropping systems adopted by the farmers. Several crops are grown in crop mixtures for which no suitable recommended practices have been developed as yet.

This study also found no significant relationship between number of farm plots and adoption. It is probable that the scattering of farm sites makes the adoption of the recommended practices uneconomical for peasant farmers.

> Hypothesis IVc. There is a significant correlation between farmers' extension services exposure and their adoption of recommended practices.

The intention here was to determine which extension methodologies were the most effective in convincing farmers to adopt the recommended extension practices. The Null hypothesis being tested is that there is no association between farmers' adoption behavior and his exposure to the various extension services and methodologies.

The measures of extension services exposure selected as the independent variables were: knowledge of and contact with the local extension agent, possession of radio, frequency of listening to agricultural broadcasts, participation in agricultural shows, NAFPP farmers' field days and result demonstrations.

As revealed in Table 66, significant positive relationships were found between adoption and farmers' knowledge of and contact

Table 66

The Correlation Between Adoption and Selected Extension Exposure Variables

Dependent variable	Pearson correlation coefficients (of the independent variables), 1981					
	Agric show participation	NAFPP participation	Result Demo visit	Ext. agent knowledge contact	Possession of radio	Listening freq. to agric. programs
ADSCOR	.141*	.260*	.329*	.158*	.084	.213*
	(204)	(203)	(205)	(203)	(203)	
	P = .022	P = .000	P = .000	P = .012	P = .116	P = .001
	(Coefficients/(Cases)/Significance)					
	*Significant at .05 level					

ADSCOR = Adoption Scores

with the local extension agent, participation in agricultural shows, NAFPP farmers' field days and result demonstrations as predicted. For these variables, the Null hypothesis of no association is rejected. These variables provided more than just exposure to new information and ideas from the extension services, they also provided the farmers with actual educational opportunities for learning. Unlike Williams' (12) earlier findings in selected areas of western Nigeria, it appears that both agricultural shows and result demonstrations have become important channels of agricultural information for Nigerian farmers.

It was noted that, it was not the possession of a radio, but rather the frequency of listening to agricultural broadcasts that was significantly related to the adoption of recommended farm practices. The explanation can be found in Patel and Ekpere's (13) study which found that "radio listenership significantly increased knowledge of improved farm practices." It is probable that farmers who did not own radios had opportunities of listening to farm broadcasts elsewhere.

The importance of the local extension agent has already been alluded to earlier on in this study. It is very probable that farmers' knowledge of the local agricultural extension agent leads to interaction and exchange of ideas thus making the farmers more favorably disposed towards considering the adoption of recommended practices.

Hypothesis V

Hypothesis Va. There is a significant correlation between farmers' adoption of recommended agricultural practices and their perceptions of the relevancy of the practices to their situations.

The Null hypothesis being tested here is that there is no association between farmers' adoption behaviors and their perceptions of the relevancy of recommended practices as viewed in terms of their personal, social, farming and economic situations.

As revealed in Table 67, analysis of data by the Pearson-Product Moment correlation program showed that significantly positive correlation exists between farmer adoption and their perception of the relevancy of the recommended practices to their farming situations. For this situation therefore as predicted. The Null hypothesis of no association is rejected in this situation. It is most likely that a farmer would be more inclined to adopt recommended practices if he perceived such practices as advantageous to his farming situations for which the practices were originally developed.

On the other hand, no significant relationships were found between farmers' adoption behavior and their perceptions of the relevancy of recommended practices as related to their personal, social and economic situations (Table 67). Apparently other psychological and socio-economic factors are more important than relevancy of practice in these situations. An uneducated farmer who feels too old and is also expected to behave in accordance with the community's social norms, which are generally not favorably disposed

Table 67

The Correlation Between Adoption and Farmers' Perception of Relevancy of Recommended Practices to Their Situations, 1981

Dependent variable	Pearson correlation coefficients of the independent variables				
ADSCOR	PESCOR	SOSCOR	FASCOR	ECSCOR	RESCOR
	.092	-.041	.258*	.075	.200*
	(205)	(205)	(205)	(205)	(205)
	P = .095	P = .279	P = .000	P = .143	P = .022

(Coefficient/(Cases)/Significance)

&Significant at .05 level

ADSCOR = Adoption Scores
PESCOR = Farmers' Relevancy Perception Scores - Personal Situation
SOSCOR = Farmers' Relevancy Perception Scores - Social Situation
FASCOR = Farmers' Relevancy Perception Scores - Farming Situation
ECSCOR = Farmers' Relevancy Perception Scores - Economic Situation
RESCOR = Farmers' Overall Relevancy Perception Scores

towards innovations, is not likely to adopt recommended practices especially with his limited economic resources.

Detailed data analysis however showed that a positively significant relationship exists between farmers' overall perceptions of the relevancy of recommended practices and their adoption of the practices (Table 67). It can be reasoned that a farmer viewing his total situations, and realizing the overall relative advantages of recommended practices would tend to adopt the practices to improve his conditions.

> Hypothesis Vb. There is a significant correlation between farmers' adoption of recommended agricultural practices and their perceptions of their involvement in extension programming.

The Null hypothesis being tested here is that there is no association between farmers' adoption and their perceptions of their involvement in the planning and execution of programs meant for them.

The measure of involvement selected as the independent variables here were: 1) involvement in needs assessment, 2) involvement in developing program objectives, 3) involvement in implementation of program objectives, and 4) involvement in the evaluation of the extension programs.

Table 68 is a summary of the analysis of the Pearson-Product-Moment Correlation analysis for the involvement scores at various phases of programming.

As seen in Table 68, no significantly positive relationships were found between adoption and farmers' perception of their

Table 68

The Correlation Between Adoption and Selected Measures of Farmers' Involvement in Extension Programming, 1981

Dependent variable	Pearson correlation coefficients of the independent variables				
ADSCOR	NESCOR	POSCOR	PISCOR	EVSCOR	INSCOR
	.005	-.0921	.377*	.154*	.226*
	(204)	(205)	(204)	(204)	(205)
	P = .472	P = .094	P = .000	P = .014	P = .001
	(Coefficient/(Cases)/Significance)				
	*Significant at .05 level				

ADSCOR = Adoption Scores
NESCOR = Needs Assessment Involvement Scores
POSCOR = Developing Program Objectives Involvement Scores
PISCOR = Program Implementation Involvement Scores
EVSCOR = Program Evaluation Involvement Scores
INSCOR = Overall Involvement Scores

involvement in needs assessment and developing program objectives. The Null hypothesis of no association is therefore accepted for these two phases of programming. The probable explanation for these results can be found in the present extension philosophy of first developing innovations and then attempting to "sell" these to the farmers rather than first determining farmers' needswith them before developing specific innovations to meet these needs. In the process of "selling" recommended practices to farmers, the extension agencies through various extension methodologies provide learning experiences for the farmers. So, as seen in Table 68, positively significant relationships exist between adoption and farmers' perceptions of their involvement in both program implementation and evaluation as predicted. The Null hypothesis of no association, is therefore rejected for these two phases of programming involvement. It is probable that a farmer who has participated in the educational learning experiences provided by implementation of program objectives, would also have the opportunity of evaluating the programs and therefore be more favorably disposed toward adopting the new ideas as provided by the programs. Viewing the overall program development process, a positively significant relationship was found between farmers' adoption and their perception of their involvement in extension programming. The Null hypothesis of no association is therefore rejected in this circumstance.

Stepwise Regression Analysis

The stepwise multiple regression analysis technique was used in this analysis because of its ability to select the "best" independent variables in predicting the variations in the dependent variable. The independent variables that were correlated to the dependent variable were entered into stepwise multiple regression program. At each step, the independent variable with the highest partial correlation is taken out and process of computing the regression is repeated.

A summary of the print out of the program (Table 69) shows: 1) The independent variables in the order they were selected and entered into the multiple regression equation, 2) a cumulative square of multiple R and 3) the change in R square.

The multiple R square (RSQ) is the amount of variation in the dependent variable explained by the independent variable while the change in multiple R square (RSQ change) is the variance explained by each of the independent variables.

Table 69 presents a summary of the ten variables that are most highly explanative of adoption among the selected independent variables entered into the stepwise regression analysis. As revealed in the table, six variables together explain 39.5 percent of the factors that are predictive of farmers' adoption behavior in the northern states as compared to 34.0 percent explained in Alao's (1) study in the former western region of Nigeria. According to Alao (1), his 34.0 percent variation explanation "was a note-worthy improvement

Table 69

Summary: Stepwise Multiple Regression Analysis for Best Explanatory Variables, 1981

Variable Name	Multiple R	R Square	RSQ Change
1. Individual's awareness	.53193	.28295	-
2. Farmers' involvement perception program implementation	.58486	.34206	.05911
3. Farmers' relevancy perception - farm situation	.60394	.36474	.02268
4. Listening frequency to farm broadcasts	.61265	.37534	.01060
5. Knowledge of agricultural programs on radio	.62065	.38521	.00987
6. Participation in voluntary social organizations	.62879	.39538	.01017
7. Visit result demonstrations	.63634	.40493	.00955
8. Knowledge and frequency of contact with extension agent	.63999	.40959	.00466
9. Participation in NAFPP farmers' field days	.64327	.41380	.00421
10. Socio-economic status	.64484	.41582	.00203

on Fliegel's (1950) result" in which the same number of variables explained only 32.0 percent of the variation in farmers' adoption behavior in the U.S. Other Nigerian studies have explained even less variability in adoption by the same number of variables. While Voh's (10) six "best" predictive variables accounted for 32.1 percent Monu's (13) accounted for 21.5 percent, 16.8 percent and 11.8 percent for the three farm practices he studied.

A further comparison of the results of this present investigation with Alao's (1) showed that the best predictive variable for adoption were the same - awareness based on agricultural innovations recalled. Awareness alone accounted for 28.3 percent variation in adoption in this investigation and 18.0 percent in Alao's (1) study.

The generally low percentage variability in adoption accounted for in all the Nigerian studies is indicative of other important factors influencing the adoption of recommended practices among peasant farmers that need be considered and researched further.

The ten clusters of the predictive variables (Table 69) covered four of the five broad categories of the independent variables evaluated viz - (1) individual personal characteristics, (2) extension service exposure, (3) farmers' perceptions of the relevancy of recommended practices, and (4) farmers' perceptions of their involvement in extension programming.

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CHAPTER SIX

SUMMARY, CONCLUSION, AND IMPLICATIONS

Summary of the Study

Problem and Purpose

The purpose of this study was to determine the Northern Nigerian farmers' awareness and application knowledge of recommended agricultural extension practices and to examine some of the factors influencing the farmers' adoption behavior.

In Nigeria, despite two decades of an apparently improved extension service and a vigorous agricultural research program, the country has been experiencing a serious decline in the agricultural sector because of the slow adoption, or complete rejection of recommended farm practices by the estimated 13 million peasant farmers who are largely responsible for the country's food production. It has been estimated that Nigeria's research knowledge and output are nearly "twenty years ahead of extension and farmers' practices." (1).

The present extension services in Nigeria operate on the basis of the diffusion and adoption theory whereby new farm practices generated by the agricultural research institutes are communicated to the farmers who are expected to adopt them.

However, the model has not worked successfully in the country principally because of our extension philosophy and some of the inherent false assumptions in the model. The current extension philosophy which strongly subscribes to Theory X, and the thesis of the subculture of peasantry in its view of the nature of man, is a major hinderance. In this orientation, the flow of information is usually one way - top to bottom, from the researchers, and "experts" through the extension workers to the farmers.

Some of the false assumptions in the diffusion and adoption model in the Nigerian context are: that there are available for diffusion, agricultural innovations which are practical, relevant and economic to the peasants' personal, social and farming needs; that the farmers not only have a free choice about these innovations but also have the resources necessary for their adoption; that the farmers are not only aware of these new improved farm practices, but also possess the application knowledge necessary for adoption.

The main objectives of the study were:

1) to determine the northern Nigerian farmers' level of awareness and application knowledge of recommended agricultural practices;
2) to determine which of the various sources of agricultural information the farmers perceive as the most important in terms of their farming situations, and whether these sources have any relationship with farmers' socio-economic status;

3) to determine whether farmers' adoption behavior is associated with personal, farming and extension service exposure variables;
4) to determine whether farmers' adoption behavior is influenced by their perceptions of the relevancy of the recommended farm practices, and by their perceptions of their involvement in extension programming.
5) to determine what major reasons the farmers consider as either motivating or hindering their adoption of the recommended agricultural practices.

Hypotheses

Five hypotheses were formulated to guide this study. These were:

1. There is a significant and positive correlation between farmers' awareness and application knowledge of recommended practices and their adoption of such practices.
2. There is a significant difference in importance of the various sources of information for recommended agricultural practices as perceived by farmers.
3. There is a significant difference among the various socio-economic groups of farmers in their use of the different sources of agricultural information.
4. There is a significant and positive correlation between farmers' personal, farming and extension services exposure characteristics and their adoption of recommended agricultural practices.

5. There is a significant and positive correlation between farmers' perceptions of the relevancy of recommended practices, their perceptions of their involvement in extension programming and their adoption behavior.

Methodology

The study covered the ten northern states of Nigeria where the Institute for Agricultural Research and the Agricultural Extension and Research Liaison Services, both of Ahmadu Bello University, Zaria normally conduct research and extension activities. Data were collected with a pretested, structured interview schedule, from 205 randomly selected farmers with the help of local agricultural assistants (extension agents).

Analysis of Data

The collected data were coded and punched on IBM cards for computer analysis at the Madison Academic Computer Center using the SPSS for Sperry Univac 1100 Computer Systems. The computer output included:

1. A descriptive analysis of the data coded
2. A reliability for scale analysis followed by a one-way analysis of variance to test for significant differences between importance rating of sources, and the relationships between use of sources of agricultural information and farmers' socio-economic groups. The significant level was set at .05 probability and where tests yielded significance, the Newman-Keul's test was employed to

determine areas of differences and then categorize the means into subsets.

3. A Pearson-Product Moment correlation analysis showing relationships and their strengths between the dependent and the selected independent variables of the study.
4. Stepwise multiple regression analysis which provided the best independent variables predictive of the dependent variable, and the amount of variations in the dependent variable explained.

Summary of Findings

Descriptive Findings

The typical northern Nigerian farmer was found to be moderately aware of recommended agricultural practices. He's characterized by partial application knowledge and low to moderate adoption. His adoption behavior however, vary significantly with type of practice.

Characteristically, he grows an average of about seven crops in various crop mixtures, on scattered small holdings but producing just enough food for himself and his household.

For the initial awareness of an agricultural innovation, his most important sources are the local extension agent, the radio and the other farmer. For his overall farming situations, his most important sources of information include the local agricultural agent, the agricultural shows, result demonstrations, the NAFPP, the radio and the other farmer.

Although he frequently listens to farm broadcasts and remembers some specific topics discussed, more often than not, he cannot identify the farm broadcasts by program titles. His most suitable time for listening is in the evening, between 6:00 and 8:00 p.m.

The television, newspapers and magazines, and the research people are usually not important sources of agricultural information for him.

Although the typical peasant farmer perceives the recommended practices as not highly relevant to his situations, he nevertheless perceives himself as being substantially involved in the overall extension programming and delivery particularly in program implementation.

The major factors hindering his adoption of the recommended practices include: 1) lack of capital and credit, 2) lack of adequate labor, 3) unavailability of inputs, either complete absence or untimely delivery and 4) lack of sufficient information and application knowledge. On the other hand, the factors motivating his adoption of the recommended farm practices include: 1) desire to increase production and improve standard of living, 2) the belief that the recommended practices may be superior, 3) the timely availability of input, and subsidies and 4) possession of more information and knowledge of the practices. The reasons hindering and motivating farmers' adoption of recommended farm practices seem to be congruent.

The phenomenon of discontinuance which has been very little researched in the North American studies and not investigated so far in the Nigeria studies, did not appear to be very serious among the Northern Nigerian farmers based on the findings of this survey. The two most frequently mentioned reasons for discontinuance were cost and the unavailability of inputs due either to total absence or untimely supply, and inadequate labor. These reasons also seem to be congruent with the reasons mentioned by farmers as hindering their adoption of the recommended practices.

Analysis of Variance

A reliability for scale analysis yielded the means of the importance of the various sources of agricultural information. A one-way analysis of variance followed by the Newman-Keul's test showed that the local extension agent, agricultural shows, result demonstrations, radio and the other farmers were the most important sources of agricultural information for farmers. The apparent decline in the importance of radio as compared to the local extension agent as a source of agricultural information is probably associated with the creation of more states and local government areas and the consequent "death" of the powerful BCNN shortwave transmitter in the former regional capital of the north. The less powerful medium wave transmitters in the new states apparently reach substantially less farmer. The creation of more Schools of Agriculture in the states, with the consequent rise in the number of AAs is also a significant

contributory factor.

Further analysis revealed that the various socio-economic groups of farmers differed only in their use of the more institutionalized and technical sources of agricultural information viz: the research people, AERLS publications, newspapers and magazines.

Correlation Analysis

Results of the correlation analysis using the Pearson-Product Moment correlation program are summarized in Tables 70, 71 and 72.

Of the seven individual personal characteristics evaluated, only two--socio-economic status and participation, were found to be significantly and positively associated with adoption as predicted age and family size were found to be negatively related to adoption. The speculation is that the older farmers tend to be more conservative and prefer the security of their traditional practices rather than take risks in trying new practices. As Norman (2) pointed out the risk attached to an innovation is one of the most important factors influencing the farmers' perceptions about the value of the innovation.

The potential advantage of a large family in the adoption of a new practice in way of needed labor, is counteracted by the extra expenses which overstretches the family's meagre resources thus preventing it from being able to purchase the needed inputs for adoption.

None of the farming variables was found to be significantly

Table 70

Summary of Predicted and Actual Relationships of Selected Variable With Awareness as the Dependent Variable

Variable	Predicted relationship	Actual relationship	Significance at .05 level
Application knowledge	Positive	As predicted	Significant
Adoption	Positive	As predicted	Significant

Table 71

Summary of Predicted and Actual Relationships of Selected Variable With Application Knowledge as the Dependent Variable

Variable	Predicted relationship	Actual relationship	Significance at .05 level
Adoption	Positive	As predicted	Significant
Functional literacy	Positive	As predicted	Significant
Participation	Positive	As predicted	Significant
Formal education	Positive	As predicted	Significant
Farming experience	Positive	As predicted	Significant

Table 72

Summary of Predicted and Actual Relationships of Selected Variables With Adoption as the Dependent Variable

Variable	Predicted relationship	Actual relationship	Significance at .05 level
Age	Positive	Negative	Not significant
Family size	Positive	Negative	Not significant
Income	Positive	Positive	Not significant
Socio-economic status	Positive	As predicted	Significant
Formal education	Positive	As predicted	Not significant
Functional literacy	Positive	As predicted	Not significant
Participation	Positive	As predicted	Significant
Number of crops grown	Positive	As predicted	Not significant
Number of farm plots	Positive	As predicted	Not significant
Acreage farmed	Positive	As predicted	Not significant
Farming experience	Positive	As predicted	Not significant
Agric show participation	Positive	As predicted	Significant
NAFPP	Positive	As predicted	Significant
Result demonstrations	Positive	As predicted	Significant

Table 72 (continued)

Variable	Predicted relationship	Actual relationship	Significance at .05 level
Extension agent knowledge	Positive	As predicted	Significant
Possession of radio	Positive	As predicted	Not significant
Listening frequently to agricultural broadcasts	Positive	As predicted	Significant
Relevancy perception-personal situation	Positive	As predicted	Not significant
Relevancy perception-social situation	Positive	Negative	Not significant
Relevancy perception-farming situation	Positive	As predicted	Significant
Relevancy perception-economic situation	Positive	As predicted	Not significant
Overall relevancy perception	Positive	As predicted	Significant

Table 72 (continued

Variable	Predicted relationship	Actual relationship	Significance at .05 level
Involvement perception needs assessment	Positive	As predicted	Not significant
Involvement perception-developing program objective	Positive	Negative	Not significant
Involvement perception program implementation	Positive	As predicted	Significant
Involvement perception program evaluation	Positive	As predicted	Significant
Overall involvement perception	Positive	As predicted	Significant

related to adoption. The speculation is that the splittering of the small-sized farms into several minute plots makes adoption unprofitable for the peasants. Further, no relevant recommended practices have been developed for the various crops mixtures and cropping patterns in which the farmers engage.

On the other hand however, all the measures of farmers' exposure to extension services, except the possession of radio, were found to be positively and significantly related to adoption. All these variables except possession of a radio, provide for awareness and educational experiences which would make the farmers more favorably disposed towards agricultural innovations. It is probable that a farmer could have a radio and not be aware of agricultural broadcasts or not may not tune in when those broadcasts are aired.

Finally, farmers' overall perceptions of the relevancy of the recommended practices and their perceptions of their involvement in extension programming were both significantly and positively related to adoption as predicted.

Stepwise Multiple Regression Analysis

Adoption score was used as the dependent variable and regressed stepwise with selected independent variables. Six variables of those predictive of adoption, were found to explain 39.5 percent of the variation in the dependent variable. The best predictive variable was awareness based on the recall of recommended agricultural practices. It explained 28.3 percent of the variation in the

dependent variable.

Conclusions and Implications

On the basis of the findings of this study which has been summarized above, the following conclusions and implications are reached.

The Northern Nigerian peasant farmers are generally aware of the recommended extension practices; however, they have only partial knowledge of how to incorporate these practices in their farming operations. The implications here is that lack of application knowledge could adversely affect farmers' adoption behavior. Farmers must not only be made aware of new farm practices, they must be provided with learning opportunities through appropriated extension methods to gain the necessary application knowledge. It is highly unlikely that farmers will be convinced to adopt a practice they do not properly understand because they lack the knowledge and skills involved.

For initial awareness of a practice, the extension agent, radio and the other farmer were found to be the most important as sources. The traditional agricultural shows and result demonstrations, and the recently initiated NAFPP were found also to be equally important as sources for farmers' overall farming situations i.e. gaining, awareness, needed application knowledge and going through all the phases of the adoption process.

Although the NAFPP was found to be an effective channel, less than half of the farmers are currently participating in this new concept of introducing improved farm practice. This percentage must drastically increase to ensure success in the program.

Easily the most important source of agricultural information therefore is the local extension agent. An important implication to note though, is that the ratio of agent to farm families is about 1:2,000 - 3,000 (3), and this makes it physically impossible for an agent to reach these many families, so other appropriate and effective methodologies must be employed. What immediately comes to mind where masses are concerned is the radio - a channel which has apparently suffered some decline in importance in Nigeria. There is need to exploit the use of radio more, with AERLS providing appropriate and timely scripts to the states regularly.

Although farmers indicated they listen frequently to farm broadcasts, most of them could not identify these broadcasts by program titles. Extension needs to increase both the frequency and length of broadcasts and make sure these are aired at the time slot the farmers indicated as most suitable - between 6:00-8:00 p.m.

It can be further concluded, that television, newspapers and magazines and AERLS publications are not important sources of agricultural information for the typical Nigerian farmers.

Although AERLS publications are directly principally to extension workers, there is a need now to lay more emphasis on those directed to the farmers since over half indicated functional literacy

ability in either their local language or the Arabic script.

Farmers do not consider the local leaders (village head and "Sarkin gonna" = "chief farmer") as important sources of agricultural information. The implication though, is that there could be a tendency to overlook these local influentials in our extension delivery programs and studies of farmers' adoption behavior as is apparently the case now. Only two of the Nigerian adoption studies (Rogers, et.al. (4), and Voh (5) have investigated the local leadership variable and both found positive significant relationship between it and adoption. The need to involve local leaders both in our studies of farmers' adoption behavior and extension program delivery is also supported by Ekpere's (6) suggestions that because of the shortage of properly trained manpower in the extension services, and the extensive geographical area an extension agent is expected to cover, "the development of local leadership is especially important. Such local leaders, it is expected, provided a multiplier effect to extension workers' efforts in reaching local farmers."

The farmers' rating of the "research people" (IAR/AERLS personnel) as unimportant, as source of agricultural information, is probably due to the lack of regular contact and interaction between the two groups. This has serious implications for our extension philosophy and extension delivery efforts because the lack of contact and interaction between these two groups tend to perpetuate the "expert"/"specialist" versus the "reluctant ignoramus" syndrome. This "expert"/"superior" mentality, consciously or unconsciously

tend to misguide our extension philosophy and further lends support to the negative views of the thesis on the subculture of peasantry. There is a definite need to adopt a more humanistic philosophy, interact more with the farmers and rid ourselves of the "specialist"/ "expert" mentality. This ensures a two-way communication which is presently non existent or very weak at best. Farmers would thus be more favorably disposed towards adopting agricultural innovations jointly developed by the two groups.

The typical northern Nigerian farmer is still growing several crops in a variety of crop mixtures as he has done for centuries. As he is not likely to change this system of farming, it is important, for the research institutions to re-evaluate their present approach to developing recommendations based on sole-cropping, and instead work with farmers in developing recommendations based on different crop mixtures.

A major reason found to be both responsible for discontinuance and hindering adoption of recommended practices is the unavailability of necessary farm inputs. The extension service in Nigeria, apart from its normal duties, is also responsible for procurement and distribution, duties they have poorly performed so far. There is definite need to get the private agribusiness sector involved in the procurement and distribution of farm inputs, not only in the form of large governmental contracts, but right down to the peasants' level. This is important because adoption of recommended practices can only occur if the necessary inputs are available and timely.

According to Mellor (7) production in traditional agriculture is limited by the amount and quality of land and the amount of labor available to the farmers. Labor was found in this investigation to be one of the major reasons farmers indicated as hindering their adoption of farm practices. They further indicated the availability of an efficient tractor service (alleviating the labor problems) as a motivator for adoption. The extension service has to be traditionally responsible for the tractor hiring services and has it provided anything but an adequate and efficient service. Here again the government should encourage the private agri-business sector to get involved. Further, herbicide research should be given top priority at the research institutes.

Land ownership, which has been found to be a limiting factor to agricultural production in certain parts of Nigeria, especially the southern states, is apparently not a major problem for the northern Nigerian farmers, at least in terms of availability.

Based on the reasons advanced by farmers as either hindering or motivating their adoption of recommended agricultural practices, it can be concluded that, personal, social and economic factors are important functions of adoption. A farmer is inclined to adopt recommended farm practices if he has the necessary capital to purchase needed inputs and labor or else he has access to adequate credit facilities and/or subsidies and incentives. Cost becomes a major constraint especially when recommended practices are in form of a package rather than a one-item or one-step process. Considering

the northern Nigerian peasant farmer's economic situation, there is a definite need to provide him with both credit facilities and subsidized inputs.

The farmers' low level of participation in voluntary social organizations is exemplified by the fact that less than half (46.3%) of the surveyed farmers belong to the farmers' cooperatives or other farmers' societies. By implication, the cooperative idea has not been vigorously pushed by the extension services. Participation in voluntary social organizations provides for exposure to new information on farm practices, and learning experiences, both which influence positively farmers' adoption behavior. Farmers must be made aware of the advantage of participation and encouraged to participate.

The farmers' perceptions of the relevancy of recommended agricultural innovations and their involvement in extension programming are important variables in farmers' adoption behavior. A farmer who does not perceive a farm practice as highly relevant to his situations, would not be inclined to accept the practice. Conversely, a farmer perceiving an innovation to be advantageous to his overall situations will no doubt be more favorably disposed toward accepting that innovation. The agricultural research institutions must with the active participation of the farmers develop practices that are relevant from the farmers' point of view rather than the researchers. This will ensure that recommended practices meet farmers' needs.

Involvement in program implementation (the educational experiences) and program evaluation is the major reason the farmers feel they are being involved in extension programming currently. Although his acceptance of recommended farm practices is facilitated by this perception, his perception of not being involved in needs assessment and determining program objective may adversely affect his adoption behavior. Our present programming process, by implication, tend to reinforce and perpetuate the "specialst/expert" mentality referred to earlier because it views the researchers, planners and change agents as the best determinants of farmers' needs, thus closing the avenue to a two-way communication in needs assessment. Since it is not sufficient to involve the farmers only in certain phases of programming, our present approach calls for a re-evaluation and adjustment both at the university level and at the ministry level. At the university level, farmer representatives must be invited to participate in the annual cropping scheme conference. The states should also establish planning sessions opened to farmers.

None of the Nigerian studies on the diffusion and adoption of farm practices, including this one, have come up with all the variables that explain fully all the variations in farmers' adoption behavior. The relatively low variation in adoption explained so far, is indicative of the multidisciplinary nature of the problem of diffusion and adoption. So further research must be conducted from this view point.

In conclusion, if the present decline in Nigeria's agricultural

production is to be reversed, the government must re-evaluate its present approach on large scale mechanized government-sponsored projects and international aid agreements and focus more attention on the country's 13 million peasants who are currently the principal producers. It is the opinion of this research that Nigeria is not ready yet for the American agribusiness model of high mass production, high technology and capital intensive for food production. Our objective for now should be to raise the output and income of the peasant farmers and thus change the present direction of agricultural production in Nigeria. It is only the peasant farmers who can bring about the government's goal of a "green revolution" and only by their accepting and incorporating modern but relevant farm practices into their operations. In order to adopt the modern farm practices, farmers must not only be made aware of these practices through appropriate extension methodologies, the extension services must design and provide educational learning experiences to enable the farmers gain the necessary application knowledge needed for adoption. Further, both the research and the extension services must ensure that farmers are involved in all the phases of program development.

The research institutions on their part must with the active participation of farmers, develop appropriate agricultural technologies that meet the needs of farmers. These must be diffused by the extension services through effective and efficient channels to the farmers.

Government on the otherhand must provide the necessary incentives, subsidies and credit facilities to enable farmers purchase needed farm inputs necessary for adoption. Finally, since the overall situations of the farmers are related to their adoption behavior, government and private agri-business must not only procure the inputs timely, it must also provide the necessary infrastructures in the rural areas for distributionand storage. Under such conditions it is expected that farmers would readily adopt recommended agricultural practices and bring about a reversal in Nigeria's agricultural decline. Their present stance may not be due to "unwillingness to listen to new ideas" but rather to "the factor of inability" (8).

There is no evidence in the findings of this study to either support the negative views of the theory on the subculture of peasantry, nor to show that the theory can adequately and satisfactorily explain farmers adoption behavior.

Recommendations and Suggestions for Further Research

1. Although there has been a significant lull in diffusion and adoption research in the western world, especially in North America, there is need to vigorously pursue such studies in Nigeria to finding the "missing variables" that will fully explain the peasant farmers' adoption behavior. By implication, it is the farmers' adoption of recommended practices that can transform Nigeria's agricultural production into a vigorous one that would make the country self-

sufficient in food production.

2. There is a need to replicate this survey with larger samples in the different ecological zones in the northern states of Nigeria so that results can be compared more meaningfully. As has already been suggested, some of the inconsistencies in the Nigerian adoption studies may be due to the different research settings.

3. Another explanation for the differences in results could be due to differences in methodological approaches, procedures, and measurements. In order to be able to compare and generalize results, there must be standardization in procedures and measures. Particularly needing definition and standardization are the concepts of adoption, innovativeness and awareness. There is need to clarify whether measurement of these concepts are based on the package constituting a recommended practice or an item in the package.

4. In order to fully understand the farmers' adoption behavior, research must be designed and carried out from a multidisciplinary point of view covering not only the personal and communication variables but also the social, psychological, institutional and environmental variables.

5. The diffusion-adoption model assumes "free choice", but this assumption is not always true in the Nigerian context. The government's role as a factor influencing farmers' adoption of recommended practices need to be investigated.

6. The phenomenon of discontinuance is an area that has been little researched in North America and not at all in Nigeria. There is urgent need to investigate this phenomenon in farmers' adoption behavior in Nigeria.

7. In order to further understand farmers' adoption behavior, it is necessary to further investigate the concept of "relevancy of practice". Adoption studies should be conducted not only according to ecological zones but packages, cropping systems, and patterns. Adoption studies on the relevancy of recommended farm practices to farmers' situations must be conducted from the farmers' point of view.

8. Finally, there is also need to investigate the nature of "clientele involvement/participation" as it influences adoption. What is involvement? From whose point of view? To what extent? etc.

9. Finally, studies should be conducted to investigate the "research people's" perceptions of the farmers. Such investigations would provide useful information for reformulating our extension philosophy and reshaping our extension delivery strategies - all in an effort to understand the farmers and make them more receptive to agricultural innovations.

Final Thought

Although this study is considered to be preliminary, it is believed that the findings of the survey contain important and useful information not only for the planning and execution of agricultural projects in the northern states of Nigeria by government officials, but also for the institutions that are responsible for the development and dissemination of the recommended agricultural practices.

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APPENDIX A

FARMERS' INTERVIEW SCHEDULE

FARMERS' INTERVIEW SCHEDULE

Name of Interviewer _____

Date of Interview _____

Time Started _____A.M./P.M.

Time Ended _____A.M./P.M.

State _____

Local Government Area (LGA) _____

Name of Village _____

Respondent's Number _____

INTRODUCTORY STATEMENT

Good morning / Good afternoon / Good evening my dear friends. We are from the Ministry of Agriculture and National Resources and we are helping "the people from Samaru" who are interested in talking to you about your farming practices. This study is being done to find better ways in which "Samaru" and the ministry can help you and your fellow farmers. We shall be very grateful therefore, if you can give us a few minutes of your time. Please feel free and answer the questions accurately and honestly. This research has nothing to do with tax assessment.

Thank you.

OCCUPATION

1. What is your occupation?

   (1) Full time farmer _____

   (2) Part time farmer _____

   (3) Other (Please specify) _____

2. If you are not a full time farmer, which occupation brings you the greatest income (i.e. which occupation is most important to you?) (Please tick,)

   (1) _____ Farming

   (2) _____ Other occupation

   *Note: If respondent indicates that an occupation other than farming is most important to him, i.e. derives more than half his total income from it, terminate the interview with thanks.

AGRICULTURAL ACTIVITIES

3. What crops do you grow on your farm?

   (1) _____

   (2) _____

   (3) _____

   (4) _____

   (5) _____

   (6) _____

   (7) _____

   (8) _____

4. What is the most important crop that you grow for your home consumption? _____

5. What is the most important crop you grow for sale (cash crop)?

_____

6. Do you grow sufficient food crops to feed you and your family for the whole year?

(1) _____ Yes

(2) _____ No

7a. Please tell me all the recommended (improved) agricultural practices you have heard about and when you first heard about them.

Practice	Year first heard about it
(1)	_____
(2)	_____
(3)	_____
(4)	_____
(5)	_____
(6)	_____
(7)	_____
(8)	_____
(9)	_____
(10)	_____
(11)	_____
(12)	_____
(13)	_____
(14)	_____

7b. Please indicate ( ) which of the following recommended agricultural practices you have heard of and when you first heard about it.

Practice	Heard About it	Year Heard about it
1. Improved Guinea Corn variety	_____	_____
2. Improved Millet variety	_____	_____
3. Improved Maize variety	_____	_____
4. Improved Rice variety	_____	_____
5. Improved Groundnut variety	_____	_____
6. Improved Cotton variety	_____	_____
7. Improved Cowpea variety	_____	_____
8. Improved Cocoa variety	_____	_____
9. Seed dressing chemicals	_____	_____
10. Application of Fertilizers	_____	_____
11. Storage chemicals	_____	_____
12. Early planting and spraying of cotton	_____	_____
13. Cowpea sole-cropping and spraying	_____	_____
14. Recommended spacing and planting rate	_____	_____
15. Mulching young seedlings (fruit trees)	_____	_____
16.		
16. Improved vegetable varieties	_____	_____
17. "Roughing" (for pest and disease control)	_____	_____
18. Cross-tying	_____	_____

	Heard About it	Year Heard About it
19. Spraying Cocoa for pest and disease control	_____	_____
20. Improved poultry stock for egg and meat.	_____	_____

ADOPTION/INNOVATIVENESS

8. Please indicate which of the following recommended agricultural practices you are currently using and when you started; also please indicate which practices are not applicable to your own farming situation.

Practice	Adopted (currently using)	Year adopted	Not Applicable
1. Improved Guinea corn variety	_____	_____	_____
2. Improved Millet variety	_____	_____	_____
3. Improved Maize variety	_____	_____	_____
4. Improved Rice variety	_____	_____	_____
5. Improved Groundnut variety	_____	_____	_____
6. Improved Cotton variety	_____	_____	_____
7. Improved Cowpea variety	_____	_____	_____
8. Improved Cocoa variety	_____	_____	_____
9. Seed dressing chemicals	_____	_____	_____
10. Application of fertilizers	_____	_____	_____
11. Storage chemicals	_____	_____	_____

Practice	Adopted (currently using	Year adopted	Not Applicable
12. Early planting and spraying of cotton	_____	_____	_____
13. Cowpea sole-cropping and spraying	_____	_____	_____
14. Recommended spacing and planting rate	_____	_____	_____
15. Mulching young seedlings (fruit trees)	_____	_____	_____
16. Improved vegetable varieties	_____	_____	_____
17. "Rouging" (for Pest and Disease control)	_____	_____	_____
18. Cross-tying of ridges	_____	_____	_____
19. Spraying Cocoa for Pest and Disease control	_____	_____	_____
20. Improved Poultry stock for egg and Meat	_____	_____	_____

IMPROVED SEED VARIETY

(Note: Ask questions 9 and 10 only if respondent indicated being aware of this practice in questions 7a and/or 7b above.)

9. When you first heard about improved seed varieties for your crops, what did you do?

(1) _____ Discussed it with other farmers

(2) _____ Asked your extension agent for more information.

(3) _____ Tried it and adopted it immediately.

(4) _____ Tried it later and adopted it.

(5) _____ Tried it but did not adopt it.

(6) _____ Adopted but later discontinued.

(7) _____ Did nothing.

10a. If you tried but did not adopt, please state reasons why

_____

_____

10b. If adopted and later discontinued, please give reason(s) why.

_____

_____

10c. If you heard about the practice and did nothing, please give reasons why _____

_____

SEED DRESSING (TREATMENT)

(Note: Ask questions 11 and 12 only if respondent indicated being aware of this practice in questions 7a and/or 7b above

11. When you first hear about seed dressing what did you do?

(1) _____ Discussed it with other farmers

(2) _____ Asked your extension agent for more information?

(3) _____ Tried it and adopted it immediately?

(4) _____ Tried it later and then adopted

(5) _____ Tried it but did not adopt it

(6) _____ Tried and adopted but later discontinued

(7) _____ Did nothing.

12a. If you tried the practice but did not adopt please state reasons why. _____

_____

12b. If you adopted and later discontinued, please give reasons why.

_____

_____

12c. If you heard about the practice and did nothing, please give reasons why. _____

_____

FERTILIZER APPLICATION

(Note: Ask questions 13 and 14 only if respondent indicated being aware of this practice in questions 7a and/or 7b above.

13. When you first heard about fertilizer application what did you do?

(1) _____ Discussed the practice with other farmers

(2) _____ Asked your extension agent for more information.

(3) _____ Tried it and adopted it immediately.

(4) _____ Tried it later and then adopted.

(5) _____ Tried but did not adopt.

(6))_____ Tried and adopted but later discontinued.

(7) _____ Did nothing.

14a. If you tried but did not adopt, please state reasons why

_____

_____

14b. If you adopted but later discontinued, please give reasons why

_____

_____

14c. If you heard about the practice but did nothing, please give reasons why _____

_____

USE OF STORAGE CHEMICALS

(Note: Ask questions 15 and 16 only if respondent indicated being aware of this practice in questions 7a and/or 7b above.

15. When you first heard about storage pesticides, what did you do?

(1) _____ Discussed the practice with other farmers.

(2) _____ Asked your extension agent for more information.

(3) _____ Tried it and adopted it immediately.

(4) _____ Tried it later and then adopted.

(5) _____ Tried it but did not adopt.

(6) _____ Tried and adopted but later discontinued the practice.

(7) _____ Did nothing.

16a. If you tried but did not adopt, please state why _____

_____

_____

16b. If you adopted practice but later discontinued, please state why

_____

_____

16c. If you heard about the practice but did nothing, please state why _____

_____

APPLICATION KNOWLEDGE

Improved Seed Variety

17a. Do you know the recommended variety for the most important food crop that you grow for your home consumption (see Question 4 above)?

(1) _____ Yes

(2) _____ No

17b. When is the recommended time for planting your most important crop for sale (cash crop) (see Question 5 above :

(1) _____ In April

(2) _____ In June

(3) _____ In August

(4) _____ As soon as rains are established in your area.

17c. What is the recommended spacing for the most important food crop you grow for your home consumption?

(1) _____

(2) _____ Don't know

Seed Dressing (Treatment)

18a. Give me the name of one of the recommended chemicals for dressing your seeds.

(1) _____

18b. What is the rate of application of the chemical you have mentioned (for the most important crop you grow for home consumption).

(1) _____

(2) _____ Don't know

18c. Can you apply seed dressing chemicals after planting?

(1) _____ Yes

(2) _____ No

Fertilizer Application

19a. Give me the names of two fertilizers recommended for your most important cash crop.

(1) _____

(2) _____

19b. How many bags of SUPA per hectare are you suppose to apply to your most important cash crop?

(1) _____

(2) _____ Don't know

19c. How many bags of SULFA or UREA per hectare are you supposed to apply to your most important food crop for home consumption?

(1) _____

(2 _____ Don't know

Storage Chemicals

20a. Give me the name of a recommended storage chemical

(1) _____

(2) _____ Don't know

20b. Can seed dressing chemicals also be used for storage?

(1) _____ Yes

(2) _____ No

20c. When do you use storage chemicals?

(1) _____ When storing for a few weeks

(2) _____ When storing for 6 months or more

(3) _____ Anytime you store any produce.

SOURCES OF INFORMATION ON RECOMMENDED PRACTICES

Use of Improved Seed Variety

21. How did you first become aware of the use of improved seed variety for your crops (Please check only one)

(1) _____ Through the extension agent in your village

(2) _____ Through the "research people" (IAR/AERLS) ("Samaru")

(3) _____ Through the agricultural salesman

(4) _____ Through another farmer

(5) _____ Through the village head

(6) _____ Through the "Sarkin gonna"

(7) _____ Through the Cooperative/farmers' society

(8) _____ Through the Radio

(9) _____ Through the TV.

(10) _____ Through AERLS publication

(11) _____ Through the Newspaper

(12) _____ Through Result Demonstration

(13) _____ Through Agric show

(14) _____ Through the NAFPP

Use of Seed Dressing

22. How did you first become aware of the practice of dressing your seeds before planting? (Please check only one)

(1) _____ Through the extension agent in your village

(2) _____ Through the "research people" (IAR/AERLS)

(3) _____ Through the agricultural salesman

(4) _____ Through another farmer

(5) _____ Through the village head

(6) _____ Through the "Sarkin gonna"

(7) _____ Through the Cooperative/farmers' society

(8) _____ Through the Radio

(9) _____ Through the TV.

(10) _____ Through AERLS publication

(11) _____ Through the Newspaper

(12) _____ Through Result Demonstration

(13) _____ Through Agric Show

(14) _____ Through the NAFPP

Use of Fertilizers

23. How did you first become aware of the practice of applying fertilizers to your crops? (Please check only one)

(1) _____ Through the extension agent in your village

(2) _____ Through the "research people" (IAR/AERLS)

(3) _____ Through the agricultural salesman

(4) _____ Through another farmer

(5) _____ Through the village head

(6) _____ Through the "Sarkin gonna"

(7) _____ Through the Cooperative/farmers' society

(8) _____ Through the Radio

(9) _____ Through the TV.

(10) _____ Through AERLS publication

(11) _____ Through the Newspaper

(12) _____ Through Result Demonstration

(13) _____ Through Agric Show

(14) _____ Through the NAFPP

Use of Storage Chemicals

24. How did you first become aware of the practice of applying fertilizers to your crops? (Please check only one)

(1) _____ Through the extension agent in your village.

(2) _____ Through the "research people" (IAR/AERLS)

(3) _____ Through the agricultural salesman

(4) _____ Through another farmer

(5) _____ Through the village head

(6) _____ Through the "Sarkin gonna"

(7) _____ Through the Cooperative/farmers' society

(8) _____ Through the Radio

(9) _____ Through the TV

(10) _____ Through AERLS publications

(11) _____ Through the Newspaper

(12) _____ Through Result Demonstration

(13) _____ Through Agric Show

(14) _____ Through the NAFPP

IMPORTANCE OF SOURCES OF INFORMATION

25. Please rate the following sources according to their importance as sources of information on recommended agricultural practices

Key

3 = Very Important

2 = Slightly Important

1 = Not Important

0 = Dont' know/No opinion

(Please circle number which best describes your feelings)

	Very Important	Slightly Important	Not Important	No Opinion
1. Extension Agent				
2. "The Research People" (IAE/AERLS)	3	2	1	0
3. Agricultural Salesman	3	2	1	0
4. Other Farmers	3	2	1	0
5. The Village Head	3	2	1	0
6. The "Sarkin Gonna"	3	2	1	0
7. Cooperative or Farmers' Society	3	2	1	0
8. Radio	3	2	1	0
9. TV	3	2	1	0
10. AERLS Publications	3	2	1	0
11. Newspapers	3	2	1	0
12. Result Demonstrations	3	2	1	0
13. Agric Shows	3	2	1	0
14. NAFPP	3	2	1	0

26. Do you know the extension agent (A.A. or A.I.) for your area?

(1) _____ Yes

(2) _____ No

27. If yes, how often do you see him?

(1) _____ Once in two weeks - (Frequently)

(2) _____ Once in three weeks - (Occasionally)

(3) _____ Once in a month - (Seldom)

(4) _____ Never

28. Do you have a radio in good working condition in your home?

(1) _____ Yes

(2) _____ No

29. If no, do you have a place you can listen to one?

(1) _____ Yes

(2) _____ No

30. Have you ever heard any agricultural programs on the radio?

(1) _____ Yes

(2) _____ No (If No, go to question 35)

31. If yes, what agricultural program(s) have you heard?

_____

_____

32. How often do you listen to these agriculturals programs?

(1) _____ All the time they are broadcast?

(2) _____ Most of the time

(3) _____ Only occasionally

33. If only occasionally, why? _____

_____

34. Are the present times of broadcast suitable for you?

(1) _____ Yes

(2) _____ No

35. What are the most suitable times for you to listen to agricultural programs on the radio?

(1) Between ____ and ____ a.m./p.m. (First Choice)

(2) Between ____ and ____ a.m./p.m. (Second Choice)

36. Did you attend the last agricultural show in your area?

(1) ____ Yes

(2) ____ No

37. Did you attend the last NAFPP Farmers' Field day in your area?

(1) ____ Yes

(2) ____ No

38. Have you ever visited the result demonstration or experimental station in your area?

(1) ____ Yes

(2) ____ No

DEMOGRAPHIC CHARACTERISTICS

Personal: Age

39. What is your age?

(1) ____ 20 Years or younger

(2) ____ 21 - 30 Years

(3) ____ 31 - 40 Years

(4) ____ 41 - 50 Years

(5) ____ 51 - 60 Years

(6) ____ 61 and over

Education

40. Did you ever attend any schools?

(1) ____ Yes

(2) ____ No

41. If yes, what formal education did you have?

(1) ____ Primary school but did not complete

(2) ____ Adult Education classes

(3) ____ Completed primary school

(4) ____ Some Secondary School/Teacher Training but did not complete

(5) ____ Completed Secondary School/Teacher Training

Literacy Level

42. Which of the following languages can you read?

(1) ____ English

(2) ____ Your local or any local language

(3) ____ "Ajami" - Arabic script

43. If you can read any of the above languages, what newspapers, magazines or publications do you read regularly?

(1) _____

(2) _____

(3) _____

(4) _____

(5) _____

44. If you cannot read, do you have anybody read any newspapers, magazines or other publications to you? If yes, please indicate which publications.

(1) _____ Yes

(1) _____

(2) _____

(3) _____

(4) _____

(5) _____

(2) _____ No

Family Size

45. How many wives do you have?

(1) _____ None

(2) _____ One

(3) _____ Two

(4) _____ Three

(5) _____ Four

46. How many children do you have? (Please circle one)

1 2 3 4 5 6 7 8 9

10 11 12 13 14 15

FARM AND FARMING CHARACTERISTICS

47. How many plots do you have planted this year?

(Please circle one

1 2 3 4 5 over 5

48. What is the total acreage of all your plots planted this year?

(1) _____ Less than 1 acre

(2) _____ 1 - 2 acres

(3) _____ 3 - 4 acres

(4) _____ 5 - 6 acres

(5) _____ 7 - 8 acres

(6) _____ 9 - 10 acres

(7) _____ 11 acres and over.

49. What is the distance of your farthest farm from your village?

_____ miles

50. Do you have a bicycle or a motorcycle?

(1) _____ Yes

(2) _____ No

51. How many years have you been farming on your own (i.e. owning and cultivating your own farms)?

_____Years

52. What is the total value of crops you sold last season (income you derived from farming)?

₦ _____

53. How many people do you have altogether working on your farms (include family and hired labor)?

    (1) _____ total full-time

    (2) _____ total part-time

54. Do you own the lands on which you presently farm?

    (1) _____ Yes

    (2) _____ No

PARTICIPATION IN COMMUNITY ORGANIZATIONS

55. Which of the following social organizations do you belong? Please indicate your activities in them.

Organizations	Member	Attendance at meetings last 1 month (Yes or No)	Committee Membership	Held Office
	(1)	(2)	(3)	(4)
1. Cooperative Society	____	____	____	____
2. Religious Organization	____	____	____	____
3. Cultural Groups	____	____	____	____
4. Village Council	____	____	____	____
5. Political Party	____	____	____	____

	YES	UNDECIDED	NO
Community Goal			
62. Do you feel that increased agricultural production is necessary for the progress of your village?	3	2	1
Community Value			
63. Do you feel that most of the farmers in your village consider the recommended methods of farming as superior to their own traditional methods?	3	2	1
Relevancy to Farmers' Farming Situations			
Soil			
64. Do you feel that most of the recommended crop varieties are suitable for your soil?	3	2	1
Plant			
65. Do you feel that the recommended varieties for your most important food crop mature at a suitable time for harvesting?	3	2	1
Pests and Diseases			
66. Do you feel that most of the farmers in your village know how to apply the recommended chemicals for pests and diseases control?	3	2	1
Relevancy to Farmers' Economic Situation			
"Relative Advantage"			
67. Do you feel that the recommended varieties for your most important cash crop give higher yeilds than your own local varieties?	3	2	1

	YES	UNDECIDED	NO
Labor			
68. Do you feel that adopting the recommended farming practices will require extra labor as compared to your own traditional methods?	1	2	3
Credit			
69. Do you feel that credit facilities are readily available to farmers in your village?	3	2	1
Inputs			
70. Do you feel that improved seeds and fertilizers are readily available to farmers in your village?	3	2	1
Capital			
71. Do you feel that most of the farmers in your village can buy all the recommended fertilizers needed for their farming?	3	2	1
Market			
72. Do you feel there is an efficient marketing system in your village whereby prices of farm produce are not determined by "middle-men"?	3	2	1
Storage			
73. Do you feel that most farmers in your village have adequate storage facilities in case of a good harvest?	3	2	1

FARMERS' PERCEPTIONS OF THEIR INVOLVEMENT IN EXTENSION PROGRAMMING

(Please circle answers as appropriate.)

	YES	UNDECIDED	NO
Needs Assessment			
74. Do you feel that the ministry usually seek the opinion of farmers before planning any agricultural activities in your village?	3	2	1
75. Do you feel that the "Samaru people" and the ministry think that they know best what the farmers need more than the farmers themselves?	1	2	3
76. Do you feel that the recommended extension practices are developed based upon the needs of the farmers?	3	2	1
77. Do you feel that the ministry always tells you what to do in order to solve your farming problems rather than ask what you would like to do?	1	2	3
Developing Program Objectives			
78. Do you feel that the ministry gives you adequate opportunities to participate in deciding what educational objectives to follow in increasing your farm production?	3	2	1
79. Do you feel that encouraging farmers to use recommended fertilizers is certainly an important way of increasing agricultural production?	3	2	1
80. Do you feel that making credit readily available to farmers is more important than encouraging them to use recommended fertilizers to increase their farm production?	1	2	3
81. Do you feel that mechanization is more important than fertilizer application in order to increase your farm production?	1	2	3

FARMERS' PERCEPTIONS OF THE RELEVANCY OF THE RECOMMENDED PRACTICES TO THEIR SITUATIONS

Farmers' Personal Situation

(Please circle answers as appropriate)

	YES	UNDECIDED	NO
Age			
56. Do you feel that you are too old to change from your traditional farming methods to using recommended practices?	1	2	3
Education			
57. Do you feel that the recommended chemicals sold in the market are labelled with instructions that most farmers like you, cannot understand?	1	2	3
Goal			
58. Do you feel that your main goal in farming is just to produce enough food for you and your family?	1	2	3
Value			
59. Do you feel that most of the recommended improved varieties are better than your own local varieties?	3	2	1

Farmers' Social Situation

"Status"			
60. Do you feel that most of the recommended practices are unsuitable for small farmers like you?	1	2	3
"Community Norms"			
61. Do you feel that the farmers in your village will mind if you cultivate your crops in a different way than they do?	1	2	3

Implementation of Extension Programs

(Involving farmers in Learning Experiences)

In the last two cropping seasons, how often do you feel you really had the opportunity to:

82. Listen to the extension agent (AA/AI) give a talk or demonstration on new farming practices

(1) ____ Never

(2) ____ A few times

(3) ____ Several times

83. Participate in NAFPP farmers' field days organized by the ministry to demonstrate new farming practices?

(1) _____ Never

(2) _____ Once

(3) _____ Twice

84. Participate in group discussions meetings with other farmers organized by the A.A./A.I. to discuss new farming methods?

(1) ____ Never

(2) ____ A few times

(3) ____ Several times

85. Participate in farm tours organized by the A.A./A.I. to see progressive farmers' farms?

(1) ____ Never

(2) ____ A few times

(3) ____ Several times

86. Participate in the agricultural shows in your district?

(1) ____ Never

(2) ____ Once

(3) ____ Twice

87. See agricultural films/slides (mobile cinema) on improved farming practices?

(1) ____ Never

(2) ____ A few times

(3) ____ Several times

Evaluation of Extension Programs

	YES	UNDECIDED	NO
88. Do you feel you know how valuable the recommended extension practices have been in terms of improving the farmers' living conditions?	3	2	1
89. Do you feel you have adequate opportunity to participate in evaluating the new agricultural practices that have been introduced in your village?	3	2	1
90. Do you feel that farmers in your village are always involved by the ministry in deciding the importance and usefulness of the ministry's extension programs for farmers?	3	2	1

FACTORS HINDERING ADOPTION

91. What do you consider as the major factors preventing you from using (adopting) the recommended extension practices that you have heard about?

(1) _____

(2) _____

(3) _____

(4) _____

(5) _____

(6) _____

(7) _____

(8) _____

(9) _____

(10) _____

FACTORS MOTIVATING ADOPTION

92. What do you consider as the major factors motivating you to use (adopt) the recommended extension practices that you have heard about?

(1) _____

(2) _____

(3) _____

(4) _____

(5) _____

(6) _____

(7) _____

(8) _____

(9) _____

(10) _____

THANK YOU.

APPENDIX B

First Letter to the States' Chief Agricultural Officers, Ministry of Agriculture and Natural Resources, Northern States of Nigeria

AGRICULTURAL EXTENSION AND RESEARCH LIAISON SERVICE
AHMADU BELLO UNIVERSITY
PUMB 1044
ZARIA

16th January, 1981

The Chief Agricultural Officer
Ministry of Agricultural and
Natural Resources

Dear Sir,

Farmers and the Recommended Practices

There is plan to conduct a small-scale agricultural survey to observe the diffusion and adoption of recommended agricultural practices among farmers in the northern state of Nigeria by a staff of the Agricultural Extension and Research Liaison Services (A.E.R.L.S.). The fact-finding exercise involves selection of 6 farmers from each of randomly selected five villages from 5 local government areas of each of the ten northern states.

The following Local Government Areas have been randomly selected in your state:

		Date
(1)	_____	_____
(2)	_____	_____
(3)	_____	_____
(4)	_____	_____
(5)	_____	_____

Your cooperation is highly required in selecting, randomly, only one village from each of the 5 LGAs mentioned above. Since only six farmers will be interviewed from each village, there may be no need to inform farmers ahead of time since they will be selected randomly on arrival.

The A.E.R.L.S. staff will report at your location on _____ for the exercise. The farmers will be required to provide the necessary information to complete the interview schedules which has been developed for the purpose.

Kindly observe the date indicated for your area and be prepared to assist the staff of A.E.R.L.S. coming.

Your very valuable cooperation would be highly appreciated during this exercise, the results of which would be useful in planning agricultural extension programs. The help of three A.S.'s will be required.

Thank you immensely for your willingness to cooperate with us at all times.

Yours sincerely,

(DR. E. A. SALAKO)
for: The Director



APPENDIX C

Second Letter to the States' Chief Agricultural Officers, Ministry of Agriculture and Natural Resources, Northern States of Nigeria

AGRICULTURAL EXTENSION AND RESEARCH LIAISON SERVICE
AHMADU BELLO UNIVERSITY
PMB 1044
ZARIA

]6th January, 1981

The Chief Agricultural Officer
Ministry of Agriculture and
Natural Resources

Dear Sir,

FARMERS AND THE RECOMMENDED PRACTICES

There is a plan to conduct a small scale agricultural survey to observe the diffusion and adoption of recommended agricultural practices among farmers in the northern states of Nigeria by a staff of the Agricultural Extension and Research Liaison Services (A.E.R.L.S.). The fact-finding exercise involves selection of 6 farmers from each of randomly selected five villages from 5 local government areas of each of the ten northern states. That is, one village from each of the 5 local government areas.

The following five local Government Areas have been randomly selected in your State:

(1) _____

(2) _____

(3) _____

(4) _____

(5) _____

Your assistance is highly required in selecting, randomly, only one village from each of the five Local Government Areas mentioned above, and for completing the enclosed interview schedules.

An A.E.R.L.S. staff will be coming round to collect the completed questionnaires a week from the date of delivery of the questionnaire.

It is hoped that the resulting information, which will be communicated to you in future, will be useful in planning Agricultural Extension Programs.

I thank you very much for your willingness to cooperate with us at all times.

Yours sincerely,

(DR. E. A. SALAKO)
for: The Director

APPENDIX D

List of Local Government Areas (LGAs) in the Ten Northern States of Nigeria as of April 1st 1980

Local Governments in the Ten Northern States
as at 1st April, 1980

BAUCHI STATE (16 LGAs)

1. Toro
2. Bauchi**
3. Tafawa Balewa
4. Dass
5. Alkaleri**
6. Gombe
7. Akko
8. Tangalawaje
9. Dukku
10. Darazo
11. Misau**
12. Azare**
13. Gamawa
14. Shira
15. Jama'are
16. Ningi**

GONGOLA STATE (17 LGAs)

1. Yola
2. Mayo Balwa
3. Fufure
4. Song**
5. Gombi
6. Mubi**
7. Michika**
8. Numan**

GONGOLA STATE (continued)

9. Guyuk
10. Karin Lamido
11. Jalingo**
12. Zing
13. Bali
14. Ganye
15. Sardauna
16. Takum
17. Wukari

BENUE STATE (13 LGAs)

1. Bassa
2. Dekina
3. Idah
4. Oju
5. Okpokwu
6. Gwer
7. Ankpa**
8. Oturkpo**
9. Katsina-Ala**
10. Kwande
11. Gboko**
12. Vandeikya
13. Makurdi**

**Selected LGAs

BORNO STATE (18 LGAs)

1. Askira
2. Bade
3. Bama
4. Biu**
5. Damaturu**
6. Damboa
7. Fika**
8. Fune
9. Geidam
10. Gujiba
11. Gwoza**
12. Kaga
13. Konduga
14. Kukawa
15. Maiduguri**
16. Monguno
17. Ngala
18. Nguru

KANO STATE (20 LGAs)

1. Bichi
2. Birnin Kudu**
3. Danbatta**
4. Dawakin Kudu
5. Dawakin Tofa
6. Dutse
7. Gaya
8. Gezawa
9. Gumel
10. Gwarzo**

KANO STATE (continued)

11. Hadejia**
12. Jahun
13. Kano (Metro)**
14. Kazaure
15. Kaffin Hausa
16. Minjibir
17. Rano
18. Ringim
19. Tudun Wada
20. Wudil

PLATEAU STATE (15 LGAs)

1. Akwanga**
2. Awe
3. Barikin Ladi
4. Gassa
5. Jos
6. Janam
7. Keffi
8. Ladi
9. Lafia**
10. Langtang
11. Mangu
12. Nasarawa**
13. Pankshin**
14. Shendam**
15. Wase

**Selected LGAs

KADUNA STATE (14 LGAs)

1. Birnin Gwari*
2. Daura
3. Dutsin-na
4. Funtua
5. Ikara
6. Jema'a**
7. Kachia
8. Kaduna**
9. Kankia
10. Katsina**
11. Malumfashi
12. Mani
13. Saminaka**
14. Zaria

KWARA STATE (12 LGAs)

1. Ilorin**
2. Asa
3. Borgu
4. Edu
5. Moro
6. Ifelodun
7. Irepodun**
8. Oyun**
9. Oyin**
10. Kogi**
11. Okene
12. Okehi

NIGER STATE (9 LGAs)

1. Abuja**
2. Agaie
3. Chanchanga**
4. Gbako**
5. Lapai**
6. Lavun**
7. Magama
8. Mariga
9. Rafi

SOKOTA STATE (19 LGAs)

1. Jega
2. Sokoto**
3. Gwadabawa
4. Takata Mafara
5. Kaura Namoda**
6. Wurno
7. Ya'uri
8. Anka
9. Bungu
10. Yabo
11. Gumi
12. Gwandu**
13. Isa
14. Badugo
15. Gusau
16. Silame
17. Argungu**
18. Argungu**
19. Bodinga**
20. Zuru

*Kano State (Not included in Study; interview schedules distributed but not collected in time for inclusion.
**Selected LGAs