

LINKAGES IN THE DEVELOPMENT AND
DELIVERY OF AGRICULTURAL
RESEARCH INFORMATION BY
NIGERIAN RESEARCH INSTITUTES

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DEGREE OF DOCTOR OF PHILOSOPHY
IN THE FACULTY OF ARTS
OF THIS UNIVERSITY

THE EFFECTIVE DATE OF THE AWARD IS

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NIGERIAN RESEARCH INSTITUTES

BY

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A THESIS IN THE DEPARTMENT OF COMMUNICATION
AND LANGUAGE ARTS SUBMITTED TO THE FACULTY OF
ARTS IN PARTIAL FULFILLMENT OF THE
REQUIREMENTS OF THE DEGREE OF

DOCTOR OF PHILOSOPHY

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ABSTRACT

A special communication system exists in each of the eighteen (18) National Agricultural Research Institutes which is responsible for linking the institutes and their researchers with public and private sector organisations and people, including the States' Extension Services and farmers. Consequently, the researcher considered it necessary to critically analyse these communication linkages in the development and delivery of agricultural information between the Research Institutes and the various target organisations.

With the aid of the questionnaire technique, data collection was carried out in the eighteen (18) National Agricultural Research Institutes in Nigeria. The chi-square (χ^2), the one-way analysis of variance (ANOVA), the Duncan's Multiple Range ANOVA and the Kruskal-Wallis tests were applied to determine the relationship between the variables. Personal observations were also used as complementary data to provide additional answers to the research questions.

Six research questions related to the problem of study were examined. The results showed that National

Agricultural Research Institutes maintain functional relationship with some relevant public and private sector organisations, in addition to the extension service, in the processes of developing and delivering agricultural information. The results also showed that effective communication linkages with the target organizations are associated with variables such as type of research institute, purpose of communication, frequency of contacts, communication methods, specific problem areas, choice of target organizations and the need for linkages.

It was found out from the study that the frequency of contacts with the various target organizations is lower for problem formulation than it is for results dissemination.

The study indicated that:

- i) the target organization influences the purpose of communication;
- ii) communication methods used by research institutes are significantly related to the purpose of communication;
- iii) type of research institute influences the communication methods used in problem formulation but not in results dissemination;
- iv) communication methods used by research institutes depend, to a great extent, on the target organization;

- v) with regards to problems formulation and results dissemination, there is an association between specific problem areas and the target organisations;
- vi) there is a significant difference in the ranking of communication methods used by Agricultural Research Institutes in contacting the various target organizations; and
- vii) Communication methods used by research institutes are determined by the specific problem areas.

Findings showed that all the eighteen (18) National Agricultural Research Institutes affirmed the need for them to maintain effective communication linkages with other organizations and people, and to enhance the linkages between them and the extension services.

DEDICATION

This thesis is dedicated:

- To the glory of GOD ALMIGHTY and the progress of mankind.
- To my father, CHIEF JOHN OYEWUNMI ADEDOYIN, who has the wisdom to send me to school and who set the standard I strive to reach.
- To my loving mother, DEACONESS JULIANA OLASUNMADE ADEDOYIN, who sacrificed a lot to sustain my life ambition.

ACKNOWLEDGMENTS

My profound gratitude goes to Dr. F. A. Adesanoye my supervisor, without whose keen interest, dedication and wealth of knowledge, this thesis would have foundered.

I am also indebted to Dr. Tony Obilade, Dr. A. B. Folarin, Dr. Sybil James, , Dr. A. Odejide and Dr. E. G. Soola, all of the Department of Communication and Language Arts who, during the initial phase of this study, gave constructive and useful advice.

My gratitude goes to the management and employees of the various National Agricultural Research Institutes studied for their cooperation. In particular, I am grateful to Assistant Directors (Research), Assistant Directors/Heads (Agricultural Extension and Research Liaison Services) and all members of staff of the Agricultural Extension and Research Liaison Services (AERLS) of the research institutes.

My warmest regards go to my wife, Bolanle, and our children, Dotun and Dayo, for their love, understanding and support to me. They all deserve my heart-felt thanks. Grateful thanks are also due to my parents, brothers and sister for their encouragement. I also give my grateful

thanks to Dapo Odulaja, Femi Oguntona and all others who have contributed in one way or the other to the successful completion of this thesis. Particular thanks to Ogun State University for granting me study leave for the period.

Above all, I thank GOD ALMIGHTY who saw me through it all.

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CERTIFICATION

I certify that this study was carried out by Samson Folawunmi Adedoyin of the Department of Communication and Language Arts, University of Ibadan, under my supervision.



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CHAPTER ONE

INTRODUCTION

To provide a continuously updated supply of specialized information, special systems capable of developing, processing and disseminating science based information are required. In respect of agriculture, such special systems exist in Nigeria in the form of national agricultural research institutes providing for the development of new scientific agricultural information, adapting it for use on farms and finally delivering it to farmers directly or indirectly. But despite the existence of research and extension systems in these agricultural research institutes, results of research do not seem to be sufficiently incorporated into the agricultural production system due to linkage problems.

The new thinking on this issue (Hartmans, 1984:7) is that a viable partnership between agriculture and communication is needed to create effective pathways for successful linkage between research stations and farmers. It is therefore necessary to analyse the existing communication linkages such as they are in an attempt to evolve, if necessary, a more productive 'alliance'. But

this will be difficult to do in the absence of a thorough understanding of necessary background situations.

1.1 Background:

Agriculture has always played and will continue to play a vital role in the social, economic and industrial development of Nigeria. It still supports about 61 percent of the working population directly, and accounts for nearly 70 percent of non-oil exports (Oyaide, 1982:1). Production of food, fiber and other industrial raw materials and the improvement in the socio-economic welfare of rural people are functions of agriculture. In spite of this, however, there is shortage of food and other agricultural products in Nigeria, and this has hindered economic progress and deterred other development efforts.

It is important to note that agricultural research in Nigeria is almost a century old and has assembled, over the years, a wealth of information which could, if properly exploited, ensure the utilization of the country's extensive agricultural resources for increased agricultural productivity. The problem, however, is that research results have not been properly applied to the agricultural production system and the consequence is the

continued shortage of food and other agricultural products in Nigeria.

To fully exploit Nigeria's extensive agricultural resources and thus raise her agricultural productivity require a two pronged effort made up of a sound technical base (research) allied to an effective communication base. A given research result should be indigenous to the environment of its utilization. This means that it is not the research result itself that is of importance but its functional relevance and applicability to the problems, situations and circumstances prevailing in the ultimate users' environment.

The flow of innovation from a source of activity to the target users and the general public enhance productivity and is therefore part of national development (Aliyu, 1986:1). In the case of agriculture, specifically, the flow of relevant innovations from the research centres to the ultimate users should be considered an essential part of scientific and technological development. Effective diffusion of such innovations is however to be achieved only through well-defined and organized procedures based on professional principles and techniques of information dissemination. It is futile, in other words, to expect

adoption of the innovations without applying these techniques.

1.1.1 Agriculture and National Development:

Agricultural development is often accorded a position of prominence in the national development plans of most developing countries including Nigeria. The development tasks assigned to agriculture include; food security, crops/animals production, employment generation, import substitution, contribution to rural development and provision of income to the economy through taxation of agricultural products and foreign exchange earnings.

The agricultural sector has continued to play an important role in the economy of Nigeria in spite of the inconsequential position to which it was relegated during the "oil boom" era of the 70s. For example, as has been mentioned earlier, agriculture still supports about 61 percent of Nigeria's population directly and accounts for nearly 70 percent of non-oil export (Oyaide, 1982:1). It provides food for the ever increasing population. This is particularly important because a nation of starving or poorly fed citizens cannot be expected to perform at an appreciable level of efficiency. This view is supported

by Olatubosun (1975), reported by Agumaga (1982:2) to have observed that:

if a country is unable to produce enough food for its requirements, its population is either underfed, or its scarce foreign exchange is spent on importing food, an exercise costly to both the individuals and the society. Either way, economic progress is hindered and development efforts thus do not yield dividends.

Agriculture also makes significant contributions to the Gross Domestic Product (GDP) and provides income to the economy through taxation of agricultural products, increased ability of farmers to meet their personal income tax obligations and the generation of foreign exchange earnings. Agriculture provides the major raw materials for the existing industries and stimulates the establishment of new ones. Therefore, the development of agriculture has enhanced the attainment of higher levels of living and a more rapid growth of the Nigeria economy.

1.1.2 Research and its Contributions to Agricultural Development:

Many countries in Africa, and indeed in the developing world as a whole, invest substantial parts of their national income on agricultural research. Taylor (1978:i) corroborated this view when he commented that "Nigeria has

increased her total financial expenditure on agricultural research with a view to increasing the totality and efficiency of production of food and export crops".

The following historical facts show that the need for and the importance of research in agriculture have long been recognised:

a) The oldest agricultural experimental station in Europe was established by Boussingault in Alsace, France in 1832.

b) The oldest agricultural experimental station in the United Kingdom (which is still operating at Rothamstead) was established in 1843.

c) The oldest agricultural experimental station in the United States, the Connecticut Agricultural Experiment Station, was established in 1877.

d) In Nigeria, the oldest agricultural experimental station was started by British Cotton Growers' Association (BCGA) at Moor Plantation, Ibadan in 1899, followed by the establishment of the Department of Agriculture in 1912 (Okigbo et al 1981:1-26).

Agriculture is an economic activity and every economic activity should be backed by strong research and

development efforts. This implies in our present case that a highly developed link should exist between agricultural research and the application of its results to productive agricultural activities. Agricultural research has, fortunately, been the oldest and perhaps the largest form of any organized scientific research undertaking in Nigeria (Abdullahi, 1978).

Agricultural development in any country, according to Igbeka (1985:1), requires the combined efforts of different groups which include farmers, government, manufacturers of agricultural inputs, distributors of agricultural products, consumers and researchers. In most cases, the last group, i.e. researchers, service the other groups. The products of this group are utilized by all the other groups. It is therefore obvious that for the process of agricultural development to be smooth, there should be research efforts in all aspects of agriculture.

Adetunji (1985:3-11) indicated that agricultural research has contributed to the improvement of agricultural production in Nigeria. He gave the example of the development of hybrid maize which has increased average yield to 5.5 tons per hectare compared to the former 1.5 to 2 tons per hectare. He also calculated that

if 500,000 hectares of land were planted to the hybrid maize seeds, production would be increased by a value of N300 million. Research has also led to the local sourcing of raw material needs of the fast expanding brewing industry in Nigeria through the use of sorghum and maize. Through research (Adetunji, 1985:3-11), a technique for rapid multiplication of cassava by which 30,000 to 60,000 cassava propagules can be raised in 14 months from a single mature parent is now in use. Adetunji (1985) also cited the following relevant examples; the development of mini-sett technique for producing seed yams rapidly and cheaply, the development of hybrid cocoa which is high-yielding as well as resistant to major pests, the development of dwarf oil-palm varieties that are capable of fruiting in three to four years instead of the usual eight years; development of vaccines to enhance livestock productivity; and the development of several industrial products from various crops and animals.

The above instances are not exhaustive of the achievements of agricultural research. However, it is not enough for research institutes to develop technologies, they must also be aggressively involved in the effective dissemination of their research results to complement the

activities of the extension service. Gone are those days when a research institute would wait for the extension agents or the users themselves to come around for information. Research must carry its results to policy makers, extension workers and even the ultimate users. This will ensure greater application of research results to productive agricultural activities thereby further enhancing agricultural development.

1.1.3 Communication as a Tool for Development:

Communication is crucial in achieving national development objectives. This is a fact acknowledged by scholars and communication specialists the world over. Soala (1984:131) for instance, affirmed that:

both developed and developing countries recognize the role communication can play in national planning for development and, where the will and the means exist, communication has been utilized and is still being positively exploited to achieve national development goals.

The definition of communication (Baikie, 1981:15) as "the movement of knowledge to people in such ways that they can act on such knowledge to achieve some useful results" corroborates that view. The useful results, expected to be achieved through communication, may range from an improvement in doing some productive task, like

agriculture, to the fostering of a sense of national unity and strength in a country.

It is hardly controvertible, therefore, that governments and people around the world recognize the immense role communication can play in development (Soola, 1984). Folarin (1979), however considered it important to realize that there is usually a gulf, in communication planning for development, between intention and execution as well as between plans and the modalities for realizing them. In most developing countries, it is argued that the practice is to first conceive and painstakingly set development plans and specific national objectives on paper and the decision to use the media to accomplish same usually comes as an afterthought. Noting this fact, Soala (1984:132) advocated a marriage between communication and national planning particularly in developing countries, including Nigeria, where development is usually not only painfully slow but also suffers from sheer lop-sidedness.

The development of communication should move in step with, indeed ahead of, industrial, commercial and administrative efficiency. This fact was expressed in the Second National Development Plan (1970 - 1974), where, as

one of the communication policy objectives of the period, it was planned to extend and improve communication facilities to the rural areas. This was aimed at bringing the rural population, which comprises mostly farmers, to the communication mainstream of Nigeria (Soola, 1984:132).

1.1.4 Information and its Relevance to Agricultural Development:

Communication is essential to agricultural development as it is the vital bridge that links the result of research from laboratory or experimental plot to farm practice. A steady flow of accurate, understandable, factual information links the scientist with the farmer. For true agricultural progress, farmers must know, must understand, must act. How far people progress depends largely upon their access to accurate and reliable information, i.e., the kind of information they can use to help solve their problems.

Agricultural communication can do the following things, among others:

- a) Speed the adoption of improved agricultural practices, by getting information about them to large numbers of people quickly and efficiently;
- b) Help meet farming emergencies by giving farmers

timely information on weather, markets, insect pests, diseases, weeds and other rapidly changing conditions; and

c) Help increase understanding between farmers or rural dwellers and city people.

For any meaningful agricultural development programme to succeed, the information flow or dialogue between the change agency personnel and the intended beneficiaries must be sustained. Ononiwu (1985:3), however, indicated that this flow must contain information that is both motivational and educational. Some agricultural development programmes fail as a result of lack of communication and coordination between the agencies and the units that are involved. These units include subject matter researchers, administrative support departments, training institutions, extension agencies, media houses and journalists, and extension workers. And as Ononiwu (1985:3) further validly noted:

the business of communication in agricultural development does not only start and end with the end-users, it has the task of enlisting and convincing several layers of bureaucracy - the project executors and planners, the field workers and the horizontal linkages in the bureaucracy.

It is imperative, thus, that for any development

programme to succeed adequate communication support must start with the people who are to carry out the programme and must of necessity be included in the total planning process from the beginning.

1.1.5 Research and Extension (Communication) Processes in Nigerian Agriculture:

Four major components are involved in agricultural research and extension (communication) processes in the country. These are:

- a) Basic Research: This tries to extend the frontiers of scientific knowledge. Basic researchers come up with basic scientific knowledge. In Nigeria, the universities are the institutions most noted for this type of research.
- b) Applied/Development Research: This tries to apply basic scientific knowledge to existing or foreseen practical problems. In Nigeria, the national agricultural research institutes are responsible for this type of research, i.e., applying scientific knowledge to solve farm problems.
- c) Extension Linkers: These try to get information across to ultimate users. In Nigeria, the extension arms of research institutes are expected to deliver

research results to Federal/State extension services whose responsibility, in turn, it is to disseminate such information directly to farmers. Three Zonal Agricultural Extension and Research Liaison Services (AERLS) were originally planned to co-ordinate results of research from the various institutes for effective transfer to Federal/State extension services which would continue the dissemination process. Only one (the AERLS at Samaru, Zaria) eventually came into existence.

d) Ultimate Users: These are the end-users (usually farmers) of the information originating from research.

The role of research is to make discoveries, while that of extension is to communicate these discoveries to potential users (Torndorn, 1971:61). Elliot (1973:1), while agreeing that the final output of a research station is information, nevertheless noted this caveat that "it is in the efficient dissemination of this information that most of the problem arises". This view strengthens the need for further research in the area of communication of agricultural innovations.

The focus of the present study is on applied/developmental agricultural research institutions.

(National Agricultural Research Institutes) in Nigeria whose outputs are expected to be applied to the production process for greater efficiency and increased productivity. According to Aradeon and Aradeon (1983), the major drawback in academic (basic) research is the pressure to develop a new and stimulating theoretical framework instead of compiling data about the reality of the situation being studied. This view coincides with the thoughts of this researcher in considering applied agricultural research to be of more direct relevance to the practical problems on the farm than basic agricultural research.

1.1.6 Research and Extension Responsibilities of the National Agricultural Research Institutes:

After detailed consideration of the constraints to agricultural production in Nigeria, the report of the Research Institutes Review Panel by Okigbo et al (1981:1-26) proceeded to list the strategy and priorities in agricultural research as follows:

- a) Breeding of crops and animals for increased yield, resistance to diseases and pests; adaptation to environmental stresses and related needs of consumers and processors.

b) Development of appropriate technologies which are adapted to the socio-economic environment of the farmers and that are within the capability of the majority of them to own, hire, use, maintain and repair.

c) Development of integrated pest management systems.

d) Development of low-cost and low-energy input technologies in crop and animal production.

e) Development of efficient forest and range management systems that increase and sustain carrying capacity of man, animals and plants.

f) Development of efficient post-harvest technologies that reduce waste with improved processing to meet the increasing demand for convenience foods resulting from urbanization, increased mobility and affluence.

g) As, but for the shortage of water, large areas of the savannah are of high potential productivity, priority should be given to irrigation research to ensure efficiency of water use and prevention of salinity problems.

h) Increased utilization of highly productive valley bottom (hydromorphic or fadama) soils. (Integrated watershed development starting with small watersheds including valley bottom soils development has a vital role to play in integrated rural development).

i) Development of efficient farming systems of varying intensities for sustained yield on small and large scale farms that effectively replace increasingly outmoded traditional intermittent bush fallow system. This still includes efficient crop combinations and sequences in time and space for sustained yields.

j) In farming systems research, some effort should be devoted to the development of integrated crop and livestock production systems that satisfy a range of alternative uses for such products or purposes as meat, milk, manure, etc.

k) Development of economically and ecologically sound principles of land development in relation to subsequent land use or farming systems.

l) Maintenance of soil fertility based on sound soil conservation and management principles that enhance high yields on a sustained basis.

Each of the agricultural research institutes has an extension arm designated as Agricultural Extension and Research Liaison Services (AERLS). The basic programme function of an AERLS is to work with researchers in identifying relevant research problems that will lead to evolution of new and appropriate technologies in agriculture, and at the same time be responsible for effective communication of such technologies to the disseminating units and/or adopting units. Opeke (1978) described AERLS as an institutionally created unit of an agricultural research institution which carries out its multiple extension functions of research, extension and teaching. Fundamentally, it is an extension service, or more specifically, it could be described as the extramural educational agency of agricultural research institutes.

The basic purpose and function of AERLS is thus to

liaise with researchers, farmers, ministries of agriculture and other agencies that may be involved in developing and disseminating technologies that will meet the needs of farmers.

Generally, AERLS, according to Anon (1985:8), has the responsibility to do the following, among other things:

- a) Assist in the transfer of new, improved and appropriate agricultural technology to the farmers through the Federal/State extension services;
- b) Ensure by "feedback" that research carried out are relevant to farmers' needs;
- c) Provide necessary in-service training for extension workers and others on a regular basis on the improved agricultural technology that is being passed to the farmers; and
- d) Provide advisory services and guidance in agricultural and rural development.

There are eighteen (18) National Agricultural Research Institutes in Nigeria exercising the research and extension responsibilities stated earlier. Each of the institutes is either responsible for research and extension on a single/group of crops or a group of livestock animals or other agricultural production and utilization, and economic problems. The list of the research institutes is as follows:

1. Cocoa Research Institute of Nigeria (CRIN), Ibadan.

2. National Horticultural Research Institute (HIHORT), Ibadan.
3. Forestry Research Institute of Nigeria (FRIN), Ibadan.
4. Institute of Agricultural Research and Training (IAR&T), Obafemi Awolowo University, Moor Plantation, Ibadan.
5. National Cereals Research Institute, (NCRI), Badeggi.
6. Institute for Agricultural Research (IAR), Ahmadu Bello University, Samaru, Zaria.
7. Nigerian Institute for Aquatic Resources Research, New Bussa.
8. Lake Chad Research Institute, Maiduguri.
9. Nigerian Institute for Oil-Palm Research (NIFOR), Benin-City.
10. Rubber Research Institute of Nigeria (RRIB), Iyanomo.
11. National Agricultural Extension and Research Liaison Services, Ahmadu Bellow University, Samaru, Zaria.
12. National Root Crop Research Institute (NRCRI), Umudike.
13. Nigerian Stored Product Research Institute (NSPRI), Ilorin.
14. Leather Research Institute of Nigeria (LERIN), Zaria.
15. National Veterinary Research Institute, Vom.
16. Nigerian Institute for Oceanography and Marine Research (NIOMR), Victoria Island, Lagos.

17. Nigerian Institute of Trypanosomiasis Research, Kaduna.
18. National Animal Production Research Institute, Shika, Zaria.

Federal Institute of Industrial Research, Oshodi (FIIRD) and Project Development Institute (PRDDA) were not considered as agricultural research institutes because they have been specifically classified as industrial research institutes by the Federal Ministry of Science and Technology.

1.1.7 Agricultural Extension and Research Liaison Services (AERLS): Functions, Problems and Prospects

Idakwoji (1983:4) defined agricultural extension as primarily an exercise in communication because it is both a means of keeping farmers and the general public abreast of the new methods and techniques being devised, and of assisting them in adopting the innovations successfully. Therefore, the concept of Agricultural Extension and Research Liaison Services (AERLS) in agriculture, as a communication conduit for transferring information from researchers to extension staff, farmers and vice versa, derives from the need for a more effective utilization of results from agricultural research.

The functions of the AERLS of National Agricultural Research Institutes according to Patel (1978:48-50) are:

1. To make scientific information readily available to professional education and extension workers;

2. To provide the national planners with the necessary scientific and factual information on marketing, pricing, land reforms, taxation, etc., needed to facilitate the establishment of sound policies for agricultural and rural development; and

3. To inform the scientists of the institute about: (a) the local agricultural problems and the socio-cultural and economic setting in which those problems have emerged; (b) the reactions of the farmers to the research results recommended; and (c) the reactions of the national planners to the scientific and factual information given them.

The major problems of AERLS in national agricultural research institutes, also according to Patel (1978:48:50), include:

a) Lack of proper understanding of the AERLS concept by those who were to implement it in the institutes, especially the Directors of the institutes;

b) Inadequate funding of extension activities (relative to research activities) resulting in lack of personnel and necessary infrastructural facilities; and

c) The traditional attitude of researchers and research institutes whereby they fail to aggressively pursue the dissemination of their research results or, at least, properly set in motion the research results dissemination process.

The efforts of the AERLS and other extension agencies would be meaningless if newly developed improved

agricultural technologies do not reach farmers or reach them but are not adopted (Salako, 1983:110). Adequate support and appropriate implementation of the AERLS concept will surely eliminate such problems.

The prospects of truly functional AERLS include:

a) The possibility of extension workers, farmers and other users of research results receiving such information through a wide variety of channels, media or disseminating units. Improvement in the effectiveness of the communication channels, media or units used will be achieved through regular evaluation exercise;

b) The practicability of adopting the specific improved practices;

c) Adoption of relevant improved practices on farmers' farms and securing information on associated problems for more critical evaluation by the research;

d) The possibility of playing an advisory role in situations where farmers require more details on particular practices, especially where field extension workers are unavailable (Salako, 1983:114 - 115).

1.1.8 Communication Methods/Channels for Reaching AERLS Targets

Various communication methods are available for agricultural extension education ranging from individual contact methods to mass media. Okereke (1978:180), however, noted that "a communication method must not only be effective but must also be appropriate to the intended

audience and above all be reasonably inexpensive".

The various target audiences of the AERLS of national agricultural research institutes and the extension/communication methods or media used are indicated in table 1. The table shows the methods or media specifically used for each of the target audiences. Iyamabo (1979:5) specifically stressed the need to maintain communication links with several people or agencies through the use of a wide variety of media in the process of technology development and dissemination.

TABLE 1: The Target Audiences and Communication Methods/Channels used in National Agricultural Research Institutes

| Target Audience | Communication Channels/Methods |
|---|---|
| A. State Extension Services, Agricultural Development Projects, River Basin Authorities and other Extension Agencies. | Technical bulletins, Newsletters, Reports, Training course for field staff, participation in seminars and workshops, input services including foundation stocks. |
| B. National/Zonal AERLS or AERLS of other Research Institutes. | All publications and reports, conferences, seminars, workshops. |
| C. Project Farmers (Selected Large-scale Farmers i.e Companies, Estates, Co-operatives etc.) and influence groups. | Personal contact, farmers bulleting, training, contact, circular letters, technical assistance, inputs supply including credit, consultancy service, field days and demonstrations. |
| D. Training Institutions | Newsletters, farmers bulletins, technical bulletins, training, seminars and workshops, and field days. |
| E. General Public | Mass Media, Radio, Television, Newspaper, Magazines and Filed days, Exhibitions etc. |
| F. Policy Makers, Administrators and Professional Associations. | Reports and all publications, mass media outlets. |

Source: Okereke, H.E (1978:181): Agricultural Research Institutes and Transfer of Technology to Farmers. In: The Role of AERLS in Improved Technology Transfer in Agriculture. Eds: Opeke, R.O et al. IART, Ibadan.

1.1.9 The Zonal And National AERLS Concepts:

In view of the importance of extension in agricultural production, the National Science and Technology Development Agency (NSTDA), the predecessor of the Federal Ministry of Science and Technology, organized a seminar at Ibadan in 1978 and recommended, inter alia, that, every national agricultural research institute should have an AERLS, and, in addition, three zonal AERLS should be established to cater for the distinct geographical zones as follows:

- i) A Northern Zonal AERLS to be based at Samaru, Zaria to cover areas North of Rivers Niger and Benue,
- ii) A South-Western Zonal AERLS to be based at Ibadan, to cover the area South-West of River Niger.
- iii) A South-Eastern Zonal AERLS to be based at Umudike to cover areas South of River Benue and East of River Niger (NSTDA, 1979:11-28).

The recommendations were immediately implemented which resulted in each research institute establishing its own AERLS. However, only the zonal AERLS at Samaru, Zaria took off among the three zonal AERLS planned. In 1987, the zonal AERLS at Samaru was upgraded to a National Agricultural Extension and Research Liaison Services

(NAERLS). The national AERLS is, as in the case of national research institutes, administratively responsible to the Federal Ministry of Science and Technology. The main objective of the national AERLS is to provide effective linkage between research institutes and university faculties of agriculture and the Federal/State extension services. Their other functions, which are similar to those of the institute-based AERLS, according to Anon (1978:3), are:

i) To transfer agricultural results from the research institutions, universities and other sources to the extension arms of the state ministries of agriculture, rural development projects, industry, farmers and utilizers of farmers' products;

ii) To provide information from the extension personnel and other users of research innovations to the research personnel on the suitability or otherwise of the innovations being transferred and the problems that require research attention;

iii) To foster co-operation with the various social institutions, input-supply organizations and other government agencies whose contribution to the socio-economic setting will facilitate the adoption of the research results by the clientele.

It is, however, important to point out at this juncture that the responsibility of disseminating information directly to farmers remains solely that of the extension services of ministries of agriculture and rural

development projects. Although research institutes and zonal offices of the NAERLS do in actual practice contact farmers directly, this is not strictly speaking supposed to be part of their programme schedule or responsibility.

In summarizing the background information provided to this study it is important to highlight that eighteen (18) agricultural research institutes exist under the aegis of the Federal Ministry of Science and Technology for development and delivery of agricultural research information. Each of the institutes has an extension sub-system (AERLS) for communication with Federal/State extension service, zonal offices of the NAERLS, educational institutions, other research institutions and researchers, policy or decision makers, influence groups, clientele organizations, farmers as well as providing the feedback mechanism to its research sub-system.

1.2 Statement of the Problem:

A major constraint which has been noted in the development and delivery of agricultural technology is the poor or ineffective linkage between the research and productive sectors. For example, Aboyade (1987:47) observed that "Federal and State extension services are assumed to serve as links between research institutes and

farmers, but in actual fact there is no effective link". Okereke (1981:81) even observed further that at the moment extension services mainly comprise administrative and input-supply services, and have little or no back-up support from research institutes in terms of new technologies.

Although some important (extension) steps have been taken to promote the links between agricultural research and productive sectors, Idowu (1988:230) still reported that:

it has been difficult for the extension system to link the activities of the research and productive sectors adequately to contribute substantially to the generation, dissemination and utilization of agricultural knowledge.

The First National Development Plan (1962 - 68) was also aimed at reducing the extension staff-farmer ratio from 1:5000 to 1:800, but at the end of the plan this was far from being achieved. The ratio at the end of the plan period was about 1:3000.

In spite of the recognition of extension services as the most important purveyors of information to rural farmers, the communication of research findings for gainful utilization by farmers has not been found effective, and continues to be a matter of concern

(Okigbo et al, 1981). The Agricultural Extension and Research Liaison Services (AERLS) was, indeed, introduced as the new institutional arrangement expected to correct poor communication of research findings to ultimate users. The major functions of the AERLS, according to Okigbo et al (1981:13) include the interpretation of research findings, field testing them under farmer's conditions and training extension agents on how to use them. Extension agents will then be able, in turn, to train farmers to adopt the research findings.

The first zonal AERLS in the country is that at Samaru which has been reported (Aboyade, 1987:48) to be a success story. This led to the widely accepted proposal to establish six (6) zonal AERLS instead of the three earlier recommended by NSTDA as follows:

- i) Ife for the South-West Area;
- ii) Umudike for the South-East Area;
- iii) Zaria for the North-West Area;
- iv) Maiduguri for the North-East Area;
- v) Kainji for the Western part of the Middle Belt, and;
- vi) Makurdi for the Eastern part of the Middle Belt.

It has, however, not been possible to effectively correct the problem of poor communication of research findings to ultimate users through the AERLS arrangement since it is only the AERLS at Samaru, Zaria that is in existence and functioning up to date. This zonal AERLS at Samaru has been upgraded to a National Agricultural Extension and Research Liaison Services (NAERLS) with five zonal offices in different parts of the country.

The Nigerian Agricultural Landscape has been described as a rather chaotic assembly of institutions working in parallels and with little or no co-ordination (Oputa, 1984:79). The existing situation whereby national agricultural research institutes or technology-generating agencies are controlled or supervised by a separate ministry (Federal Ministry of Science and Technology) from the user ministry (Ministry of Agriculture) which control or supervise other aspects of agricultural and rural development including the extension service further complicates the technology generation and dissemination processes. This is because the existing situation has created the problem of co-ordinating the activities of the various agencies involved across ministerial or departmental boundaries.

to note that Nigeria which used to be an exporter of agricultural produce became a net importer within the period. And judging by the number and distribution of research institutes (as shown in Table 2), the technical base of Nigeria agriculture cannot be said to be weak. The major area of problem has been that the conversion of research results to actual production activities has been inefficient if not totally lacking.

The widespread concern in Nigeria that research results are not sufficiently incorporated into the agricultural production system (NSTDA, 1979:11-28) is a pointer to the gravity of the problem. The situation has not changed significantly despite the fact that agricultural research spends 10% of Nigeria's budget for agriculture and employs 33% of the trained agricultural staff (Iyamabo, 1979:3). The existence of eighteen (18) agricultural research institutes in the country with extension sub-systems for disseminating agricultural research information across ministerial or departmental boundaries to the various extension (Agricultural Development Projects, National Accelerated Food Production Programme, River Basin Development Authorities, Ministries of Agriculture, etc.) and user organizations has also not changed the situation.

TABLE 2: Number and Distribution of National Agricultural Research Institutes in Nigeria

| State | Number of Institutes | Location | Name of Institute |
|---------|----------------------|------------|--|
| Bendel | 2 | Benin-City | Nigerian Institute for Oil-palm Research |
| | | Iyanomo | Rubber Research Institute of Nigeria |
| Imo | 1 | Umuahia | National Root Crops Research Institute |
| Kaduna | 5 | Zaria | Institute for Agricultural Research |
| | | " | National Animal Production Research Institute |
| | | " | Leather Research Institute of Nigeria |
| | | " | Agricultural Extension and Research Liaison Services (AERLS) |
| | | Kaduna | Nigerian Institute for Trypanosomiasis Research |
| Kwara | 2 | Ilorin | Nigerian Stored Product Research Institute |
| | | New Bussa | Nigerian Institute for Aquatic Resources Research |
| Lagos | 1 | Lagos | Nigerian Institute for Oceanograph and Marine Research |
| Niger | 1 | Badeggi | National Cereals Research Institute |
| Oyo | 4 | Ibadan | Cocoa Research Institute of Nigeria (CRIN) |
| | | " | Forestry Research Institute of Nigeria |
| | | " | National Horticultural Research Institute |
| | | " | Institute of Agricultural Research and Training |
| Plateau | 1 | Vom | National Veterinary Research Institute |
| Borno | 1 | Maiduguri | Lake Chad Research Institute. |

Source: NSTDA (1979): Nigerian Research Institutes Review Panel Report, Government Press, Lagos, Nigeria.

Aboyade (1987:46), while contributing to a debate on why the rate at which improved farm practices are adopted on the farm lags far behind the rate of discoveries of such new practices by researchers, observed that:

Although personal methods have been emphasized as important during the critical stages of trial and adoption of new practices, especially in the more complex operations, it appears that their use by extension workers is at present grossly inadequate or deficient, because extension workers are so few in number and lack adequate training. Therefore, several other channels or sources have to be used by the extension services and several other relevant organizations and agencies to get a lot of information across to farmers and the rural people.

Equally of concern is the fact that many of the researches in agriculture are sometimes found to be unrelated to the problems and needs of farmers, because of inadequate communication linkages with relevant organizations in the process of formulating research problems as well as lack of proper feedback to researchers from farmers.

These are serious problems which deserve close study because, according to Warboys (1983:64):

a major obstacle to development and transfer of appropriate technology is the attitude taken by institutions involved. Obviously new technology cannot be absorbed until there are sweeping changes in the structure and functioning of the relevant institutional framework, or some institutional arrangements to generate and to diffuse innovations capable of yields.

The major purpose of this study, therefore, is to attempt to investigate the existing communication linkages

so as to come out with a model for strengthening the existing and fully realise potential linkages between research institutes and the various target groups. It is anticipated that this effort will ensure a more effective development and delivery of agricultural research information by Nigerian Agricultural Research Institutes.

The two key problems recognized from the discussion so far are:

- a) The inappropriateness of information at the disposal of research institutes on the mundane but real problems of daily existence and survival of farmers in rural communities.
- b) The ineffective communication of research results from research to ultimate users.

These problems have guided the researcher in deciding on the major problem of this study, which is namely, to examine the relationship between communication linkages, and the formulation of relevant research problems as well as the effective delivery of research results by National Agricultural Research Institutes in Nigeria.

Specifically, the study has sought to answer the following research questions:

1. Is there a significant relationship between the

choice of target organization and the type of research institute in matters pertaining to

(a) formulation of research problems

(b) dissemination of research results?

2. Is there a significant difference in the frequency of contacts between target organizations and research institutes during the problem formulation stage and the result dissemination stage?

3. Is there a significant relationship between choice of target organisations and the

(a) purpose of communication

(b) communication methods used, and

(c) research problem areas?

4. Is there a significant relationship between communication methods and the

(a) purpose of communication

(b) research problem areas, and

(c) type of research institutes?

5. Is there a significant difference between the ranking of communication methods used by research institutes?

6. Does the research institutes see any need to maintain effective communication linkages with other

organisations in addition to the extension services?

1.3 Significance of the Study:

The fundamental cause of the low growth rate in agricultural production is what is usually referred to as "stagnant production technology" which often occurs when improved production practices and inputs are not widely used (Olayide, 1976:27). There is, therefore, every likelihood that improved production technology developed through research, among and in combination with other factors, will have positive implications for increased food production in Nigeria.

There are several reasons why available technology is currently not being utilized at a level to show any appreciable impact on the Nigerian food balance sheet. Among these reasons are the functional relevance of the technology itself, and the operational modes of its transfer.

Researchers set their priorities on the basis of their professional expertise and research fund available as allocated to specific research programmes only. Amon (1975:2) confirmed this view by reporting that "very often we hear it alleged, either rightly or wrongly, that our agricultural research officers stay in their research

environments to decide and conduct research on what they think is best for farmers". The problem was properly put in focus by Agumagu (1982:33) when he observed that "it is not so much the form or level of agricultural technology that is of great importance but the functional relevance of technology type to farming situations".

Research results can only be functionally relevant and acceptable to the ultimate users if there is adequate communication between the researchers and the ultimate users as well as other concerned agencies, organizations and individuals in deciding the research problems. Put differently, agricultural research can only yield relevant or appropriate technology if information flow or dialogue between the researchers and the intended beneficiaries, policy and administrative support units, extension services, influence groups, the media, other researchers, precedes the formulation of the research problem (Singh, 1985).

The operational mode of transferring technology is also important in knowing whether or not the technologies reach and are utilized by the intended beneficiaries. Agumagu (1982:100) lends support to this view by observing that "even where information and necessary staff

and facilities for its dissemination exist, the technology of passing it on (communication) could lead to ineffective utilization of message". Ononiwu (1985:3) went further by saying that the business of communication support does not start or end only with the end-users; it has, as well, the task of enlisting, convincing or involving not only several layers of the bureaucracy but also various horizontal linkages in the bureaucracy.

It is obvious that emphasis should be put on how communication linkages in development and delivery of agricultural research information can be effectively designed for enhanced agricultural productivity in Nigeria. Hence, this study was embarked upon to systematically analyse communication linkages in the formulation of research problems and the dissemination of research results in Nigerian Agricultural Research Institutes. Specifically, the following groups will benefit from the results of this research:

- (a) The Agricultural Extension and Research Liaison Service (AERLS) subsystems of national research institutes. The results will guide them to maintain effective communication linkages at the problem formulation and results dissemination stages.

Consequently, relevance of research problems to the needs of target organisations and effective dissemination of research results will be enhanced.

(b) The target organizations who will become oriented towards linking effectively and regularly with research institutes. This will ensure improved services to farmers and industrialists who are ultimate users of research results.

(c) Farmers and industrialists who are to put the research findings from the institutes into practice for increased productivity and enhanced income.

(d) The nation (Nigeria) will also benefit from her huge investments in agricultural research through efficient application of research findings to farm and industrial practices. This will result to increased production of food, raw materials for industries and improvement in the income level as well as the standard of living of the people.

1.4 Objectives of the Study:

The general objective of the study is to critically analyse the communication linkages in the development and delivery of agricultural research information by Nigerian Research Institutes. This will provide information on the

functional relationship between research institutes and the various agencies linking with them in the processes of formulating research problems and disseminating research results. The specific objectives are:

1. To determine the various organizations contacted and the frequency of contacts between research institutes and such organizations in the formulation of research problems and the dissemination of research results.
2. To determine relationships between organizations contacted and the
 - purposes of communication;
 - communication methods used; and
 - research problem areas.
3. To determine relationships between communication methods used and the
 - purposes of communication;
 - research problem areas; and
 - research institutes.
4. To rank the communication methods used by research institutes in the formulation of research problems and in the dissemination of research results, and to analyse critically the differences between the

rankings.

5. To evolve a model for strengthening existing communication linkages and the full achievement of potential communication linkages for a more effective development and delivery of agricultural research information by Nigerian Agricultural Research Institutes.

1.5 Scope of the Study:

The National Agricultural Research Institutes in Nigeria were selected as the unit of analysis of this study. These organisations have the mandate to conduct applied/developmental research (i.e. conduct research into practical problems of agricultural production, protection, economics/marketing, post-harvest (storage and processing) and utilization; and develop technologies for solving such problems). Besides, they each have a service-oriented extension sub-system to ensure application of new technologies to production practices. Eighteen (18) out of the total of twenty-four (24) research institutes under the aegis of the Federal Ministry of Science and Technology (FMST) are agricultural research institutes. Most of them were established to tackle broad agricultural problems (such as production, protection, marketing,

post-harvest storage and processing and utilization), while a few were established to tackle specific problems or problems areas. They are widely distributed all over Nigeria and thus their activities are supposed to cover the entire country effectively.

Research efforts in university faculties of agriculture have not been directly included in this study because greater emphasis is given to pedagogic and basic research, with very little attention to applied research, in Nigerian universities. They also possess research-oriented (and not service-oriented) extension departments. International Agricultural Research Centres in Nigeria were also not directly included in this study because their mandates do not specifically include extension work. Therefore, National Agricultural Research Institutes are the most relevant for this study in terms of mandate, operations and coverage.

1.6 Theoretical Framework for the Study:

The theory-to-practice sequence of development is the theoretical framework for this study. Lionberger and Gwin (1982:31) developed a "theory-to-practice sequence" which begins with the development of basic science knowledge and ends with an innovation put to use in the user's own

social system/environment. The various steps involved, as listed by the authors, are:

Step I: Test theories and add to basic science knowledge.

Step II: Try to intervene in the scientific process.

Step III: Invent something potentially useful.

Step IV: Test inventions or innovations locally to determine if they will work, are feasible and will fit in.

Step V: Disseminate the locally tested and proven knowledge.

Step VI: Put the locally validated information to use.

The functions that must be performed in a technology development and transfer process, which they clearly indicated, are innovation, dissemination and integration. They also indicated the kinds of social systems that are involved in the sequence. These are:

- | | |
|--------------------------------------|---|
| A. Basic Scientist Sub-system: | Trying to extend the frontiers of scientific knowledge. |
| B. Applied Scientist Sub-system: | Trying to apply scientific knowledge to farmers' or practical/field problems. |
| C. Extension/Linkers Systems: | Trying to get information out to farmers. |
| D. Users' Social System/Environment: | Farmers who ultimately use the new information are part of special systems. |

The "theory-to-practice sequence" is not a linear but a cyclic and continual process whereby basic science knowledge is generated by the basic scientist sub-system, the applied scientist sub-system use the basic knowledge to find solutions to existing problems, the extension/linkers system disseminates the information to ultimate users and communicate feedback to the research system, and the ultimate users make use of the information to improve their practices or achieve useful results within their social system or environment. At the end, new problems are introduced again into the system for attention of the research system. It is thus a cyclic and continual process as shown in Figure 1:

The "theory-to-practice sequence" is an adequate theoretical framework for this study because National Agricultural Research Institutes are applied research systems utilizing basic science knowledge developed in the universities and other basic research institutions to invent or develop new technologies or something potentially useful at practical level (i.e. outside academic circles). The institutes also have extension (AERLS) sub-systems which disseminate the innovations or research information through zonal AERLS, Federal/State

Extension Services, the mass media and other relevant or accredited linker agencies/groups to the intended beneficiaries. The ultimate users are then expected to utilize the new technology in their environment. Problems emanating from the use of the technology or entirely new problems are re-introduced into the system to continually keep the cyclic process in motion.

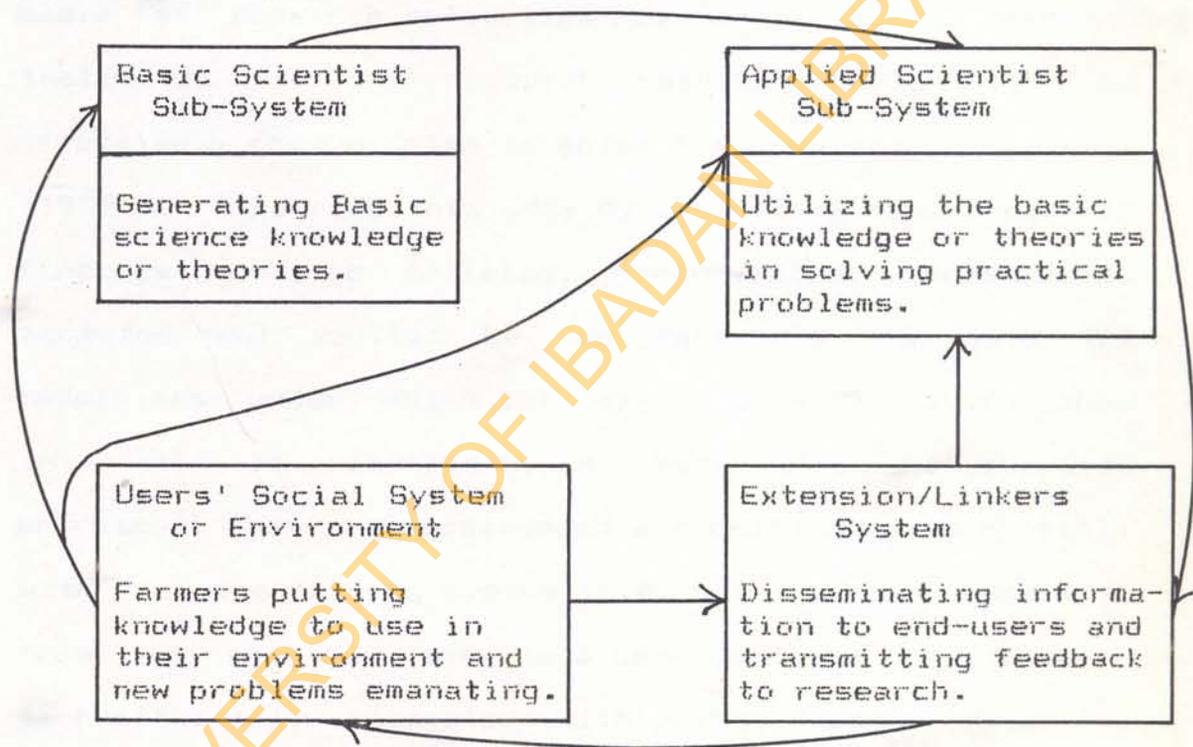


Figure 1A: A Cyclic Representation of the "Theory-to-Practice Sequence".

The "theory-to-practice sequence" is preferred to other alternative systems because it either accommodates them effectively or has advantage over them. For example, the

"theory-to-practice sequence" effectively accommodates the "farmer-back-to-farmer" model of Rhoades and Broth (1982) which emphasizes the generation of acceptable agricultural technology by stressing that applied research must begin and end with the farmer (See Figure 1B). Farmers' problems, situations and circumstances should form the basis of research activities of agricultural research institutes and the research results should also be effectively communicated to solve the problems. Williams (1980:22) supported this idea by indicating that "research findings must be collated, communicated, understood, accepted and applied by the farmers". He gave the conditions under which this can be done by saying that this will be possible by ensuring that the improved practices that are recommended are culturally compatible with farmers farming system (i.e. not a sudden departure from the practice they have been used to for years), technologically feasible (within the farmers means to understand, hire, own and use) and economically profitable (yield better financial returns than previous practice) for the farmers to adopt. The "theory to practice sequence" did not only accommodate all the points emphasized in the "farmer-back-to-farmer" model but also

FARMER-BACK-TO-FARMER

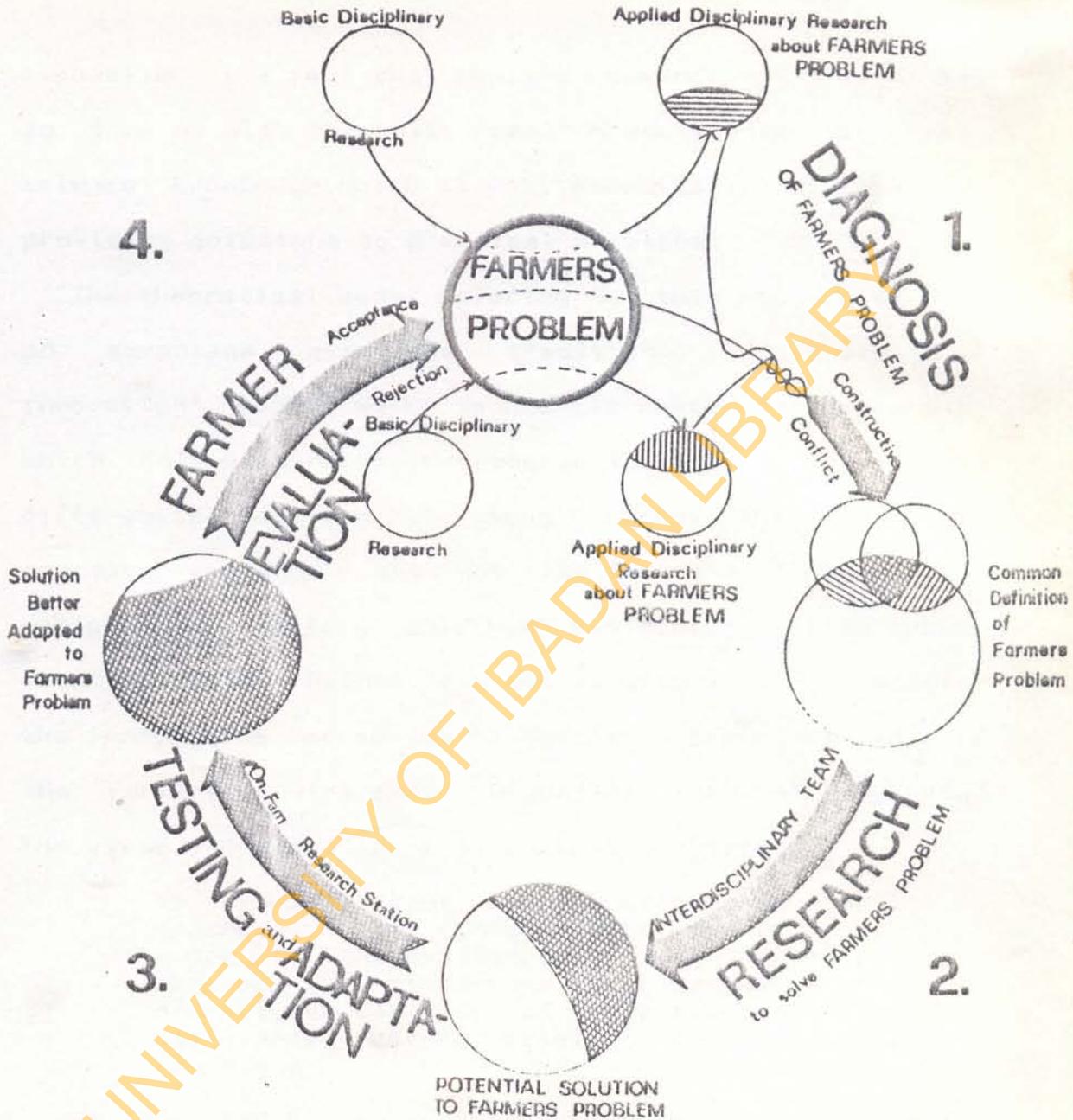


Figure 1B : Farmer-Back-to-Farmer—a model generating acceptable technology.

emphasized the fact that applied research sub-system has to link up with the basic research sub-system for basic science knowledge which it must essentially utilize for providing solutions to practical problems.

The theoretical model selected for this study also has an advantage over the traditional "diffusion of innovation" model which is heavily based on researches which only examine socio-demographic factors to explain differential adoption rate among farmers. The "theory-to-practice sequence" has not limited itself to socio-demographic factors only in explaining differential adoption rate. Rather, attempt is also made to examine the innovations themselves to determine their relevance to the farmers' environment. Bogunjoko (1983:64) supported the views expressed above by commenting that:

in order to adopt recommended agricultural practices, the farmers must first become aware of the existence of such practices, develop an interest in them, evaluate, try and become convinced of their relevance and usefulness before finally adopting the practices.

He concluded by saying that "since the adoption process involves a series of stages, farmers rely on a wide variety of sources of information to lead them from awareness stage to the adoption stage" (Bogunjoko,

1983:64).

Although the "agricultural knowledge flow and use" model developed by Idowu (1988:221) is similar to the "theory-to-practice sequence" adopted for this study, the later still has an advantage over the former. The "agricultural knowledge flow and use" model was conceived as comprising three main interrelated sub-systems. These are:

- i) The knowledge generation (research) sub-system;
- ii) The knowledge dissemination (extension) sub-system; and
- iii) The knowledge utilization (farmer) sub-system.

The primary function of the model is one of moving useful knowledge from research, through extension to farmers, and in moving relevant knowledge back through the system. The "agricultural knowledge flow and use" model as conceived by Idowu (1988:221), however, failed to recognise the differential roles of basic scientists sub-system and applied scientists sub-system in the agricultural technology development-transfer-utilization process. The "theory-to-practice sequence", therefore, has the advantage of recognising the differential roles of basic scientists sub-system and applied scientists sub-

system in technology development-transfer-utilization process over the "agricultural knowledge flow and use" model.

1.7 Conceptualization/Definition of Terms:

National Agricultural Research Institutes: These are applied or developmental agricultural research institutes established (Decree No. 33 of 1973) by the Federal Government of Nigeria under the aegis of the Federal Ministry of Science and Technology to conduct research and ensure delivery/application of research results (extension) within the limits of their mandate for the overall development of Nigeria's agricultural industry. They maintain service-oriented extension system.

University Faculties of Agriculture: These are arms of academic institutions (universities) essentially established for teaching and research. Their nature of research is mostly pedagogic and basic/fundamental or esoteric. They maintain research-oriented extension system.

International Agricultural Research Centres in Nigeria: These are internationally controlled and funded agricultural research institutions existing within Nigeria.

Research: It is an investigation undertaken or a production process which uses certain amount of inputs to produce quantities of new knowledge and innovations (Ajobo, 1977:1). Research can also be used to describe or refer to a system within which such effort is carried on.

Basic Research: Basic or fundamental research refers to research conducted essentially for scientific motives (Elliot, 1973:1-2).

Applied Research: Applied or developmental research refers to research conducted to solve practical problems and resulting in the introduction of new innovations (Elliot, 1973:1-2).

Extension: "Extension is an on-going process of getting useful information to people (communication dimension) and then in assisting those people to acquire the necessary knowledge, skills and attitudes to utilize effectively this information or technology (the educational dimension)" (Swanson and Clear, 1984:1). By this definition, extension can as well be regarded essentially as an exercise in communication since two of the purposes of communication are to inform and to educate.

Linkage: Linkage is a term used to indicate that two or more systems are connected by messages so as to form a

greater system. It can be defined as a regularized pattern of interaction between two or more systems which in a real sense forms a bond between them. In this study, the conceptualization of linkage by Idowu (1988:221) as regularized pattern of communication interactions in the form of an input-output relationship between the research and other organization including the extension sub-systems is adopted.

Organizations: This term is specifically used in this study to refer to systems, agencies, groups and individuals such as policy makers, zonal AERLS, farmers, institutions, researchers, entrepreneurs etc. that may be contacted in the process of developing and/or delivering research information by National Agricultural Research Institutes in Nigeria.

Methods of Communication: This is used to refer to the various channels or media that could be used in the communication process.

Agriculture: The cultivation and production of crops and forest resources; rearing of animal and fishes; and their use by man as food, raw materials for industries and source of employment, livelihood, income etc.

Diffusion: The processes involved in the spread of new ideas, innovations, technologies, information, facts etc.

Adoption: The acceptance or uptake and use (utilization) of information, ideas, facts, technologies, etc. emanating from a source as a result of effective communication, dissemination or extension services.

Development: The process of generating new ideas, innovations, technologies, facts or any information through research.

Delivery: Process of packaging and transferring innovations, technologies, knowledge, ideas, facts or any information from source (research centres) to disseminating units or ultimate adopting units.

Disseminating Unit: This refers to client extension organizations, agencies, or individuals responsible for direct contact/final dissemination or nearest to the adoption units in the information flow process/chart.

Ultimate Adoption Unit: The ultimate user or end-user of new ideas, innovations, facts, knowledge, technologies or information, etc.

Relevance/Appropriateness: This refers to compatibility of new ideas, technologies or research information with the ultimate users or end-users environment (problems,

situations, circumstances, etc.).

Information Sources: These refer to organizations or various units capable of providing and/or transmitting useful information in the processes of developing and delivering appropriate/relevant technologies, innovations, facts, ideas or research information.

Technology: This is used in this study to refer to all research information or innovations.

Purpose of Communication: Purposes of communication in this study are:

- a) development of agricultural research information or formulation of research problems.
- b) delivery of agricultural research information or dissemination of research results.

Problems Areas For Research: This specifically refers to agricultural areas such as: (i) Production practices; (ii) Protection practices; (iii) Economics/marketing (iv) Post-harvest technologies (storage, processing etc.). (v) Utilization. All of these are regarded as the foci of research and extension efforts (i.e. on which research information is expected to be developed and delivered) in this study.

CHAPTER TWO

LITERATURE REVIEW

Researchers exist as part of the total society of superficially related parts: the policy makers, the researchers themselves and the community (including the media practitioners, extension workers, trainers, the target audiences and the general public). For effectiveness of the research endeavour, stronger communication bonds should exist between researchers and each of the various other units than those existing now among them. Researchers can achieve a more realistic and relevant concept of development through access to adequate information on existing problems and expectations of the generality of the people.

Conceptualization of communication linkages in technology development and delivery has not been definitive. This study is yet another effort at achieving effective communication linkages in agricultural technology development and delivery to the ultimate users or adopting units. Achievement of this goal will make the activities of research institutes and those of the various organizations that are involved in technology development and delivery interactive,

complementary and reciprocal.

In this chapter, therefore, relevant literature is examined on the various variables in the communication process that are important in the development and delivery of agricultural research information. This is followed by a summary of the points gathered from both theoretical and empirical studies.

2.1 Some Existing Linkages In Agricultural Research and Extension:

As stated earlier, conceptualisation of communication patterns, models or pathways in technology development and delivery has not been very definitive. This is true considering the fact that many models have been used by extension and development communication experts in their attempts to explain generalizations about the development and dissemination of research results to ultimate users. Normally, science-based information originates from research and passes through extension to farmers or the ultimate users. Among several extension communication experts who have worked in this area is Watts (1984:20-39) who illustrated the extension linkage with research and farmers as in Figure II.

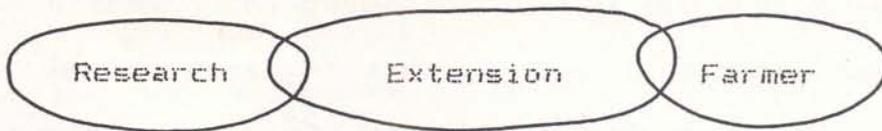


Figure II: Extension Linkage with Research and Farmers

This shows that the roles of research, extension and farmers should normally be dovetailing into one another. In other words, overlapping, interactive, complementary and reciprocal. Watts also illustrated the technology flow pattern between research, extension and farmers as follows (Figure III).

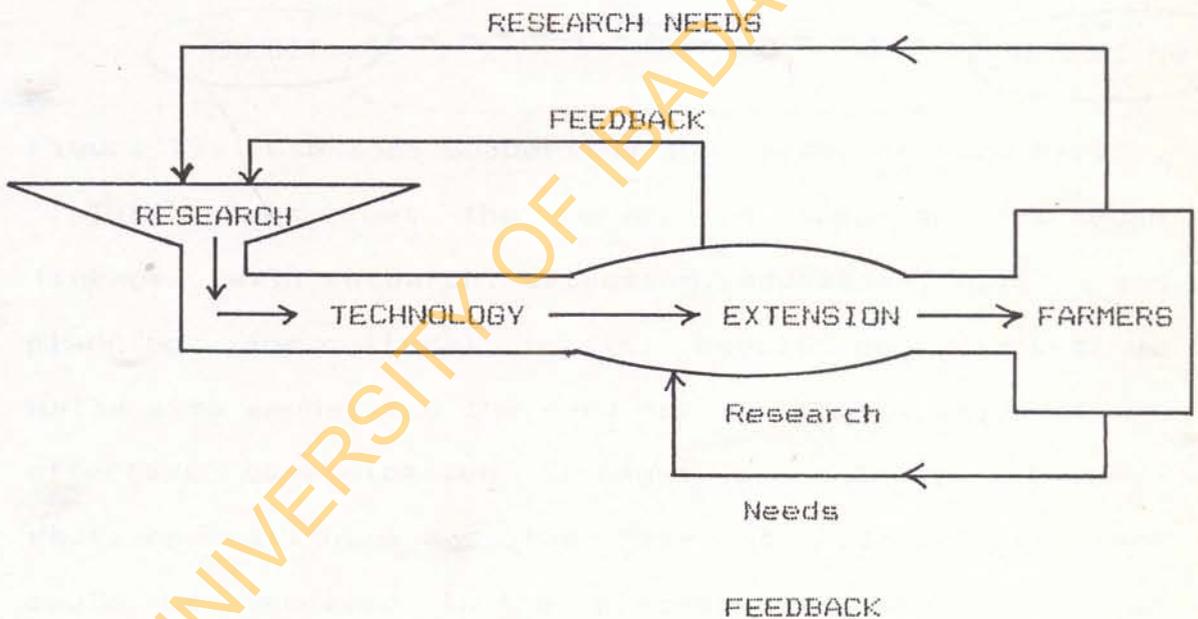


Figure III: Flow of Technology to Farmer from Research Through Extension.

It is obvious from this model that technology is the

product of research, extension is the "diffusion-adoption" system while farmers are the users of the technology developed by research. Watts went further by showing the linkages supporting the farmer as indicated in Figure IV.

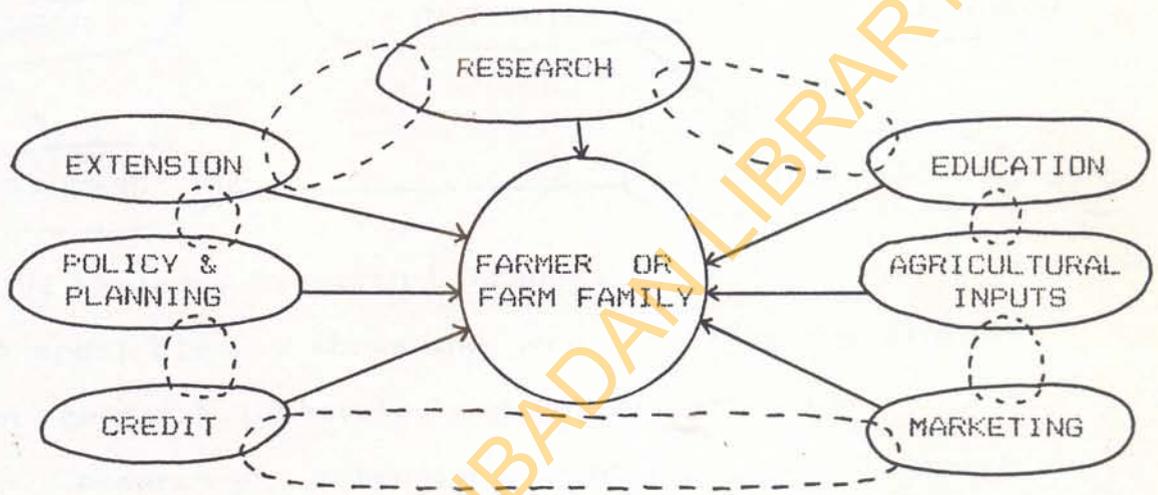


Figure IV: Linkages Supporting the Farmer or Farm Family.

This shows that the farmer is supported through linkages with research, extension, education, policy and planning, agricultural inputs, credit and marketing. Watts also emphasized the need for the organization of an effective communication linkages or pathways between research institutes and other relevant organizations that could be involved in the process of development and delivery of new technology. He illustrated the linkages as in Figure V.

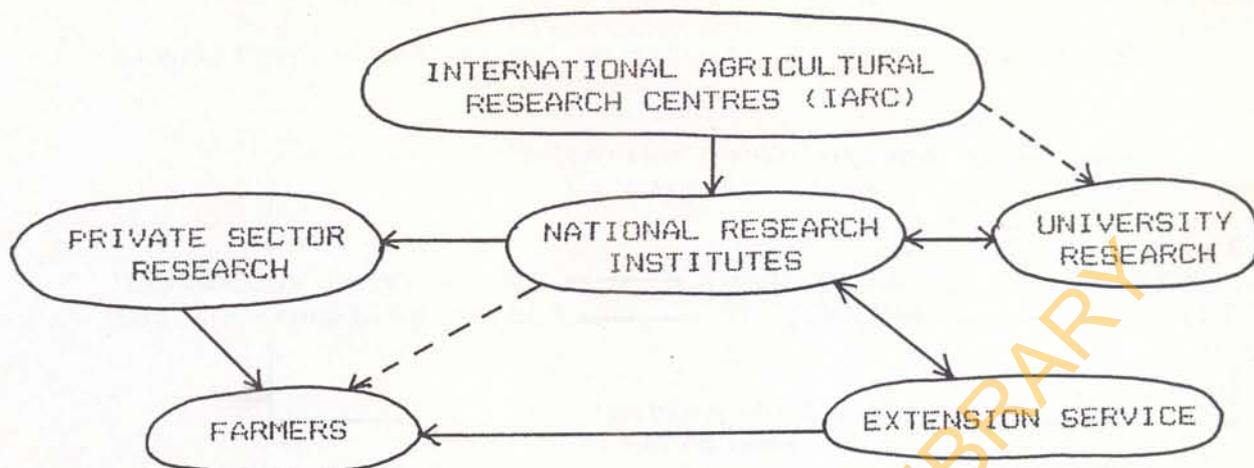


Figure V: Primary Research Linkages.

This model clearly shows the need for effective linkage between research institutes and university research; and between research and extension. International Research Centres should link with National Research Centres while National Research Centres are expected to link with private sector research as well. University Research and International Research Centres are not expected to have direct link with the extension system and farmers except through National Research Institutes, while the latter are not expected to have direct link with farmers except on rare occasions.

However, Swanson et al (1984:89-107) in an attempt to explain the concept of technology development, transfer and utilization during a discussion on extension

strategies for technology utilization, offered a simplified model which is illustrated in Figure VI.

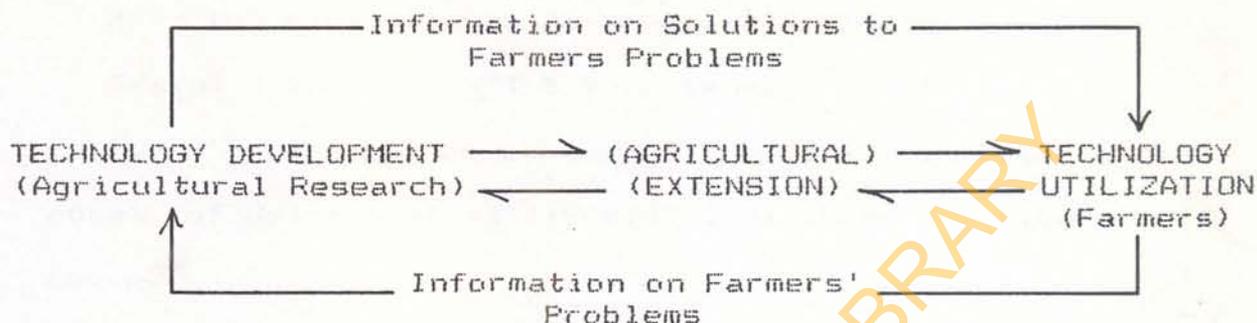


Figure VI: A Simple Conception of a Technology Development, Transfer and Utilization System.

This model simply indicates that agricultural research is expected to develop technology based on information on farmers' problems received through extension; and transfers the new technology or information on solutions to farmers problems through extension to the farmers who are to utilize the technology.

Idowu (1988:224), while commenting on the importance of the major technology transfer strategies towards improving the Research-Extension linkage, listed three major strategies which have contributed significantly to the improvement of the links between research and extension in Nigeria in recent years. These are:

1. The National Accelerated Food Production Programme (NAFFPP);

2. The Farming Systems/On-Farm Adaptive Research (FS/OFAR) Strategy;

3. The Agricultural Development Projects (ADPs) and Training and Visit (T & V) Extension Approach.

Idowu's idea can be conceptualized to be similar to the model of Swanson et al (1984:89-107) shown in Figure VI above.

Oyolu (1983:69) proposed a reversible tripartite interaction between the researcher, the extension agent and the farmer as in Figure VII below.

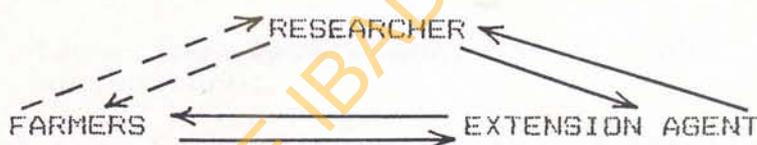


Figure VII: Pathways in Agricultural Technology Development and Transfer.

This model shows that the interaction between the researcher and the farmer is not expected to be as strong as that between the researcher and the extension agent. The relative strength of any of all the reactors in their pathways determines the effectiveness of the technology developed and transferred. Okerek (1983:83), in an attempt to explain the critical role of the AERLS in technology development and transfer, proposed a model as

in Figure VIII below.

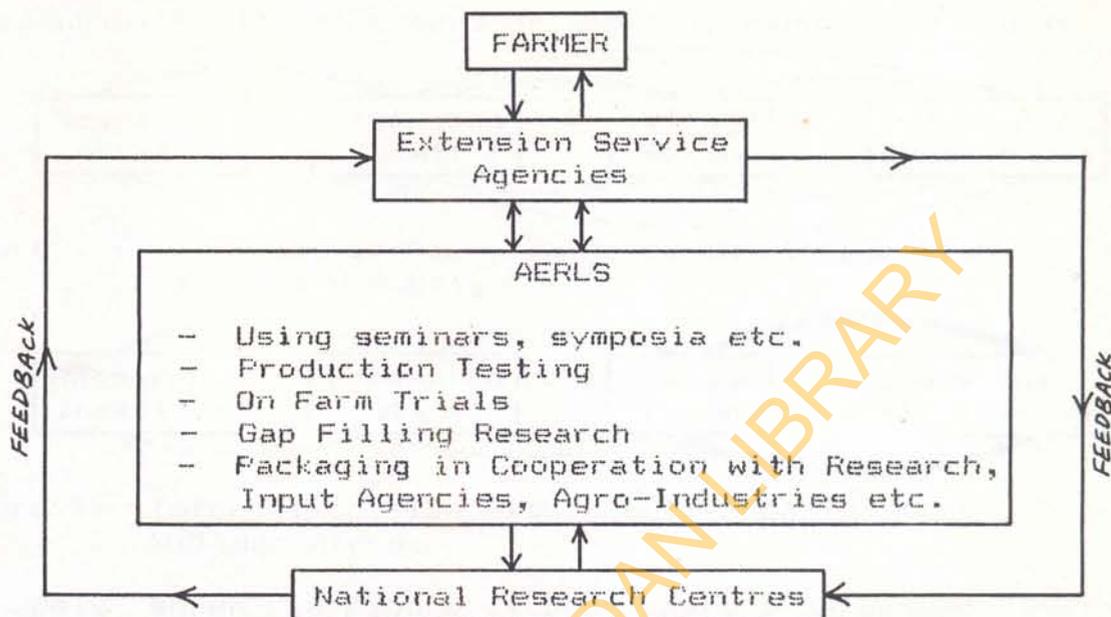


Figure VIII: Technology Development and Transfer in Agriculture.

This model can be summarised in the following steps (Okereke, 1983a:81):

1. Research Institutes produce research results based on general needs, problems and activities.
2. The AERLS, in cooperation with the Research, the Extension, Agro-industries, input supply agencies and the farmers, modify and adopt the research results into recommendations on the basis of specific needs, specific problems and targeted farmers. The recommendations are communicated to the extension services for transfer to the farmers.
3. The extension service disseminates the recommendations to farmers and also obtains feedback from the farmers for transfer to research.

LAS (1983:3) also developed a model for linking research with village groups as shown in Figures IX and X.

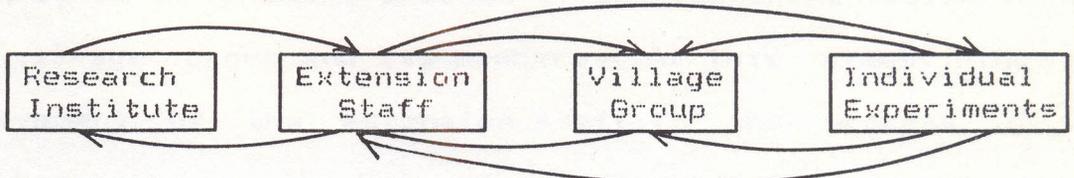


Figure IX: Information Flows in Research Linkage with Village Groups.

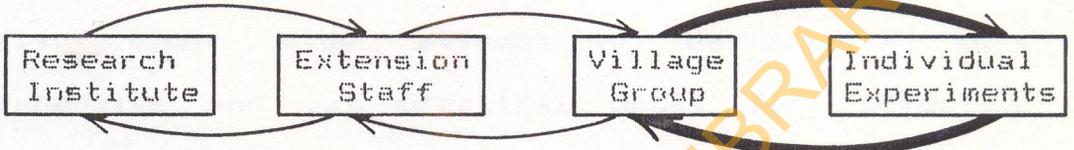


Figure X: Information Flow with a Self-Experimenting Village Group.

Models shown in Figure IX and Figure X proposed the involvement of village groups in the development of an extension programme aimed at linking research with farmers in Ghana. The models were based on the idea of encouraging the conduction of on-farm experiments by groups as well as individual farmers under the supervision of extension staff. Field days were later to be organized at the experimental farms where a number of innovations could be observed. Specifically, Figure IX shows the implementation of the method at the early stage when the link between the extension staff and the village group is expected to be strong. The extension staff is intensively involved in the execution of the

trials. Figure X shows the ultimate aim of the method which is to stimulate a process of self-experimentation in the village group and its members. At this stage, the involvement of the extension staff in the process of experimentation can be reduced to providing ideas, stimulating and gathering of feedback.

This study also attempt to develop a more comprehensive and yet practical model for effective communication linkage in the process of technology development and delivery in National Agricultural Research Institutes. The role of extension as a development communication system serving as the main agricultural information conduit is recognized but more opportunities for direct linkages have been introduced in the new model suggested in this thesis.

2.2 An Overview of the Models of Dissemination and Utilization of Knowledge:

The major theoretical and empirical studies of knowledge dissemination and utilization can be grouped conveniently into these three categories: (a) the "Research, Development and Diffusion", (b) the "Social Interaction" and (c) the "Problem-Solver" perspectives. The models, as elucidated by Havelock et al (1979) are presented below:

a) The Research, Development and Diffusion Model: This model posits a user population which can be reached effectively and influenced through a process of "dissemination", or by dissemination activities of various sorts, provided, however, that this dissemination is preceded by an extensive and complex process of research and development. Such processes usually include "basic research", "applied research", "development", "production", and "packaging" as the main features. There are many variations of this model but they all seem to have the following five features in common:

- i) a rational sequence of activities which moves from research to development to packaging before dissemination takes place.
- ii) adequate planning and coordination in the evolution of any particular message to be disseminated.
- iii) a division of labour and a separation of roles and functions.
- iv) a clearly defined target audience i.e. a specified passive consumer, who will accept the innovation if it is delivered on the right channel, in the right way, and at the right time.
- v) a high initial development cost prior to any dissemination activity. It, however, foresees an even higher gain in the long run, in terms of efficiency, quality, and capacity to reach a mass audience.

This model seems to be a particularly popular and appropriate model for dealing with dissemination and utilization issues at the macrosystemic and policy levels because it subdivides the knowledge flow system neatly into different functional roles which exist within different subcultures. These are the research community, the product organizations, the practitioners and the consumers. In criticism, this model can be said to be over rational, over idealized, excessively research oriented, and inadequately user oriented.

- b) The Social Interaction (S-I) Model: The social interaction researchers assume the existence of a diffusible innovation as a precondition for any analysis of the diffusion process. If the innovation is a stable element which we can easily identify as a constant, the task of measuring its flow through a social system over time is made considerably easier. This measurement of the flow is the primary concern of the S-I theorists; they study the pattern of flow and the effects of social structure and social relationships and groupings on the fate of innovations. Six major points can be derived from the theory and these are:

- i) The importance of the Social Relation Networks: The S-I theorists know better that a complex and intricate set of human substructures and processes must be operative before diffusion will succeed.
- ii) The User's Position in the Network: The S-I school recognises opinion leadership i.e. the fact that initial acceptance by a small majority of key influentials is the major factor in diffusion to the community as a whole. The prestige of these individuals, their status as exemplars and norm-setters, and the frequency of their interaction with other members were the key factors in gaining acceptance from the great majority.
- iii) Informal Personal Contact: The opinion leader is an important factor in social diffusion because he has a lot of friendly personal contacts and depends largely on word-of-mouth communication with local people.
- iv) The Individuals Group Identity and Group Loyalty: People tend to adopt and maintain attitudes and behaviours which they perceive as normative for their psychological reference group. A society which allows large numbers of individuals to maintain large numbers of diverse and overlapping reference group identifications will be a very innovative society.
- v) The Essential Irrelevance of the Size of Adopting Unit: The configurational theory of diffusion permits comparative analysis of patterns of flow and relationships regardless of size and other differentiating characteristics of the specific adopting units studied.
- vi) Significance of Stages of Adoption for 'Dissemination and Utilization' Strategies: This model has tuck to the five phase of "AIETA": awareness, interest, evaluation, trial and adoption. Different types of influence strategy (mass media, demonstration, contact with experts, informal contact with peers, etc.) are most effective at different stages of the "AIETA" model.

Criticisms of this model include (i) the fact that the processes related to invention, research and development of innovations have not been studied; (ii) the translation, or as they are diffusion through the system has been understudied; (iii) the processes of maladoption, inadequate or inappropriate adoption and rejection have been given less than adequate coverage; and (iv) the loose and sketchy understanding of the psychological processes inside the user-adopter.

c) The Problem-Solver Model: This model rests on the primary assumption that knowledge utilization is a part, only a part, of a problem-solving process inside the user which begins with a need, and ends with the satisfaction of that need. The stages involved include (1) need sensing and articulation, (2) diagnosis and formulation of the need as a problem to be solved, (3) identification and search for resources relevant to the problem, (4) retrieval of potentially feasible solutions and solution-pertinent ideas, (5) translation of this retrieved knowledge into specific solutions or solution prototypes, and (6) behavioural try-out or application to the need, with evaluation of effectiveness being made in terms of need reduction.

Five solid points are stressed by the problem-solving theorists (1) the user is the starting place, (2) diagnosis precedes solution identification, (3) the outside helping role is non-directive (i.e. not taken over by doing the problem-solving for the client), (4) the importance and effective utilization of internal resources, and (5) user-initiated change is the strongest.

This model basically represents a psychological or user-oriented approach to problems of dissemination and utilization. It has however been criticised for putting excessive strain on the user, minimising the role of outside resources, and for not providing an effective model for mass diffusion and utilization. It is more widely used as a relevant model for dissemination and utilization.

2.3 Information:

Information is very critical in strengthening the link and achieving the integration of various social groups so that they can develop together as a cohesive and well organised community (Aboyade, 1987:16). Information creates negative entropy, i.e. the energy to act in the individual. It is this recognized capacity of information

to facilitate and bring about significant changes within an individual's group or a country that makes it so vital in the development process.

In the opinion of Aboyade (1987:16), adequate information will not only make for a better understanding and appreciation of the relevance of new programmes to the every day living conditions of the people, but will also encourage a closer link between the initiators and beneficiaries of development efforts. Any system initiating and stimulating development has a responsibility to provide and disseminate information about its activities to make the people knowledgeable about things happening around them, and also generate in them the right attitudes and encourage the adoption of desirable value system.

Information dissemination is an important element in the strategy for development (Mabogunje, 1980). It mobilises the masses to encourage their active participation in the various development programmes. The introduction and spread of new ideas through a constant flow and exchange of information would be at the heart of any development effort.

Rogers (1969), however, observed that the desired

change in human behaviour can be produced through the processes by which information - be it on agricultural innovations, health improvement methods, political news, new manufacturing techniques, etc.- gets transferred from one source to another (i.e. communication).

2.4 Development Communications

Rogers (1975b) defined development as "a widely participatory process of social change and material advancement for the majority of the people through their gaining greater control over their environment". On the other hand, Inayatullah (1967:101) defines it as "change towards patterns of society that allow better realization of human values, that allow a society greater power over its environment and over its own destiny, and that enables its individuals to gain increased control over themselves". The two definitions stress the fact that development is a normative concept in that existing conditions are no longer conducive to human dignity and socio-economic advancement and, therefore, should be changed for the better. However, Moemeka (1989:4) said "development means one basic thing to all people, a change for the better in both the human, cultural, scio-economic

and political conditions of the individual and, consequently, of the society".

From the above it is possible to see development communication as the application of the process of communication to development process. In a very broad sense, development communication according to Moemeka (1989:5), "is the art and science of human communication applied to the speedy transformation of a country (economic growth, modernization, industrialization) and the mass of its people (self-actualization, fulfilment of human potentials, greater social justice). This can be achieved through what Rosario-Brad (1979:34) describes as "the identification and utilization of appropriate expertise in the development process that will increase the participation of intended beneficiaries at the grassroot level".

In essence, development communication creates enhancing atmosphere for the exchange of ideas that produce a happy balance in social and economic advancement between physical output and human relationships. Its main objective, therefore, is to impart, to cultivate the attitudes and to teach the skills that people require for progress and advancement.

Development communication requires a deliberate, systematic and continuous planning so as to organize human activity for the effective use of communication resources and for the realization of communication policies in the context of a particular country's development goals, means and priorities. According to Moemeka (1989:19), communication should not be seen only as a tool, a supporting mechanism or an independent variable in development. Rather, it should be viewed as an integral part of development plans, one of whose major objectives is to create communication systems or models that could provide opportunity for people to have access to means of communication, and to make use of these means in improving the quality of their lives.

Besides creating opportunity for people to know about the technical nature of new ideas and how they work and with what effect, development communication plays the more important role of creating an atmosphere for understanding how these new ideas fit into the real social situation in which the people operate (Adesanoye, 1987).

Agricultural communication has proved to be an essential factor for rapid agricultural development. A steady flow of accurate, understandable and factual

information links scientists with the farmers. How far farmers can progress depends largely upon their access to accurate and reliable information - information they can use to help solve their farm problems. Balcet (1982:11) thus made a relevant observation that:

Nigeria has never seen a time when the role of the agricultural extension communicator has been so important. Nor has there ever been a time when so many people want to learn so much about improved agricultural practice so quickly.

Agricultural development will be slowed down without sufficient information (Kincaid, 1986:15). Therefore, extension should be more concerned with communication of useful research findings to the farming community. The ultimate goal of development communication, including agricultural communication, is to catalyze development and smoothen the path to development.

2.5 Channels For Communication of Agricultural Research Information In Nigeria:

The analysis of the problems of Nigerian research institutes' profiles indicates that they employ five major reporting system in their communication. These, according to National Science and Technology Development Agency (NSTDA) (1979:306), are:

1. the institutes annual reports;
2. conference papers contributed in proceedings by

researchers of the institutes;

3. learned journal articles which give individual researchers intellectual recognition;

4. extension reports; and

5. direct services in terms of end-products of research going directly to society.

The five reporting systems have, however, in our view not been fully exploited fully enough to evolve an optimal research information dissemination system of relevance to national development. The problems of information dissemination system in Nigeria were identified (NSTDA, 1979a:226) as follows:

1. The five reporting systems are grossly inadequate in terms of magnitude of what is available for dissemination. This problem of inadequacy is compounded by the language of communication which seriously restricts the clientele and the coverage.

2. The problem of research documentation. A survey of some research institutes' libraries has shown that little effort has been directed at research documentation and this constitutes a serious bottleneck to further progress in research.

3. The problem of preservation and/or exhibition of

research results and innovations. This is aggravated by the non-availability of national museum of research and development in Nigeria.

4. The problem of inadequate information on researchers' areas of expertise, and problem areas and/or urgent commissions. There is a dire need for a national directory of research which gives all relevant information, annually updated and revised from time to time.

NSTDA (1979a :306 - 310), therefore recommended that six major information systems be adopted by research institutes in Nigeria as follows:

1. Policy briefs which aim at explaining the research results, achievements, goals and problems of research to policy makers.

2. Research monographs which constitute individual projects reporting media. There are three (3) types of result monographs:

- a) the technical monograph, which contains all technical and analytical aspects of the project and its results;

- b) the extension education monograph, which takes out all technicalities and reduces the results to simple prose that can be understood by the general reader; and

c) the bulletin, which sets out results and recommendations arising from them in terms of guidelines and mechanisms for result utilization.

3. Proceedings of conferences, seminars and workshops.

This information dissemination system is of three types:

- a) the contributions of individual participants;
- b) the report of rapporteurs and the summary of proceedings; and
- c) conference recommendations and policy implications for the society. The last two types are the most essential results of seminars, workshops and conferences.

4. The institutes' annual report. This should be informative and educative rather than being a padding of so many materials that have little relevance.

5. Extension services by the institutes. The overall emphasis on extension has been very small in these institutes as evidenced by:

- i) the small proportion of resources committed to extension;
- ii) the general lack of seriousness with which researchers have taken extension work;
- iii) the absolute lack of information on characteristics of extension clientele and the socio-economic responses/effects expected or achieved; and
- iv) the absolute lack of linkage between research and extension, a situation which has been largely responsible for the non-

incorporation of research results into the production practices.

For research institutes to be relevant, they must extend results of their researches to users and/or producers. Researchers must also be prepared to test and/or demonstrate their results.

6. Direct services to the public, which should include seed multiplication, breeding stock production, inputs production, vaccine production, seedlings production, fabrication, producer education, products management, supervisory services, etc. These direct services must be seen as the socio-economic culmination of research relevance and must thus be accorded due priority.

2.6 Communication Linkage among Researchers:

One of the indispensable requirements for progress in research is the existence of channels for effective communication among research workers. Effective communication is essential among individual scientists, within research institutes, among disciplines, among research centres in Nigeria (National Research Institutes, Universities and International Research Centres), and among institutes in different countries. Okigbo, et al

(1981:1-26) lent support to these views by indicating that adequate communication among individuals or organizations engaged directly or indirectly in research is necessary for the following reasons:

i) It enhances progress in research by ensuring that the research worker keeps abreast of development in his or her field and all the time builds on advances and experiences gained elsewhere.

ii) Communication minimizes unnecessary duplication and waste.

iii) It facilitates better co-ordination of research activities.

iv) In the Nigerian context, communication among staff within a research institute eliminates misunderstanding and rumors, which are sources of conflict.

The authors emphasized the fact that communication enhances progress in research by noting that progress in industrial research and secret research establishments such as defense is often limited by inadequate communication. There is thus the need for information to flow vertically throughout the hierarchy of the Ministry of Science and Technology (FMST) to the individual

research workers and from the Directors of the research institutes to the various units and eventually to the research workers. The situation whereby people working in a research institute are sometimes ignorant of what the institute is doing and about results of research emanating therefrom is unproductive. The establishment of newsletters at different levels can solve such problem. Okigbo et al (1981:1-26), therefore, expressed the need for horizontal flow of information from one individual to another, from one department or unit to another and from one institute to another within or outside Nigeria.

NSTDA (1979:11-28), commenting on the complementary roles of research institutions, noted that:

- a) the recognition of the fundamental role of research in the research institutes and the university is a prerequisite to agricultural development;
- b) communication between individual scientists (researchers) and between the various research organizations in the country is at present uncoordinated and in many areas non-existent;
- c) research communication even among the research institutes under the aegis of NSTDA (now Federal Ministry of Science and Technology) is far from

satisfactory and there is at present no suitable forum through which various researches in University Faculties of Agriculture and International Research Institutions both within Nigeria and the West African Region are co-ordinated for effective transfer to and utilization by the farmers;

d) as a suggestion, an effective mechanism for effective co-ordination and communication should be worked out among the various institutions.

In their contribution to the discussion, Aradeon and Aradeon (1983:79) noted that researchers, of course, communicate individually or as groups with policy makers, with media specialists and with members of the public. But, in their opinion, the level of communication among researchers must be increased to maximize the impact of such communication and also to avoid communicating obsolete, untimely and irrelevant information. Active communication interaction among researchers would significantly enhance the effectiveness of problem analysis and of scientific and policy recommendations.

Therefore, the Agricultural Research Institutes are expected to communicate with other researchers or other research institutions working on similar problems to the

ones on their research schedule and align, where feasible, co-ordinate such research activities with their own. The present research believes that if research is to provide the opportunity for agriculture to meet the needs of national development now and in the future, adequate communication must exist among researchers, research centres and within research institutes.

2.7 Communication Linkage Between Research and Policy Makers

People communicate to influence the other party in some way (Okereke, 1983:39). In line with this opinion, Iyamabo (1979) advised research institutes to maintain adequate communication interaction with policy makers. Adequate communication interaction between research and policy makers is a necessary step towards guiding the development of workable policies and promoting the best interest of farmers through researchers' understanding of how existing agricultural policies affect them and their farm business. Russel (1981:40), Williams (1968) and Akinbode (1971:29-42) found that agricultural researchers still require information in the area of policy as well as in the legal, commercial and social aspects of agriculture.

Ononiwu (1985:3) affirmed that "the business of research communication should essentially include the task of enlisting and convincing several layers of bureaucracy and policy making bodies". He went further to state that, from the evidence of his research, some agricultural development programmes failed owing to the lack of communication interaction between many agencies and units such as researchers, administrative support units and policy making bodies among others. It is thus advisable that researchers regularly invite policy makers to workshops and forward newsletters to them. In order to maximize their impact, researchers should be presenting package solutions to government. Aradeon and Aradeon (1983) suggested that indirect communication with the policy makers via the public and media often proves to be the most productive form of communication.

It is, however, important to note that there are two separate bodies mainly concerned with formulating policies that affect agriculture at national level in Nigeria. FMST (1985:6-7) listed the responsibilities of its Department of Agricultural Sciences to include, among others:

- i) Policy formulation in agricultural research: crops, livestock, forestry, fisheries etc.
- ii) Identification and determination of priorities, objectives and targets for agricultural research.
- iii) Promotion of agricultural research and technology for national development.
- iv) Direction, co-ordination, monitoring and evaluation of agricultural research.
- v) Liaising with international organizations concerned with agricultural research e.g. FAO, IITA, WARDA, CGIAT, IUFRO, etc.
- vi) Supervision of National Agricultural Research Institutes.

On the other hand, Adenola (1986:i-ii) indicated that the Federal Ministry of Agriculture formulates agricultural policies, sets agricultural priorities and gives direction to agricultural development through its National Council on Agriculture (NCA). It is assisted by the National Agricultural Development (NADC), which is responsible for drawing policy guidelines on the crop sub-sector of agriculture; the National Forestry Development Committee (NFDC), which is responsible for drawing policy guidelines on the forestry and fisheries sub-sector of

agriculture; and the National Livestock Development Committee (NLDC), responsible for drawing policy guidelines on the livestock sub-sector of agriculture.

The responsibility for formulating agricultural policies and setting priorities is thus vested in two separate ministries: agricultural research policies and priorities are formulated/set by the Federal Ministry of Science and Technology and its agencies; while agricultural development and extension policies/priorities are formulated, set and executed by Federal/State Ministries of Agriculture and their agencies (including the Federal Agricultural Co-ordinating Unit). Conscious effort aimed at maintaining communication linkages with policy makers is yet, according to NSTDA (1979a:307), to be pursued by research institutes and researchers in Nigeria. This situation, brings to light the need for communication linkages between research and the various relevant policy making ministries and their respective agencies for proper research orientations, relevance of findings, understanding and effective delivery/utilization of research results.

2.8 Communication Linkage Between Research and the Public:

The public should be aware of the opportunities available in the various agricultural research institutes to enable them to appreciate the role of research in national development. Aliyu (1986:2) supported this view when he argued that "it is the task of research institutes to keep the whole nation informed of science and technology activities or their research results which involves reaching a number of categories of the populace".

Communication between research and the public is very important since public confidence will be lacking if research results are unknown to the public. In the opinion of Okigbo et al (1981:28-34), one way of ensuring this confidence is by communicating through the media and through special releases from each research institute which ensure that the public is informed of development accurately and in simple language.

Aradeon and Aradeon (1983:72-83) supported the views expressed on the need for an effective communication linkage between researchers and the public by suggesting that this could be in the form of special periodic features in the news media - television, radio, popular magazine, leaflets and daily newspapers geared towards

meeting the interest of the public and keeping it aware of existing problems and informed of the available solutions. Also, public participation in conferences organized by research institutes would increase the validity of the conference/workshop information base and also have public relations value. This researcher agrees fully with the views expressed by the various authorities cited on this issue.

2.9 Communication Linkage Between Research and Industrialists, Entrepreneurs, Credit Institutions and the Opinion Leaders:

Private sector involvement in agriculture will require increased involvement of national research centres in basic and applied research. Continuous adoption and use of results of such research may be achieved through continual communication with and education of prospective users (industrialists or entrepreneurs) (Igben, 1984:11-24). Ijere (1984) also expressed the opinion that science and technology (research) can have significant influence on the development of Nigerian agricultural enterpenureship by furnishing new knowledge of various inputs - agro-chemicals, seeds and seedlings - which preserve, protect or prolong the lives of the farm products. He concluded by observing that technological innovations are evident in

the work of national research centres. Such innovations, according to him, could stimulate the use of improved technology (hardwares and softwares) in agro-industries through adequate communication interaction. Anunsiowu (1984:206) stresses the importance of communication linkage between research and private sector by saying that "the effective participation of the private sector in Nigerian agricultural activities cannot be operationalised without supportive functions including operationally effective research system and adequate communication/extension services in quality and quantity".

Ajakaiye (1984:231-242) also noted that the task of revamping Nigeria's agriculture can be achieved through the combined effects of improved technology, resources availability, management and marketing expertise as well as the availability of capital capable of creating economic opportunities for farmers. He specifically emphasized the fact that the formulation of appropriate lending policy for private sector investment in agriculture will require adequate communication linkage between the credit institutions and agricultural research centres. Such linkage will also enable research centres to come out with economically feasible and profit-oriented

research findings.

NSTDA (1979:11-28) noted with concern that the commercial firms regard the research institutions with fear and suspicion and as obstacles to quick business (sometimes unscrupulous) transactions, and so try to circumvent the necessary testing and certification of their products by these institutions. It thus recommended adequate communication interaction between research and the commercial firms to ensure a common understanding of their roles. It is obvious that such intention would result in mutually beneficial relationship with the result that a considerable portion of research could be financed by the private agro-allied enterprises as, is the case in the advanced countries of the world. Opinion leaders, according to Aliyu (1986:5), normally influencing government actions, policy formulation, operational strategy of government and private agencies, adoption of innovations by corporate bodies and individuals, and further dissemination of information. He therefore suggested effective linkage between research and the opinion leaders and recommended regular press releases and exchange of publications for this purpose.

The need for communication linkage between research

and industrialists, entrepreneurs, credit institutions and the opinion leaders has thus been established in the literature. For example, communication interaction between private sector and research institutions will keep industrialists or entrepreneurs abreast of technologies ready for adoption at the various research centres and keep the research centres abreast of expectations of the industrial sector. This will surely enhance the research, extension, consultancy and advisory service roles of the research centres.

2.10 Communication Linkage Between Research and Educational Institutions:

To ensure that the latest research results are utilized in the development and training of the various levels of manpower needed for Nigeria's agricultural development, Aliyu (1986:6) suggested that apart from the need for communication interaction between research institutes and research components of educational institutions, there is also an important need for communication interaction with teaching components of educational institutions. Such interaction will enable research to obtain feedback on existing knowledge gaps or areas of priority in agricultural information. Teachers and agricultural

students could also use information from research centres to guide operations on research and teaching farms or school farms and the activities of their parent farmers, respectively.

2.11 Communication Linkage Between Research and the Media/Journalists

Folarin (1979) and Prosser (1978) agreed on the fact that the ideal form of communication in the rural setting is 'interpersonal' communication with its subsets of 'dyadic', 'triadic', 'family', and small group communication, and its focused interaction and potential for immediate feedback through cues and disclosure processes. Folarin (1979) and Sommerland (1966), however, contend that for jet-age development, the interpersonal communication process alone will be impossibly slow, particularly for developing countries understandably anxious for development. The consensus among these communication scholars is thus that a jet-age development requires a jet-age means of communication - the mass media - which are indispensable.

Creating new pathways between research centres and the farm is one of the vital tasks of the mass media in Nigeria and elsewhere. Hartmans (1984:7) commented that:

though word about new farming ideas and techniques reaches farmers by numerous means, none can reach as many people as quickly as the mass media. And none is more uniquely suited to disseminate timely, accurate information about agricultural technology and to arouse farmers' interest by painting a vivid picture of its possibilities for them.

Communication linkage between research and media/journalists can motivate the media to regularly disseminate information that can ensure agricultural development in Nigeria. Hartmans (1984:7) buttressed this view by saying that the media can have a less direct but equally important impact on agricultural development by trying to influence the course of government policy. According to him, increased productivity can be encouraged or discouraged by what the government decides about the pricing of agricultural commodities, the purchase of food imports and the priority given to agricultural research. He was even of the view that media people can contribute much by lobbying hard for policies that favour domestic agricultural production and for action programmes that make new technology available to farmers.

It should therefore be highly rewarding for researchers and journalists to work together and come to a better understanding of each other. Hartmans indeed proceeded to

suggest a few things journalists can do that will make it far easier to extract from scientists newsworthy information about agricultural research:

i) Journalists should keep in mind that researchers are, if not by nature, at least by training, very cautious and tentative in their work. They are reluctant to make bold, unambiguous statements about the results of their experiments. As a result, though it may task journalists patience to do same, they may have to hold off on some stories until the scientists are fully confident of their conclusions. The alternative is to take special care to couch the story in tentative rather than absolute terms.

ii) Journalists should remember that scientists pride themselves on their precision and accuracy and have a high regard for those qualities in people of other professions. That is why agricultural researchers are upset by news stories in which one disease or insect pest is confused with another or in which incorrect implications are drawn from a particular research finding.

iii) Journalists should note that researchers are no less vain than other people. It flatters them to have their work recognised by the public. So, they are especially helpful if you remind them that information about their research is going to be conveyed accurately to the people who will benefit from it and to members of donor organizations that finance it.

Since the media are pivotal in the effort to increase communication between researchers and the public, journalists must be well educated by being given agricultural production modules including the basic

vocabulary, tools, of analysis and working knowledge of practical agricultural production (Aradeon and Aradeon, 1983). This would arouse the journalists' concerned and help them to achieve a more informed base from which to suggest solutions. Their ability to suggest solutions will build their confidence and proficiency. All these put together will make them more motivated in getting the news and writing articles or features on agriculture.

Adedoyin (1987) was optimistic that communication linkage between research centres and the media stations or practising journalists could enhance the latter's understanding of packages of recommendations and existing agricultural policies and should result in better dissemination of the information to the grassroots and the various relevant client organizations, groups and individuals through the media. He also expressed the view that researchers could also obtain feedback through the journalists for the purpose of guiding or shaping future research endeavours. Finally, he suggested regular briefing, seminars, workshops etc. for media practitioners or journalists on the latest research results or crucial agricultural issues in addition to regular supply of publications to them. It has thus been effectively

established in the literature that communication linkage between research and the media or journalists is necessary for publishing and thus multiplying the benefits of research.

2.12 Communication Linkage Between Research and Extension Service/Government and Service Agencies

The extension sub-systems of research institutes structure their activities more specifically for the attention of and interaction with Federal/State extension systems or government service agencies. Agricultural extension is largely a programme responsibility of Federal/State extension service (Kincaid, 1968:15). Poor communication linkage between research and Federal/State extension services has thus been one of the major factors limiting agricultural production in Nigeria (Okigbo et al 1981).

NSTDA (1979:24) recognised the fact that "agricultural development would reach its highest efficiency when there is an effective linkage between research and agricultural extension and other services". It also gave one of the major factors responsible for the existing gap between the acquisition of research results and their application as the failure to co-ordinate working relationship between

research, extension and provision of inputs including farm supplies, credit facilities, security of tenure and the creation of available and profitable market outlets. NSTDA also recognised the need for the improvement of the services provided by government agencies for effective transfer and utilization of research results. It cited the examples of the Directorate of Food, Road and Rural Infrastructures (DFRRI) and the Federal/State Ministries of Works which are responsible for providing adequate road networks throughout the country. NSTDA concluded by saying that improved public utility services and educational and health facilities are important complementary elements to effective agricultural extension.

Since, as we already noted, the role of directly contacting the farmers is neither that of the research institutes nor of the zonal AERLS (now national AERLS) but specifically that of the Federal/State extension services, there should of necessity be an adequate and effective communication linkage between research and extension services.

2.13 Communication Linkage Between Research and Farmers

Research should involve the farmers or rural people, not only as the potential users of the research findings but also as participants in the research process. Farmers help to identify research problems and to test possible solution (Adedoyin, 1984:12-29). Other possible advantages of effective communication linkage between research and farmers are as follows:

- i) It enables the recognition of the value of the farmers' knowledge acquired through experience and annual 'experimentation'.
- ii) It increases the possibility of developing improved systems which while arresting the constraints the farmers face will at the same time be compatible with their goals.
- iii) It opens up a new method of analysing farm problems and reaching solutions.
- iv) By involving farmers from the beginning, avenues are open for communication and easy adoption of technologies that may result from the research.

Hartmans (1984:7) also stressed that "effective research linkage with farmers is a way of ensuring that all citizens, especially the great majority who live in

rural communities, have access to knowledge that can help them improve their work and lives". Individual farmers and small groups of farmers such as the co-operatives can be reached through interpersonal communication supplemented with mass media. In his own contribution, Ijere (1983:169-183) recognised co-operative societies as reliable vehicle for channeling and transferring research results or agricultural technology. National Council of Nigeria Farmers (NCNF) and the Nigerian Farmers Association (NFA) could also serve the best interest of farmers by maintaining an effective communication linkage with the research sector.

Evidence provided from the literature has thus shown that it is not out of place for research to maintain effective communication interaction with farmers or ultimate users either individually or as a group.

2.14 Communication Linkage Between Research and National AERLS:

The National AERLS is essentially to provide effective linkage between research institutes and university faculties of agriculture and the Federal/State extension service.

Enyinnia et al (1983:119) listed the role of AERLS as

including, among other things,

i) Regular Liaison between research institutes and ministries of agriculture of its client states or zone.

ii) Identifying problems leading to research in the co-operating states or its zone and communicate same to appropriate research institutes for action.

Effective communication linkage between research and AERLS is thus of great importance in the agricultural technology development and delivery process.

2.15 Communication and the "Diffusion-Adoption" Process:

Communication may be used to refer generally to the movement of ideas, facts, innovations, technologies or information from sources to ultimate users, target audience or receivers. On the other hand, diffusion refers specifically to the horizontal spread of such ideas, facts, innovations, technologies or information among the ultimate users, target audience or receivers. Lionberger and Gwin (1982:57-90), however, explained that diffusion and adoption (uptake and use) of any idea, facts, innovations, technologies or information require effective communication practice.

Lionberger and Gwin also listed conditions which diffusion research shows are necessary for diffusion and adoption of new technology to take place as:

- i) A continuing supply of updated, usable information.
- ii) Individuals (farmers) must be relatively free to accept and use the new information and technology that is being recommended.
- iii) The resources needed to adopt the recommended practice must be available to potential adopters under conditions suitable to their needs.

Adoption decision is the product of a sequence of communication influences operating through time. Lionberger and Gwin explained this point as reflected in Table III.

They also gave a typical adoption pattern as: Innovators; Early adopters; Late adopters; Majority; and Laggards.

Okereke (1983:44) threw more light on the relationship between communication and diffusion by saying that "extension messages cannot reach all farmers directly and so, diffusion (i.e. horizontal spread) is very important among farmers, target categories, functional groups or

institutional groups simply because they are more homophilous in most attributes".

TABLE III: Information Needs of Farmers at Different Stages of Adoption

| Stages | Function | Kinds of Information | Preferred Sources |
|-----------------------------------|--------------------------|---|--|
| Awareness | Become Informed | Notification | Mass media channels, fellow farmers and government agencies. |
| Interest | Become Informed | More Details | Mass media channels, fellow farmers and government agencies. |
| Evaluation (or legitimization) | Self-Persuasion Local | Will it work for me? trial consequences- social, economic; Evalua- tion of peers; Results elsewhere | Trusted fellow farmers; Trusted others. |
| Trial | Decision to use | Applications: How? How Much? When? | Guide publications; Local dealers; Self; Neighbours. |
| Adoption | Confirmation | Own result and experience of others | Own experience; Other farmers. |

Sources: Lionberger, H.F and Gwin, P.H (1982); Application from Diffusion Research.
In: Communication Strategies: A Guide for Agricultural Change Agents, U.S.A.
Interstate Printers and Publishers Inc.

Also (1989:3-5) and Okoye (1989:17) categorised factors associated with farmers adoption of innovations as follows:

- (a) characteristics of the innovation
- (b) situational factors regarding farmers themselves and their farms.

Important characteristics of farm practices influencing adoption include:

- i) Relative Advantage: This is the degree (usually expressed in economic profitability) to which an innovation is superior to the one it replaces.
- ii) Compatibility: This is the degree to which an innovation is consistent with existing values and past experiences of the adopters.
- iii) Complexity: This is the degree to which an innovation is consistent with existing values and past experiences of adopters.
- iv) Divisibility: This is the degree to which an innovation may be tried on a limited basis.
- v) Visibility or Communicability: This is the degree to which the trial results of an innovation are conspicuously better than the one it is replacing and can be diffused to others.

Situational factors which can affect the adoption of an innovation include:

- 1) Size of farm business: The larger the farm business and the more specialized the nature of the farm business, the earlier the farmer tends to adopt those new and improved practices which

are applicable to his farm enterprises and farm organization.

- ii) Personal characteristics: Adoption of farm practices is generally related to the level of education, farmers background and attitude towards the innovations (Alao, 1989:5).
- iii) Sociological characteristics: The higher the individual's social status and prestige in the community, the more his interaction with other adopters and the earlier his adoption tends to be.
- iv) Social nature of community and neighbourhood: Where the norms of the community are favourably disposed towards innovativeness, adoption is more likely to occur. Some institutional characteristics also affect the behaviour of individual farmers with respect to technological changes. For example, system of land ownership which confers greater permanency to the farmers tend to lead to innovativeness.
- v) Contact with extension service and availability of extension officers: The presence of able and efficient Extension Officers at the local level

has a direct effect on innovativeness of farmers.

- vi) Leadership structure in the community: The success of many programmes depends on the approval of the formal and informal leaders.
- vii) Crisis situation: Wars, earthquakes, drought, excessive rainfall and flood may bring about adoption of improved practices.

It is now clear through exposure to the relevant literature that while communication may be necessary for the dissemination of information to some adopting units, it is equally necessary for the effective spread (diffusion) of such information to other adopting units.

2.16 Conditions for Communication Success:

Okereke (1983:42-44) and Rogers (1973) explained the condition for communication success as follows:

i) Message Production Skills: This includes all the processes of catching the attention and the interest of the receiver, of using codes and symbols meaningful to him and of designing the message in the form he can process and understand.

ii) Homophily and Heterophily: Homophily is the degree to which a source-receiver pair are similar in

certain attributes such as beliefs, education, social status, etc. Communication between homophilous individuals is generally effective. On the other hand, heterophily is the degree to which a source-receiver pair are different in certain attributes. Communication between heterophilous source-receiver pairs is less effective than between homophilous pairs. It is however difficult to find a situation where complete homophily exists (i.e. source and receiver similar in all respects). Infact, some amount of heterophily is always necessary for effective communication. This will surely enhance the credibility of the source once it has a high degree of empathy with the receiver and attends to feedback from the receivers.

iii) Credibility: This is the degree to which a source is perceived as trustworthy and competent by the receiver. Berlo et al (1970:365-576) gave the two dimensions of credibility as 'competence' credibility and 'safety' credibility. A change agent or communicator is said to possess 'competence' credibility when he is more knowledgeable about the innovations he is introducing than his clients which

makes him to be regarded as an expert. A source is perceived as possessing 'safety' credibility if he is seen by his clients as their peer. The normal practice is to consult competence credibility (heterophilous) sources (e.g. the research or extension expert) at the knowledge stage in the communication process when the individual is gaining information about the innovation. On the other hand, 'safety' credibility (homophilous) sources and channels are consulted at the persuasive communication stage when the individual already has a positive attitude towards the innovation.

iv) Empathy: This is the ability of the communicator to perceive how the receiver feels and share these feelings. In this case, he will be in a position to design his message to meet the receivers needs and situations.

v) Feedback: By attending to feedback from his receivers, a source is able to empathize more fully with them, understand their needs, meanings, and may ultimately become more "homophilous" with them, leading to more effective communication.

vi) Feedforward: This is information about the

receiver which the source has, prior to initiating communication and must use it to predict the effectiveness of his communication. If a source has false information about the receiver, his communication has failed before he starts.

vii) Noise: Noise refers to any disturbance which interferes with the effectiveness of communication process.

viii) Selectivity: This refers to the tendency by people to seek familiarity and reinforcement for their existing attitudes and to avoid situations which do not agree with their previous attitudes. There are three selectivity processes: selective exposure, selective perception and selective recall.

a) selective exposure is the tendency to attend to communication messages that are consistent with one's attitudes, beliefs, professions or means of livelihood.

b) selective perception is the way we see and interpret the world around us. This determines the way we encode and decode messages, the nature of the feedback and the source-receiver interaction.

c) selective recall is the tendency to recall (remember) only communication messages that agree with our attitudes and beliefs.

ix) Cognitive Dissonance: This refers to knowledge which is inconsistent with a person's attitudes and beliefs. It is an uncomfortable situation which people often seek to reduce or, if possible, completely avoid.

x) Information Overload: Information fatigue, poor performance or rejection of the entire information often occur as a result of information overload, i.e. an excess of information inputs beyond what the receiver is able to process and utilize.

xi) Accessibility: This refers to ready availability of information to those who need it, who want it and who can benefit from it. These factors are taken into consideration in this study.

2.17 Communication Effects:

People communicate for the purpose of informing, entertaining and educating. Communication can thus be described as a relationship between source and receiver which has four aspects, namely; interaction, facts or contents, appeal and expression. Okereke (1983:40),

however, noted that the actual communication effects (resulting from the various communication aspects) are the changes in receiver's behaviour that occur as a result of the message received. Effective communication is one which results in intended behavior of the receiver. The three main types of communication effects, according to Okereke (1983), are changes in receiver's knowledge, attitudes and behavior.

2.18 Advocacy Communication/Journalism:

Ultimately, all the articles, reports, books, etc. by communication specialists are in a position to significantly influence the attitude of both policy makers and the public. For example, Aiyepoku (1980) found that policy makers ranked scholarly periodicals as the most frequently used documentary source of information for arriving at policy decisions. To significantly influence the attitude of both policy makers and the public, Aradeon and Aradeon (1983:81) recommended that:

researchers should make adequate research information or publications on key issues affecting agriculture available to media practitioners to create a crew of informed editors, journalists, script writers, programmers, directors, etc. who must always seek out and repeatedly focus on all problems or benefits involved in the available or proposed policy.

They concluded that "by constantly highlighting these issues the media specialists can activate the public to bring informed pressure to bear on the policy makers". Research could communicate steadily with media specialists for this purpose.

2.19 Persuasive Communication:

Persuasive communication can be described as a communicative process in which the communicator seeks to elicit a desired response of his receiver(s). Anderson (1971:45) explained the persuasive process as one in which the communicator seeks to utilize, to marshal, to modify, to adjust, to refocus, to redirect the motivational forces impinging upon the receiver(s) so as to adjust and alter their behaviour or potential for response. It is imperative that researchers should successfully adopt the theory and practice of persuasion in the process of communicating their research results or new technologies.

2.20 Co-publication:

Cabanilla and Hargrove (1985:279) defined co-publication as an "arrangement whereby the original publisher of a book or document grants permission to a second agency to translate, publish and to disseminate the

publication in another language". Since language is a major barrier to the spread of knowledge, the spread of science-based information usually published in English alone by National Agricultural Research Institutes has not been effective among Nigerians, especially owing to a very high level of illiteracy. It may then be wise for national research institutes to grant co-publication permission to Federal/State extension services, farmers co-operative associations, the National Council of Nigerian Farmers (NCF) etc. to translate their packaged recommendations into the local languages of their operational areas or of their members.

2.21 Summary

National Agricultural Research Institutes in Nigeria, as applied research centres, were specifically established to develop and deliver science-based information for integration into the practice of agriculture. It is however important to note the fact that the process of developing and effectively disseminating appropriate/relevant technology require that the research problems should be indigenous to the adopting units (end users) environment.

Relevant literature has been cited in this chapter to

confirm that communication interaction/linkage between research and the various relevant information sources will be necessary for the development of appropriate technology which will eventually be acceptable to the adopting units. Also, communication interaction/linkage between research and the various relevant disseminating units will be necessary for widespread delivery of agricultural research information.

It has also been demonstrated in this chapter that the present pattern of communicating and co-ordinating research information in National Agricultural Research Institutes needs a lot of improvement.

CHAPTER THREE

RESEARCH DESIGN AND METHODOLOGY

This chapter defines the study population and explains the instrumentation, data collection procedure and methods of data analysis. It also explains the procedure for ensuring validity and reliability of the study.

3.1 The Study Population:

The study population comprised the 18 National Agricultural Research Institutes in the country. These were specifically established by the Nigerian government to conduct research into problems of agricultural development (applied/development research) and to deliver their research results for the improvement of agricultural practice in Nigeria. While thirteen (13) out of the eighteen (18) institutes work on broad agricultural problem areas (such as production, protection, economics/marketing, post-harvest technology - storage and processing - and utilization) the remaining five institutes work on specific problem areas. The institutes are widely spread all over Nigeria and their activities are expected to cover the entire country.

Other research agencies such as the universities'

faculties of agriculture and international research centres in Nigeria were deliberately excluded from the present investigation because they are not directly relevant to the situation being studied for the following reasons. Firstly, the faculties of agriculture in the universities conduct mostly pedagogic and basic researches and also operate a basic research-oriented extension system. Thus, according to William (1990:25), "while the focus of research by the various Research Institutes is applied in nature, basic research relating to agriculture is presumed to be primarily carried on by the various faculties of agriculture". Secondly, the International Agricultural Research Centres in Nigeria (such as the International Institute for Tropical Agriculture (IITA) and the International Livestock Centre for Africa (ILCA)) do not have extension services as part of their mandate. Since, therefore, our main interest is more in the area of applied agricultural extension research than a purely basic research, we consider it enough to concentrate on the Research Institutes whose raison detre is clearly applied agricultural research.

The eighteen (18) National Agricultural Research Institutes were studied, their Directors serving as

respondents. The use of all the institutes in the study has correspondingly allowed for the inclusion of all possible respondents who provided the required information for our analysis. The entire population, rather than a sample of it, was used because of the small population size.

3.2 Instrument:

The major instrument used for data collection was a questionnaire structured and deliberately designed to elicit factual information that would lead to as realistic and valid findings as are possible. Thus, our primary source of data was the questionnaire as described above. The secondary source was other information obtained through library research, and discussion with relevant officials and specialists as considered necessary.

3.3 Data Collection Procedure:

Data were collected through the use of a questionnaire (Appendix I) in a field survey that spanned a period of six months from May to October, 1988. A letter of introduction was issued to the researcher by the Acting Head of his Department to ensure easy access to the various institutes, officials and the desired information.

The researcher personally delivered copies of the questionnaire to the institutes. In the process of going round to retrieve their responses, the researcher was able to hold short interview with the Directors. The researcher then spent two days in each of the institutes studying the records. The short interviews with the Directors and the studying of the records of each institute were undertaken with the sole aim of cross-checking the facts and clarifying some of the points raised.

3.4 Methods of Data Analysis:

Various statistical methods of analysis were used to compute the data. But before the actual statistical analysis, the research institutes, the target organizations, the communication methods employed by them, and the specific problem areas worked upon by the research institutes were grouped as shown in tables 4, 5, 6 and 7. The research institutes were grouped according to the types of crops, livestock, products or agricultural activities researched upon while the target organizations were grouped according to the types of activities or functions they perform.

In order to provide answers to questions 1, 3 and 4

which related to type of research institutes, target organizations, communication methods used and specific problem areas for research, a chi-square test was considered adequate and was thus applied to the data. To answer question 2, however, a one-way ANOVA (parametric) and Duncan's multiple range ANOVA (non-parametric) tests were considered more suitable and were thus applied to answer the question.

TABLE 4: Research Institutes (in groups)

| GROUP CODE | GROUP TITLE | INDIVIDUAL RESEARCH INSTITUTES |
|------------|----------------|--|
| GR 1 | Crops Research | <ul style="list-style-type: none"> - National Cereals Research Institute, Badeggi. - National Horticultural Research Institute, Ibadan. - National Root Crop Research Institute, Umudike. - Cocoa Research Institute of Nigeria, Ibadan. - Nigerian Institute of Oil-Palm Research, Benin-City. - Rubber Research Institute of Nigeria, Iyanomo. |

- GR 2 Livestock and
 Water Resources
 Research
 Intitutes
- National Animal Production Research Institute, Zaria.
 - National Veterinary Research Institute, Vom.
 - Nigeria Institute of Trypernosomiasis Research, Kaduna.
 - Lake Chad Research Institute, Maiduguri.
 - Kainji Lake Research Institute New-Bussa.
 - Nigerian Institute for Oceanography and Marine Research, Lagos.
- GR 3 General
 Agriculture,
 Products and
 Extension Research
 Institute
- Institute for Agricultural Research, Samaru, Zaria.
 - Institute of Agricultural Research and Training, Moorplantation, Ibadan.
 - Forestry Research Institute of Nigeria, Ibadan.
 - Nigerian Stored Products Research Institute, Ilorin.
 - Leather Research Institute of Nigeria, Zaria.
 - National Agricultural Extension and Research Liaison Services, Zaria.
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TABLE 5: Organizations Contacted (in groups)

| GROUP CODE | GROUP TITLE | ORGANIZATIONS |
|------------|---------------------------------------|--|
| GO 1 | Extension Organizations | <ul style="list-style-type: none"> - States Extension Services - Federal Extension Services |
| GO 2 | Industrial/Commercial Organizations | <ul style="list-style-type: none"> - Private Sector/Commercial Organizations. - Banking Institutions. |
| GO 3 | Research and Educational Institutions | <ul style="list-style-type: none"> - Other National Research Institutes. - International Research Centres - Farming System Research Network. |
| GO 4 | Policy Makers | <ul style="list-style-type: none"> - Policy Makers (Ministries of Science and Technology; and of Agriculture). |
| GO 5 | Farmers and Farmers' Organizations | <ul style="list-style-type: none"> - Practising farmers and Rural people. - Farmers' Co-operative Associations and Agencies. |
| GO 6 | Media and Other Possible Linkers | <ul style="list-style-type: none"> - Media Organizations - Professional Agricultural Associations. - Urban people and Opinion leaders. - The General Public. |

TABLE 6: Communication Methods used (in groups)

| GROUP CODE | GROUP TITLE | METHODS |
|------------|------------------------------|--|
| GM 1 | Individual Contact Methods | <ul style="list-style-type: none"> - Farm and Home Visits - Office calls - Correspondence - Telephone Calls, etc. |
| GM 2 | Small Groups Contact Methods | <ul style="list-style-type: none"> - Training Courses - Conferences - Workshops - Seminars - On-Farm Adaptive Research - Demonstrations - Group Meetings - Science and Technology Briefings. |
| GM 3 | Mass Contact Methods | <ul style="list-style-type: none"> - Publications - Radio - Television - Newspapers - Mobile Audio-Visual Vans - Field/Achievement Days - Trade Fairs - Agricultural Shows - Exhibitions. |

TABLE 7: Specific Problem Areas for Research

| C O D E | SPECIFIC PROBLEM AREAS |
|---------|---|
| P 1 | Production Aspects |
| P 2 | Protection Aspects |
| P 3 | Economics and Produce Marketing Aspects |
| P 4 | Post-Harvest and Storage Aspects |
| P 5 | Utilization Aspects |

Only a percentage analysis was carried out on the specific data collected to answer question 6 as the nature of the data collected in respect of the question did not permit the use of any other statistical test than the percentage analysis carried out on it.

Personal observations and information obtained through the cross-checking of relevant records as well as discussions with relevant officials/specialists as complimentary data were used to discuss the results of the tests.

Validity:

In order to ensure that relationships determined between the variables examined are as a result of the factors examined and not the result of some extraneous variables, several steps were taken. First, the researcher achieved face validity for the research instrument by presenting a draft of the questionnaire to experts who examined the questionnaire for clarity, comprehensibility and inclusiveness. The amended instrument was then presented to extension specialists to ensure that the contents cover the major determinants of communication linkages, with special reference to research information. The researcher also pre-tested the

instrument on ten researchers and staff of the Teaching and Research Farm at Ogun State University, Ago-Iwoye. This was done for purpose of comparing the responses to detect possible ambiguity, misperception or vagueness in the draft.

Reliability:

The researcher tried to ensure the reliability or consistency of the instrument over time by adopting the test-retest method. The instrument was administered twice at one month interval (in February and March, 1988) on the researchers and staff of the School of Agriculture, Moorplantation, Ibadan. The two sets of responses were compared for convergence and variation. Correlation coefficient of 0.91 provided evidence of reliability.

In addition to the steps adopted to ensure validity and reliability, the raw information was codified by using a blank copy of the questionnaire to record the sum of scores for all the items. The data were then tabulated and subjected to appropriate statistical procedures.

CHAPTER FOUR

DATA ANALYSIS AND DISCUSSION

This chapter deals with analysis and discussion of the data obtained through the use of the instrument described in chapter three. The raw data gathered from the questionnaire are presented in tables (where necessary) along with the summarised data and discussed in relation to the major goals of the study. The implications of the findings are discussed in relation to the research questions to which the data have provided answers.

The data were analysed using the grouping and the statistical methods discussed in the previous chapter.

I. THE RESULTS OF THE DATA ANALYSIS:

The results of the data analysis and answers provided to the research questions are as now presented :

Question One: Is there a significant relationship between choice of target organizations and the type of research institutes in matters pertaining to

- (a) formulation of research problems
- (b) dissemination of research results?

To answer the question, a Chi-square test was applied to the data. (Details of the computations are presented in Appendix II). The result of this test is presented in Tables 8 and 9.

TABLE 8: Relationship Between Target Organizations and Research Institutes in Problems Formulation

| RESEARCH INSTITUTES (GROUPS) | TARGET ORGANIZATIONS CONTACTED (GROUPS) | | | | | | TOTAL |
|------------------------------|---|-----|-----|-----|-----|-----|-------|
| | G01 | G02 | G03 | G04 | G05 | G06 | |
| GR 1 | 944 | 47 | 246 | 49 | 203 | 67 | 1556 |
| GR 2 | 524 | 30 | 167 | 35 | 186 | 43 | 965 |
| GR 3 | 687 | 54 | 353 | 35 | 173 | 88 | 1390 |

df = 10

2

X Value = 76.500

Result = Significant at 0.01 level.

2

The result of the chi-square (χ^2) test presented in table 8 shows a highly significant relationship between target organizations and the type of research institutes in research problems formulation. In other words, the target organizations in research problems formulation depend on the type of research institute. For example, crop based research institutes have different target organizations from those of livestock based research institutes in the process of formulating research problems.

TABLE 9: Relationship Between Target Organizations and Research Institutes in Result Dissemination

| RESEARCH INSTITUTES (GROUPS) | TARGET ORGANIZATIONS CONTACTED (GROUPS) | | | | | | TOTAL |
|------------------------------|---|-----|-----|-----|-----|-----|-------|
| | G01 | G02 | G03 | G04 | G05 | G06 | |
| GR 1 | 998 | 95 | 193 | 54 | 511 | 418 | 2269 |
| GR 2 | 576 | 60 | 147 | 46 | 263 | 279 | 1369 |
| GR 3 | 867 | 72 | 323 | 46 | 637 | 596 | 2541 |

df = 10

2

X Value = 97.506

Result = Significant at 0.01 level

On the question of possible relationship between target organizations and type of research institutes in the dissemination of research results, the X^2 test was also applied to the data. Table 9 above shows the result of the X^2 test to be highly significant. Therefore, the target organizations in the dissemination of research results depend on the type of research institute. Since research institutes have been set up to work on specific agricultural problems, it is quite logical for each of them to have a specific target group or audience. For example, a tree crop research institute is likely to direct its efforts more specifically at tree crop farmers

or related agencies than, say, to arable crop farmers.

Concerning Research Question 1, therefore, it can be said validly that organizations contacted by Nigerian Agricultural Research Institutes, both in problem formulation and in result dissemination, depend on the type of research institute.

Question Two: Is there a significant difference in the frequency of contacts between research institutes and target organizations during problems formulation stage and result dissemination stage?

TABLE 10A: ANOVA Summary for the Frequency of Contacts with Organizations by Research Institutes for Problems Formulation

| Source | df | Sum of Squares (SS) | Mean Square (MS) | F Value | Probability Level | Result |
|---------------------|-----|---------------------|------------------|---------|-------------------|--------|
| Research Institutes | 17 | 14941.407 | 878.906 | 1.40 | 0.1387 | NS |
| Error | 252 | 158735.867 | 629.904 | | | |

TABLE 10B: Mean Frequency of Contacts with Organizations
By Research Institutes for Problems Formulation

| <u>LEVEL</u> | <u>MEAN</u> |
|--------------|-------------|
| IAR | 26.07 |
| IART | 24.60 |
| NCRI | 21.33 |
| NIHORT | 15.73 |
| NRCRI | 21.93 |
| CRIN | 10.60 |
| NIFOR | 25.87 |
| RRIN | 11.27 |
| NAPRI | 21.40 |
| NVRI | 10.47 |
| NITR | 11.27 |
| FRIN | 2.87 |
| LCRI | 9.07 |
| KLRI | 8.33 |
| NIDMR | 5.47 |
| NSPRI | 9.87 |
| LERIN | 8.80 |
| AERLS | 24.13 |

The result of the ANOVA (parametric) test presented in table 10 shows that there is no significant difference in the frequency of contacts with organizations by research institutes in the process of formulating research problems.

Similarly, a possible difference in the frequency of contacts with organizations by individual research institute in the process of disseminating research results was subjected to the ANOVA (parametric) test.

TABLE 11A: ANOVA Summary for the Frequency of Contacts with Organizations by Research Institutes for Results Dissemination

| Source | df | Sum of Squares (SS) | Mean Square (MS) | F Value | Probability Level | Result |
|--------------------|-----|---------------------|------------------|---------|-------------------|--------|
| Research Institute | 17 | 44391.233 | 2611.249 | 2.62 | 0.0006 | S |
| Error | 252 | 250795.733 | 995.221 | | | |

LSD (5% level) = 22.69

TABLE 11B: Mean Frequency of Contacts with Organizations by Research Institutes for Results Dissemination

| LEVEL | MEAN |
|--------|-------|
| IAR | 35.40 |
| IART | 22.60 |
| NCRI | 28.00 |
| NIHORT | 14.40 |
| NRCRI | 33.07 |
| CRIN | 17.53 |
| NIFOR | 39.87 |
| RRIN | 18.93 |
| NAPRI | 22.00 |
| NVRI | 12.20 |
| NITR | 14.80 |
| FRIN | 16.87 |
| LCRI | 20.07 |
| KLRI | 9.40 |
| NIOMR | 16.73 |
| NSPRI | 23.73 |
| LERIN | 10.73 |
| NAERLS | 63.87 |

Table 11 above indicates that the frequency of contacts with organizations for results dissemination varies significantly from one research institute to the other (at less than 1% probability level). This situation is most likely due to the varying level of emphasis placed on the development and functioning of the extension units by National Agricultural Research Institutes in Nigeria. For example, the extension unit of each of the research institutes can only function to the extent to which administrative support (funding, staffing, provision of facilities, and structural organization) is available to it.

Tables 10 and 11 also show that the mean frequencies for results dissemination are relatively higher than those for problems formulation. The implication of these findings is that research institutes generally maintain more communication linkages with organizations for the purpose of disseminating research results than for the formulation of research problems.

The specific data for this question were further subjected to Duncan's Multiple Range ANOVA test to compare each institutes' frequency of contact with target organizations with one another's.

TABLE 12: Result of Duncan's Multiple Range ANOVA for Comparing the Frequencies of Contacts with Organizations by Research Institutes for Result Dissemination

| INSTITUTE | MEAN | GROUPING |
|-----------|-------|----------|
| NAERLS | 63.87 | A |
| NIFOR | 39.87 | B |
| IAR | 35.87 | B |
| NRCRI | 33.07 | B |
| NCRI | 28.00 | B |
| NSPRI | 23.73 | B |
| IART | 22.60 | B |
| NAPRI | 22.00 | B |
| LCRI | 20.07 | B |
| RRIN | 18.93 | B |
| CRIN | 17.53 | B |
| FRIN | 16.87 | B |
| NIDMR | 16.73 | B |
| NITR | 14.80 | B |
| NIHORT | 14.40 | B |
| NVRI | 12.20 | B |
| LERIN | 10.73 | C |
| KLRI | 9.40 | C |

RESULT = MEANS WITH SAME LETTER ARE NOT SIGNIFICANTLY DIFFERENT

The result (presented in Table 12 above) shows that NAERLS is significantly different from other institutes by having an extremely high frequency and that LERIN and KLRI are also significantly different from others by having extremely low frequencies. The remaining research institutes (15 out of the total of eighteen) are not significantly different from each other as shown in the table by their common grouping (B).

It can, therefore, be said that there is significant difference in frequency of contacts with organizations by research institutes for results dissemination.

The various tests applied to the specific data to answer question two thus show that while no significant differences exist in the frequency of contacts with organizations by research institutes for problems formulation, significant differences do exist in their frequency of contacts for results dissemination.

In order to compare the frequencies for problems formulation with those for results dissemination, the data were also subjected to the Duncan's Multiple Range ANOVA test. The result of the test is as shown in Table 13.

TABLE. 13: Ranking of Research Institutes based on Frequencies of Contacts with Organizations for Problems Formulation and Results Dissemination

| RESEARCH INSTITUTES | RANKING FOR PROBLEM FORMULATION | RANKING FOR RESULTS DISSEMINATION |
|---------------------|---------------------------------|-----------------------------------|
| NAERLS | 4 | 1 |
| CRIN | 11 | 11 |
| FRIN | 18 | 12 |
| KLRI | 16 | 18 |
| LCRI | 14 | 9 |
| LEPIN | 15 | 17 |
| IAR | 1 | 3 |
| IART | 3 | 7 |
| NAPRI | 6 | 8 |
| NCRI | 7 | 5 |
| NIHORT | 8 | 15 |

| | | |
|-------|----|----|
| NIFOR | 2 | 2 |
| NIDMR | 17 | 13 |
| NITR | 10 | 14 |
| NRCRI | 5 | 4 |
| NSPRI | 13 | 6 |
| NVRI | 12 | 15 |
| RRIN | 9 | 10 |

²
 $d_i = 254$

r (rank correlation) = 0.738

⁵
 Notes: From the table of Critical Values of the Spearman Rank Correlation Coefficients, the Critical Values of r for $N = 18$ are 0.399 and 0.564 at 5% and 1% levels of significance respectively. This indicates a high agreement in the rankings i.e. frequency of formulation is highly correlated with frequency of dissemination.

The result reveals the difference in the ranking of the research institutes based on frequencies of contacts in problems formulation and results dissemination. For example, IAR is the highest in rank in frequency of contacts for problems formulation while NAERLS is the highest in rank in frequency of contacts for results dissemination. Generally, from the rankings shown in table 13 and the mean frequencies shown in tables 10A, 10B, 11A and 11B, it can be observed that each of the institutes places greater emphasis on communication

linkages for results dissemination than for problems formulation.

It is similarly evident from the table that some research institutes rank higher in communication linkages for problems formulation than for results dissemination. Examples of such institutes include IAR, IAR&T, NAPRI, NIHORT, RRIN, NITR, NVRI and KLRI. The first three of these institutes are supervised by the university system and their inclination, consequently, is bound to be influenced by the extension research orientation of the university extension system.

In the same vein, some institutes rank higher in communication linkages for results dissemination than for problems formulation. Examples of such institutes include NAERLS, NRCRI, NCRI, NSPRI, LCRI, FRIN and NIOMR. This finding shows greater adherence of these research institutes to the extension service orientation peculiar to the ministry extension system. Although there are relative variations in the level of linkages maintained for the different purposes by the two groups, it is, however, noteworthy that each of the institutes maintains communication linkages both for problems formulation and results dissemination.

However, the result of the rank correlation test reveals a high degree of agreement in the rankings for problem formulation and results dissemination. In other words, frequency of contacts for problems formulation is highly correlated with frequency of contacts for results dissemination.

The answer to question two can thus be summarized as follows: that there is no significant difference in the frequencies of contacts with organizations by the various research institutes for problems formulation but that much differences exist for results dissemination. In addition, contacts are more frequent for results dissemination than for problems formulation. It is, however, important to note that frequency of contacts for problems formulation is highly correlated with frequency of contacts for results dissemination.

Question Three(a): Is there a significant relationship between choice of target organizations by the institutes and purpose of communication?

To provide an answer to this question, the chi-square test was applied to the relevant data. (Details of the computations are presented in Appendix III). The specific data and the result of the χ^2 test are as presented in Table 14.

2

TABLE 14: Result of the χ^2 Test for Determining Dependence of Target Organizations on Purpose of Communication

| TARGET ORGANIZATIONS (GROUPS) | PURPOSE OF COMMUNICATION | |
|-------------------------------|--------------------------|-----------------------|
| | PROBLEMS FORMULATION | RESULTS DISSEMINATION |
| G0 1 | 1540 | 2004 |
| G0 2 | 716 | 1206 |
| G0 3 | 647 | 725 |
| G0 4 | 386 | 946 |
| G0 5 | 280 | 509 |
| G0 6 | 362 | 958 |

df = 5
 χ^2 Value = 204.06
 Result = Significant at 0.01 level.

The table shows that there is a highly significant relationship between target organizations and the purpose of communication with the implication that the organizations contacted by research institutes and the frequency of such contacts vary significantly according to the purpose of communication.

Question Three(b): Is there a significant relationship between choice of target organizations and communication methods employed?

In order to find out if there is a significant relationship between communication methods used by research institutes and organizations contacted by them,

both in research problems formulation and research results dissemination, the chi-square test was applied to the data. (Details of the computation are presented in Appendix IV). Tables 15 and 16 present the results of this test.

TABLE 15: Result of the χ^2 Test for Determining Relationship Between Communication Methods and Organizations Contacted in Problems Formulation

| ORGANIZATIONS CONTRACTED (GROUPS) | COMMUNICATION METHODS (GROUPS) | | | |
|--------------------------------------|--------------------------------|------|------|-------|
| | GM 1 | GM 2 | GM 3 | TOTAL |
| G0 1 | 655 | 935 | 486 | 2076 |
| G0 2 | 35 | 26 | 41 | 102 |
| G0 3 | 147 | 391 | 355 | 893 |
| G0 4 | 15 | 73 | 50 | 138 |
| G0 5 | 123 | 255 | 120 | 498 |
| G0 6 | 47 | 61 | 67 | 175 |

df = 10

χ^2

X Value = 163.806

Result = Significant at 0.01 level

The result of the χ^2 test shows that there is a highly significant relationship between communication methods employed by research institutes and target organizations or groups in the process of formulating research problems. In other words, the communication methods used by research institutes to make contacts in the process of formulating

research problems depend significantly on the organizations or groups contacted. The χ^2 test was also applied to the specific data for results dissemination and the result is presented in Table 16.

TABLE 16: Result of the χ^2 Test for Determining Relationship Between Communication Methods And Organizations Contacted for Results Dissemination

| ORGANIZATIONS CONTACTED (GROUPS) | COMMUNICATION METHODS (GROUPS) | | | |
|----------------------------------|--------------------------------|------|------|-------|
| | GM 1 | GM 2 | GM 3 | TOTAL |
| G0 1 | 318 | 961 | 1073 | 2352 |
| G0 2 | 54 | 49 | 155 | 258 |
| G0 3 | 88 | 300 | 333 | 801 |
| G0 4 | 19 | 94 | 42 | 155 |
| G0 5 | 106 | 549 | 763 | 1418 |
| G0 6 | 171 | 433 | 761 | 1365 |

df = 10
 χ^2
 X Value = 183.032

Result = Significant at 0.01 level

Table 16 also shows a highly significant relationship between the communication methods of research institutes and the organizations they contact in the process of dissemination research results. Methods used by research institutes for communicating research results depend on the specific target organizations they have in mind. For example, publications may be most appropriately

used for disseminating findings of a particular research endeavour to policy makers while radio may be the most appropriate channel for disseminating the same findings to farmers.

Question Three(c): Is there a significant relationship between choice of target organizations and research problem areas?

To see whether a significant relationship exists between specific research problem areas and the target organizations contacted by the institutes both for problems formulation and results dissemination, the χ^2 test was applied to the data. (Details of the computations are presented in Appendix V). The results are presented in Tables 17 and 18.

TABLE 17: Result of the χ^2 Test to Determine Relationship Between Specific Areas of Research and Organizations Contacted in Problems Formulation

| ORGANIZATIONS CONTACTED (GROUPS) | SPECIFIC AREAS | | | | | TOTAL |
|----------------------------------|----------------|-----|-----|-----|-----|-------|
| | P 1 | P 2 | P 3 | P 4 | P 5 | |
| G0 1 | 12 | 145 | 4 | 64 | 51 | 276 |
| G0 2 | 3 | 8 | 3 | 13 | 3 | 30 |
| G0 3 | 6 | 71 | 10 | 54 | 41 | 184 |
| G0 4 | 3 | 3 | 6 | 4 | 4 | 20 |
| G0 5 | 12 | 79 | 3 | 25 | 29 | 148 |
| G0 6 | 7 | 16 | 9 | 12 | 4 | 48 |

df = 20
 χ^2 Value = 96.669

Result = Significant at 0.01 level.

Table 17 shows a highly significant relationship between specific research areas and the organization contacted by institutes in the process of formulating their research problems. For example, organizations contacted by a research institute on storage problems are most likely to be different from those the institute will contact on field production problems. The χ^2 test was also applied to the data on results dissemination and the result is as presented in Table 18.

TABLE 18: Result of the χ^2 Test to Determine the Relationship Between Specific Areas of Research and Organizations Contacted for Results Dissemination

| ORGANIZATIONS CONTACTED (GROUPS) | SPECIFIC AREAS | | | | | TOTAL |
|----------------------------------|----------------|-----|-----|-----|-----|-------|
| | P 1 | P 2 | P 3 | P 4 | P 5 | |
| G0 1 | 18 | 180 | 7 | 192 | 52 | 499 |
| G0 2 | 10 | 22 | 4 | 19 | 8 | 63 |
| G0 3 | 17 | 114 | 60 | 20 | 23 | 234 |
| G0 4 | 12 | 25 | 8 | 6 | 4 | 55 |
| G0 5 | 11 | 71 | 3 | 36 | 31 | 152 |
| G0 6 | 24 | 156 | 68 | 28 | 88 | 364 |

df = 20
 χ^2 Value = 316.670

Result = Significant at 0.01 level.

Table 18 also indicates that specific areas for research are significantly related to the organizations contacted in the dissemination of research results. In other words, the organizations contacted by research institutes in the process of disseminating their results depend significantly on the specific areas of research. Thus, in disseminating its research information, an institute will choose a different target for crop protection from one for crop utilization.

Question Four (a): Is there a significant relationship between methods of communication and purpose of communication?

In seeking answer to this question, the chi-square test was applied to the data. (Details are in Appendix VI).

Table 19 presents the result of this test.

TABLE 19: Result of χ^2 Test for Determining Dependence of Communication Methods used by Research Institutes on Purpose of Communication

| COMMUNICATION METHODS (GROUPS) | PURPOSE OF COMMUNICATION | | TOTAL |
|--------------------------------|--------------------------|----------------------|-------|
| | PROBLEM FORMULATION | RESULT DISSEMINATION | |
| GM 1 | 1354 | 839 | 2193 |
| GM 2 | 1685 | 2525 | 4210 |
| GM 3 | 1212 | 3255 | 4467 |

df = 2
2
X Value = 742.281

Result = Significant at 0.01 level.

The table shows a highly significant relationship between communication methods used by research institutes and their communication intention. In other words, the methods employed depend on the purpose of communication. For example, while information may be best obtained through correspondence in the process of research problems formulation, radio broadcast may be the best in disseminating information regarding solutions to the problem (research results) to farmers. This finding supports the existing practice of using methods that are most relevant to particular situations or circumstances in disseminating information relating to them.

Question Four (b): Is there a significant relationship between communication methods and research problem areas?

The chi-square test was applied to the data for the question. (Details of the computations are presented in Appendix VII). The results are presented in Tables 20 and 21.

2

TABLE 20: Result of the χ^2 Test to Determine the Relationship Between Specific Areas of Research and Communication Methods Used in the Process of Formulating Research Problems

| SPECIFIC AREAS | COMMUNICATION METHODS (GROUPS) | | | |
|----------------|--------------------------------|------|------|-------|
| | GM 1 | GM 2 | GM 3 | TOTAL |
| P 1 | 3 | 5 | 8 | 16 |
| P 2 | 83 | 139 | 117 | 339 |
| P 3 | 3 | 4 | 6 | 13 |
| P 4 | 19 | 90 | 104 | 213 |
| P 5 | 50 | 53 | 102 | 205 |

df = 8

χ^2 Value = 38.421

Result = Significant at 0.01 level.

Table 20 shows that there is a highly significant relationship between specific areas of research and the communication methods used by the institutes in the process of formulating research problems. In other words, the communication methods used by these institutes in formulating research problems depend significantly on specific areas of agriculture under investigation.

TABLE 21: Result of the χ^2 Test for Determining Relationship Between Specific Areas of Research and Communication Methods Used by Research Institutes for Result Dissemination

| SPECIFIC AREAS | COMMUNICATION METHODS (GROUPS) | | | TOTAL |
|----------------|--------------------------------|------|------|-------|
| | GM 1 | GM 2 | GM 3 | |
| P 1 | 3 | 9 | 17 | 29 |
| P 2 | 61 | 249 | 274 | 584 |
| P 3 | 10 | 84 | 32 | 126 |
| P 4 | 18 | 121 | 181 | 120 |
| P 5 | 13 | 91 | 91 | 195 |

df = 8

2

χ^2 value = 45.140

Result = Significant at 0.01 level.

From Table 21, there is also evidence of a highly significant relationship between specific problem areas and the communication methods adopted by institutes in disseminating agricultural information. The inference is thus that some methods are more suitable in disseminating information on certain problem areas than on others. For example, while demonstration methods may be most appropriate for disseminating information on citrus budding (production aspect), they may not be the most appropriate

for disseminating information on the economics of citrus production.

Question Four (c): Is there any significant relationship between methods of communication and type of research institutes?

The chi-square test was also applied to the data to find answer to this question. (Details are presented in Appendix VIII). Results of this test are presented in tables 22 and 23.

TABLE 22: Result of the Chi-Square Test for Determining Relationship Between Type of Research Institutes and Communication Methods used by them in Problem Formulation

| RESEARCH INSTITUTES (GROUPS) | COMMUNICATION METHODS (GROUPS) | | | |
|------------------------------|--------------------------------|------|------|-------|
| | GM 1 | GM 2 | GM 3 | TOTAL |
| GR 1 | 814 | 573 | 507 | 1894 |
| GR 2 | 255 | 474 | 291 | 1020 |
| GR 3 | 325 | 645 | 415 | 1385 |

$$df = 4$$

$$X^2 \text{ Value} = 190.920$$

$$\text{Result} = \text{Significant at } 0.01 \text{ level.}$$

The result of X^2 test presented above shows that there is a highly significant relationship between type of

research institute and the communication methods used by them for making contacts in the process of formulating research problems. The test was also applied to determine the relationship in the dissemination of research results. Table 23 provides the results.

TABLE 23: ² Result of the χ^2 Test for Determining Relationship Between Type of Research Institutes and Communication Methods Used by them for Results Dissemination

| RESEARCH INSTITUTES (GROUPS) | COMMUNICATION METHODS (GROUPS) | | | TOTAL |
|------------------------------|--------------------------------|------|------|-------|
| | GM 1 | GM 2 | GM 3 | |
| GR 1 | 298 | 877 | 1186 | 2396 |
| GR 2 | 194 | 525 | 759 | 1478 |
| GR 3 | 345 | 1026 | 1286 | 2657 |

df = 4
 χ^2
 χ Value = 4.547

Result = Not significant (P = 0.337).

Table 23 above indicates no significant relationship between the type of research institutes and the communication methods used by them in the process of disseminating research results. In other words, the methods employed by institutes to communicate research results to the relevant target groups do not depend on the

type of institute. The implication of these findings is that while research institutes differ, to a great extent, on the communication methods they adopt in the formulation of their research problems, the situation is not the same for results dissemination.

Question Five : Is there a significant difference between the ranking of communication methods used by research institutes?

In order to investigate a possible difference in the ranking of communication methods used by research institutes, a Kruskal-Wallis (one-way non-parametric ANOVA) test was applied to the data. (Details are presented in Appendix IX). The result of the test is presented in Table 24.

TABLE 24: Result of Kruskal-Wallis Test to Determine Possible Difference in the Ranking of Communication Methods Used by Research Institutes

| LEVEL | SUM OF RANKS | MEAN SCORE |
|--------|--------------|------------|
| IAR | 3510.50 | 195.03 |
| IART | 3407.50 | 189.31 |
| NCRI | 3513.00 | 195.17 |
| NIHORT | 2793.00 | 155.17 |
| NRCRI | 3589.50 | 199.42 |
| CRIN | 2905.50 | 161.42 |
| NIFOR | 3185.50 | 176.97 |
| RRIN | 2625.00 | 156.94 |
| NAPRI | 3389.00 | 188.28 |
| NVRI | 2427.50 | 134.86 |
| NITR | 2521.50 | 140.08 |

| | | |
|-------|---------|--------|
| FRIN | 2084.50 | 115.81 |
| LCRI | 2905.00 | 161.39 |
| KLRI | 2146.50 | 119.25 |
| NIOMR | 2451.00 | 136.17 |
| NSPRI | 3007.00 | 167.06 |
| LERIN | 2163.00 | 120.17 |
| AERLS | 3825.50 | 212.53 |

df = 17

χ^2
 χ^2 value = 31.86

Probability level = 0.0157

Result = significant at 0.05 level

The result of the test shows a significant difference (at 5% probability level) in the ranking of communication methods used in making contact by Agricultural Research Institutes. In other words, the frequency of use of the various communication methods varies significantly from one institute to the other.

Question Six: Do the research institutes see any need to maintain communication linkages with other organizations in addition to the extension services?

All eighteen (18) National Agricultural Research Institutes involved in this investigation answered the above question in the affirmative. They see a need. This answer led to a further analysis to identify the reasons that research institutes no longer rely solely on the extension service for effective linkages in the

development and dissemination of agricultural information.

TABLE 25: Result of the Percentage Analysis (%) for Determining Major Reasons why Research Institutes Contact other Organizations In Addition to the Extension Service.

| S/N | POSSIBLE REASONS | NO | % | RESULT |
|-----|--|----|------|--------|
| 1. | Poor extension staff-farmers ratio... | 18 | 100 | VI |
| 2. | Poor funding of extension activities... | 7 | 38.9 | FI |
| 3. | Lack of proper organisation of the extension system..... | 11 | 61.1 | I |
| 4. | Over concentration on administrative and inputs distribution to the neglect of the educational responsibilities of the extension system..... | 15 | 83.3 | VI |
| 5. | Poor staff motivation..... | 5 | 27.8 | FI |
| 6. | Inadequacy of essential support services..... | 17 | 94.4 | VI |
| 7. | Inadequate technical knowledge in agriculture by the extension agents.... | 6 | 33.3 | FI |
| 8. | Inadequate flow of information within extension organizations..... | 17 | 94.4 | VI |
| 9. | Lack of management training and experience by the extension officers... | 3 | 16.7 | NI |
| 10. | Political interference..... | 3 | 16.7 | NI |
| 11. | Insufficient authority for field extension staff..... | 9 | 50.0 | I |
| 12. | Lack of facilities for processing and disseminating information quickly..... | 17 | 94.4 | VI |

| | | | |
|---|----|------|----|
| 13. The inefficiency of the extension system..... | 4 | 22.2 | NI |
| 14. Available innovations at the research institutes not effectively disseminated for use especially at farmers' level... | 15 | 83.3 | VI |
| 15. The encouraging results achieved through linkage with other organisations and groups of people as a way to complement the efforts or the extension service..... | 18 | 100 | VI |

<25 = Not Important (NI): 25 - <50 = Fairly Important (FI)
 50 - <75 = Important (I): 75 - 100 = Very Important (VI).

According to Table 25, the most important problems of the extension system as identified by the research institutes include: poor extension staff-farmers ratio (100%); encouraging results achieved as a result of direct linkage with other organisations or groups of people by research institutes (100%); inadequacy of essential support services (94.4%), inadequate flow of information within extension organisations (94.4%); lack of facilities for processing and disseminating information quickly (94.4%); over concentration of efforts and resources on administrative and inputs distribution (83.3%); ineffective dissemination of available innovations at the institutes for use especially at the farmers' and

industrialists' levels (83.3%). Other important problems include: lack of proper organisation of the extension system (61.1%) and insufficient authority for field extension staff (50.0%). Other reasons or problems shown to have attracted less than 50% score in Table 25 are deemed to be of little or no importance because their scores are low.

From the findings, it is to be inferred that the decision by research institutes to contact other target organisations in addition to the extension service is a way to ensure adequate generation and dissemination of agricultural information, a practice which has probably come to stay. This practice will both complement the efforts of the extension services and, at the same time, make the impact of the institutes more felt by the people. It thus deserves close study, the results of which should be used to enhance its usefulness and effectiveness.

Research institutes were also requested to indicate how adequately they think the states' extension services have been performing their educational functions within the local government areas in which the institutes are located. Table 26 presents the data and the result.

TABLE 26: Result of the Research Institutes Scoring of the Performance of Educational Tasks by States Extension Services in their various Local Government Areas.

| S/N | FUNCTIONS | INADEQUATE | | ADEQUATE | |
|-----|--|------------|------|----------|------|
| | | NO | % | NO | % |
| 1. | Dissemination of information to farmers and other users.... | 13 | 72.2 | 5 | 27.8 |
| 2. | Transmission of farmers and other users problems to research..... | 15 | 83.3 | 3 | 16.7 |
| 3. | Liaison with relevant organisations, groups of people and local leaders..... | 11 | 61.1 | 7 | 38.9 |

Table 26 shows that the research institutes believe strongly that the states extension services are not adequately performing their educational functions especially at the local level. In other words, the institutes are dissatisfied with the performance of the states' extension services with regard to information dissemination to farmers and other users, feedback to research from farmers and other users, and effective linkage with relevant organizations and groups of people. This probably accounts for the reason, among others, that the Research Institutes no longer rely solely on the

extension system for effective linkage with farmers and other beneficiaries of research results. The result is that every research institute now maintains a network of communication linkages for purpose of ensuring effective development and delivery of agricultural information.

II. DISCUSSION OF THE RESULTS:

The answers provided to the research questions which emanated from the results of data analysis are further discussed below. This is intended to offer additional explanations on the findings of this research and their implications as well as to provide support from scholarly works in relevant fields. It is also hoped that the discussion will enable the drawing of sound conclusions for the study.

Question 1 sought to determine whether target organizations contacted by National Agricultural Research Institutes in problems formulation and results dissemination depend on the type of research institute. Our data suggest a clear relationship between target organizations, both in problems formulation and result dissemination, and the type of research institute. The implication of this is that, since research institutes

were set up either for specific crops, livestock or agricultural activities, it is expected of them to have target organizations or groups of people.

Supporting the finding is Okereke's (1978:100) observation that a communication method must not only be effective but must also be appropriate to the intended audience. Thus it behoves research institutes to establish effective link with the specific organizations they were established to serve, each institute catering to its specific target audience. For example, the target audience of a Tree Crops Research Institute is most likely to be different from that of a Livestock or Veterinary Research Institute.

Question 2 sought to find out if there is any significant difference between the frequency of contacts for problems formulation and for results dissemination by different research institutes. The result of the relevant data indicates that while no significant difference exists among research institutes in this respect for problem formulation, significant variation exist among them for results dissemination.

The implication is that research institutes act in a similar manner with regards to communication linkages for

problem formulation. One can infer from this that very low emphasis is placed by research institutes on communication linkages for problem formulation. On the other hand, research institutes vary significantly from one to another in the level of emphasis they place on communication linkages for result dissemination. The variation in this respect is most likely due to the differences in the level of development and the orientation of the extension service units of the various research institutes. In general, the extension service units of most research institutes have been oriented to place greater emphasis on communication linkages for results dissemination than for problems formulation.

This is probably responsible for Eleje's (1981:150) criticism on the extension service units of research institutes to the effect that: "current problems on the farm are not adequately transmitted to researchers in most cases". This operational attitude, we have found in the investigation is common to all the eighteen research institutes in Nigeria. However, while it can be rightly said that research institutes emphasize communication linkages for results dissemination more than for problems formulation, it is still pertinent to note that the level

of emphasis for results dissemination varies from institute to institutes.

Question 3(a) sought to know whether the purpose of communication determines the organizations contacted by research institutes. The data (see table 14 above) clearly indicate a highly significant relationship between the two factors, implying consequently, that organizations contacted by these institutes and the frequency of such contacts vary according to the communication purpose. More specifically, the National Agricultural Research Institutes maintain more communication linkages with organizations and groups of people for results dissemination than for problem formulation.

Question 3(b) was designed to find out whether the communication methods used by research institutes depend on organizations contacted by them. Tables 15 and 16 show that there is a highly significant relationship between the communication methods used by the institutes and the organizations contacted by them, both for problems formulation and results dissemination. In other words organizations contacted determine the communication methods employed in making the contacts. This is because one method of communication may not be equally effective

for contacting two different organizations or groups of people.

Question 3(c) sought to determine whether the specific problem areas for research determine the organizations contacted by research institutes. Results of the analysis, as presented in Tables 17 and 18, show a highly significant relationship between the two factors, both for problems formulation and results dissemination. The result of an experiment on "Criteria for selection of extension methods" by Williams et al (1984:65) suggested that the nature of the subject matter and its complexity determine both the organizations to be contacted and the communication methods to use in making the contacts. This is in line with our own finding with respect to question 3(c).

Question 4(a) is "Did the communication methods used by research institutes depend on purpose of communication?" The result, as presented in Table 19, shows a highly significant relationship between communication methods used by research institutes and purpose of communication. In other words, the communication methods most appropriate in contacting organizations or people in formulating research problems differ significantly from those that are

considered so in the process of disseminating research results. According to Williams et al (1984:64), one of the fundamental challenges to the extension communicator is the choice of communication methods to suit particular situations. Hence, different communication methods have different purposes, situations or circumstances for which they are most suitable.

Question 4(b) is "Do the specific problem areas determine the communication methods used by research institutes"? Tables 20 and 21 show this to be the case to a significant degree. The finding of Williams et al (1984:65) cited earlier is again relevant here, namely that the nature of the subject matter and its complexity determines both the organizations to be contacted and the communication methods employed in making the contact. The implication is that some communication methods are more suitable for making contacts on one specific problem area than the other.

Question 4(c) is "Did the type of agricultural Research Institute determine communication methods used by them"? The results, as presented in Tables 22 and 23, indicate a highly significant relationship. Thus, different types of research institutes may use different communication

methods to accomplish their goals. For example, Food Crop Research Institutes may not find the communication methods used by Water Resources Research Institutes to be the most effective or appropriate for achieving their own goal.

Question 5 is "Is there any difference between the ranking of communication methods used by research institutes"? The result of the investigation, as presented in Table 24, reveals such a significant difference. The inference to be drawn is that the institutes vary significantly from one another in their weighting and use of communication methods, confirming our earlier finding in this study that the type of research institute, to a great extent, dictates the choice of communication methods.

Question 6 sought to determine whether there is need for agricultural research institutes to maintain communication linkages with other organizations in addition to the extension services. All the National Agricultural Research Institutes confirmed the need. This finding was supported by Watts (1984) who, from the evidence of his research, emphasized the need for the organization of an effective linkage between research institutes and other relevant organizations or groups of

people that could be involved in the processes of developing and delivering new technology. Singh (1985) also support the finding by concluding from his study on "Narrowing the Extension Gap" that:

agricultural research could only yield relevant or appropriate technology if information flow or dialogue between the researchers and the intended beneficiaries, policy and administrative support units, extension services, influence groups, the media and other researchers precedes the formulation of the research problem.

Ononiwu (1985:3) also noted that "agricultural research has failed to make desired impact due to lack of communication interaction with many other agencies that could be involved in information dissemination".

The implication of all this is that there are many other agencies and groups of people, apart from the extension services, that could be helpful to research institutes in the development and delivery of agricultural information. Communication linkages should, therefore, be established with such relevant agencies or groups of people. This approach will most likely enhance the impact of the research institutes especially on primary beneficiaries.

The research institutes gave reasons for their decisions to complement the efforts of the extension

services in establishing direct linkages with other agencies or groups. Their reasons, as presented earlier, have adequate support in the literature. For example, the issue of poor extension staff-farmer ratio is supported by Eleje's (1981:156) study on "Extension and its Manpower Requirements in Nigerian Agriculture" which revealed that:

the Philippines has a ratio of 1:100 or 150, the U.K has 1:312, the Netherlands 1:191, Norway 1:286, Kenya 1:200, India 1:250 and Nigeria has a ratio of 1:2000 overall but much lower in some parts of the country.

His study also revealed that there are some local government areas in Nigeria with populations of more than one million but only three agricultural extension staff.

Williams (1978:82) also confirms the inadequacy of essential support services, and regards overconcentration of efforts and resources on administrative and inputs distribution to the neglect of the educational roles of the extension system as some of the problems facing extension services in Nigeria. Further confirmation of the reasons advanced by the research institutes is found in Okereke's (1978:176) conclusion from his study on States Extension Services that:

The State Extension Service as they now operate have a number of serious structural and operational weaknesses:

- a) their programmes are too general, diffused, lack impact, difficult to evaluate and generally ineffective;
- b) they are too input-supply oriented;
- c) they have little educational values resulting in lack of self-sustaining improvements in farming; and
- d) inadequate staffing resulting in very low extension staff-farmer ratio.

The above evidence in support of our findings thus clearly indicates that the actions of the research institutes have been based on their determination to overcome the serious limitations imposed on them by the identified problems. The result of the investigation on how adequately the extension service has been performing its educational functions at the local government level (Table 26) further underlines the need to complement the efforts of the extension services by establishing linkages with relevant agencies or groups of people. As far as the research institutes were concerned and contrary to public expectation, the states extension services were not adequately performing their educational functions of:

- i) disseminating information to farmers,
- ii) transmitting farmers' problems to research, and
- iii) liaising with other relevant agencies (e.g. media houses, industries, policy makers, educational institutions, professional associations or

groups, etc.), farmers groups and local leaders.

According to Eleje (1981:150):

the role of extension must be seen as a communication process in which the extension worker continuously interacts with the researcher, the farmer and other relevant agencies to ensure modernised agricultural production.

In support of the findings of this study concerning the same matter, Williams (1980:26) confirmed that extension has not made appreciable impact in farming in Nigeria because it lacks the essential infrastructural facilities to enable it to perform effectively. And for as long as this situation persists, the ineffectiveness of the states' extension system is likely to continue. Therefore, the research institutes' decision to contact other relevant agencies or groups, even if it is only to supplement the efforts of the extension system, is in the best interest of the country.

The findings thus confirm the establishment of communication linkages by National Agricultural Research Institutes for the development and delivery of agricultural information.

Responses from the interviews conducted in this investigation have revealed that National Agricultural Research Institutes in Nigeria contact several

organizations and people including the extension services in their efforts to ensure that their impact is positively felt in the country. The interviews also indicate that the research clientele system comprises a wide range of organizations and people such as extension services, farmers, agro-industrialists, professional associations, media agencies, etc. Primarily, research institutes are expected to forge links with the extension services for problems formulation and/or results dissemination but they have lost confidence in the capability of the extension services alone to cope with these arduous tasks. Evidences from other scholarly works and this study have shown that the extension services, both at present and, even, in the foreseeable future, cannot provide adequate linkage with farmers who constitute the primary target audience of the extension system. Research institutes, therefore, feel that if the extension system is thus remiss in this regard, it is not likely to be able to cope with the extra responsibility of linking research with the other clienteles.

Research institutes, according to the results of this study, have thus committed themselves to maintaining direct communication linkages with various other relevant

organizations and people, including, of course, the extension services. Furthermore, this study has thrown up several other pieces of vital information that could be effectively used in the planning and implementation of an efficient multi-directional communication linkage system for the development and delivery of agricultural information by Research Institutes in Nigeria.

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CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

SUMMARY

The problem that is to be urgently addressed is why, after almost one century of Government support for agricultural research and extension, Nigerian agriculture still remains traditional, having failed to manifest any significant scientific transformation. This is in spite of the fact, according to Idachaba (1988:44), that the number of public institutions servicing agricultural research and extension in Nigeria is more than adequate. The reason for this seems to be the one identified by Cernea et al (1984:3) namely, the weak linkages between research and extension on the one hand and, on the other, the absence of linkages between research and other relevant organizations and people, both in the public and private sectors. This problem has been exacerbated, in the opinion of Williams (1988), by two things: lack of institutional consolidation, and improper administrative location of responsible agencies.

In a report on research management in Nigeria, the Federal Ministry of Science and Technology (1982:76) identified the main reason for the weak and/or nonexistent

linkages as "lack of or insufficient consultation or communication between research institutes and the various organizations and groups". This is in spite of the fact that a special system exists, in each of the 18 National Agricultural Research Institutes, which is responsible for linking the institute and its researchers with the various public and private sector organizations/groups including the states' extension services and farmers. The special system is the Agricultural Extension and Research Liaison Services (AERLS) unit.

This study, therefore, attempted to critically analyse the communication linkages in the development and delivery of agricultural information in Nigerian Research Institutes. The study was carried out through the use of the questionnaire-interview technique.

A questionnaire formed the major data gathering instrument. Six research questions were examined, to investigate a possible relationship between certain variables relevant to the investigation. The statistical tests applied to the data from the entire 18 National Agricultural Research Institutes in Nigeria are the Chi-square (χ^2), the one way Analysis of Variance (ANOVA), the Duncan's Multiple Range ANOVA and the Kruskal-Wallis

tests. Question 6 could not be subjected to any of these statistical tests because of the nature of the data but descriptive statistics such as frequency and percentages were used for all the variables in that question.

The results of our investigation indicate clearly that the country's Agricultural Research Institutes maintain a certain level of functional communication links with several public and private sector organizations and groups in the development and delivery of agricultural information. Such organizations and people are grouped as extension organizations; research and educational institutions; industrial, finance and commercial organizations; policy making agencies or groups; farmers and cooperative associations; media organizations, and other possible linker groups.

Our analysis of the specific data on each of the research questions has revealed the following:

1. Communication linkages with any of the target organizations by research institutes is associated with the type of institute. For an example, the target organizations frequently contacted by the Cocoa Research Institute of Nigeria, for problems formulation and results dissemination will most likely be different

from those frequently contacted by National Veterinary Research Institute.

2. The frequency of research institutes' communication linkages with the various target organizations is lower for problem formulation and relatively higher, although varying significantly, for results dissemination. We may, therefore, infer that the institutes place greater emphasis on communication linkages for results dissemination than for problems formulation. That the level of emphasis on communication linkages for results dissemination varies significantly from one institute to other is, in our view, a reflection of the differences in the level of development of the Agricultural Extension and Research Liaison Services (AERLS) units of the institutes.

3. The purpose of communication is related to the target organizations contacted by research institutes. There is in other words, an association between target organizations contacted and purpose of communication. The study suggests that the organizations contacted by research institutes in the process of formulating research problems are often different from those contacted in the dissemination of research results.

4. Communication methods used by research institutes depend, to a great extent, on target organizations. The study suggests that research institutes tend to use different communication methods, in most of the cases, to contact different organizations or groups. For example, while a seminar may serve as an effective method of disseminating results of a particular research endeavour to members of the academic community, demonstration may be the most appropriate method for disseminating the same results to members of a farmers' cooperative society.

5. There is a significant relationship between specific problem areas and target organizations for problems formulation and results dissemination. This implies that research institutes tend to contact different organizations for different problems. This is probably based on the relevance of each organization to the problem on hand. For example, organizations contacted by research institutes on economics of production may be different from those contacted on product utilization.

6. Communication methods used by research institutes are influenced by the purpose of communication. This

indicates that the communication methods adopted by a research institute is also influenced by the purpose of communication.

7. Communication methods used by research institutes are also influenced by the specific problem areas. This situation is true for both problem formulation and results dissemination. This finding suggests that some methods are more suitable for making contacts in respect of certain problem areas than for others. Research institutes, therefore, tend to be guided by this assumption.

8. Type of research institute influences communication methods used in contacting target organizations, especially for problems formulation. This suggests that different types of research institute tend to use different communication methods or use the same methods but to varying degrees.

9. There is difference in the ranking of communication methods used by agricultural institutes in contacting the various target organizations. This result suggests that the relative importance and frequency of use of the various communication methods vary significantly from one institute to the other.

10. All the research institutes affirmed the need for them to maintain communication linkages with other relevant organizations or groups in addition to the extension services. They support the continued and continuing linkages with the organizations and groups. This is because the research institutes no longer feel able to rely solely on the States' extension services for linkage with farmers and other relevant public and private sector agencies. Our findings indicate a clear feeling among the institutes that these extension services are ill-equipped to adequately disseminate results of their researches to farmers as well as transmit farmers' problems to them. This inadequacy, in the eyes of the institutes, is a result of the following factors: poor extension staff-farmer ratio; inadequate essential support services; and equally important, the encouraging results obtained through contacts with other relevant organizations and groups in addition to the extension services. Other inauspicious factors include: the inadequate flow of information within extension organizations, lack of facilities for timely processing and disseminating of relevant information; overconcentration of efforts and

resources on administrative duties and input distribution; failure of the extension services to disseminate available innovations at the research institutes; lack of proper organizational system for extension services; and, finally, insufficient authority for field extension staff.

CONCLUSION

From the findings of this study, one can draw several conclusions. According to the findings, effective communication linkages between the various relevant organization or groups and the research institutes is related to several variables among which are: type of research institute, purpose of communication, frequency of contacts, communication methods, specific problem areas, choice of organizations for contact and the perceived need for linkages.

Communication linkages, it has been revealed, are needed to ensure a functional relationship between research institutes and the various relevant organizations or groups. For effectiveness, such communication linkages have to be adequately planned and equally emphasized for both problems formulation and results dissemination. This

study, therefore, has unveiled the fact that research institutes no longer depend on the states' extension service as the only system that could efficiently and successfully link research institutes with their primary and secondary beneficiaries.

It is also clear from the evidence of this study that research institutes have to strengthen their Agricultural Extension and Research Liaison Services (AERLS) units to enable them to cope with the tasks of maintaining direct linkages with several other public and private sector organizations in addition to the extension system. In realisation of the fact that government may not be in a position, now or in the foreseeable future, to be able to employ the adequate number of extension workers required for direct personal contact with farmers, greater prominence will continue to be accorded the use of mass communication methods and direct contacts with several other user/linker organizations or groups. The on-going rapid provision of infrastructures in the Nigerian Rural Sector will also facilitate this development.

It is anticipated that the proper coordination of the Research-Extension-Farmers linkage may, on the long run, become feasible when the Universities of Agriculture are

fully operational. But even then, the research institutes and the Universities of Agriculture will continue to be faced with the reality of having to maintain direct communication linkages with other relevant organizations or groups for more effective generation, dissemination and utilization of appropriate agricultural information until the problems incapacitating the extension system are totally solved.

RECOMMENDATIONS

After a thorough consideration of the findings of this study taken in conjunction with the field observations and the numerous interviews held with the Directors and the other personnel of the various research institutes, one feels the need to put forward some recommendation which, if implemented, should in our view, lead to much needed improvement in certain areas.

The importance of communication to the agricultural research process as a whole is quite evident in this study. Communication linkages, as has earlier been observed, are indispensable for the development and delivery of agricultural information in research institutes. There is, therefore, the need to provide effective operational guidelines for such linkages in

these institutes. This will not only encourage research institutes to generate and disseminate appropriate technologies, but will also encourage effectiveness of the disseminating (including the extension services) and user agencies as well as promote the application of research findings by farmers, agro-industrial entrepreneurs and others.

It is, therefore, necessary for research institutes to build effective linkage systems into their operations and in the execution of their programmes. This is to enable them to overcome the linkage problems already created by the defective administrative location of research institutes under a separate ministry from the extension system.

To bring about effective and meaningful communication linkages in the development and delivery of agricultural information in Nigerian Research Institutes, the following specific operational and logistic recommendations are put forward:

1. The Federal Ministry of Science and Technology should direct all its research institutes to place equal emphasis on the development of their extension (AERLS) and research arms. The institutes should be

assisted with adequate resources to employ extension specialists and procure essential materials for establishing or maintaining effective linkage systems. The Directors of the institutes should also be regularly exposed through seminars and training programmes to principles and practices of extension communication.

2. Research institutes should organize their AERLS units in such a way as will enable them to place equal emphasis on communication linkages for both research problems formulation and results dissemination. Communication linkages with all relevant agencies, groups and individuals will provide the information required for the generation of appropriate, relevant and acceptable innovations. This will even make the dissemination and utilization of the innovations a relatively easy task to accomplish. It is important that such communication linkages would have involved the various categories of the intended end users of the research results in the problem formulation process. This is to make the resultant innovations easily acceptable to them. On the other hand, communication linkages in the delivery

process will encourage faster and wider dissemination of the results to intended beneficiaries.

3. AERLS units of research institutes should maintain effective communication linkages with several organizations, groups and individuals. The Research Institutes have hitherto relied solely on the extension system for linkage with the intended beneficiaries of research results. The outcome has been less than encouraging. It is, therefore, important for the institutes to maintain communication linkages with the following, among others: policy makers; media and other linker systems; research, education and training institutions; industrial, finance and commercial organizations, in addition, of course, to the extension system. In other words, existing and potential linkages should be developed for greater achievements. The agencies to link with may be either linker or user organizations or both. Whichever is the case an effective linkage with each of them will surely facilitate the ultimate application of findings to farming and agro-industrial production processes.

4. Since the type of research institute, in most of the cases, determines the organizations contacted by them, it is important for each institute to take its target audience into consideration in deciding which organizations and/or groups of people to contact. For example, it may not be useful or rewarding for National Horticultural Research Institute to arbitrarily choose to link with the same set of organizations or people as the National Veterinary Research Institute.

5. In deciding on which target organizations to contact, research institutes should take into consideration the purpose of communication. This is in light of the fact that some organizations may be excellent in the problem formulation process but may not be too useful in the process of disseminating agricultural information.

6. The choice of relevant communication methods should always be guided by the knowledge of organizations to be contacted. In most cases, different organizations have specific communication methods that can be most effectively used to contact them.

7. Research institutes should always choose to contact organizations that are relevant to their specific problems. This will go a long way in ensuring correct, appropriate and timely dissemination of information. For example, it may be better to contact the Nigerian Agricultural and Cooperative Bank (NACB) on matters relating to agricultural financing than the Broadcasting Corporation of Oyo State (BCOS).

8. The purpose of communication should also be an important determinant of the communication methods to use. Research institutes will surely find certain methods of communication to be more suitable for making contacts in the problems formulation process than in the results dissemination process.

9. It is important for research institutes to always choose communication methods they consider to be most appropriate for the specific problems on their hands. This is because some communication methods are obviously more suitable for maintaining linkages on some specific problems either in problems formulation or results dissemination.

10. The type of research institute should be an important indicator of communication methods that can

be most effectively used in contacting relevant target organizations, groups and people, especially for problem formulation. For example, it may not be appropriate for the Nigerian Stored Products Research Institute to use the same communication methods as the National Animal Production Research Institute at all times. This is because of the difference in the subject matters they are expected to cover which may, in turn, require the use of different communication methods for effective linkage with relevant organizations.

11. Choice of communication methods should always be based on the following factors: relevance to the specific problems on hand, organizations to contact, purpose of communication and type of research institute. It is therefore, important that each institute should be encouraged to have access to as wide a variety of communication methods as possible for its use. The use of more than one communication method is apt to achieve better results than concentrating on just a single communication strategy.

12. The AERLS units of research institutes should be fully developed into media resources and communication

centres.

13. There is the need for further research in the area of 'Coordinating the various Research-Extension-Farmer linkages in Nigeria'.

Finally, it is evident that agricultural research has come of age in Nigeria. As expected in a country with 18 Agricultural Research Institutes located in different places, it is natural to expect that information that can be used to transform Nigerian agriculture must abound in these institutes. However, the inability of the extension system alone to provide adequate linkage between research and farmers, agro-based industrial entrepreneurs, etc., must be recognised as a serious shortcoming which must be redressed. With the on-going development of existing and potential linkages by the various Research Institutes, the much desired communication linkages for effective development and delivery of agricultural information may be in place in the country sooner than we dare to hope today.

Agricultural Communication Linkage Model

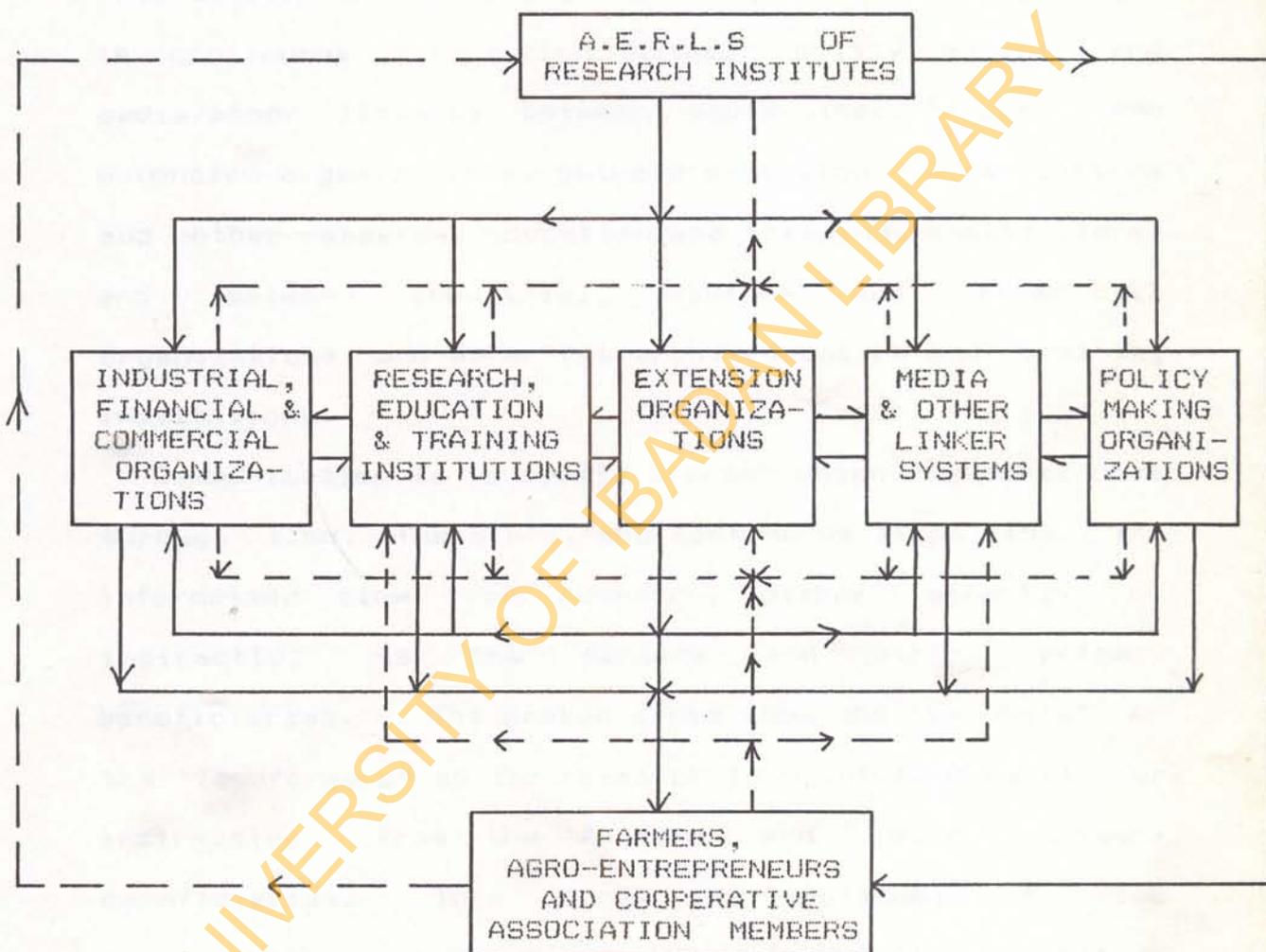
A review of existing communication models in agricultural development and transfer is presented in Chapter 2. Most of the models were shown to have been

designed to strengthen the existing Research - Extension linkage while totally ignoring the potential linkages between research and other relevant organizations, groups and people. Following the outcome of this study, the importance of developing the existing and potential linkages for effective generation and dissemination of agricultural information in research institutes becomes obvious.

The communication linkage model shown in Figure XI below can be used to aid the understanding and guide the operation of communication linkages in the development and delivery of agricultural information in Nigerian Agricultural Research Institutes.

As the Figure shows, the model links the AERLS of research institutes directly with extension organizations; other research, education and training institutions; media and other linker systems; industrial, financial and commercial organizations; policy-making organizations; and farmers/cooperative associations either in the information development or delivery processes. The extension organizations can still perform their traditional role of linking research with farmers and others under this arrangement. Media and other linker systems; industrial,

FIGURE XI: Communication Linkage Model for the Development and Delivery of Agricultural Information in Nigeria



financial and commercial organizations; policy makers; and other research, education and training institutions can also link with farmers. There is also a continuous interaction among the organizations. For example, there is continuous interaction between policy makers and media/other linkers; between media/other linkers and extension organizations; between extension organizations and other research, education and training institutions; and between industrial, finance and commercial organizations and other research, education and training institutions.

Communication is a cyclic process which is continuous through time. Therefore, the continuous lines show the information flow from research, either directly or indirectly, to the farmers and other primary beneficiaries. The broken lines show the "feedback" or the "feedforward" to the research institutes, directly or indirectly, from the farmers and other primary beneficiaries. This model is applicable to the communication linkages for problems formulation as well as for results dissemination in the nation's Agricultural Research Institutes.

BIBLIOGRAPHY

BOOKS

- Aboyade, B. O. The Provision of Information for Rural Development Ibadan. Fountain Publications, 1987 pp 16; 46 - 48.
- Ajakaiye, M. B. The Role of Banks in Financing Private Sector Investments in Agriculture. In: The Private Sector and Nigerian Agricultural Development. Eds: Osuntogun, A and Ugorji, R. U. Ilorin ARMTI, 1984 pp 231 - 242.
- Anunsionwu, E.C. The Nigerian Agricultural Sector and the Framework for Effective Private Sector Participation. In: The Private Sector and Nigerian Agricultural Development. Eds: Osuntogun, A and Ugorji, R. U. Ilorin, ARMTI. 1984 pp. 202 - 208.
- Aradeon, D and Aradeon, S. D. The Communication Factor in Research on Human Settlement and Environment. In: Environmental Awareness for Media Practitioners: A Nigerian Workshop. Eds: E. Nwuneli and A. Opubor. Seagull Books Limited. 1983 pp. 72 - 83.
- Cernea, M. M; Coulter, J. K & Russell, J. F. Research - Extension - Farmer: A Two-way Continuum for Agricultural Development. Washington D.C., U.S.A. The World Bank. 1984 p.3.
- Havelock, R. B. Planning for Innovation Through Dissemination and Utilization of Knowledge. U.S.A. Michigan, Ann Arbor. The University of Michigan. Centre for Research on Utilization of Scientific Knowledge (CRUSK). 1979 pp (11-15).

- Igben, M. S. The Role of the Private Sector in Nigerian Agricultural Development: An Overview. In: The Private Sector and Nigerian Agricultural Development. Eds. Osuntogun, A and Ugorji, R. U. Ilorin, ARMTI. 1984 pp. 11 - 22.
- Ijere, M. D. The Role of Co-operatives in Agricultural Technology Transfer. In: The Private Sector and Nigerian Agricultural Development. Eds: Osuntogun, A and Ugorji, R. U. Ilorin, ARMTI. 1984 pp. 169 - 183.
- Inayatullah. Quoted by Hamdan Bin Adean, et al. The Nature of Development. Introduction to Development Communication. Honolulu, East-West Communication Institute, 1980. p.8.
- Kerlinger, F. Foundations of Behavioural Research. New York: Holt, Rinehart and Winston, 1964.
- Lionberger, H. F and Gwin, P. H. Development and Delivery of Science-Based Information: The New Way. In: Communication Strategies: A Guide for Agricultural Change Agents. U.S.A. Interstate Printers and Publishers, Inc. 1982 pp. 27 - 56.
- Lionberge, H. F and Gwin, P. H. Application from Diffusion Research. In: Communication Strategies: A Guide for Agricultural Change Agents. U.S.A. Interstate Printers and Publishers, Inc. 1982 pp. 57-90.
- Mabogunje, A. L. The Development Process. London. Hutchison. 1980
- Olayide, S. O. Economic Survey of Nigeria (1960 -1975). Ibadan. Aromolaran Publishers. 1976 pp. 26-29.
- Prosser, M. H. The Cultural Dialogue: Boston. Houghton Mifflin Co. 1978.
- Rhoades, R. E & Booth, R. H. Farmer-Back-To-Farmer: A Model for Generating Acceptable Agricultural Technology. Social Science Department, International Potato Centre. 1982.

- Rogers, E. M. Communication Research and Rural Development In: Research in Rural Africa Ed: Norman Miller. East Lansing, Michigan State University. 1969.
- Rogers, E. M. Communication Strategies for Family Planning. New York. The Free Press. A Division of Macillan Publishing Co., Inc. 1973.
- Rosario-Braid, F. A User-Oriented Communication Strategy. In: Braid(ed), Communication Strategy for Productivity Improvement Tokyo: Asian Productivity Organization. 1979 p.34
- Russell, H. M. Information for Extension Workers in Nonliterate Societies. In Problems of Identifying Needs for Library and Information Services in a Predominantly Nonliterate Society - with Particular Reference to Agricultural and Rural Development. Ed: B. O. Aboyade. The Hague: FID, 1981 pp. 40 - 45.
- Sommerland, Illoyd. The Press in Developing Countries. New Delhi: Atam Ram and Sons. 1966.
- Swanson, B. E and Clear, J.B. The History and Development of Agricultural Extension. In Agricultural Extension - A Reference Manual. Second Edition. Rome. F.A.O, 1984 pp. 1 - 19.
- Swanson, B. E; Rolling, N and Jiggins, J. Extension Strategies for Technology Utilization. In Agricultural Extension - A Reference Manual. Second Edition. Rome. F.A.O. 1984 pp. 89 - 107.
- Watts, L. H. The Organizational Setting for Agricultural Extension. In Agricultural Extension - A Reference Manual. Second Edition. Rome. F.A.O. 1984 pp. 20 - 39.
- Williams, D. B. Agricultural Extension: Farm Extension Services in Australia, Britain and United States of America. Garlton: Melbourne University Press. 1968.

Williams, S.K.T. Rural Development in Nigeria. University of Ife Press. 1978 p. 82.

Williams, S.K.T., Fenley, J. M & Williams, C. E: A Manual for Agricultural Extension Workers in Nigeria. University of Ibadan. 1984 p. 65.

JOURNALS:

Akinbode, I. A. Role of Divisional Extension Officers in the Western State of Nigeria. Quarterly Journal of Administration 6 (1), 1971 pp. 29 - 42.

Berlo, D. K et al. Dimensions for Evaluating the Acceptability of Message Sources. Public Opinion Quarterly 33, 1970 pp. 365 - 576.

Bogunjoko, J. O. Sources of Information on Improved Farm Practices: A Study of Farmers in Giwa District of Kaduna State. The Nigerian Journal of Agricultural Extension. 1 (2) Zaria, AERLS. 1983 pp. 64 - 71.

Cabanilla, V.L & Hargrove, T.R. A Study of the Role of Co-publication in Agricultural Technology Transfer. International Journal for Development Technology Vol. 3 pp. 279 - 293.

Elmandjra, M. Communication, Information and Development. Journal of the Society for International Development 1985 (1) p. 3.

Korten, D. C. Towards Technology for Managing Social Development. Development Digest Vol. I XIX No. 1 1981 pp. 45 - 55.

Moemeka, A.A. Perspectives on Development Communication. African Media Review Vol. 3(3), 1989 pp 1-24

Okoye, A.A. Factors Affecting Adoption Process by Farmers in Selected Local Government Areas of Anambra State, Nigeria. The Nig. Agric. Journal Vol. 24(1) 1989 p.17.

- Oputa, C. O. Agricultural Research and Extension Linkages: The Nigerian Experience. Journal of Rural Development in Nigeria, Vol. 2, 1984 pp. 79 - 83.
- Rogers, E.M. The Anthropology of Modernization and Modernization of Anthropology. Review in Anthropology 2: 345 - 358.
- Soola, E. O. Communication Policy and National Planning - An Agenda for the 80s. Journal of Rural Development in Nigeria, Vol. 1 (2), 1984. pp. 131 - 137.
- Tornbohm, R. Extensions: The Communication Link Between Agricultural Research and Farm Practice. Rhodesia Agriculture Journal, 68 (5), 1971 pp. 61 - 63.
- Warboys, I. B. Some Aspects of Technology Transfer in Farming. International Journal of Development Technology, Vol. 1, March, 1983 pp. 59 - 60.

OTHER PUBLISHED RESEARCH STUDIES:

- Abdullahi, Anjo. Complementary Roles of Institutions and Specialists in Technology Transfer: A Research Viewpoint. Proceedings of the National Seminar on Transfer of Research Results in Agriculture. Ibadan. NSTDA. 1978.
- Adenola, Tunji. Preface. Proceedings of the National Agricultural Development Committee and Fourth Joint NAFPP Workshop Published by FDA and NCRI. 1986.
- Adetunji, S. A. Research, Extension Service and Self-Sufficiency in Food and Raw Materials Production. Report of the 12th Conference on Package of Recommendations for Production of Food in Southwest Nigeria. Ibadan. I.A.R &T. 1985 pp. 3 - 11.

- Alao, J. Ade. The Adoption Process. Strengthening Agricultural Extension in Nigeria (FAO) Project No. NIR/87/014 Report. Ile-Ife. O.A.U. 1989.
- Anderson, K. E. Persuasion: Theory and Practice. Boston Mass Allyn and Bacon. 1971 p. 45.
- Baika, Adamu. Keynote Address. Agricultural Information Workshop Proceedings. AERLS - Zaria. A.B.U. 1981 pp. 13 - 22.
- Elliot, R. C. Communicating Results of Agricultural Research. Institute of Adult Practitioners Symposium Report Salisbury. 1973 pp. 1 - 2.
- Enyinnia, T.
Iloka, A. W &
Okereke, H. E. The Role of AERLS Umudike in the Transfer of Agricultural Technology. Proceedings of the Training Workshop on Rural Agricultural Extension. Umudike. NRCRI. 1983 pp. 118 -122.
- Idachaba, F. S. Extension Services and Institutional Linkages. Proceedings of the National Seminar on Universities of Agriculture. Lagos. National Universities Commission, 1988 pp. 43 - 58.
- Ijere, M. O. The Role of Co-operatives in Agricultural Technology Transfer. Proceedings of the Training Workshop on Rural Agricultural Extension. Umudike. NRCRI. 1983 pp. 46 - 57
- Kincaid (Jr), J.M. Strategies for the Improvement of Agricultural Extension Work and Non-Degree Agricultural Training in Nigeria. Consortium for the Study of Nigeria's Rural Development (CSWRD) - 13. Michigan State University. 1968 p. 15.
- LAS, A. de
Jagar. Farming Systems Research and Extension - A Practical Experience. West African Farming Systems Research Network Bulletin. No. 4. 1988 p. 3.

- Okereke, H. E. Agricultural Research Institutes and Transfer of Technology to Farmers. Proceedings of the First National Workshop on Role of AERLS in Improved Technology Transfer in Nigeria. Ibadan. I.A.R & T. 1978 pp. 167 - 184.
- Okereke, H. E. Extension Communications: The Interpersonal Aspect. Proceedings of the Training Workshop on Rural Agricultural Extension. Umudike. NRCRI. 1983 pp. 39 - 83.
- Okereke, H. E. Technology Development and Transfer: The Role of AERLS. Proceedings of the Training Workshop on Rural Agricultural Extension. Umudike. NRCRI. 1983 pp. 81 - 83.
- Opeke, R. Ola. The Multiple Roles of AERLS in the Transfer of Technology in Agriculture. Proceedings of the First National Workshop on the Role of AERLS in Improved Technology Transfer in Agriculture. Ibadan. I.A.R&T. 1978 pp. 185 - 193.
- Oyolu, C. The Role of Agricultural Research in Technology Development and Transfer with Special Reference to Nigeria. Proceedings of the Training Workshop on Rural Agricultural Extension. Umudike. NRCRI. 1983 pp. 69 - 78.
- Patel, A. U. Whither AERLS of the National Institutes of Agricultural Research. Proceedings of the First National Workshop on the Role of AERLS in Improved Technology Transfer in Agriculture. Ibadan. I.A.R & T. 1978 pp. 48 - 50.
- Salako, E. A. The Role of AERLS in the Transfer of Agricultural Technology in the Northern States of Nigeria. Proceedings of Workshop on Rural Agricultural Extension. Umudike. NRCRI. 1983 pp. 110 - 117.

- Singh, Danlat. Working Paper on Demonstration and Mass Media in Narrowing Extension Gap. Proceedings of National Workshop on Agricultural Extension. Ibadan. 1985.
- Taylor, T. A. Preface. Proceedings of the First National Workshop on the Role of AERLS in Improved Technology Transfer in Agriculture. Ibadan. I.A.R & T. 1979 p. i.
- Williams, S.K.T. Role of Extension in Agricultural Development In: Proceedings of the Nigerian Agricultural Extension Conference. Zaria. A.B.U. 1980 pp. 18 - 36.
- Williams, S.K.T. Extension Services in Universities of Agriculture. Proceedings of the National Seminar on Universities of Agriculture. Lagos. National Universities Commission. 1988 pp. 59 - 68.

UNPUBLISHED RESEARCH STUDIES:

- Adedoyin, S. F. A Study of Research Activities of NIHORT and the Effectiveness of its Information/Technology Dissemination Process in Ibadan Division of Oyo State. M.Sc. Thesis. Department of Agricultural Extension Services. University of Ibadan. 1984 pp. 12 - 29.
- Adedoyin, S. F. Agricultural Technology Diffusion Process: NIHORT'S Approach. Applied Communication Seminar Series, Department of Communication and Language Arts, University of Ibadan. 1987. p. 12.
- Adesanoye, F.A. On Mass communication and Mass Incommunication in Nigeria. Seminar Paper at the Department of Communication and language Arts, University of Ibadan. Tuesday, June 2nd, 1987.

- Agumagu, C. A. The Development and Transfer of Technology in Nigerian Agriculture: The Case of Maize, Rice and Cassava. M.Sc. Thesis. Department of Agricultural Extension Services, University of Ibadan. 1982 pp. 2 - 100.
- Aiyepoku, W. O. The Perception and Utilization of Information by Policy Makers in Nigeria. A Report to the Director, National Library of Nigeria, Lagos. 1980.
- Ajobo, O. Failure of Research in Nigerian Agriculture: An Economic Viewpoint. CRIN Seminar Series. 1977 p. 1.
- Aliyu, A. Working Document on Strategy for Publicising Science and Technology Activities. Lagos, HIOMR, Victoria Island, 1986 pp. 1 - 8.
- Amon, B. O. F. Opening Address. First National Seminar on Fruits and Vegetables. Ibadan. 1975.
- Balcet, J. C. Adoption of Farm Technology in the Northern ADPs. Paper at the First National Seminar on Agricultural Development Projects, Ibadan. 1982 p. 11.
- Folarin, A. B. Creating a Network for Communication to Stimulate Agricultural Revolution in Nigeria. A Proposal for Development Communication. Boston University, 1979.
- Idakwoji, I. P. The Use of Communication Media for Extension Work in Agriculture: A Case Study of Ayangba ADP. B. A. Communication and Language Arts Project Report. University of Ibadan. 1983.
- Idowu, I. A. Institutionalization of knowledge Flows: An Analysis of the Links Between Agricultural Research and Extension in Nigeria. Ph.D Thesis. Berlin, Technical University. 1988 pp. 221 - 230.

- Igbeka, J. C. Role of Research Institutions in Relation to Nigerian Agriculture: A Research Agricultural Engineer's Viewpoint. Paper at the National Seminar on Agricultural Productivity. Ilorin, ARMTI. 1985 p. 1.
- Iyamabo, D. E. Funding, Philosophy and Expectations of Agricultural Research: The Government View. Invited Paper at a Symposium on Resource and Result-Oriented Research in Nigerian Agricultural Institutes and Faculties. Ibadan, I.A.R & T. 1979 pp. 1 - 18.
- Okereke, H. E. Major Constraints in Adoption of New Technology by the Nigerian Farmers. Paper at the Institute for Policy and Strategic Studies, Kuru, Nigeria. Mimeo. July, 1981.
- Ononiwu, G. D. Communication Support for Agricultural Development. Paper at the National Workshop on Agricultural Extension. Ibadan, FACU. 1985 p. 3.
- Oyaide, D. F. Agricultural Production and Prospects for Agro-Industries in Nigeria. Paper at 1982, Lagos Specialised Trade Fair. 3rd December, 1982.
- Williams, S.K.T. Agricultural Extension/Research Linkage: An Essential Ingredient for Increased Agricultural Production in Nigeria. Second Open Lecture, College of Agricultural Sciences, Ogun State University. 9th February, 1990. p.25.

NEWSPAPER ARTICLES:

- Hartmans, E. H. Science and Journalism: Need to Forge Viable Partnership. Daily Sketch Weekend Focus, Saturday, 13th October, 1984 p. 7.

GOVERNMENT PUBLICATIONS:

- Eleje, I. Extension and its Manpower Requirement in Nigerian Agriculture. In: The Crops Sub-sector in the Fourth National Development Plan (1981 - 1985). FDA 1981 pp. 150 - 185.
- Federal Ministry of Agriculture (FMA). Activities of Federal Ministry of Agriculture at a Glance. Lagos, F.M.A., Ikoyi. April, 1981 pp. 9 - 62
- Federal Ministry of Education, Science and Technology (FMEST). Brochure on Science and Technology Department of the Federal Ministry of Education, Science and Technology. A Document Specially Prepared for the Science and Technology Briefing, NIIA, Lagos. 1985 pp. 1 - 28.
- Federal Ministry of Science and Technology (FMST). Brochure on Federal Ministry of Science and Technology. Science and Technology Briefing, NIIA, Lagos. 22nd February, 1985 pp. 6 - 7.
- Federal Ministry of Science and Technology (FMST). Report of Workshop on Research Management. Lagos. July, 1982 p. 76.
- National Science and Technology Development Agency (NSTDA). Recommendations of the National Seminar on the Transfer of Research Results in Agriculture. Ibadan. NSTDA. 1979 pp. 11 - 28.
- National Science and Technology Development Agency (NSTDA). Nigerian Research Institutes Review - A Final Report. January, 1979 pp. 226 - 310.
- Okigbo, B. N et al. Science, Technology, Research and Agricultural Development. A Report of Research Institutes Review Panel. Vol. 1. Ibadan Office, Green Revolution Committee, 1981. pp. 1 - 26.

Okigbo, B. N
et al.

Science, Technology, Research and Agricultural Development. A Report of Research Institutes Review Panel. Vol. 2. Ibadan Office. Green Revolution Committee. 1981 pp. 28 - 34.

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APPENDIX 1

DEPARTMENT OF COMMUNICATION AND LANGUAGE ARTS
UNIVERSITY OF IBADAN, IBADAN.

QUESTIONNAIRE RESPONDED TO BY
NATIONAL AGRICULTURAL RESEARCH INSTITUTES

1. What is the name of your Research Institute?

2. Where is your Research Institute located?

i) Town/Village:

ii) Local Government Area:

iii) State:

3. When was your Research Institute Established?

4. Name the specific crops, animals or agricultural activities on your research mandate:

A. COMMUNICATION LINKAGES IN RESEARCH PROBLEMS FORMULATION:

5. How often did your institute contact the following organizations or groups in the four years in the process of research problem formulation (identifying and deciding on problems to research upon)?

| Organizations/Groups | No of Times per Year | | | |
|--|----------------------|------|------|------|
| | 1984 | 1985 | 1986 | 1987 |
| i) Other National Agricultural and related Research Institutes | | | | |
| ii) International Agricultural Research Centres | | | | |

- iii) Universities and other basic Research and Teaching Institutions
 - iv) Policy making bodies/ agencies
 - v) Private sector/commercial organizations
 - vi) Banks and other Finance Institutions
 - vii) The General Public
 - viii) Media Organizations/ Journalists
 - ix) State Extension Service and Related Government Agencies
 - x) Federal Extension System and Related Agencies (ADP, River Basins, NAFPP etc.)
 - xi) Farmer's Cooperatives and other Farmers Associations
 - xii) Zonal Agricultural Extension and Research Liaison Services (AERLS)
 - xiii) Urban People and Opinion Leaders
 - xiv) Practising Farmers and Rural People
 - xv) Professional Agricultural Associations
 - xvi) National Farming System Research Network
-

6. How often did your Institute use the following communication methods in making contacts (generally) in the process of research problems formulation?

| Communications Methods | No of Times per Year | | | |
|---|----------------------|------|------|------|
| | 1984 | 1985 | 1986 | 1987 |
| i) a) Training Courses | | | | |
| b) Conferences | | | | |
| c) Workshops | | | | |
| d) Seminars | | | | |
| ii) On-Farm Adaptive Research | | | | |
| iii) Method and Result Demonstration | | | | |
| iv) Publications | | | | |
| v) Radio | | | | |
| vi) Television | | | | |
| vii) Newspapers | | | | |
| viii) Mobile Audio-Visual Operations | | | | |
| ix) Field/Achievement Days | | | | |
| x) a) Science and Technology Briefings | | | | |
| b) Trade Fairs | | | | |
| c) Agricultural Shows | | | | |
| d) Exhibitions | | | | |
| xi) Group Meetings | | | | |
| xii) Individual Contact Methods (Specify) | | | | |

7. How often did your Institute use the following communication methods in contacting National Agricultural and Related Research Institutes in the process of formulating research problems?

| Communication Methods | No of Times per Year | | | |
|---|----------------------|------|------|------|
| | 1984 | 1985 | 1986 | 1987 |
| i) a) Training Courses | | | | |
| b) Conferences | | | | |
| c) Workshops | | | | |
| d) Seminars | | | | |
| ii) On-Farm Adaptive Research | | | | |
| iii) Method and Result Demonstrations | | | | |
| iv) Publications | | | | |
| v) Radio | | | | |
| vi) Television | | | | |
| vii) Newspapers | | | | |
| viii) Mobile Audio-Visual Operations | | | | |
| ix) Field/Achievement Days | | | | |
| x) a) Science and Technology Briefings | | | | |
| b) Trade Fairs | | | | |
| c) Agricultural Shows | | | | |
| d) Exhibitions | | | | |
| xi) Group Meetings | | | | |
| xii) Individual Contact Methods (Specify) | | | | |

8. How often did your Institute use the following communication methods in contacting International Agricultural Research Centres in the process of formulating Research Problems?

| Communication Methods | No of Times per Year | | | |
|---|----------------------|------|------|------|
| | 1984 | 1985 | 1986 | 1987 |
| i) a) Training Courses | | | | |
| b) Conferences | | | | |
| c) Workshops | | | | |
| d) Seminars | | | | |
| ii) On-Farm Adaptive Research | | | | |
| iii) Method and Result Demonstrations | | | | |
| iv) Publications | | | | |
| v) Radio | | | | |
| vi) Television | | | | |
| vii) Newspapers | | | | |
| viii) Mobile Audio-Visual Operations | | | | |
| ix) Field/Achievement Days | | | | |
| x) a) Science and Technology Briefings | | | | |
| b) Trade Fairs | | | | |
| c) Agricultural Shows | | | | |
| d) Exhibitions | | | | |
| xi) Group Meetings | | | | |
| xii) Individual Contact Methods (Specify) | | | | |

9. How often did your Institute use the following communication methods in contacting Universities and other Basic Research and Teaching Institutions in the process of research problems formulation?

| Communication Methods | No of Times per Year | | | |
|---|----------------------|------|------|------|
| | 1984 | 1985 | 1986 | 1987 |
| i) a) Training Courses | | | | |
| b) Conferences | | | | |
| c) Workshops | | | | |
| d) Seminars | | | | |
| ii) On-Farm Adaptive Research | | | | |
| iii) Method and Result Demonstrations | | | | |
| iv) Publications | | | | |
| v) Radio | | | | |
| vi) Television | | | | |
| vii) Newspapers | | | | |
| viii) Mobile Audio-Visual Operations | | | | |
| ix) Field/Achievement Days | | | | |
| x) a) Sciences and Technology Briefings | | | | |
| b) Trade Fairs | | | | |
| c) Agricultural Shows | | | | |
| d) Exhibitions | | | | |
| xi) Group Meetings | | | | |
| xii) Individual Contact Methods (Specify) | | | | |

10. How often did your Institute use the following communication methods in contacting Policy Making Bodies in the process of research problems formulation?

| Communication Methods | No of Times per Year | | | |
|---|----------------------|------|------|------|
| | 1984 | 1985 | 1986 | 1987 |
| i) a) Training Courses | | | | |
| b) Conferences | | | | |
| c) Workshops | | | | |
| d) Seminars | | | | |
| ii) On-Farm Adaptive Research | | | | |
| iii) Method and Result Demonstration | | | | |
| iv) Publications | | | | |
| v) Radio | | | | |
| vi) Television | | | | |
| vii) Newspapers | | | | |
| viii) Mobile Audio-Visual Operations | | | | |
| ix) Field/Achievement Days | | | | |
| x) a) Sciences and Technology Briefings | | | | |
| b) Trade Fairs | | | | |
| c) Agricultural Shows | | | | |
| d) Exhibitions | | | | |
| xi) Group Meetings | | | | |
| xii) Individual Contact Methods (Specify) | | | | |

11. How often did your Institute use the following communication methods in contacting Private Sector/Commercial Organizations in the process of research problems formulation?

| Communication Methods | No of Times per Year | | | |
|---|----------------------|------|------|------|
| | 1984 | 1985 | 1986 | 1987 |
| i) a) Training Courses | | | | |
| b) Conferences | | | | |
| c) Workshops | | | | |
| d) Seminars | | | | |
| ii) On-Farm Adaptive Research | | | | |
| iii) Method and Result Demonstration | | | | |
| iv) Publications | | | | |
| v) Radio | | | | |
| vi) Television | | | | |
| vii) Newspapers | | | | |
| viii) Mobile Audio-Visual Operations | | | | |
| ix) Field/Achievement Days | | | | |
| x) a) Sciences and Technology Briefings | | | | |
| b) Trade Fairs | | | | |
| c) Agricultural Shows | | | | |
| d) Exhibitions | | | | |
| xi) Group Meetings | | | | |
| xii) Individual Contact Methods (Specify) | | | | |

12. How often did your Institute use the following communication methods in contacting Banks and Other Finance Institutions in the process of research problems formulation?

| Communication Methods | No of Times per Year | | | |
|---|----------------------|------|------|------|
| | 1984 | 1985 | 1986 | 1987 |
| i) a) Training Courses | | | | |
| b) Conferences | | | | |
| c) Workshops | | | | |
| d) Seminars | | | | |
| ii) On-Farm Adaptive Research | | | | |
| iii) Method and Result Demonstrations | | | | |
| iv) Publications | | | | |
| v) Radio | | | | |
| vi) Television | | | | |
| vii) Newspapers | | | | |
| viii) Mobile Audio-Visual Problems | | | | |
| ix) Field/Achievement Days | | | | |
| x) a) Science and Technology Briefings | | | | |
| b) Trade Fairs | | | | |
| c) Agricultural Shows | | | | |
| d) Exhibitions | | | | |
| x) Group Meetings | | | | |
| xii) Individual Contact Methods (Specify) | | | | |

13. How often did your Institute use the following communication methods in contacting The General Public in the process of research problems formulation?

| | No of Times per Year | | | |
|---|----------------------|------|------|------|
| | 1984 | 1985 | 1986 | 1987 |
| i) a) Training Courses | | | | |
| b) Conferences | | | | |
| c) Workshops | | | | |
| d) Seminars | | | | |
| ii) On-Farm Adaptive Research | | | | |
| iii) Method and Result Demonstrations | | | | |
| iv) Publications | | | | |
| v) Radio | | | | |
| vi) Television | | | | |
| vii) Newspapers | | | | |
| viii) Mobile Audio-Visual Operations | | | | |
| ix) Field/Achievement Days | | | | |
| x) a) Science and Technology Briefings | | | | |
| b) Trade Fairs | | | | |
| c) Agricultural Shows | | | | |
| d) Exhibitions | | | | |
| xi) Group Meetings | | | | |
| xii) Individual Contact Methods (Specify) | | | | |

14. How often did your Institute use the following communication methods in contacting Media Organizations and Journalists in the process of research problems formulation?

| Communication Methods | No of Times per Year | | | |
|---|----------------------|------|------|------|
| | 1984 | 1985 | 1986 | 1987 |
| i) a) Training Courses | | | | |
| b) Conferences | | | | |
| c) Workshops | | | | |
| d) Seminars | | | | |
| ii) On-Farm Adaptive Research | | | | |
| iii) Methods and Result Demonstrations | | | | |
| iv) Publications | | | | |
| v) Radio | | | | |
| vi) Television | | | | |
| vii) Newspapers | | | | |
| viii) Mobile Audio-Visual Operations | | | | |
| ix) Field/Achievement Days | | | | |
| x) a) Sciences and Technology Briefings | | | | |
| b) Trade Fairs | | | | |
| c) Agricultural Shows | | | | |
| d) Exhibitions | | | | |
| xi) Group Meetings | | | | |
| xii) Individual Contact Methods (Specify) | | | | |

15. How often did your Institute use the following communication methods in contacting States Extension Service and Related Agencies in the process of reseach problems formulation?

| Communication Methods | No of Times per Year | | | |
|---|----------------------|------|------|------|
| | 1984 | 1985 | 1986 | 1987 |
| i) a) Training Courses | | | | |
| b) Conferences | | | | |
| c) Workshops | | | | |
| d) Seminars | | | | |
| ii) On-Farm Adaptive Research | | | | |
| iii) Method and Result Demonstrations | | | | |
| iv) Publications | | | | |
| v) Radio | | | | |
| vi) Television | | | | |
| vii) Newspapers | | | | |
| viii) Mobile Audio-Visual Operations | | | | |
| ix) Field/Achievement Days | | | | |
| x) a) Science and Technology Briefings | | | | |
| b) Trade Fairs | | | | |
| c) Agricultural Shows | | | | |
| d) Exhibitions | | | | |
| x) Group Meetings | | | | |
| xii) Individual Contact Methods (Specify) | | | | |

16. How often did your Institute use the following communication methods in contacting Federal Extension System and Related Agencies in the process of research problems formulation?

| Communication Methods | No of Times per Year | | | |
|--|----------------------|------|------|------|
| | 1984 | 1985 | 1986 | 1987 |
| i) a) Training Courses | | | | |
| b) Conferences | | | | |
| c) Workshops | | | | |
| d) Seminars | | | | |
| ii) On-Farm Adaptive Research | | | | |
| iii) Method and Result Demonstrations | | | | |
| iv) Publications | | | | |
| v) Radio | | | | |
| vi) Television | | | | |
| vii) Newspapers | | | | |
| viii) Mobile Audio-Visual Operations | | | | |
| ix) Field/Achievement Days | | | | |
| x) a) Science and Technology Briefings | | | | |
| b) Trade Fairs | | | | |
| c) Agricultural Shows | | | | |
| d) Exhibitions | | | | |
| x) Group Meetings | | | | |
| xi) Individual Contact Methods (Specify) | | | | |

17. How often did your Institute use the following communication methods in contacting Farmer's Cooperatives and other Farmers Association in the process of research problems formulation?

| Communication Methods | No of Times per Year | | | |
|---|----------------------|------|------|------|
| | 1984 | 1985 | 1986 | 1987 |
| i) a) Training Courses | | | | |
| b) Conferences | | | | |
| c) Workshops | | | | |
| d) Seminars | | | | |
| ii) On-Farm Adaptive Research | | | | |
| iii) Method and Result Demonstrations | | | | |
| iv) Publications | | | | |
| v) Radio | | | | |
| vi) Television | | | | |
| vii) Newspapers | | | | |
| viii) Mobile Audio-Visual Operations | | | | |
| ix) Field/Achievement Days | | | | |
| x) a) Science and Technology Briefings | | | | |
| b) Trade Fairs | | | | |
| c) Agricultural Shows | | | | |
| d) Exhibitions | | | | |
| xi) Group Meetings | | | | |
| xii) Individual Contact Methods (Specify) | | | | |

18. How often did your Institute use the following communication methods in contacting National Agricultural Extension and Research Liaison Services (NAERLS) in the process of research problems formulation?

| Communication Methods | No of Times per Year | | | |
|---|----------------------|------|------|------|
| | 1984 | 1985 | 1986 | 1987 |
| i) a) Training Courses | | | | |
| b) Conferences | | | | |
| c) Workshops | | | | |
| d) Seminars | | | | |
| ii) On-Farm Adaptive Research | | | | |
| iii) Method and Result Demonstrations | | | | |
| iv) Publications | | | | |
| v) Radio | | | | |
| vi) Television | | | | |
| vii) Newspapers | | | | |
| viii) Mobile Audio-Visual Operations | | | | |
| ix) Field/Achievement Days | | | | |
| x) a) Science and Technology Briefings | | | | |
| b) Trade Fairs | | | | |
| c) Agricultural Shows | | | | |
| d) Exhibitions | | | | |
| xi) Group Meetings | | | | |
| xii) Individual Contact Methods (Specify) | | | | |

19. How often did your Institute use the following communication methods in contacting the General Elites/Influence Groups in the process of formulating research problems?

| Communication Methods | No of Times per Year | | | |
|---|----------------------|------|------|------|
| | 1984 | 1985 | 1986 | 1987 |
| i) a) Training Courses | | | | |
| b) Conferences | | | | |
| c) Workshops | | | | |
| d) Seminars | | | | |
| ii) On-Farm Adaptive Research | | | | |
| iii) Method and Result Demonstrations | | | | |
| iv) Publications | | | | |
| v) Radio | | | | |
| vi) Television | | | | |
| vii) Newspapers | | | | |
| viii) Mobile Audio-Visual Operations | | | | |
| ix) Field/Achievement Days | | | | |
| x) a) Science and Technology Briefings | | | | |
| b) Trade Fairs | | | | |
| c) Agricultural Shows | | | | |
| d) Exhibitions | | | | |
| xi) Group Meetings | | | | |
| xii) Individual Contact Methods (Specify) | | | | |

20. How often did your Institute use the following communication methods in contacting Practising Farmers and Rural People in the process of research problems formulation?

| Communication Methods | No of Times Per Year | | | |
|---|----------------------|------|------|------|
| | 1984 | 1985 | 1986 | 1987 |
| i) a) Training Courses | | | | |
| b) Conferences | | | | |
| c) Workshops | | | | |
| d) Seminars | | | | |
| ii) On-Farm Adaptive Research | | | | |
| iii) Method and Result Demonstrations | | | | |
| iv) Publications | | | | |
| v) Radio | | | | |
| vi) Television | | | | |
| vii) Newspapers | | | | |
| viii) Mobile Audio-Visual Operations | | | | |
| ix) Field/Achievement Days | | | | |
| x) a) Science and Technology Briefings | | | | |
| b) Trade Fairs | | | | |
| c) Agricultural Shows | | | | |
| d) Exhibitions | | | | |
| xi) Group Meetings | | | | |
| xii) Individual Contact Methods (Specify) | | | | |

21. How often did your Institute use the following communication methods in contacting Professional Agricultural Associations in the process of research results formulation?

| Communication Methods | No of Times per Year | | | |
|--|----------------------|------|------|------|
| | 1984 | 1985 | 1986 | 1987 |
| i) a) Training Courses | | | | |
| b) Conferences | | | | |
| c) Workshops | | | | |
| d) Seminars | | | | |
| ii) On-Farm Adaptive Research | | | | |
| iii) Method and Result Demonstrations | | | | |
| iv) Publications | | | | |
| v) Radio | | | | |
| vi) Television | | | | |
| vii) Newspapers | | | | |
| viii) Mobile Audio-Visual Operations | | | | |
| ix) Field/Achievement Days | | | | |
| x) a) Science and Technology Briefings | | | | |
| b) Trade Fairs | | | | |
| c) Agricultural Shows | | | | |
| d) Exhibitions | | | | |
| x) Group Meetings | | | | |
| xi) Individual Contact Methods (Specify) | | | | |

22. How often did your Institute use the following communication methods in contacting the National Farming Systems Research Group in the process of research results formulations?

| Communication Methods | No of Times per Year | | | |
|---|----------------------|------|------|------|
| | 1984 | 1985 | 1986 | 1987 |
| i) a) Training Courses | | | | |
| b) Conferences | | | | |
| c) Workshops | | | | |
| d) Seminars | | | | |
| ii) On-Farm Adaptive Research | | | | |
| iii) Method and Result Demonstrations | | | | |
| iv) Publications | | | | |
| v) Radio | | | | |
| vi) Television | | | | |
| vii) Newspapers | | | | |
| viii) Mobile Audio-Visual Operations | | | | |
| ix) Field/Achievement Days | | | | |
| x) a) Science and Technology Briefings | | | | |
| b) Trade Fairs | | | | |
| c) Agricultural Shows | | | | |
| d) Exhibitions | | | | |
| xi) Group Meetings | | | | |
| xii) Individual Contact Methods (Specify) | | | | |

23. How often did your Institute contact the various organizations specifically on Production Problems in the process of formulating research problems?

| Organizations/Groups | No of Times per Year | | | |
|--|----------------------|------|------|------|
| | 1984 | 1985 | 1986 | 1987 |
| i) Other National Agricultural and Related Research Institutes | | | | |
| ii) International Agricultural Research Centres | | | | |
| iii) Universities and other Basic Research and Teaching Institutions | | | | |
| iv) Policy Making Bodies | | | | |
| v) Private Sector/Commercial Organizations | | | | |
| vi) Banks and other Finance Institutions | | | | |
| vii) The General Public | | | | |
| viii) Media Organizations and Journalists | | | | |
| ix) States Extension Services and Related Agencies | | | | |
| x) Federal Extension System and Related Agencies (ADP, River Basins, NAFPP etc.) | | | | |
| xi) Farmer's Co-operatives and other Farmer's Associations | | | | |

- xii) Zonal Agricultural Extension and Research Liaison Services (AERLS)
- xiii) Urban People and Opinion Leaders
- xiv) Practising Farmers and Rural People
- xv) Professional Agricultural Associations
- xvi) National Farming System Research Network

24. How often did your Institute contact the various organizations specifically on Crop/Animal Protection Problems in the process of formulating research problems?

| Organizations/Groups | No of Times per Year | | | |
|--|----------------------|------|------|------|
| | 1984 | 1985 | 1986 | 1987 |
| i) Other National Agricultural and Related Research Institutes | | | | |
| ii) International Agricultural Research Centres | | | | |
| iii) Universities and other Basic Research and Teaching Institutions | | | | |
| iv) Policy Making Bodies | | | | |
| v) Private Sector/Commercial Organizations | | | | |
| vi) Banks and other Finance Institutions | | | | |

- vii) The General Public
- viii) Media Organizations and Journalists
- ix) State Extension Service and Related Agencies
- x) Federal Extension System and Related Agencies (ADP, River Basins, NAFPP etc.)
- xi) Farmer's Co-operative and other Farmer's Associations
- xii) Zonal Agricultural Extension and Research Liaison Services (AERLS)
- xiii) Urban People and Opinion Leaders
- xiv) Practising Farmer and Rural People
- xv) Professional Agricultural Associations
- xvi) National Farming System Research Network

25. How often did your Institute contact the various organizations specifically on Economic/Marketing Problems in the process of formulating research problems?

| Organizations/Groups | No of Times per Year | | | |
|--|----------------------|------|------|------|
| | 1984 | 1985 | 1986 | 1987 |
| i) Other National Agricultural and Related Research Institutions | | | | |

- ii) International Agricultural Research Centres
 - iii) Universities and other Basic Research and Teaching Institutions
 - iv) Policy Making Bodies
 - v) Private Sector/Commercial Organizations
 - vi) Banks and other Finance Institutions
 - vii) The General Public
 - viii) Media Organizations and Journalists
 - ix) States Extension Service and Related Agencies
 - x) Federal Extension System and Related Agencies (ADP, River Basins, NAFPP etc.)
 - xi) Farmers's Co-operatives and other Farmer's Associations
 - xii) Zonal Agricultural Extension and Research Liaison Services (AERLS)
 - xiii) Urban People and Opinion Leaders
 - xiv) Practising Farmers and Rural People
 - xv) Professional Agricultural Associations
 - xvi) National Farming System Research Network
-

26. How often did your Institute contact the various organizations specifically on Post-Harvest (Storage, Processing etc.) problem in the process of formulating research problems?

| Organizations/Groups | No of Items per Year | | | |
|--|----------------------|------|------|------|
| | 1984 | 1985 | 1986 | 1987 |
| i) Other National Agricultural and Related Research Institutes | | | | |
| ii) International Agricultural Research Centres | | | | |
| iii) Universities and other Basic Research and Teaching Institutions | | | | |
| iv) Policy Making Bodies | | | | |
| v) Private Sector/Commercial Organizations | | | | |
| vi) Banks and other Finance Institutions | | | | |
| vii) The General Public | | | | |
| viii) Media Organizations and Journalists | | | | |
| ix) States Extension Service and Related Agencies | | | | |
| x) Federal Extension System and Related Agencies (ADP, River Basins, NAFPP etc.) | | | | |
| xi) Farmer's Co-operatives and other Farmer's Associations | | | | |

- xii) Zonal Agricultural Extension and Research Liaison Services (AERLS)
- xiii) Urban People and Opinion Leaders
- xiv) Practising Farmer's and Rural People
- xv) Professional Agricultural Associations
- xvi) National Farming System Research Network

27. How often did your Institute contact the various organizations specifically on Crop/Animal Products Utilization Problems in the process of formulating research problems?

| Organizations/Groups | No of Items per Year | | | |
|--|----------------------|------|------|------|
| | 1984 | 1985 | 1986 | 1987 |
| i) Other National Agricultural and Related Research Institutes | | | | |
| ii) International Agricultural Research Centres | | | | |
| iii) Universities and other Basic Research and Teaching Institutions | | | | |
| iv) Policy Making Bodies | | | | |
| v) Private Sector/Commercial Organizations | | | | |
| vi) Banks and other Finance Institutions | | | | |

- vii) The General Public
- viii) Media Organizations and Journalists
- ix) States Extension Service and Related Agencies
 - x) Federal Extension System and Related Agencies (ADP, River Basins, NAFPP etc.)
 - xi) Farmer's Co-operatives and other Farmer's Associations
 - xii) Zonal Agricultural Extension and Research Liaison Services (AERLS)
- xiii) Urban People and Opinion Leaders
- xiv) Practising Farmer's and Rural People
 - xv) Professional Agricultural Associations
 - xvi) National Farming System Research Network

28. How often did your institute use the following communication methods in contacting these organizations especially on crops/animal production aspects in the process of formulating research problems?

| Communication Methods | No of Times per Year | | | |
|------------------------|----------------------|------|------|------|
| | 1984 | 1985 | 1986 | 1987 |
| i) a) Training Courses | | | | |
| b) Conferences | | | | |
| c) Workshops | | | | |
| d) Seminars | | | | |

- ii) On-Farm Adaptive Research
- iii) Method and Result Demonstrations
- iv) Publications
- v) Radio
- vi) Television
- vii) Newspapers
- viii) Mobile Audio-Visual Operations
- ix) Field/Achievement Days
 - x) a) Science and Technology Briefings
 - b) Trade Fairs
 - c) Agricultural Shows
 - d) Exhibitions
- xi) Group Meetings
- xii) Individual Contact Methods (Specify)

29. How often did your institute use the following communication methods in contacting those organizations especially on crop/animal protection aspects in the process of formulating research problems?

| Communication Methods | No of Times per Year | | | |
|------------------------|----------------------|------|------|------|
| | 1984 | 1985 | 1986 | 1987 |
| i) a) Training Courses | | | | |
| b) Conferences | | | | |
| c) Workshops | | | | |
| d) Seminars | | | | |

- ii) On-Farm Adaptive Research
 - iii) Method and Result Demonstrations
 - iv) Publications
 - v) Radio
 - vi) Television
 - vii) Newspapers
 - viii) Mobile Audio-Visual Operations
 - ix) Field/Achievement Days
 - x) a) Science and Technology Briefings
 - b) Trade Fairs
 - c) Agricultural Shows
 - d) Exhibitions
 - xi) Group Meetings
 - xii) Individual Contact Methods (Specify)
-

30. How often did your institute use the following communication methods in contacting those organizations especially on economics/marketing aspects in the process of formulating research problems?

| Communication Methods | No of Times per Year | | | |
|-----------------------|----------------------|------|------|------|
| | 1984 | 1985 | 1986 | 1987 |

- i) a) Training Courses
- b) Conferences
- c) Workshops
- d) Seminars

- ii) On-Farm Adaptive Research
 - iii) Method and Result Demonstrations
 - iv) Publications
 - v) Radio
 - vi) Television
 - vii) Newspapers
 - viii) Mobile Audio-Visual Operations
 - ix) Field/Achievement Days
 - x) a) Science and Technology Briefings
 - b) Trade Fairs
 - c) Agricultural Shows
 - d) Exhibitions
 - xi) Group Meetings
 - xii) Individual Contact Methods (Specify)
-

31. How often did your institute use the following communication methods in contacting those organizations especially on post-harvest aspects in the process of formulating research problems?

| Communication Methods | No of Times per Year | | | |
|------------------------|----------------------|------|------|------|
| | 1984 | 1985 | 1986 | 1987 |
| i) a) Training Courses | | | | |
| b) Conferences | | | | |
| c) Workshops | | | | |
| d) Seminars | | | | |

- ii) On-Farm Adaptive Research
 - iii) Method and Result Demonstrations
 - iv) Publications
 - v) Radio
 - vi) Television
 - vii) Newspapers
 - viii) Mobile Audio-Visual Operations
 - ix) Field/Achievement Days
 - x) a) Science and Technology Briefings
 - b) Trade Fairs
 - c) Agricultural Shows
 - d) Exhibitions
 - xi) Group Meetings
 - xii) Individual Contact Methods (Specify)
-

32. How often did your institute use the following communication methods in contacting those organizations especially on utilization aspects in the process of formulating research problems?

| Communication Methods | No of Times per Year | | | |
|------------------------|----------------------|------|------|------|
| | 1984 | 1985 | 1986 | 1987 |
| i) a) Training Courses | | | | |
| b) Conferences | | | | |
| c) Workshops | | | | |
| d) Seminars | | | | |

- ii) On-Farm Adaptive Research
 - iii) Method and Result Demonstrations
 - iv) Publications
 - v) Radio
 - vi) Television
 - vii) Newspapers
 - viii) Mobile Audio-Visual Operations
 - ix) Field/Achievement Days
 - x) a) Science and Technology Briefings
 - b) Trade Fairs
 - c) Agricultural Shows
 - d) Exhibitions
 - xi) Group Meetings
 - xii) Individual Contact Methods (Specify)
-

33. Do you think your institute has the capacity to directly contact all its target farmers throughout the country to know their farming problems?

Yes/No:

34. Do you agree that there are other organizations or groups whose roles can be complimentary to that of the State/Federal Extension Service in providing your institute with adequate information on farmer's problems, situations and circumstances?

Yes/No:

35. Do you agree that adequate understanding of farmer's problems, situations and circumstances will ensure the formulation of appropriate research problems by your institute?

Yes/No:

B. COMMUNICATION LINKAGES IN RESEARCH RESULTS DISSEMINATION

36. Do you have an Agricultural Extension and Research Liaison Services (AERLS) unit or Extension Sub-system in addition to the research sub-system in your institute?

Yes/No:

37. If answer to question 36 is NO, which machinery is available in your institute for dissemination of research results:

38. Are Extension Specialists or personnel included in the Membership of research programmes of your institute?

Yes/No:

39. If answer to question 40 is No, explain the reasons:

40. How often did your Institute contact the following organizations or groups in the past four years in the process of disseminating research results?

| Organizations/Groups | No of Times per Year | | | |
|--|----------------------|------|------|------|
| | 1984 | 1985 | 1986 | 1987 |
| i) Other National Agricultural and Related Research Institutes | | | | |
| ii) International Agricultural Research Centres | | | | |

- iii) Universities and other
Basic Research and Teaching
Institutions
 - iv) Policy Making Bodies
 - v) Private Sector/Commercial
Organizations
 - vi) Banks and other Finance
Institutions
 - vii) The General Public
 - viii) Media Organizations and
Journalists
 - ix) States Extension Service
and Related Agencies
 - x) Federal Extension System
and Related Agencies (ADP,
River Basins, NAFPP, etc.)
 - xi) Farmers Co-operatives and
other Farmer's Associations
 - xii) Zonal Agricultural Extension
and Research Liaison
Services (AERLS)
 - xiii) Urban People and
Opinion Leaders
 - xiv) Practising Farmers and Rural
People
 - xv) Professional Agricultural
Associations
 - xvi) National Farming System
Research Network
-

41. How often did your research Institute use the following communication methods to contact Other National Agricultural and Related Research Institutes in the process of disseminating research results?

| Communication Methods | No of Times per Year | | | |
|---|----------------------|------|------|------|
| | 1984 | 1985 | 1986 | 1987 |
| i) a) Training Courses | | | | |
| b) Conferences | | | | |
| c) Workshops | | | | |
| d) Seminars | | | | |
| ii) On-Farm Adaptive Research | | | | |
| iii) Method and Result Demonstrations | | | | |
| iv) Publications | | | | |
| v) Radio | | | | |
| vi) Television | | | | |
| vii) Newspapers | | | | |
| viii) Mobile Audio-Visual Operations | | | | |
| ix) Field/Achievement Days | | | | |
| x) a) Science and Technology Briefings | | | | |
| b) Trade Fairs | | | | |
| c) Agricultural Shows | | | | |
| d) Exhibitions | | | | |
| xi) Group Meetings | | | | |
| xii) Individual Contact Methods (Specify) | | | | |

42. How often did your research Institute use the following communication methods to contact International Agricultural Research Centres in the process of disseminating research results?

| Communication Methods | No of Times per Year | | | |
|---|----------------------|------|------|------|
| | 1984 | 1985 | 1986 | 1987 |
| i) a) Training Courses | | | | |
| b) Conferences | | | | |
| c) Workshops | | | | |
| d) Seminars | | | | |
| ii) On-Farm Adaptive Research | | | | |
| iii) Method and Result Demonstrations | | | | |
| iv) Publications | | | | |
| v) Radio | | | | |
| vi) Television | | | | |
| vii) Newspapers | | | | |
| viii) Mobile Audio-Visual Operations | | | | |
| ix) Field/Achievement Days | | | | |
| x) a) Science and Technology Briefings | | | | |
| b) Trade Fairs | | | | |
| c) Agricultural Shows | | | | |
| d) Exhibitions | | | | |
| x) Group Meetings | | | | |
| xii) Individual Contact Methods (Specify) | | | | |

43. How often did your Institute use the following communication methods to contact Universities and other Basic Research and Teaching Institutions in the process of disseminating research results?

| Communication Methods | No of Times per Year | | | |
|---|----------------------|------|------|------|
| | 1984 | 1985 | 1986 | 1987 |
| i) a) Training Courses | | | | |
| b) Conferences | | | | |
| c) Workshops | | | | |
| d) Seminars | | | | |
| ii) On-Farm Adaptive Research | | | | |
| iii) Method and Result Demonstrations | | | | |
| iv) Publications | | | | |
| v) Radio | | | | |
| vi) Television | | | | |
| vii) Newspapers | | | | |
| viii) Mobile Audio-Visual Operations | | | | |
| ix) Field/Achievement Days | | | | |
| x) a) Science and Technology Briefings | | | | |
| b) Trade Fairs | | | | |
| c) Agricultural Shows | | | | |
| d) Exhibitions | | | | |
| xi) Group Meetings | | | | |
| xii) Individual Contact Methods (Specify) | | | | |

44. How often did your Institute use the following communication methods to contact Policy Making Bodies in the process of disseminating research results?

| Communication Methods | No of Times per Year | | | |
|---|----------------------|------|------|------|
| | 1984 | 1985 | 1986 | 1987 |
| i) a) Training Courses | | | | |
| b) Conferences | | | | |
| c) Workshops | | | | |
| d) Seminars | | | | |
| ii) On-Farm Adaptive Research | | | | |
| iii) Method and Result Demonstrations | | | | |
| iv) Publications | | | | |
| v) Radio | | | | |
| vi) Television | | | | |
| vii) Newspapers | | | | |
| viii) Mobile Audio-Visual Operations | | | | |
| ix) Field/Achievement Days | | | | |
| x) a) Science and Technology Briefings | | | | |
| b) Trade Fairs | | | | |
| c) Agricultural Shows | | | | |
| d) Exhibitions | | | | |
| xi) Group Meetings | | | | |
| xii) Individual Contact Methods (Specify) | | | | |

45. How often did your institute use the following communication methods to contact Private Sector/Commercial Organizations in the process of disseminating research results?

| Communication Methods | No of Times per Year | | | |
|---|----------------------|------|------|------|
| | 1984 | 1985 | 1986 | 1987 |
| i) a) Training Courses | | | | |
| b) Conferences | | | | |
| c) Workshops | | | | |
| d) Seminars | | | | |
| ii) On-Farm Adaptive Research | | | | |
| iii) Method and Result Demonstrations | | | | |
| iv) Publications | | | | |
| v) Radio | | | | |
| vi) Television | | | | |
| vii) Newspapers | | | | |
| viii) Mobile Audio-Visual Operations | | | | |
| ix) Field/Achievement Days | | | | |
| x) a) Science and Technology Briefings | | | | |
| b) Trade Fairs | | | | |
| c) Agricultural Shows | | | | |
| d) Exhibitions | | | | |
| xi) Group Meetings | | | | |
| xii) Individual Contact Methods (Specify) | | | | |

46. How often did your Institute use the following communication methods to contact Banks and other Finance Institutions in the process of disseminating research results?

| Communication Methods | No of Times per Year | | | |
|---|----------------------|------|------|------|
| | 1984 | 1985 | 1986 | 1987 |
| i) a) Training Courses | | | | |
| b) Conferences | | | | |
| c) Workshops | | | | |
| d) Seminars | | | | |
| ii) On-Farm Adaptive Research | | | | |
| iii) Method and Result Demonstrations | | | | |
| iv) Publications | | | | |
| v) Radio | | | | |
| vi) Television | | | | |
| vii) Newspapers | | | | |
| viii) Mobile Audio-Visual Operations | | | | |
| ix) Field/Achievement Days | | | | |
| x) a) Science and Technology Briefings | | | | |
| b) Trade Fairs | | | | |
| c) Agricultural Shows | | | | |
| d) Exhibitions | | | | |
| xi) Group Meetings | | | | |
| xii) Individual Contact Methods (Specify) | | | | |

47. How often did your Institute use the following communication methods to contact The General Public in the process of disseminating research results?

| Communication Methods | No of Times per Year | | | |
|---|----------------------|------|------|------|
| | 1984 | 1985 | 1986 | 1987 |
| i) a) Training Courses | | | | |
| b) Conferences | | | | |
| c) Workshops | | | | |
| d) Seminars | | | | |
| ii) On-Farm Adaptive Research | | | | |
| iii) Method and Result Demonstrations | | | | |
| iv) Publications | | | | |
| v) Radio | | | | |
| vi) Television | | | | |
| vii) Mobile Audio-Visual Operations | | | | |
| viii) Newspapers | | | | |
| ix) Field/Achievement Days | | | | |
| x) a) Science and Technology Briefings | | | | |
| b) Trade Fairs | | | | |
| c) Agricultural Shows | | | | |
| d) Exhibitions | | | | |
| xi) Group Meetings | | | | |
| xii) Individual Contact Methods (Specify) | | | | |

48. How often did your Institute use the following communication methods to contact Media Organizations and Journalists in the process of disseminating research results?

| Communication Methods | No of Times per Year | | | |
|---|----------------------|------|------|------|
| | 1984 | 1985 | 1986 | 1987 |
| i) a) Training Courses | | | | |
| b) Conferences | | | | |
| c) Workshops | | | | |
| d) Seminars | | | | |
| ii) On-Farm Adaptive Research | | | | |
| iii) Method and Result Demonstrations | | | | |
| iv) Publications | | | | |
| v) Radio | | | | |
| vi) Television | | | | |
| vii) Newspapers | | | | |
| viii) Mobile Audio-Visual Operations | | | | |
| ix) Field/Achievement Days | | | | |
| x) a) Science and Technology Briefings | | | | |
| b) Trade Fairs | | | | |
| c) Agricultural Shows | | | | |
| d) Exhibitions | | | | |
| xi) Group Meetings | | | | |
| xii) Individual Contact Methods (Specify) | | | | |

49. How often did your Institute use the following communication methods to contact States Extensions Service and Related Government Agencies in the process of disseminating research results?

| Communication Methods | No of Times per Year | | | |
|---|----------------------|------|------|------|
| | 1984 | 1985 | 1986 | 1987 |
| i) a) Training Courses | | | | |
| b) Conferences | | | | |
| c) Workshops | | | | |
| d) Seminars | | | | |
| ii) On-Farm Adaptive Research | | | | |
| iii) Method and Result Demonstrations | | | | |
| iv) Publications | | | | |
| v) Radio | | | | |
| vi) Television | | | | |
| vii) Newspapers | | | | |
| viii) Mobile Audio-Visual Operations | | | | |
| ix) Field/Achievement Days | | | | |
| x) a) Science and Technology Briefings | | | | |
| b) Trade Fairs | | | | |
| c) Agricultural Shows | | | | |
| d) Exhibitions | | | | |
| xi) Group Meetings | | | | |
| xii) Individual Contact Methods (Specify) | | | | |

50. How often did your Institute use the following communication methods to contact Federal Extension Service and Related Agencies in the process of disseminating research results?

| Communication Methods | No of Times per Year | | | |
|---|----------------------|------|------|------|
| | 1984 | 1985 | 1986 | 1987 |
| i) a) Training Courses | | | | |
| b) Conferences | | | | |
| c) Workshops | | | | |
| d) Seminars | | | | |
| ii) On-Farm Adaptive Research | | | | |
| iii) Method and Result Demonstrations | | | | |
| iv) Publications | | | | |
| v) Radio | | | | |
| vi) Television | | | | |
| vii) Newspapers | | | | |
| viii) Mobile Audio-Visual Operations | | | | |
| ix) Field/Achievement Days | | | | |
| x) a) Science and Technology Briefings | | | | |
| b) Trade Fairs | | | | |
| c) Agricultural Shows | | | | |
| d) Exhibitions | | | | |
| xi) Group Meetings | | | | |
| xii) Individual Contact Methods (Specify) | | | | |

51. How often did your Institute use the following communication methods to contact Farmer's Cooperatives and other Farmer's Associations in the process of disseminating research results?

| Communication Methods | No of Times per Year | | | |
|---|----------------------|------|------|------|
| | 1984 | 1985 | 1986 | 1987 |
| i) a) Training Courses | | | | |
| b) Conferences | | | | |
| c) Workshops | | | | |
| d) Seminars | | | | |
| ii) On-Farm Adaptive Research | | | | |
| iii) Method and Result Demonstrations | | | | |
| iv) Publications | | | | |
| v) Radio | | | | |
| vi) Television | | | | |
| vii) Newspapers | | | | |
| viii) Mobile Audio-Visual Operations | | | | |
| ix) Field/Achievement Days | | | | |
| x) a) Science and Technology Briefings | | | | |
| b) Trade Fairs | | | | |
| c) Agricultural Shows | | | | |
| d) Exhibitions | | | | |
| xi) Group Meetings | | | | |
| xii) Individual Contact Methods (Specify) | | | | |

52. How often did your Institute use the following communication methods to contact National Agricultural Extension and Research Liaison Services (NAERLS) in the process of disseminating research results?

| Communication Methods | No of Times per Year | | | |
|---|----------------------|------|------|------|
| | 1984 | 1985 | 1986 | 1987 |
| i) a) Training Courses | | | | |
| b) Conferences | | | | |
| c) Workshops | | | | |
| d) Seminars | | | | |
| ii) On-Farm Adaptive Research | | | | |
| iii) Method and Result Demonstrations | | | | |
| iv) Publications | | | | |
| v) Radio | | | | |
| vi) Television | | | | |
| vii) Newspapers | | | | |
| viii) Mobile Audio-Visual Operations | | | | |
| ix) Field/Achievement Days | | | | |
| x) a) Science and Technology Briefings | | | | |
| b) Trade Fairs | | | | |
| c) Agricultural Shows | | | | |
| d) Exhibitions | | | | |
| xi) Group Meetings | | | | |
| xii) Individual Contact Methods (Specify) | | | | |

53. How often did your Institute use the following communication methods to contact Urban People and Opinion Leaders in the process of disseminating research results?

| Communication Methods | No of Times per Year | | | |
|---|----------------------|------|------|------|
| | 1984 | 1985 | 1986 | 1987 |
| i) a) Training Courses | | | | |
| b) Conferences | | | | |
| c) Workshops | | | | |
| d) Seminars | | | | |
| ii) On-Farm Adaptive Research | | | | |
| iii) Method and Result Demonstrations | | | | |
| iv) Publications | | | | |
| v) Radio | | | | |
| vi) Television | | | | |
| vii) Newspapers | | | | |
| viii) Mobile Audio-Visual Operations | | | | |
| ix) Field/Achievement Days | | | | |
| x) a) Science and Technology Briefings | | | | |
| b) Trade Fairs | | | | |
| c) Agricultural Shows | | | | |
| d) Exhibitions | | | | |
| xi) Group Meetings | | | | |
| xii) Individual Contact Methods (Specify) | | | | |

54. How often did your Institute use the following communication methods to contact Practising Farmers and Rural People in the process of disseminating research results?

| Communication Methods | No of Times per Year | | | |
|---|----------------------|------|------|------|
| | 1984 | 1985 | 1986 | 1987 |
| i) a) Training Courses | | | | |
| b) Conferences | | | | |
| c) Workshops | | | | |
| d) Seminars | | | | |
| ii) On-Farm Adaptive Research | | | | |
| iii) Method and Result Demonstrations | | | | |
| iv) Publications | | | | |
| v) Radio | | | | |
| vi) Television | | | | |
| vii) Newspapers | | | | |
| viii) Mobile Audio-Visual Operations | | | | |
| ix) Field/Achievement Days | | | | |
| x) a) Science and Technology Briefings | | | | |
| b) Trade Fairs | | | | |
| c) Agricultural Shows | | | | |
| d) Exhibitions | | | | |
| xi) Group Meetings | | | | |
| xii) Individual Contact Methods (Specify) | | | | |

55. How often did your Institute use the following communication methods to contact Professional Agricultural Associations in the process of disseminating research results?

| Communication Methods | No of Times per Year | | | |
|---|----------------------|------|------|------|
| | 1984 | 1985 | 1986 | 1987 |
| i) a) Training Courses | | | | |
| b) Conferences | | | | |
| c) Workshops | | | | |
| d) Seminars | | | | |
| ii) On-Farm Adaptive Research | | | | |
| iii) Method and Result Demonstrations | | | | |
| iv) Publications | | | | |
| v) Radio | | | | |
| vi) Television | | | | |
| vii) Newspapers | | | | |
| viii) Mobile Audio-Visual Operations | | | | |
| ix) Field/Achievement Days | | | | |
| x) a) Science and Technology Briefings | | | | |
| b) Trade Fairs | | | | |
| c) Agricultural Shows | | | | |
| d) Exhibitions | | | | |
| x) Group Meetings | | | | |
| xii) Individual Contact Methods (Specify) | | | | |

56. How often did your Institute use the following communication methods to contact National Farming System Research Groups in the process of disseminating research results?

| Communication Methods | No of Times per Year | | | |
|---|----------------------|------|------|------|
| | 1984 | 1985 | 1986 | 1987 |
| i) a) Training Courses | | | | |
| b) Conferences | | | | |
| c) Workshops | | | | |
| d) Seminars | | | | |
| ii) On-Farm Adaptive Research | | | | |
| iii) Method and Result Demonstrations | | | | |
| iv) Publications | | | | |
| v) Radio | | | | |
| vi) Television | | | | |
| vii) Newspapers | | | | |
| viii) Mobile Audio-Visual Operations | | | | |
| ix) Field/Achievement Days | | | | |
| x) a) Science and Technology Briefings | | | | |
| b) Trade Fairs | | | | |
| c) Agricultural Shows | | | | |
| d) Exhibitions | | | | |
| xi) Group Meetings | | | | |
| xii) Individual Contact Methods (Specify) | | | | |

57. How often did your Institute use the following communication methods to make contact (generally) in the process of disseminating research results?

| Communication Methods | No of Times per Year | | | |
|---|----------------------|------|------|------|
| | 1984 | 1985 | 1986 | 1987 |
| i) a) Training Courses | | | | |
| b) Conferences | | | | |
| c) Workshops | | | | |
| d) Seminars | | | | |
| ii) On-Farm Adaptive Research | | | | |
| iii) Method and Result Demonstrations | | | | |
| iv) Publications | | | | |
| v) Radio | | | | |
| vi) Television | | | | |
| vii) Newspapers | | | | |
| viii) Mobile Audio-Visual Operations | | | | |
| ix) Field/Achievement Days | | | | |
| x) a) Science and Technology Briefings | | | | |
| b) Trade Fairs | | | | |
| c) Agricultural Shows | | | | |
| d) Exhibitions | | | | |
| xi) Group Meetings | | | | |
| xii) Individual Contact Methods (Specify) | | | | |

58. How often did your Institute contact the various organizations specifically on Crops/Animal Production Aspects in the process of disseminating research results?

| Organizations/Groups | No of Times per Year | | | |
|--|----------------------|------|------|------|
| | 1984 | 1985 | 1986 | 1987 |
| i) Other National Agricultural and Related Research Institutes | | | | |
| ii) International Agricultural Research Centres | | | | |
| iii) Universities and other Basic Research and Teaching Institutions | | | | |
| iv) Policy Making Bodies | | | | |
| v) Private Sector/Commercial Organizations | | | | |
| vi) Banks and other Finance Institutions | | | | |
| vii) The General Public | | | | |
| viii) Media Organizations and Journalists | | | | |
| ix) States Extension Service and Related Agencies | | | | |
| x) Federal Extension System and Related Agencies (ADP, River Basins, NAFPP etc.) | | | | |
| xi) Farmers Co-operatives and other Farmer's Associations | | | | |
| xii) Zonal Agricultural Extension and Research Liaison Services (AERLS) | | | | |

- xiii) Urban People and
Opinion Leaders
- xiv) Practising Farmers and Rural
People
- xv) Professional Agricultural
Associations
- xvi) National Farming System
Research Network

59. How often did your Institute contact the various organizations specifically on Crops/Animal Protection Aspects in the process of disseminating research results?

| Organizations/Groups | No of Times per Year | | | |
|--|----------------------|------|------|------|
| | 1984 | 1985 | 1986 | 1987 |
| i) Other National Agricultural and Related Research Institutes | | | | |
| ii) International Agricultural Research Centres | | | | |
| iii) Universities and other Basic Research and Teaching Institutions | | | | |
| iv) Policy Making Bodies | | | | |
| v) Private Sector/Commercial Organizations | | | | |
| vi) Banks and other Finance Institutions | | | | |
| vii) The General Public | | | | |

- viii) Media Organizations and Journalists
- ix) States Extension Service and Related Agencies
- x) Federal Extension System and Related Agencies (ADP, River Basins, NAFPP etc.)
- xi) Farmers Co-operatives and other Farmer's Associations
- xii) Zonal Agricultural Extension and Research Liaison Services (AERLS)
- xiii) Urban People and Opinion Leaders
- xiv) Practising Farmers and Rural People
- xv) Professional Agricultural Associations
- xvi) National Farming System Research Network

60. How often did your Institute contact the various organizations specifically on Economics/Marketing Aspects in the process of disseminating research results?

| Organizations/Groups | No of Times per Year | | | |
|--|----------------------|------|------|------|
| | 1984 | 1985 | 1986 | 1987 |
| i) Other National Agricultural and Related Research Institutes | | | | |
| ii) International Agricultural Research Centres | | | | |

- iii) Universities and other
Basic Research and Teaching
Institutions
 - iv) Policy Making Bodies
 - v) Private Sector/Commercial
Organizations
 - vi) Banks and other Finance
Institutions
 - vii) The General Public
 - viii) Media Organizations and
Journalists
 - ix) States Extension Service
and Related Agencies
 - x) Federal Extension System
and Related Agencies (ADP,
River Basins, NAFPP etc.)
 - xi) Farmers Co-operatives and
other Farmer's Associations
 - xii) Zonal Agricultural Extension
and Research Liaison
Services (AERLS)
 - xiii) Urban People and
Opinion Leaders
 - xiv) Practising Farmers and Rural
People
 - xv) Professional Agricultural
Associations
 - xvi) National Farming System
Research Network
-

61. How often did your Institute contact the various organizations specifically on Post-Harvest (Storage, Processing, etc.) aspects in the process of disseminating research results?

| Organizations/Groups | No of Times per Year | | | |
|--|----------------------|------|------|------|
| | 1984 | 1985 | 1986 | 1987 |
| i) Other National Agricultural and Related Research Institutes | | | | |
| ii) International Agricultural Research Centres | | | | |
| iii) Universities and other Basic Research and Teaching Institutions | | | | |
| iv) Policy Making Bodies | | | | |
| v) Private Sector/Commercial Organizations | | | | |
| vi) Banks and other Finance Institutions | | | | |
| vii) The General Public | | | | |
| viii) Media Organizations and Journalists | | | | |
| ix) States Extension Service and Related Agencies | | | | |
| x) Federal Extension System and Related Agencies (ADP, River Basins, NAFPP etc.) | | | | |
| xi) Farmers Co-operatives and other Farmer's Associations | | | | |

- xii) Zonal Agricultural Extension and Research Liaison Services (AERLS)
- xiii) Urban People and Opinion Leaders
- xiv) Practising Farmers and Rural People
- xv) Professional Agricultural Associations
- xvi) National Farming System Research Network

62. How often did your Institute contact the various organizations specifically on Crops/Animal Products Utilization Aspects in the process of disseminating research results?

| Organizations/Groups | No of Times per Year | | | |
|--|----------------------|------|------|------|
| | 1984 | 1985 | 1986 | 1987 |
| i) Other National Agricultural and Related Research Institutes | | | | |
| ii) International Agricultural Research Centres | | | | |
| iii) Universities and other Basic Research and Teaching Institutions | | | | |
| iv) Policy Making Bodies | | | | |
| v) Private Sector/Commercial Organizations | | | | |
| vi) Banks and other Finance Institutions | | | | |

- vii) The General Public
- viii) Media Organizations and Journalists
- ix) States Extension Service and Related Agencies
- x) Federal Extension System and Related Agencies (ADP, River Basins, NAFPP etc.)
- xi) Farmers Co-operatives and other Farmer's Associations
- xii) Zonal Agricultural Extension and Research Liaison Services (AERLS)
- xiii) Urban People and Opinion Leaders
- xiv) Practising Farmers and Rural People
- xv) Professional Agricultural Associations
- xvi) National Farming System Research Network

63. How often did your Institute use the following communication methods to contact those organizations specifically on Crops/Animal Production Aspects in the disseminating research results?

| Communication Methods | No of Times per Year | | | |
|------------------------|----------------------|------|------|------|
| | 1984 | 1985 | 1986 | 1987 |
| i) a) Training Courses | | | | |
| b) Conferences | | | | |
| c) Workshops | | | | |
| d) Seminars | | | | |

- ii) On-Farm Adaptive Research
 - iii) Method and Result Demonstrations
 - iv) Publications
 - v) Radio
 - vi) Television
 - vii) Newspapers
 - viii) Mobile Audio-Visual Operations
 - ix) Field/Achievement Days
 - x) a) Science and Technology Briefings
 - b) Trade Fairs
 - c) Agricultural Shows
 - d) Exhibitions
 - xi) Group Meetings
 - xii) Individual Contact Methods (Specify)
-

64. How often did your Institute use the following communication methods to contact those organizations specifically on Crops/Animal Protection Aspects in the disseminating research results?

| Communication Methods | No of Times per Year | | | |
|-----------------------|----------------------|------|------|------|
| | 1984 | 1985 | 1986 | 1987 |

- i) a) Training Courses
- b) Conferences
- c) Workshops
- d) Seminars

- ii) On-Farm Adaptive Research
- iii) Method and Result Demonstrations
- iv) Publications
- v) Radio
- vi) Television
- vii) Newspapers
- viii) Mobile Audio-Visual Operations
- ix) Field/Achievement Days
 - x) a) Science and Technology Briefings
 - b) Trade Fairs
 - c) Agricultural Shows
 - d) Exhibitions
- xi) Group Meetings
- xii) Individual Contact Methods (Specify)

65. How often did your Institute use the following communication methods to contact those organizations specifically on Economics/Marketing Aspects in the disseminating research results?

| Communication Methods | No of Times per Year | | | |
|-----------------------|----------------------|------|------|------|
| | 1984 | 1985 | 1986 | 1987 |

- i) a) Training Courses
- b) Conferences
- c) Workshops
- d) Seminars

- ii) On-Farm Adaptive Research
 - iii) Method and Result Demonstrations
 - iv) Publications
 - v) Radio
 - vi) Television
 - vii) Newspapers
 - viii) Mobile Audio-Visual Operations
 - ix) Field/Achievement Days
 - x) a) Science and Technology Briefings
 - b) Trade Fairs
 - c) Agricultural Shows
 - d) Exhibitions
 - xi) Group Meetings
 - xii) Individual Contact Methods (Specify)
-

66. How often did your Institute use the following communication methods to contact those organizations specifically on Post-Harvest (Storage, Processing, etc.) Aspects in the process of disseminating research results?

| Communication Methods | No of Times per Year | | | |
|-----------------------|----------------------|------|------|------|
| | 1984 | 1985 | 1986 | 1987 |

- i) a) Training Courses
- b) Conferences
- c) Workshops
- d) Seminars

- ii) On-Farm Adaptive Research
- iii) Method and Result Demonstrations
- iv) Publications
- v) Radio
- vi) Television
- vii) Newspapers
- viii) Mobile Audio-Visual Operations
- ix) Field/Achievement Days
 - x) a) Science and Technology Briefings
 - b) Trade Fairs
 - c) Agricultural Shows
 - d) Exhibitions
- xi) Group Meetings
- xii) Individual Contact Methods (Specify)

67. How often did your Institute use the following communication methods to contact those organizations specifically on Crops/Animal Products Utilization Aspects in the process of disseminating research results?

| Communication Methods | No of Times per Year | | | |
|-----------------------|----------------------|------|------|------|
| | 1984 | 1985 | 1986 | 1987 |

- i) a) Training Courses
- b) Conferences
- c) Workshops
- d) Seminars

- ii) On-Farm Adaptive Research
 - iii) Method and Result Demonstrations
 - iv) Publications
 - v) Radio
 - vi) Television
 - vii) Newspapers
 - viii) Mobile Audio-Visual Operations
 - ix) Field/Achievement Days
 - x) a) Science and Technology Briefings
 - b) Trade Fairs
 - c) Agricultural Shows
 - d) Exhibitions
 - xi) Group Meetings
 - xii) Individual Contact Methods (Specify)
-

- 68. Do you think your Institute has the capacity to effectively reach all her target farmers in Nigeria alone (on her own)? Yes/No:
- 69. Do you agree that there are other organizations/groups whose roles can be complimentary to that of the States Extension Service in effectively disseminating your research results to farmers, etc.? Yes/No:
- 70. State the major reasons why your Institute contact other organizations in addition to the States Extension Service:

71. Score (tick) the performance of these educational tasks by States Extension Service in the Local Government Area within which your Institute is located?

| Tasks | Exce- llent | Very Good | Good | Fair | Poor | Very Poor |
|---|----------------|--------------|------|------|------|--------------|
| a) Dissemination of research results to farmers and other users | | | | | | |
| b) Transmission of farmers and other users problems to research. | | | | | | |
| c) Liaison with relevant organizations, groups of people and local leaders. | | | | | | |

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APPENDIX II

COMPUTATION OF THE CHI-SQUARE VALUE FOR DETERMINING
THE RELATIONSHIP BETWEEN ORGANIZATIONS TARGET
AND THE TYPE OF RESEARCH INSTITUTE

(a) PROBLEM FORMULATION:

| INSTITUTES: FREQUENCY, EXPECTED, PERCENT, ROW PCI, COL PCI, | ORGANIZATIONS | | | | | | TOTAL |
|--|--------------------------------|-----------------------------|-------------------------------|-----------------------------|-------------------------------|-----------------------------|----------------|
| | GO 1 | GO 2 | GO 3 | GO 4 | GO 5 | GO 6 | |
| GR 1 | 944 24.14 60.67 43.81 | 47 1.20 3.02 35.88 | 246 6.29 15.81 32.11 | 49 1.25 3.15 41.18 | 203 5.19 13.05 37.45 | 67 1.71 4.31 33.84 | 1556 39.79 |
| GR 2 | 524 13.40 54.30 24.32 | 30 0.77 3.11 22.90 | 167 4.27 17.31 21.80 | 35 0.89 3.63 29.41 | 166 4.24 17.20 30.63 | 43 1.10 4.46 21.72 | 965 24.67 |
| GR 3 | 687 17.57 49.42 31.38 | 54 1.38 3.88 41.22 | 353 9.03 25.40 46.08 | 35 0.89 2.52 29.41 | 173 4.42 12.45 31.92 | 88 2.25 6.33 44.44 | 1390 35.54 |
| TOTAL: | 2155 55.10 | 131 3.35 | 766 19.59 | 119 3.04 | 542 13.86 | 198 5.06 | 3911 100.00 |

(b) RESULTS DISSEMINATION:

| | | ORGANIZATIONS | | | | | | |
|-------------|-----------|---------------|-------|-------|-------|-------|-------|--------|
| INSTITUTES: | | 60 1 | 60 2 | 60 3 | 60 4 | 60 5 | 60 6 | TOTAL |
| FREQUENCY, | EXPECTED, | | | | | | | |
| PERCENT, | ROW PCI, | | | | | | | |
| COL PCI, | | | | | | | | |
| GR 1 | | 998 | 95 | 193 | 54 | 511 | 418 | 2269 |
| | | 16.10 | 1.53 | 3.11 | 0.87 | 8.24 | 6.74 | 36.60 |
| | | 43.98 | 4.19 | 8.51 | 2.38 | 22.52 | 18.42 | |
| | | 40.88 | 41.85 | 29.11 | 36.99 | 36.22 | 31.88 | |
| GR 2 | | 576 | 60 | 147 | 46 | 263 | 297 | 1389 |
| | | 9.29 | 0.97 | 2.37 | 0.74 | 4.24 | 4.79 | 22.41 |
| | | 41.47 | 4.32 | 10.58 | 3.31 | 18.93 | 21.38 | |
| | | 23.60 | 26.43 | 22.17 | 31.51 | 18.64 | 22.65 | |
| GR 3 | | 867 | 72 | 323 | 46 | 637 | 596 | 2541 |
| | | 13.99 | 1.16 | 5.21 | 0.74 | 10.28 | 9.61 | 40.99 |
| | | 34.12 | 2.83 | 12.71 | 1.81 | 25.07 | 23.46 | |
| | | 35.52 | 31.72 | 48.72 | 31.51 | 45.15 | 45.46 | |
| TOTAL: | | 2441 | 227 | 663 | 146 | 1411 | 1311 | 6199 |
| | | 39.38 | 3.66 | 10.70 | 2.36 | 22.76 | 21.15 | 100.00 |

APPENDIX III

COMPUTATION OF THE CHI-SQUARE VALUE FOR DETERMINING
THE RELATIONSHIP BETWEEN TARGET ORGANIZATIONS
AND PURPOSE OF COMMUNICATION

| ORGANIZATIONS FREQUENCY, EXPECTED, PERCENT, ROW PCT, COL PCT. | P U R P O S E | | TOTAL |
|--|---|---|-------------------|
| | PU 1 | PU 2 | |
| GO 1 | 1540 1355.3 14.98 43.45 39.18 | 2004 2188.7 19.50 56.55 31.57 | 3544 34.48 |
| GO 2 | 716 735.0 6.97 37.25 18.21 | 1206 1187.0 11.73 62.75 19.00 | 1922 18.70 |
| GO 3 | 647 524.7 6.29 47.16 16.46 | 725 847.3 7.05 52.84 11.42 | 1372 13.35 |
| GO 4 | 386 509.4 3.76 28.98 9.82 | 946 822.6 9.20 71.02 14.90 | 1332 12.96 |

| | | | |
|--------|-------|-------|--------|
| 60 5 | 280 | 509 | 789 |
| | 301.7 | 487.3 | |
| | 2.72 | 4.95 | 7.68 |
| | 35.49 | 64.51 | |
| | 7.12 | 8.02 | |
| <hr/> | | | |
| 60 6 | 362 | 958 | 1320 |
| | 504.8 | 815.2 | |
| | 3.52 | 9.32 | 12.84 |
| | 27.42 | 72.58 | |
| | 9.21 | 15.09 | |
| <hr/> | | | |
| TOTAL: | 3931 | 6348 | 10279 |
| | 38.24 | 61.76 | 100.00 |
| <hr/> | | | |

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APPENDIX IV

COMPUTATION OF THE CHI-SQUARE VALUE FOR DETERMINING THE
RELATIONSHIP BETWEEN COMMUNICATION METHODS USED BY
RESEARCH INSTITUTES AND TARGET ORGANIZATIONS

(a) PROBLEMS FORMULATION:

| ORGANIZATIONS: FREQUENCY, EXPECTED, PERCENT, ROW PCT, COL PCT. | M E T H O D S | | | TOTAL |
|---|---------------|-------|-------|-------|
| | GM 1 | GM 2 | GM 3 | |
| GM 1 | 655 | 935 | 486 | 2076 |
| | 546.5 | 931.0 | 598.4 | |
| | 16.87 | 24.09 | 12.52 | 53.48 |
| | 31.55 | 45.04 | 23.41 | |
| | 64.09 | 53.70 | 43.43 | |
| GM 2 | 35 | 26 | 41 | 102 |
| | 26.9 | 45.7 | 29.4 | |
| | 0.90 | 0.67 | 1.06 | 2.63 |
| | 34.31 | 25.49 | 40.20 | |
| | 3.42 | 1.49 | 3.66 | |
| GM 3 | 147 | 391 | 355 | 893 |
| | 235.1 | 400.5 | 257.4 | |
| | 3.79 | 10.07 | 9.14 | 23.00 |
| | 16.46 | 43.78 | 39.75 | |
| | 14.38 | 22.46 | 31.72 | |
| GM 4 | 15 | 73 | 50 | 138 |
| | 36.3 | 61.9 | 39.8 | |
| | 0.39 | 1.88 | 1.29 | 3.55 |
| | 10.87 | 52.90 | 36.23 | |
| | 1.47 | 4.19 | 4.47 | |

| | | | | |
|-------|-------|-------|-------|--------|
| GM 5 | 123 | 255 | 120 | 498 |
| | 131.1 | 223.3 | 143.6 | |
| | 3.17 | 6.57 | 3.09 | 12.83 |
| | 24.70 | 51.20 | 24.10 | |
| | 12.04 | 14.65 | 10.72 | |
| ----- | | | | |
| GM 6 | 47 | 61 | 67 | 175 |
| | 46.1 | 78.5 | 50.4 | |
| | 1.21 | 1.57 | 1.73 | 4.51 |
| | 26.86 | 34.86 | 38.29 | |
| | 4.60 | 3.50 | 5.99 | |
| ----- | | | | |
| TOTAL | 1022 | 1741 | 1117 | 3882 |
| | 26.33 | 44.85 | 28.83 | 100.00 |
| ----- | | | | |

(b) RESULT DISSEMINATION

| ORGANIZATIONS: FREQUENCY, EXPECTED, PERCENT, ROW PCT, COL PCT. | M E T H O D S | | | TOTAL |
|---|---------------|-------|--------|-------|
| | GM 1 | GM 2 | GM 3 | |
| GM 1 | 318 | 961 | 1073 | 2352 |
| | 280.1 | 913.5 | 1158.4 | |
| | 5.01 | 15.14 | 16.90 | 37.05 |
| | 13.52 | 40.86 | 45.62 | |
| | 42.06 | 38.97 | 34.31 | |
| ----- | | | | |
| GM 2 | 54 | 49 | 155 | 258 |
| | 30.7 | 100.2 | 127.1 | |
| | 0.85 | 0.77 | 2.44 | 4.06 |
| | 20.93 | 18.99 | 60.08 | |
| | 7.14 | 1.99 | 4.96 | |
| ----- | | | | |

| | | | | |
|-------|-------|-------|-------|--------|
| GM 3 | 88 | 388 | 333 | 801 |
| | 95.4 | 311.1 | 394.5 | |
| | 1.39 | 5.99 | 5.24 | 12.62 |
| | 10.99 | 47.44 | 41.57 | |
| | 11.64 | 15.41 | 10.65 | |
| GM 4 | 19 | 94 | 42 | 155 |
| | 18.5 | 60.2 | 76.3 | |
| | 0.30 | 1.48 | 0.66 | 2.44 |
| | 12.26 | 60.65 | 27.10 | |
| | 2.51 | 3.81 | 1.34 | |
| GM 5 | 106 | 549 | 763 | 1418 |
| | 168.8 | 550.8 | 698.4 | |
| | 1.67 | 8.65 | 12.02 | 22.33 |
| | 7.48 | 38.72 | 53.81 | |
| | 14.02 | 22.26 | 24.40 | |
| GM 6 | 171 | 433 | 761 | 1365 |
| | 162.5 | 530.2 | 672.3 | |
| | 2.69 | 6.82 | 11.99 | 21.50 |
| | 12.53 | 31.72 | 55.75 | |
| | 22.62 | 17.56 | 24.34 | |
| TOTAL | 756 | 2466 | 3127 | 6349 |
| | 11.91 | 38.84 | 49.25 | 100.00 |

APPENDIX V

COMPUTATION OF THE CHI-SQUARE VALUE FOR DETERMINING THE
RELATIONSHIP BETWEEN SPECIFIC PROBLEM AREAS FOR RESEARCH
AND TARGET ORGANIZATIONS

(a) PROBLEMS FORMULATION:

| ORGANIZATIONS: FREQUENCY, EXPECTED, PERCENT, ROW PCT, COL PCT. | SPECIFIC PROBLEM AREAS | | | | | TOTAL |
|---|------------------------|-------|-------|-------|-------|-------|
| | P 1 | P 2 | P 3 | P 4 | P 5 | |
| GO 1 | 12 | 145 | 4 | 64 | 51 | 276 |
| | 17.6 | 125.9 | 13.7 | 67.2 | 51.6 | 39.09 |
| | 1.70 | 20.54 | 0.57 | 9.07 | 7.22 | |
| | 4.35 | 52.54 | 1.45 | 23.19 | 18.48 | |
| | 26.67 | 45.03 | 11.43 | 37.21 | 38.64 | |
| GO 2 | 3 | 8 | 3 | 13 | 3 | 30 |
| | 1.9 | 13.7 | 1.5 | 7.3 | 5.6 | 4.25 |
| | 0.42 | 1.13 | 0.42 | 1.84 | 0.42 | |
| | 10.00 | 26.67 | 10.00 | 43.33 | 10.00 | |
| | 6.67 | 2.48 | 8.57 | 7.56 | 2.27 | |
| GO 3 | 8 | 71 | 10 | 54 | 41 | 184 |
| | 11.7 | 83.9 | 9.1 | 44.8 | 34.4 | 26.06 |
| | 1.13 | 10.06 | 1.42 | 7.65 | 5.81 | |
| | 4.35 | 38.59 | 5.43 | 29.35 | 22.28 | |
| | 17.78 | 22.05 | 28.57 | 31.40 | 31.06 | |
| GO 4 | 3 | 3 | 6 | 4 | 4 | 20 |
| | 1.3 | 9.1 | 1.0 | 4.9 | 3.7 | 2.83 |
| | 0.42 | 0.42 | 0.85 | 0.57 | 0.57 | |
| | 15.00 | 15.00 | 30.00 | 20.00 | 20.00 | |
| | 6.67 | 0.93 | 17.14 | 2.33 | 3.03 | |

| | | | | | | |
|--------|-------|-------|-------|-------|-------|--------|
| GO 5 | 12 | 79 | 3 | 25 | 29 | 148 |
| | 9.4 | 65.5 | 7.3 | 36.1 | 27.7 | |
| | 1.70 | 11.19 | 0.42 | 3.54 | 4.11 | 20.96 |
| | 8.11 | 53.38 | 2.03 | 16.89 | 19.59 | |
| | 26.67 | 24.53 | 8.57 | 14.53 | 21.97 | |
| GO 6 | 7 | 16 | 9 | 12 | 4 | 48 |
| | 3.1 | 21.9 | 2.4 | 11.7 | 9.0 | |
| | 0.99 | 2.27 | 1.27 | 1.70 | 0.57 | 6.80 |
| | 14.58 | 33.33 | 18.75 | 25.00 | 8.33 | |
| | 15.56 | 4.97 | 25.71 | 6.98 | 3.03 | |
| TOTAL: | 45 | 322 | 35 | 172 | 132 | 706 |
| | 6.37 | 45.61 | 4.96 | 24.36 | 18.70 | 100.00 |

(b) RESULTS DISSEMINATION:

| ORGANIZATIONS: FREQUENCY, EXPECTED, PERCENT, ROW PCT, COL PCT. | SPECIFIC PROBLEM AREAS | | | | | TOTAL |
|---|------------------------|-------|------|-------|-------|-------|
| | P 1 | P 2 | P 3 | P 4 | P 5 | |
| GO 1 | 18 | 180 | 7 | 192 | 52 | 449 |
| | 31.3 | 193.4 | 51.1 | 103.1 | 70.1 | |
| | 1.36 | 13.65 | 0.53 | 14.56 | 3.94 | 34.04 |
| | 4.01 | 40.09 | 1.56 | 42.76 | 1.58 | |
| | 19.57 | 31.69 | 4.67 | 63.37 | 25.24 | |
| GO 2 | 10 | 22 | 4 | 19 | 8 | 63 |
| | 4.4 | 27.1 | 7.2 | 14.5 | 9.8 | |
| | 0.76 | 1.67 | 0.30 | 1.44 | 0.61 | 4.78 |
| | 15.87 | 34.92 | 6.35 | 30.16 | 12.70 | |
| | 10.87 | 3.87 | 1.67 | 6.27 | 3.88 | |

| | | | | | | |
|--------|-------|-------|-------|-------|-------|--------|
| GO 3 | 17 | 114 | 60 | 20 | 23 | 234 |
| | 16.3 | 100.8 | 26.6 | 53.8 | 36.5 | |
| | 1.29 | 8.64 | 4.55 | 1.52 | 1.74 | 17.74 |
| | 7.26 | 48.72 | 25.64 | 8.55 | 9.83 | |
| | 18.48 | 20.07 | 40.00 | 6.60 | 11.17 | |
| GO 4 | 12 | 25 | 8 | 6 | 4 | 55 |
| | 3.8 | 23.7 | 6.3 | 12.6 | 8.6 | |
| | 0.91 | 1.90 | 0.61 | 0.45 | 0.30 | 4.17 |
| | 21.82 | 45.45 | 14.55 | 10.90 | 7.27 | |
| | 13.04 | 4.40 | 5.33 | 1.98 | 1.94 | |
| GO 5 | 11 | 71 | 3 | 38 | 31 | 154 |
| | 10.7 | 66.3 | 17.5 | 35.4 | 24.1 | |
| | 0.83 | 5.38 | 0.23 | 2.88 | 2.35 | 11.68 |
| | 7.14 | 46.10 | 1.95 | 24.68 | 20.13 | |
| | 11.96 | 12.50 | 2.00 | 12.54 | 15.05 | |
| GO 6 | 24 | 156 | 68 | 28 | 88 | 364 |
| | 25.4 | 156.7 | 41.4 | 83.6 | 56.8 | |
| | 1.82 | 11.83 | 5.16 | 2.12 | 6.67 | 27.60 |
| | 6.59 | 42.86 | 18.68 | 7.69 | 24.18 | |
| | 26.09 | 27.46 | 45.33 | 9.24 | 42.72 | |
| TOTAL: | 92 | 568 | 150 | 303 | 206 | 1319 |
| | 6.97 | 43.06 | 11.37 | 22.97 | 15.62 | 100.00 |

APPENDIX VI

**COMPUTATION OF THE CHI-SQUARE VALUE FOR DETERMINING
DEPENDENCE OF COMMUNICATION METHODS USED BY
RESEARCH INSTITUTES AND PURPOSE OF COMMUNICATION**

| METHODS: FREQUENCY, EXPECTED, PERCENT, ROW PCT., COL PCT. | P U R P O S E | | TOTAL |
|--|---------------|--------|--------|
| | PU 1 | PU 2 | |
| GM 1 | 1354 | 839 | 2193 |
| | 857.6 | 1335.4 | |
| | 12.46 | 7.72 | 20.17 |
| | 61.74 | 38.26 | |
| | 31.85 | 12.68 | |
| GM 2 | 1685 | 2525 | 4210 |
| | 1646.4 | 2563.6 | |
| | 15.50 | 23.23 | 38.73 |
| | 40.02 | 59.98 | |
| | 39.64 | 38.15 | |
| GM 3 | 1212 | 3255 | 4467 |
| | 1746.9 | 2720.1 | |
| | 11.15 | 29.94 | 41.09 |
| | 27.13 | 72.87 | |
| | 28.13 | 49.18 | |
| TOTAL: | 4251 | 6619 | 10870 |
| | 39.11 | 60.89 | 100.00 |

APPENDIX VII

CHI-SQUARE COMPUTATION FOR DETERMINING THE
RELATIONSHIP BETWEEN SPECIFIC AREAS FOR RESEARCH
AND COMMUNICATION METHODS USED BY THE INSTITUTES

(a) PROBLEMS FORMULATION:

| PROBLEMS; FREQUENCY, EXPECTED, PERCENT, ROW PCT, COL PCT. | M E T H O D S | | | TOTAL |
|--|---------------------------------------|---|---|------------------|
| | GM 1 | GM 2 | GM 3 | |
| P 1 | 3 3.2 0.38 18.75 1.90 | 5 5.9 0.64 31.25 1.72 | 8 6.9 1.02 50.00 2.37 | 16 2.04 |
| P 2 | 83 68.1 10.56 24.48 52.53 | 139 125.5 17.68 41.00 47.77 | 117 145.3 14.89 34.51 34.72 | 339 43.13 |
| P 3 | 3 2.6 0.38 23.08 | 4 4.8 0.51 30.77 1.37 | 6 5.6 0.76 46.15 1.78 | 13 1.65 |
| P 4 | 19 42.8 2.42 8.92 12.03 | 90 78.9 11.45 42.25 30.93 | 104 91.3 13.23 48.83 30.86 | 213 27.10 |

| | | | | |
|--------|-------|-------|-------|--------|
| P 5 | 50 | 53 | 102 | 205 |
| | 41.2 | 75.9 | 87.9 | |
| | 6.36 | 6.74 | 12.98 | 26.08 |
| | 24.39 | 25.85 | 49.76 | |
| | 31.65 | 18.21 | 30.27 | |
| <hr/> | | | | |
| TOTAL: | 158 | 291 | 337 | 786 |
| | 20.10 | 37.02 | 42.88 | 100.00 |

(b) RESULTS DISSEMINATION:

| PROBLEMS: FREQUENCY, EXPECTED, PERCENT, ROW PCT, COL PCT. | M E T H O D S | | | TOTAL |
|--|---------------|-------|-------|-------|
| | GM 1 | GM 2 | GM 3 | |
| P 1 | 3 | 9 | 11 | 29 |
| | 2.4 | 12.8 | 13.8 | |
| | 0.24 | 0.72 | 1.36 | 2.31 |
| | 10.34 | 31.03 | 58.62 | |
| | 2.86 | 1.62 | 2.86 | |
| <hr/> | | | | |
| P 2 | 61 | 249 | 274 | 584 |
| | 48.9 | 258.0 | 277.1 | |
| | 4.86 | 19.86 | 21.85 | 46.57 |
| | 10.45 | 42.64 | 46.92 | |
| | 58.10 | 44.95 | 46.05 | |
| <hr/> | | | | |
| P 3 | 10 | 84 | 32 | 126 |
| | 10.6 | 55.7 | 59.8 | |
| | 0.80 | 6.70 | 2.55 | 10.05 |
| | 7.94 | 66.67 | 25.40 | |
| | 9.52 | 15.16 | 5.38 | |

| | | | | |
|--------|-------|-------|-------|--------|
| P 4 | 18 | 121 | 181 | 320 |
| | 26.8 | 141.4 | 151.8 | |
| | 1.44 | 9.65 | 14.43 | 25.52 |
| | 5.63 | 37.81 | 56.56 | |
| | 17.14 | 21.84 | 30.42 | |
| <hr/> | | | | |
| P 5 | 13 | 91 | 91 | 195 |
| | 16.3 | 86.1 | 92.5 | |
| | 1.04 | 7.26 | 7.26 | 15.55 |
| | 6.67 | 46.67 | 46.67 | |
| | 12.38 | 16.43 | 15.29 | |
| <hr/> | | | | |
| TOTAL: | 105 | 554 | 595 | 1254 |
| | 8.37 | 44.18 | 47.45 | 100.00 |
| <hr/> | | | | |

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APPENDIX VIII

COMPUTATION OF THE CHI-SQUARE VALUE FOR DETERMINING THE
RELATIONSHIP BETWEEN TYPES OF RESEARCH INSTITUTES AND
COMMUNICATION METHODS USED

(a) PROBLEMS FORMULATION:

| INSTITUTES; FREQUENCY, EXPECTED, PERCENT, ROW PCT, COL PCT. | M E T H O D S | | | TOTAL |
|--|--------------------------------|--------------------------------|--------------------------------|----------------|
| | GM 1 | GM 2 | GM 3 | |
| GR 1 | 814 18.93 42.98 58.39 | 573 13.33 30.25 33.87 | 507 11.79 26.77 41.80 | 1894 44.06 |
| GR 2 | 255 5.93 25.00 18.29 | 474 11.03 46.47 28.01 | 291 6.77 28.53 23.99 | 1020 23.73 |
| GR 3 | 325 7.56 23.47 23.31 | 645 15.00 46.57 38.12 | 415 9.65 29.96 34.21 | 1385 32.22 |
| TOTAL: | 1394 32.43 | 1692 39.36 | 1213 28.22 | 4299 100.00 |

(b) RESULTS DESSEMINATION:

| INSTITUTES: FREQUENCY, EXPECTED, PERCENT, ROW PCT., COL PCT. | M E T H O D S | | | |
|---|-------------------------------|---------------------------------|---------------------------------|----------------|
| | GM 1 | GM 2 | GM 3 | TOTAL |
| GR 1 | 298 4.59 12.62 35.60 | 677 13.50 37.15 36.12 | 1186 16.26 50.23 36.71 | 2361 36.35 |
| GR 2 | 194 2.99 13.13 23.18 | 525 8.08 35.52 21.62 | 759 11.68 51.35 23.49 | 1478 22.75 |
| GR 3 | 345 5.31 12.98 41.22 | 1026 15.79 38.61 42.26 | 1268 19.80 48.40 39.80 | 2657 40.90 |
| TOTAL: | 837 12.88 | 2428 37.38 | 3231 49.74 | 6496 100.00 |

APPENDIX IX

KRUSKAL-WALIS COMPUTATION FOR POSSIBLE DIFFERENCES
IN THE RANKING OF COMMUNICATION METHODS USED BY
RESEARCH INSTITUTES

| LEVEL | NO | SUM OF SCORES | EXPECTED UNDER HD | STD. DEV. UNDER HD | MEAN SCORE |
|--------|----|---------------|-------------------|--------------------|------------|
| IAR | 18 | 3150.50 | 2925.00 | 385.79 | 195.03 |
| IART | 18 | 3407.50 | 2925.00 | 385.79 | 189.31 |
| NCRI | 18 | 3513.00 | 2925.00 | 385.79 | 195.17 |
| NIHORT | 18 | 2793.00 | 2925.00 | 385.79 | 155.17 |
| NRCRI | 18 | 3598.50 | 2925.00 | 385.79 | 199.42 |
| CRIN | 18 | 2905.50 | 2925.00 | 385.79 | 161.42 |
| NIFOR | 18 | 3185.50 | 2925.00 | 385.79 | 176.97 |
| PRIN | 18 | 2825.00 | 2925.00 | 385.79 | 156.94 |
| NAPRI | 18 | 3389.00 | 2925.00 | 385.79 | 188.25 |
| NVRI | 18 | 2427.50 | 2925.00 | 385.79 | 134.86 |
| NITR | 18 | 2521.50 | 2925.00 | 385.79 | 140.08 |
| FRIN | 18 | 2084.50 | 2925.00 | 385.79 | 115.81 |
| LCRI | 18 | 2905.00 | 2925.00 | 385.79 | 161.39 |
| KLRI | 18 | 2146.50 | 2925.00 | 385.79 | 119.25 |
| NIOMR | 18 | 2451.00 | 2925.00 | 385.79 | 136.17 |
| NSPRI | 18 | 3007.00 | 2925.00 | 385.79 | 167.06 |
| LERIN | 18 | 2153.00 | 2925.00 | 385.79 | 120.17 |
| AERLS | 18 | 3825.50 | 2925.00 | 385.79 | 212.53 |