Farmer motivation patterns in participating in adaptive crop research trials/demonstrations in Sierra Leone

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Farmer motivation patterns in participating in adaptive crop research trials/demonstrations in Sierra Leone

by

Amadu Muhamed Bangura

A Dissertation Submitted to the Graduate Faculty in Partial Fulfillment of the Requirements for the Degree of DOCTOR OF PHILOSOPHY

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1983
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CHAPTER 1. INTRODUCTION

In many developing countries, up to 85 percent of the population is rural and depends on agriculture for its livelihood (World Bank, 1975). The increasing interest towards rural development among policy makers in developing countries, especially during the past two decades, is therefore not surprising. In the West African country of Sierra Leone, for example, various agricultural programs have continued to enjoy high priority in the national development package for improving the general well-being of the people. Although the program delivery mechanisms vary among different government change agents, a common element among the change agents is to convince farmers to change from traditional farming patterns to improved technologies. Programs such as the provision of supervised credit, free farm inputs, demonstration farms, farmer training, and adaptive research would hopefully increase productivity and hence the standard of living in rural communities. In short, the major task of most change agents in Sierra Leone is the provision of farm inputs, and to a large extent the communication and diffusion of innovations among farmers.

Communication itself has been the focus of many diffusion and adoption studies conducted by rural sociologists. Yet few studies have concerned themselves with the effect of farmer motivation on adoption. Unquestionably, an understanding of such motivation patterns would enhance the effectiveness of planning and executing agricultural extension programs in developing countries. In light of the above, a greater part
of this study will focus on understanding farmers' values and attitudes towards development projects. Specifically, it will focus on the values and attitudes of Sierra Leone farmers toward the Adaptive Crop Research and Extension (ACRE) project, and how these could be linked to the program delivery system to increase clientele participation and hence program adoption.

Research Problem and Objectives

When a gap exists between the goals of a social system and the existing situation, research is necessary to provide objective information which would be useful to all people involved for improving the situation. The Sierra Leone ACRE project presently is in such a dilemma, in which there exists a gap between the objectives of the project (increased farmer production through adoption of farm innovations) and the existing negative attitudes by farmers towards the program. Although the problem of farmers' resistance to innovations is usually common among peasants in developing countries (Rogers, 1969), the Sierra Leone problem raises two fundamental questions for the proposed research: (1) What are the major variables affecting farmers' adoption of innovations in Sierra Leone, and (2) what variables are manipulable for farmer motivation and hence increasing participation and adoption of the ACRE project programs.

Focusing on this gap and the two questions raised, the objectives of the research are: (1) To identify and diagnose factors affecting clientele participation and adoption of the ACRE project programs,
and (2) to suggest strategies for motivating farmers in adopting farm innovations in Sierra Leone.

The specific objectives are to:

(1) Determine Sierra Leone farmers' characteristics which influence adoption of farm innovations.

(2) Determine the extent to which ACRE project contact farmers have adopted the recommended agricultural innovations.

(3) Determine the relationships between farmers' characteristics and the adoption of recommended agricultural innovations.

(4) Determine whether farmers perceive ACRE project innovations as viable alternatives to their traditional patterns of crop production.

(5) Determine relationships between farmer motivation and adoption of ACRE project innovations.

(6) Generate implications of the research findings for future research and program modification to stimulate farmer adoption.

Justification

The rationale for studying farmer motivation patterns in Sierra Leone originates in the problems which numerous change agents face in disseminating innovations among farmers and stimulating them to adopt such new practices. Therefore, a basic step in promoting such motivation is an understanding of farmer characteristics, including their attitudes and value systems. It is equally important to understand the
program delivery system, which could be a contributing factor in con­straining farmer participation and hence constraining adoption of farm innovations. A knowledge of farmers' characteristics and the nature of the delivery system can enhance understanding of program limitations and the necessary modifications for achieving program objectives.

For instance, if a relationship exists between change agents' visits and adoption scores, then programs could be redesigned in terms of the numbers and/or types of farm visits by change agents. Similarly, if the recognition of farmers within their own village stimulates adoption, then change agents would need to include mechanisms for providing recognition in the delivery system. Additionally, if farmers' inability to adopt an innovation is due to lack of capital for buying farm inputs, then the program could be modified to provide credit facilities for farmers. In short, knowing the change-inhibiting factors, including the program delivery system and farmers' social, psychological and economic constraints which could impede adoption, presents the change agent with the challenge of modifying the program to overcome such limitations. Furthermore, a knowledge of appropriate motivation strategies for affecting change could be very useful to policy makers and practitioners involved in rural development efforts in Sierra Leone and other developing countries.

Dissertation Outline

In accomplishing the stated objectives, the dissertation will comprise six chapters as follows: The first chapter has included an
 introduction, a statement of the problem and objectives, and a justification for the study. The second chapter will describe a general background of Sierra Leone agricultural development programs, and review the literature on the adoption/diffusion model. Specifically, various elements of the adoption/diffusion model and their shortcomings relating to developing countries in general and Sierra Leone in particular will be highlighted. In the third chapter, the theoretical framework for farmer motivation will be presented. The theoretical framework will guide the study and analysis of data. A multiple indicators approach to motivation will be discussed and the motivation variables including communication, demonstration farm visits, farmer training, perceived benefits, appropriateness of technology (compatibility) and farmer recognition will be adopted as criteria for motivation. In addition, the relevant individual farmer characteristic variables and the change inhibiting factors to motivation and hence adoption will be addressed. Lastly, the model variables and their definitions including hypotheses will be presented. The fourth chapter which deals with the methodology will describe the research setting, including the target population, methods of data collection, sampling procedures, operationalization of concepts, and statistical techniques used in analyzing the data. The fifth chapter will deal with analysis and discussion of the research findings in relation to the research problem and objectives, and existing adoption/diffusion theories. In the sixth and final chapter, the results will be summarized and conclusions will be drawn in relation to the objectives of the research and policy ramifications.
CHAPTER 2. REVIEW OF THE LITERATURE ON
THE ADOPTION/DIFFUSION MODEL

Introduction

The first chapter was concerned with stating the research problem, the objectives of the study, and justification for the dissertation. In the second chapter, there will be a brief review of the literature on adoption and diffusion studies and a discussion of various elements of the classical adoption and diffusion model and its shortcomings as it relates to developing countries. To place this in context, a brief discussion on agricultural development in Sierra Leone is in order.

Agricultural Development in Sierra Leone

Within a total area of 27,000 sq. miles, nearly 80 percent of Sierra Leone's 3.5 million people live in rural areas and depend mostly on subsistence farming for a livelihood. Besides the mining industry (diamonds, iron-ore, rutile and bauxite), agricultural production (cocoa, coffee, ginger, sesame and piassava) still remains the mainstay of the country's export economy. However, with the current decline in mining operations, especially the iron-ore and diamonds, the importance of agriculture has become even more evident to the national policy makers. Apart from the urgent need to boost export earnings, the desire to improve the nation's agricultural industry has been made more obvious by the ever-increasing importation of rice, the nation's staple. Contrary to the current decline in rice production, Sierra Leone was a rice exporter between 1931 and 1954 (Jarret, 1956; Jordan, 1965). Since then, the country
has increasingly depended on rice imports in part due to the diamond boom in 1958 which attracted much of the farming population, the increasing population, and the rural migration to urban centers for jobs and social amenities. Additionally, the very low priority given to agricultural development before 1974 by the national government contributed to the irreconcilable average agricultural production increase of 1.5 percent/year with a population increase of 2.3 percent/year (USDA, 1977:2-3).

Recognizing this urgent need to alleviate the rice importation problem, the government of Sierra Leone has given the highest priority to agriculture during the past five years with the aim of transforming subsistence production to more stable productive farms which will hopefully make the country self-sufficient in food (USDA, 1977). This emphasis on agricultural development is manifest in the appropriation of 32 percent of the nation's development budget in the 1978/79 fiscal year, compared with the 4 percent in 1969 fiscal year (USDA, 1977). Besides the Integrated Agricultural Development projects, one of the programs in progress for boosting agricultural production is the on-farm research trials and demonstrations which were initiated two years ago by the joint efforts of the Sierra Leone government and the United States Agency for International Development, under the name of the Adaptive Crop Research and Extension (ACRE) project. The success of such a program depends in part on the willingness of the farmers to adopt the new practices introduced by the change agents.

Unfortunately, one limitation of the project has been the reluctance
of farmers to actively participate in the program or adopt the innovations. In certain instances, some farmers have actually refused the establishment of trial plots on their farms, let alone adopted the recommended practices. Thus, a problematic gap exists between the objectives of the ACRE project (farmer participation/adoption) and the existing negative attitudes of farmers towards the program. In light of the above, the primary purpose of the research is to examine the ACRE project to provide valuable insight and suggestions for policy makers and the project's personnel. This should help in designing programs which could enhance farmer motivation and hence adoption of ACRE project innovations in Sierra Leone.

Why farmers resist innovations

Social change theory posits that one of the reasons for resistance to change "could be due to the presence in the recipient culture of material and systems which are, or are felt to be, irreconcilable with the invading traits or systems and therefore tend to block them, checking their further diffusion" (Kroeber, 1964:143). For instance, it may be easier to introduce yams as a staple food in a staple-free community than in one with a long tradition of well-established staple food habits. Similarly, Norman (1969) concludes that farmers' response to economic incentives is contingent upon meeting their production targets of growing crops which maximize their security needs. He notes that in Zaria (northern Nigeria) in spite of the positive correlation between early planting and cotton yields, farmers continued to sow cotton only after
having planted their staple crops (yams, maize, and cassava). In a related study, Carr (1971) argues that resistance to adoption could be due to the incongruity of farmers' objectives and those of the change agents. For example, while farmers in some developing countries may expect highest yields for the least labor input, the extension organization may be anticipating increased yields per acre. Consistent with the above findings, Norman (1974) confirmed that under conditions of limited rainfall in northern Nigeria, traditional mixed cropping proved more rewarding than the recommended modern monocultural practices. In a related study, Biggs contends that "the failure of farmers to adopt new technological 'packages' entirely may be due to a sign of creativity rather than backwardness" (Biggs, 1980:23). He notes that in Bangladesh and Bihar, traditional rice varieties and bamboo tubewells respectively, outperformed the new rice varieties or the steel tubewells introduced by change agents. These findings lend support to the need to understand how research contributes to adapting technological packages to specific agroclimatic and sociocultural situations.

Closely related to these findings, Foster (1973) has discussed at least five change-inhibiting factors inherent both in traditional societies and the structure and functions of the bureaucratic mechanism within the change agency. The first of these factors is cultural barriers, that is, the effect of traditional values, beliefs, norms and attitudes on the innovation. For example, an improved seed program failed in India because "it has long been thought a disgrace and a sign of failure or poor management to be forced to borrow or buy seed. The village farmer
takes pride in being able to raise enough food to maintain his family and having enough left over to use as seed" (Opler and Sigh, 1952:7). Similarly, despite the earlier adoption of a hybrid corn in a Mexican project, Apodaca (1952) reports the subsequent rejection of the innovation due to the perceived inferior quality of the corn dough. Consistently, Isaac (1971) found that farmers in Sierra Leone adopted a new rice variety because of its superiority over the traditional variety in terms of its texture and keeping quality.

A second change-inhibiting factor is social barriers that are due to the social structure, social relationships, class factors, authority, political units and factions. For instance, in many traditional societies informal exchange and reciprocity are social imperatives which could be complementary to social integration, yet constraining innovativeness and productivity. A man who amasses wealth and fails to share with his kin, especially during weddings and funerals, could be heavily criticized and ostracized (Macgregor, 1946).

A third change-inhibiting factor is psychological barriers due to communication problems, the nature of perceptions, and individual and group motivation. For instance, Neisser (1955) attributes the failure of a community development program in Nigeria to the villagers' perceptions and suspicion of government authorities. There is also a negative perception of free gifts in traditional communities. For example, Barker (1959) showed how people in Zululand attached prestige to paying heavily for medical facilities.

Economic constraints is a fourth change-inhibiting factor. A major
part of the economic factor is the inability of farmers to purchase inputs for the trials and subsequent adoption of innovations.

Finally, within the extension organization itself, the bureaucratic mechanism is a subculture which could inhibit innovativeness. Many change agents including some foreign experts may know very little about village conditions. Yet they often operate under the assumption that strategies which have been well-received in western countries could be successfully applied in developing countries.

Literature Review on Adoption and Diffusion Studies

For many decades, rural sociologists have continued in their interest in understanding and explaining the behavior patterns of people in the adoption and nonadoption of innovations. Early adoption and diffusion studies are recorded as far back as the late 1930s. By 1943, the most widely known adoption and diffusion study (Ryan and Gross, 1943), which focused on the diffusion of hybrid corn in Iowa, gave momentum to the interest in diffusion research. "To date, more than 1,100 empirical studies of adoption and diffusion processes have been completed in the fields of anthropology, sociology, medical sociology, education, communication and marketing" (Yarbrough et al., 1972:2).

For the purposes of this research, adoption is a decision-making process through which individuals become aware of a new idea, practice or product and accept it in their everyday life. On the other hand, diffusion is the mechanism through which a new idea, practice or product spreads through a social system. Rogers and Shoemaker (1971) have conceptualized the adoption process into five stages. The five stages are:
(1) the awareness stage among a target audience, (2) the interest arousal or information-gathering stage, (3) the evaluation stage, during which the potential adopter makes a mental judgment of the workability of the innovation, (4) the trial stage, when the individual tries the innovation on a small scale, and (5) the adoption (full acceptance of the innovation), which usually follows a successful trial stage (Beal and Bohlen, 1957). Innovations can also be rejected at any stage along the process. Moreover, there is usually no clear distinction between these stages. Individuals can vacillate between the stages or move from awareness, straight on to adoption, especially if the innovation is low in cost with no major consequences (Rogers, 1962).

This latter point indicates that the attributes of an innovation affects its rate of adoption. For instance, Wilkening (1950) and Rogers (1961) note that the rate at which an innovation is adopted largely depends on the nature of the innovation itself. The five universally relevant attributes which determine the rate of adoption of an innovation are: (1) its relative advantage over other alternatives, (2) its compatibility with the social norms and production patterns of the target group, (3) its complexity or difficulty of understanding, (4) the degree to which it can be tried in small amounts (trialability), and (5) its observability.

Research has also indicated that almost without any exception, the earlier adopters are more progressive, have higher income and wealth, have higher education, tend to be key functionaries, are more cosmopolitan, and if they are farmers, operate larger farms. Those people with
opposite characteristics tend to be later adopters (Ascroft et al., 1973).

In a given social system, an innovation follows a general pattern of diffusion. A small group of innovators with sufficient resources to take risks and with few change-inhibiting factors in the social system often initiate adoption. Such individuals usually obtain information through the mass media or extension. Soon these highly innovative individuals are imitated by a larger group of highly placed people (early adopters) who adopt only when they are certain of the innovation's potential benefits. Following this stage, the innovation spreads quite rapidly, often by word of mouth, till majority of the people have adopted. The poor, less informed, and most isolated individuals called laggards are usually the last to adopt (Bohlen, 1960).

In spite of the wealth of knowledge now available about adoption behavior, one major limitation of adoption and diffusion research remains. This is its confinement to developed areas of the world. This limitation notwithstanding, many policy makers and extension professionals have adopted the classical adoption and diffusion model without adequate modifications to suit the different sociocultural and economic realities in developing countries. One assumption of the classical adoption model is that conditions in research centers are compatible with those among the clientele groups. For example, in most developed countries, farmers are reasonably literate and adequately informed about scientific agricultural research findings. Moreover, the types of machinery and permanent farm structures that exist in the technology
development centers are identical with those on the clientele's farm operations. Unfortunately, the opposite is often the case in developing countries because there is often a wide disparity between conditions in the research center and what actually obtains in farmers' operational environments. As a matter of fact, many arguments have been presented for the cognizance of these differences in implementing the classical adoption and diffusion model in developing countries.

Shortcomings of the Adoption/Diffusion Model

The classical diffusion model has had wide implementation in developing countries. However, in recent years, much criticism has been levied against the model because of inadequate modifications to suit the specific local conditions. For instance, Beltrans (1976) contends that in the classical diffusion model there is no provision for including the social structure in which innovations are introduced, especially in developing countries. Also, the model operates on the assumption that communication induces development and technological innovations, regardless of whom it may benefit and whom it may harm.

By ignoring the milieu in which innovations are introduced, e.g. the power structure of the community, Drake (1971), Parra (1966), and Roca (1969) argue that communication and access to increased productivity have largely served the interest of the elite groups in Latin America. In a related study, Diaz-Bordenave (1976) has emphasized the need to understand the diversity of farmers, the economic consequences of innovations, and the role of the media in the communication of innovations in developing countries. Instead of contending with the classical diffusion model,
which is often concerned with what happens to the innovation, the new model, he continues, should focus on what happens to the adopter and his society.

Structuralists such as Blau (1960) have also argued against the diffusion model assumption that individuals are completely in control of the decision to adopt innovations. He maintains that individuals are influenced by common values within the community and by those significant others who are part of the individual's network of the social relations. For instance, in a study to determine the effect of individual and community characteristics on innovativeness in Togo (West Africa), Francis (1974) found a positive relationship between community structural differentiation and farmers' adoption scores. In a related study, Han (1970) illustrated the usefulness of balance theory in attitude change. He confirmed that the adoption of innovations by an individual depends not only on his perception of the innovation but also upon those of his significant others. In addition to use of opinion leaders in the diffusion process, Chesterfield and Puddle (1976) established that extension agents in Venezuela generally ignored relatives and other community members who were considered as opinion leaders, thus resulting in the low adoption of farm innovations. A complementary study by Currens (1976) showed an increase in the adoption of rice-growing innovations in Liberia when women were included in the program, especially in the decision-making process.

Ascroft et al. (1973), Chambers (1980), and Roling et al. (1976) observed that diffusion strategies have focused on the minority, the more
progressive, richer, and easily reachable farmers, thus ignoring the more deprived majority who are isolated and include the poorest of the poor. They recommend an introspection into the nature of the extension system including diagnostic studies of rural problems in collaboration with clientele groups. For instance, Airey et al. (1979) found that due to lack of prior diagnostic studies, several major program modifications were necessary for the success of an integrated agricultural development project in Sierra Leone. These included such things as the construction of feeder roads and treatment for waterborne diseases by clients. In Kenya, Ascroft et al. (1973) showed that through diagnostic studies, diffusion programs could reach the so-called non-innovative laggards.

Lastly, many diagnostic or evaluation studies have emphasized program goal attainment while paying little attention to the very important aspect of measuring the intensity and frequency of actual program delivery. Quay (1977), Patton (1978), and Lee-Sehrest et al. (1979) maintain that such studies need to focus on program treatment, services delivered, and personnel involvement including training and supervision.

The literature reviewed in this chapter has indicated that individuals generally go through five stages during the process of adoption or rejection of an innovation. These stages are awareness, interest, evaluation, trial, and adoption or rejection. There are five attributes which affect the adoption of an innovation. These are its relative advantage, compatibility, complexity, divisibility, and observability. The literature also indicates that among any social group, earlier
adopters tend to be the more progressive, wealthier, more educated, more cosmopolitan, key functionaries, and farmers who operate larger farms.

Almost without exception, when an innovation is introduced in any community, it is usually accepted first by a small group of innovators. The innovators, in turn, are imitated by a small majority of early adopters. From then on, the adoption assumes a snowball pattern till most people have adopted. Although this classical adoption/diffusion model has been successfully implemented in developed countries, the evidence presented in this chapter suggests a need for theoretical and methodological modifications to suit local conditions especially in a developing country such as Sierra Leone. In this light, the theoretical framework in the following chapter leans heavily on a process of purposive external motivational factors as a modification of the classical adoption/diffusion model for stimulating interest in and the adoption of agricultural innovations in Sierra Leone.
CHAPTER 3. THEORETICAL FRAMEWORK FOR FARMER MOTIVATION

Introduction

A theory often serves as a frame of reference for the researcher and the audience. As a matter of fact,

A science without a theory is blind because it lacks that element which alone is able to organize facts and give direction to research. It is necessary to have a theory . . . which is empirical and not speculative. This means that theory and facts must be closely related to each other. (Kurt Lewin, 1936:4)

Similarly, Merton (1968) states that there is an interdependent relationship between sociological theory and empirical research. The purpose of this chapter is to develop this theoretical frame of reference. The chapter will: (1) present a rationale for the motivation perspective chosen for this study; (2) discuss a multiple indicators approach to motivation, including the variables and expected relationships; and (3) derive general and specific hypotheses for the study. However, because a comprehensive review of all adoption and diffusion studies cannot be fully covered in this dissertation, the primary concern will be the adoption and diffusion of agricultural innovations.

Theoretical Frameworks

In most of rural Sierra Leone, many farmers still depend on traditional farming methods and low yielding varieties. Yet, improved technologies and new high yielding varieties are available, either from the ACRE project or other agricultural extension programs in the country. Within this framework, the major problem confronting change agents in the country is how to increase awareness among farmers and motivate them
to adopt the new technologies.
A major tool for increasing the adoption of farm innovations in Sierra Leone is through an effective communication system that pays greatest attention to farmer motivation. From a social psychological perspective, Lerner (1958), McClelland (1961), and Hagen (1962) have advanced the case for motivation by asserting that innovativeness is usually initiated by an increased number of creative and motivated individuals in a society.

Moreover, the decision to adopt an innovation is often a voluntary social action process occurring within a specific social context. Parsons (1968) has espoused that social action involves individual actors striving to achieve their goals at the least cost within some biological, cultural and environmental (ecological) constraints. In this context, motivation would be seen as a constraint modifier for effecting a kind of social change among individuals, communities, and societies.

Motivation could also be justified from Parsons' social systems perspective. Parsons (1968) conceptualizes the universe as a social system composed of subsystems whose existence depends on the functions of adaptation, goal attainment, integration, and latent pattern maintenance (AGIL). Such functions are consistent with the organismic, personality, social, and cultural systems, respectively. Furthermore, integration among these subsystems involves a cybernetic hierarchy of control consisting of information and energetic controls. Thus, the culture according to Parsons controls the social, which in turn controls
the personality, and the latter controls the organismic system. Alternatively, the organismic system provides energy for the personality, which provides energy for the social, and the social in turn provides energy for the cultural system. Within this framework, Parsons views social change occurring due to excesses in either information or energy exchange among the subsystems. For example, excess motivation (energy) could affect the modification of the systems' roles, and normative structures, leading to adoption in the diffusion of innovations. In the case of traditional communities, for example, age ranks very high within the normative social status hierarchy. In such communities, an effective extension program which emphasizes motivation may stimulate increased knowledge and income among certain elements within the community. Thus, the benefits derived from the new technology could enhance the upward mobility of knowledgeable individuals within the social status hierarchy. Such emphasis on knowledge instead of age is in part an alteration of the normative structures.

In the same orientation, rural communities in Sierra Leone are conceptualized as subsystems to which Parsons' functional imperatives are applicable for justifying motivation. As he states, a social system must have "a sufficient proportion of its component actors adequately motivated to act in accordance with the requirements of its role systems" (Parsons, 1968:27).

"Motivation is a purposive or goal-directed behaviour that is acquired through experience by learning. It is a way of gratifying needs and desires" (Vago, 1980:213). However, motivation in this study
specifically refers to those activities of change agents which induce the active participation of the target group in the planned change. This is different from the internal need achievement motivation which is more or less concerned with individual personality traits.

Certain devices or procedures could elucidate or stimulate a means of satisfying one's desires. For instance, "we believe that most human actions are the result of tensions. When tension differentials become strong enough, they lead to action" (Dichter, 1960:38). Dichter identifies three principles, for "triggering off" of action in some desired goal which are relevant to this study. These include: (1) a functional principle in which motives are believed to have a reason, are interrelated, and have an influencing effect on each other; (2) a dynamic principle, which maintains that motives are culturally influenced; and (3) the "fetish rationality" in which people are believed to make decisions relative to their gains and losses. This last principle is consistent with Katz (1960), Homans (1961), and Blau's (1967) utilitarian orientation to adoption, in which they argue that all adoption is a function of gains or rewards. In effect, high-rewarding innovations have a better chance for adoption than low-rewarding innovations. Thus, the motivation model that follows centers around a functional utility approach.

The Theoretical Model and Variables

Considering the limitations of the classical diffusion model and the need for farmer motivation as a modification of the diffusion strategy, the model in the research starts from individual clientele characteristics and change inhibiting variables to motivation variables, and finally
INPUTS

- Individual and social characteristics
  - Social participation
  - Social status
  - Individual goal

- Change inhibiting factors
  - Economic constraints

PROCESS

- Communication
- Demonstration farm visit
- Perceived benefit
- Appropriateness of technology
- Farmer recognition

OUTPUT

Adoption

Figure 1. Farmer motivation model
to adoption, as illustrated in Figure 1. The resulting general causal model could be discussed as follows. One factor that enhances the adoption/diffusion process is motivation, which has to do with the change agents' strategies for inducing attitudes and behavioral change among the target population. Blake and Moulton have emphasized the need for motivation by pointing out that "if a man has little knowledge of what really makes men tick, less than a precise sense of why men act as they do, and only a vague awareness of what motivates others, he will have little chance of getting excellent results" (Blake and Moulton, 1965:5).

The three stages in the model include: inputs, motivation as a process, and adoption as output. In the first stage, the inputs will include: understanding farmers' characteristics, their attitudes and value systems, and the change inhibiting factors within the community which are expected to have effects on the second stage, motivation. Such motivation will include: effective communication, demonstration farm visits, perceived benefits, appropriateness of technology, and farmer recognition. Lastly, the motivation process is expected to have direct effect on the degree of farmer adoption of the ACRE project innovations in Sierra Leone.

The Variables and Definitions

**Individual and social characteristics**

The individual and social characteristics will include: social participation, social status, and individual goals.

**Social participation** Social participation is the degree to which an individual is involved in community affairs and has membership in
community organizations. Such social organizations are sources of farm information; hence, they provide opportunities for farmers to meet others who share their problems and interests. Mulford and Klonglan (1972) note a strong relationship between perceived rewards for participation in specific voluntary organizations and continued individual participation. In similar studies, Lioberger and Coughenour (1957), Clark and Akindode (1968), and Alao (1971) found participation in voluntary organizations to be positively related to adoption of farm innovations.

**Social status**

Social status includes the individual's prestige, income, education, and level of living. The level of living is the amount of materials and resources possessed by an individual for his everyday use. In most rural communities in Sierra Leone, social status includes age, family size, farm size, traditional leadership, and size of hired labor for farm operations. These variables were used for determining social status because the characteristics of the study group could not permit the use of conventional scales (Voh, 1980).

**Individual goals**

Individual goals include farmers' aspirations and what they wish to achieve in farming. From a voluntaristic theory of action perspective, Parsons (1968) views individuals as utilitarian goal-seeking actors having alternative choices for achieving their goals. The choice of any means for achieving a goal is influenced by internal and external (ecological) constraints, including social values and norms. Within this framework,
individual farmers' actions directed towards achieving a goal are expected to affect farmers' level of motivation. Hence, "if an individual's goals can be identified by an extension professional, they can be more effective as motivators" (Lewis, 1972:26). For example, Castillo (1964), Gupta (1966), Palmore and Freedman (1968), and Roy et al. (1968) have found that earlier adopters have higher aspirations (goals) than later adopters.

**Change inhibiting variables**

The environmental (change inhibiting) variables will include the traditional values, social cultural, and economic factors. Foster (1973) has demonstrated that cultural and economic constraints have a negative effect on adoption behavior. Rogers (1962) refers to these constraints as traditionalism. Copp (1956), Lerner (1958), and Benvenuti (1961) measured traditional dimensions by asking respondents about public issues as a yardstick for individuals' involvement outside their communities.

**Economic constraints**

Economic constraints refer to farmers' inability to purchase farm inputs such as labor, seeds, fertilizers, and pesticides. Gibson (1978) sees client motivation as benefit minus cost. "An individual uses many resources (power) in maintaining daily activities and personal commitments (load). The power that remains is the margin the individual has to invest in new activities. An individual who is about to engage in a new activity will examine his/her current margin and the potential costs and benefits of the new activity" (Gibson, 1978:7).
In a typical Sierra Leone rural community, the cost of an innovation affects the rate at which it could be tried and eventually adopted. Cost is closely related to the divisibility of the innovation (the degree to which an innovation could be tried in a small scale). Polgar (1963), Fliegel and Kivlin (1966) and Sigh (1966) have shown that the trialability of an innovation, as perceived by members of a social system, is positively related to its rate of adoption. Philips (1955) and Foster (1973) have illustrated resistance to the adoption of medical innovations due to poverty. Rogers and Shoemaker (1971) have also indicated that richer farmers, who have the means to take risks or purchase new technology, are faster adopters than poorer farmers.

Motivation variables

The motivation variables include: communication (program delivery), demonstration farm visits, perceived benefits (observability, appropriateness of technology (compatibility), and farmer recognition.

Motivation is a goal-oriented behavior which has been identified as "an act or activity by one person designed to stimulate or arouse a state within a second person or group of persons that under appropriate circumstances initiates or regulates activity in relation to goals" (Klausmeier, 1961:320). Hess and Miller (1954), Carter and Williams (1959), Morrison (1964), and Christiansen and Taylor (1966) have indicated that earlier adopters have higher levels of achievement motivation than later adopters. Many motivation variables such as rewards, training, communication, participation, achievement, and recognition have been used as social psychological concepts (Lodahl and Kejner, 1965;
Maslow, 1954; Herzberg, 1968) to measure their relation to job involve­
ment.

In the case of agricultural programs in many developing countries, farmer motivation is necessary because in some traditional societies such as the rural communities in Sierra Leone, individual need levels are culturally determined and can affect the decision process involving the adoption of agricultural innovations, and hence the attainment of higher order (social and psychological) need levels. In such communities, it is necessary to manipulate clientele environment through the process of farmer motivation including: effective communication, demonstration farm visits, perceived benefits from extension programs, the use of appropriate technology, and farmer recognition, which are discussed next.

**Communication (program delivery)**

Communication is "the degree to which information is transmitted among members of a social system" (Price, 1972:58). Mendez (1968), Guimaraes (1968), and Yadav (1967) report a faster rate of adoption among societies whose members had closer interpersonal communication. Part of communication has to do with program delivery, which refers to the processes in actual program implementation. Specifically, it deals with the structure and dynamics of the extension system, the intensity and integrity of clients/change agent interaction, and program evaluation, all of which constitute Foster's (1973) bureaucratic constraints to technological change. Intensity in this research means the
frequency of client/change agent interaction, while integrity means the strength or actual ingredients of the program delivered.

Many agricultural extension programs in developing countries have paid greater attention to clientele adoption rather than the question of how to motivate farmers to be innovative. Fundamental among any innovation promoting strategy is the actual intensity and integrity of the program delivered. Foster (1973) claims that the four prerequisites for promoting social change programs among individuals are: (1) the awareness among clients of an achievable realistic need; (2) an adequate knowledge of how to achieve that goal; (3) the availability of the means (materials and services) for achieving the need; and (4) a receptive environment towards innovations. Unquestionably, these prerequisites are within the manipulative capability of the change agency, especially the program delivery mechanism including the structure and dynamics of the innovating organization and the nature of client/change agent interaction. That is, "the way of tackling the problem itself" (Jackson, 1956:12).

Niehoff (1964), Petrini (1967), Whiting (1968), and Hursh (1969) have established that change agent success (adoption rate) is positively related to the extent of change agent effort, which in part is program implementation.

Some parameters Lee-Sechrest et al. (1979) have used for measuring program delivery include: staff qualifications, intensity of staff and client contact, length of contact, focus of treatment (specific vs. diffuse treatment), and clarity of treatment. In other words, "does
extension deliver its product(s) more effectively and/or efficiently than its competitors" (Biggs, 1980:8). Program effectiveness is the extent to which an organization achieves its prescribed goals. "Efficiency refers to the degree to which an organization allocates and utilizes its resources in such a way as to attain its goals at a minimum cost" (Mulford et al., 1977:92).

Demonstration farm visits

Since one of the strategies of the ACRE project is establishing demonstration farms, farm visit is an important factor for motivation. Mosher (1978) notes that farm visits inform, encourage, and assist farmers to become competent. Rogers (1962) and Chambers (1980) have confirmed that change agents reach the upper social status clientele who operate larger farms and live on access roads to the disadvantage of smaller, more remote, and lower status farmers. The inadequacy of change agents in Sierra Leone also justifies organized demonstration farm visits.

Perceived benefits

Perceived benefits (observability) is "the degree to which the results of an innovation are visible to others" (Rogers and Shoemaker, 1971:154). Hruschka and Rheinwald (1965) concluded that the more observable innovations were more widely adopted than the less observable ones.

Appropriateness of technology

A complementary factor to perceived benefits is the appropriateness of the technology (compatibility). One element of the appropriateness
of a technology for a social system is the degree of its compatibility with the social and cultural patterns of the clientele. "Compatibility is the degree to which an innovation is perceived as consistent with the existing values, past experiences, and needs of the receivers" (Rogers and Shoemaker, 1971:145). Compatibility ensures greater security for farmers. The incompatibility of an innovation (Rogers and Shoemaker, 1971) is reported to have been responsible for the failure of a milk producing innovation in India because of the taboo against cows and the low status attached to goat rearing.

**Farmer recognition**

Recognition refers to attention or acknowledgment for something done. In this study, farmer recognition means special notice given to clients for participating in the ACRE program. From a social psychological perspective, farmer recognition is a kind of reward for a positive response towards a specific stimulus, such as an innovation. Farmer recognition is a status booster, which satisfies a basic social psychological need such as social acceptance and recognition. Herzberg (1968) found a positive relationship between high performance and a sense of achievement, recognition, and responsibility. Van Dersal (1962) measured the amount of attention given to individuals for high performance as an index of recognition.

**Adoption**

Adoption is usually the continuous use of an innovation and has been defined as "a decision to make full use of a new idea as the best
course of action available" (Rogers and Shoemaker, 1971:26). Atala (1980) measured adoption as the number of recommended farm practices (innovations) in full and continuous use by farmers in northern Nigeria. The emphasis in this study is the behavioral aspect of adoption that is a direct action in which farm operators fully accept and actually use the recommended agricultural innovations.

Hypotheses

General hypothesis 1

There is a relationship between farmers' individual characteristics including social participation, age, farm income, farm size, hired labor, individual goal, and economic constraint, and adoption of agricultural innovations.

Subhypothesis 1 Social participation, age, farm income, farm size, hired labor, and individual goal are positively related to adoption scores.

E.H: 1.1 The higher the social participation, the higher the adoption.
E.H: 1.2 The older the farmer, the higher the adoption score.
E.H: 1.3 The higher the farm income, the higher the adoption score.
E.H: 1.4 The larger the farm size, the higher the adoption score.
E.H: 1.5 The more the hired labor, the higher the adoption score.
E.H: 1.6 The higher the individual goal, the higher the adoption score.

Subhypothesis 2 Economic constraints are negatively related to adoption scores.

E.H: 2.1 The higher the economic constraints, the lower the adoption scores.
General hypothesis 2

There is a relationship between farmers' characteristics and the level of farmer motivation (program delivery) including the frequency of the extension agents' visits (communication), demonstration farm visits, perceived benefits, the appropriateness of technology, and farmer recognition.

Subhypothesis 3 Social participation is positively related to communication, demonstration farm visits, perceived benefits, appropriateness of technology, and farm recognition.

E.H: 3.1 The higher the social participation, the higher the communication.

E.H: 3.2 The higher the social participation, the higher the demonstration farm visits.

E.H: 3.3 The higher the social participation, the higher the perceived benefits.

E.H: 3.4 The higher the social participation, the higher the appropriateness of the technology.

E.H: 3.5 The higher the social participation, the higher the farmer recognition.

Subhypothesis 4 Age is positively related to communication, demonstration farm visits, perceived benefits, appropriateness of technology, and farmer recognition.

E.H: 4.1 The older the farmer, the higher the communication.

E.H: 4.2 The older the farmer, the higher the demonstration farm visits.

E.H: 4.3 The older the farmer, the higher the perceived benefits.
E.H: 4.4 The older the farmer, the higher the appropriateness of technology.

E.H: 4.5 The older the farmer, the higher the recognition.

**Subhypothesis 5** Farm income is positively related to communication, demonstration farm visits, perceived benefits, appropriateness of technology, and farmer recognition.

E.H: 5.1 The higher the income, the higher the communication.

E.H: 5.2 The higher the income, the higher the demonstration farm visits.

E.H: 5.3 The higher the income, the higher the perceived benefits.

E.H: 5.4 The higher the income, the higher the appropriateness of technology.

E.H: 5.5 The higher the income, the higher the farmer recognition.

**Subhypothesis 6** Farm size is positively related to communication, demonstration farm visits, perceived benefits, appropriateness of technology, and farmer recognition.

E.H: 6.1 The larger the farm, the higher the communication.

E.H: 6.2 The larger the farm, the higher the demonstration farm visits.

E.H: 6.3 The larger the farm, the higher the perceived benefits.

E.H: 6.4 The larger the farm, the higher the appropriateness of technology.

E.H: 6.5 The larger the farm, the higher the farmer recognition.

**Subhypothesis 7** Hired labor is positively related to communication, demonstration farm visits, perceived benefits, appropriateness of technology, and farmer recognition.

E.H: 7.1 The higher the hired labor, the higher the communication.
E.H: 7.2 The higher the hired labor, the higher the demonstration farm visits.
E.H: 7.3 The higher the hired labor, the higher the perceived benefits.
E.H: 7.4 The higher the hired labor, the higher the appropriateness of the technology.
E.H: 7.5 The higher the hired labor, the higher the farmer recognition.

**Subhypothesis 8** Individual goal is positively related to communication, demonstration farm visits, perceived benefits, appropriateness of technology, and farmer recognition.
E.H: 8.1 The higher the individual goal, the higher the communication.
E.H: 8.2 The higher the individual goal, the higher the demonstration farm visits.
E.H: 8.3 The higher the individual goal, the higher the perceived benefits.
E.H: 8.4 The higher the individual goal, the higher the appropriateness of technology.
E.H: 8.5 The higher the individual goal, the higher the farmer recognition.

**Subhypothesis 9** Economic constraints are negatively related to communication, demonstration farm visits, perceived benefits, appropriateness of technology, and farmer recognition.
E.H: 9.1 The higher the economic constraints, the lower the communication.
E.H: 9.2 The higher the economic constraints, the lower the demonstration farm visits.
E.H: 9.3 The higher the economic constraint, the lower the perceived benefits.

E.H: 9.4 The higher the economic constraint, the lower the appropriateness of technology.

E.H: 9.5 The higher the economic constraints, the lower the farmer recognition.

General Hypothesis 3

There is a positive relationship between farmer motivation variables including communication demonstration farm visits, perceived benefit, appropriateness of technology, farmer recognition, and adoption scores.

E.H: 10 The higher the communication, the higher the adoption scores.

E.H: 11 The higher the demonstration farm visits, the higher the adoption scores.

E.H: 12 The higher the perceived benefits, the higher the adoption scores.

E.H: 13 The higher the appropriateness of technology, the higher the adoption scores.

E.H: 14 The higher the farmer recognition, the higher the adoption scores.
CHAPTER 4. METHODS AND PROCEDURES

Introduction

The main objectives in this chapter are to (1) describe the research setting, (2) present the sampling procedures, (3) describe the operationalization of variables, and (4) discuss the statistical techniques used in analyzing the data.

The Research Setting

Individual farm operators within the rural communities in the five Sierra Leone ACRE project zones located at Rokupr, Kabala, Makeni, Kenema, and Njala, respectively, were the units of analysis for this study. The first three zones (Rokupr, Kabala, and Makeni) are located in the Northern province of Sierra Leone. The Kenema zone is in the Eastern province, and the Njala zone, which is also the administrative and research headquarters for the ACRE project, is located at the agricultural university town of Njala in the Southern province (see Figure 2). Each of the five zones covers an operational area of approximately 25 miles radius, and the zonal headquarters are relatively more urban than the villages immediately surrounding these townships.

Geography of the area

Sierra Leone is generally characterized by two distinct (dry and wet) seasons, high humidity, high temperatures (average of 85°F), and heavy monsoon rains (about 200 inches/year), which fall during the wet season (May-October). These climatic factors together with the numerous topographic variations, the traditional farming practices, and the soil
Figure 2. ACRE project operational zones
types all contribute to high soil erodibility, resulting in the deteriorating soil fertility. The vegetation in the country varies from the thick tropical forests in the eastern and parts of the southern provinces to the large savannah grasslands in the northern province. Shifting cultivation (bush fallow) is the main cropping pattern practiced by farmers, who cultivate an average of 3.5 acres/year. The intensified shifting cultivation practices are also rapidly transforming most of the forests to secondary bush, and the latter to grasslands.

Moderately simple societies are the features of many rural communities in Sierra Leone. Among these people, common beliefs, shared consensus, and the care for kinfolk (Durkheim's mechanical solidarity) continues to strengthen the social bond. Polygamy is widely practiced, with common judicial and administrative institutions. Additionally, traditional secret societies and communal rotary work organizations are part of the enculturation process.

There are thirteen ethnic groups in the country. Among these, Mende and Temne predominate in the ACRE zones, but other groups are also represented. The ethnic diversity is important for understanding certain limitations in change agent/client communication.

In addition to language barriers, the inadequacy of feeder roads in the country including the ACRE zones equally places special constraints on the mobility of people and farm products. The major religions are Christianity and Muhammadanism, which are almost equally represented in the country. However, Moslems tend to dominate in numbers within the ACRE project zones.
Land tenure

Traditionally, land is owned by the extended family in the individual chiefdoms which are comprised of numerous villages or townships in the rural areas. Protection of the land within the chiefdom is usually entrusted to the paramount chief. Land cannot be sold for any reason. However, it is very common for nonmembers of a particular family to be allowed to cultivate a specific piece of land for one or two years, after paying a modest token fee (rent) for utilizing such lands. The land tenure system in Sierra Leone has a long tradition; it is very touchy and needs a lot of research to resolve the polemics for and against land sale in the rural areas. For now, it might be reasonable to mention that the status quo militates against large scale agricultural development, but at the same time, caution should prevail for a more equitable resolution of the problem.

Economic activities

Although mining of diamonds, iron-ore, bauxite, and rutile continues to attract many people, the major economic activity in rural Sierra Leone is subsistence farming. Since most farmers depend on natural rain, major cropping activities are conducted during the rainy season (May-October) and harvesting is done in the dry months between November and January. Rice is the staple crop grown by almost every farmer. Other locally consumed food crops include cassava, sweet potatoes, groundnuts, sorghum, millet, benniseed (sesame), maize, peas, beans, onions, vegetables, and plantation crops such as oilpalms, oranges and pineapples.
These plantation crops also have high commercial value in the local market. Other plantation crops grown purposely for commercial or export include: cocoa, coffee, tobacco, and ginger. Less than 20 percent of the total export earnings are realized from agricultural products.

Mining of diamonds, iron-ore, bauxite, and rutile provides over 70 percent of the nation's foreign exchange earnings. Moreover, modest industrial activities in forestry, textiles, brewery, oilpalm products, and tobacco provide few job opportunities for people in urban settlements. Within this framework, the ACRE project which is discussed next is designed to improve agricultural productivity in rural Sierra Leone.

The ACRE Project

The Sierra Leone Adaptive Crop Research and Extension (ACRE) project is cosponsored by the Sierra Leone government and the United States Agency for International Development (AID). The major objective is to increase agricultural productivity among small farm operators in the country. Through extension activities, the project expects to reach about 20,000 farm families in rural Sierra Leone. At the moment, the project's major emphasis is on locally consumed food crops such as rice, cassava, sweet potatoes, groundnuts, maize, beans and peas.

The major structural units of the project involved in program delivery are illustrated in Figure 3. As Figure 3 illustrates, the administrative structure of the ACRE project based at Njala University includes representatives from the USAID team and the Sierra Leone
Figure 3. ACRE project organizational linkages for program delivery
ministries of agriculture and education, respectively. Extension and research are the two major concerns of the project at Njala and other zonal areas.

Extension activities include disseminating proven technologies to farmers, conducting field trips, organizing demonstration farm visits and field-days, and to some extent supervising farm trials and demonstration plots. Such activities place extension personnel in direct contact with village communities and individual farm families. Extension also provides free mini-kits (seeds, cuttings, fertilizers, and pesticides), and about $20 compensation to each participating (contact) farmer. Feedback information from farmers is channelled through the extension network to the project's administrative structure at Njala and beyond.

The research component of the project conducts on-station experiments and trials and replicates such trials on contact farmers' fields, often through extension. Farmers' responses to such trials are also reported through the organizational hierarchy. In addition to research and extension, the project is also committed to a constant process and post program evaluation.

The ACRE project operates in five zones (different locations) in the country. Each zone constitutes several villages ranging in population from about 50 to 800 farm families. In each ACRE zone are 60 ACRE contact farmers who receive free mini-kits and regular agricultural information from the ACRE extension agents. The remainder of the farming population in the ACRE zones, the noncontact farmers, do not receive free
mini-kits or regular contact with ACRE extension agents. Noncontact farmers may, however, occasionally obtain direct or indirect information from ACRE change agents.

A notable feature in the ACRE villages is the presence of numerous other organizations or extension agencies such as: the Ministry of Agriculture, Peace Corps, CARE, Planned Parenthood Association (PPA), Planned International, Water wells program, literacy campaign, etc. Ironically, these organizations share very few or no linkages or communication among each other, notwithstanding the fact that they serve the same clients and share the common objective of improving living conditions in rural Sierra Leone.

The Rokupr zone

The Rokupr zone, located in the northwestern region (see Figure 4) is basically different from the other four zones by its low-lying lands and typically vast areas of mangrove (tidal) swamps. The swamps are characterized by high salinity in the dry season, but are very suitable for swamp rice production in the wet season. Swamp rice production is the major economic activity in this region, but fishing is also important, especially along the long coastal region. The national rice research station is based in this zone.

Temne is the major language in this area, but Susu, Limba, Fulla and Madingo are also important. The language diversity in this zone and the Kabala and Makeni zones poses special problems for change agent/client communication. Moreover, at least 70 percent of the population in this zone is Moslem, a cultural factor of economic importance in agriculture.
Figure 4. ACRE project chiefdoms and villages of contact farmers, Rokupr zone
A pest control problem is the monkey population. Because among Moslems monkey eating is a taboo, however, there is little enthusiasm for monkey pest control among farmers in this area.

The Kabala zone

This area is located in the uppermost northern region of the country (see Figure 5). Unlike the Rokupr zone, this area has a very high altitude. The land is undulating, with vast savannah grassfields, pockets of inland valley swamps, and more moderate temperatures and rainfall compared to other areas of the country. Because of the absence of large rivers in this zone, the incidence of the tsetse fly is very low, thus enhancing cattle production. The moderate rainfall experienced in this zone also encourages vegetable production throughout the year.

Farming is the major economic activity in this zone, especially beef and vegetable production. The major crops produced include rice, cassava, groundnuts, maize, millet, sorghum, sweet potatoes, onions, and tobacco.

The main languages in this zone include Madingo, Kuranko, Yalunka, Fulla, Susu, Temne, and Limba. Thus, the existence of many ethnic groups poses communication problems similar to the Rokupr and Makeni zones. Another problem for extension is the limited accessibility to farmers due to the very hilly topography. Despite these limitations, the Kabala zone has a very high agricultural potential due to its unique micro-climate.

The Makeni zone

Located in the heartland of the northern province (see Figure 6), the Makeni zone is characterized by vast flat savannah grassfields
Figure 5. ACRE project chiefdoms and villages of contact farmers, Kabala zone
Figure 6. ACRE project chiefdoms and villages of contact farmers, Makeni zone
(boli-lands), hot humid air, and heavy rains during the wet months. Apparently, the main factor for selecting this zone is the presence of the boli-lands, which are different from other soil types in Sierra Leone. Rice, groundnuts, tobacco and cattle are the major agricultural products in this area.

In addition to farming, trading and transport business are the major economic activities in this area.

Temne is the main ethnic group in this zone, but Limba, Lokko, Fulla, Susu, Kuranko, and Yalunka are equally important communication media. There are more Moslems in this zone than Christians, especially among the ACRE clientele groups.

The Kenema zone

The Kenema zone is located in the east (see Figure 7). Some areas are hilly with thick tropical rain forests. Lateritic upland soils predominate, but there are also vast inland valley swamps in which rice is grown almost throughout the year. Kenema is the most agriculturally productive among the five ACRE zones. The people in this area have a long history of commercial farming, mostly cocoa and coffee. With heavy rainfall and deep sandy loam soils, this zone is ideal for cocoa and coffee production, the nation's leading agricultural foreign exchange earners. In addition to the export crops, other locally consumed food items are widely grown in this area. In addition to farming, diamond mining and the forest industries operations make Kenema very unique in its economic potential.
Figure 7. ACRE project chiefdoms and villages of contact farmers, Kenema zone
Mende is the main ethnic group, and most farmers are Mende speakers. This is an advantage for extension communication. Christianity and the Muslim religions are almost evenly spread in this zone.

The Njala zone

The Njala zone is found in the south (see Figure 8). Njala is the nation's agricultural university town and the headquarters for the ACRE project. This area is relatively flat and dominated by secondary bush. Njala has the typical Sierra Leone climate of hot dry seasons followed by heavy rains in the wet periods of the year. Upland soils that are less fertile than those in Kenema predominate, but pockets of inland valley swamps are also present for rice cultivation.

Farming is the major economic activity in this area. Njala is also the main agricultural research center in the country. It is ideal for this purpose because of the university facilities.

Rice, cassava, sweet potatoes, maize, groundnuts, and many other crops are grown for local consumption. Ginger and oilpalm products are the major export crops produced in this area. Mende is the main language in the Njala area, and this factor, much like in the Kenema zone, enhances communication between change agents and clients.

To a large extent, it is the small differences in soil types, economic activities, and micro-climates that necessitated the location of the five different ACRE zones in the country.
Figure 8. ACRE project chiefdoms and villages of contact farmers, Njala zone
Sampling Procedures

The universe of the study was small farm operators in Sierra Leone, and the target population was all residents within the 25 mile radius around the Rokupr, Kabala, Makeni, Kenema, and Njala ACRE project locations. The five zonal project locations necessitated sampling in all five areas. The unit of analysis was the individual farmers within the specified areas. Because the respondents included ACRE project participating (contact) and nonparticipating farmers, a proportional random sampling technique was used in selecting our sample.

The high illiteracy among the target population necessitated a face-to-face structured interview schedule. It was administered to an equal number of participating and nonparticipating farmers (376 total) in the ACRE villages during February and March, 1982.

Sample Selection

The specific ACRE villages from which respondents were randomly selected were predetermined by the ACRE project operational areas. Because the ACRE project deals directly with about 60 farmers in each zone, it was decided to sample about two-thirds (40 farmers) of that population and an equal number of noncontact farmers in each zone. Since each zone constitutes several villages, a proportional simple random sample was selected from each ACRE village.

Sample selection for the ACRE contact farmers was relatively easy. When a proportional sample size was decided for representing contact farmers in each ACRE village, a simple random sample (ballot) was drawn
from the list of contact farmers in the village (sample frame).

In the case of noncontact farmers, a modified version of simple random sampling was used because of the lack of a comprehensive listing of all farmers in each village (sample frame). The process involved selecting from a proxy list of houses found in the village (Warwick and Lininger, 1975), excluding houses of ACRE contact farmers. In each village thus sampled, the interval (I) was determined by the formula

\[ I = \frac{N}{n} \frac{1}{\frac{1}{f}} \]

where \( N \) = number of households in the village - ACRE contact houses;
\( n \) = sample size; and
\( \frac{1}{f} \) = the result or the inverse of the sampling fraction.

One obvious limitation in selecting noncontact farmer respondents from among the ACRE villages, instead of the noncontact villages, was the possibility of introducing bias or response influence from the contact farmers. An attempt was made to circumvent this problem by interviewing farmers from noncontact villages. Unfortunately (for the ACRE project), the overwhelming lack of awareness about the ACRE project among nonparticipating farmers was convincingly demonstrated during the questionnaire pretesting exercise. Thus, program unawareness from among noncontact villages could have significantly restricted the amount of information needed for this study. In light of the above limitation, the researcher was compelled to utilize noncontact farmers within the ACRE project villages.
Operationalization

In Chapter 3, the variable definitions and their theoretical rationale were discussed. In this section, attention will be given to a description of the measurement of the variables in the research model.

Social participation ($X_1$)

In measuring social participation, attendance and participation at regular meetings and the acceptance of leadership positions have to be considered in addition to official membership (Smith and Reddy, 1972). Social participation was measured by summing respondents' memberships and positions in voluntary organizations such as cooperatives, village rotary work forces, rotary credit societies, farmers' clubs, traditional societies, religious organizations, village councils, and chiefdom councils. Respondents received a score of one point for belonging to each social organization and another point for each position held within an organization.

Social status

Age, farm income, farm size, and hired labor were the criteria used for measuring social status.

Age ($X_2$)  Age at the time of data collection was the measure for respondents' ages. One limitation in this procedure was the very high illiteracy rate among respondents whose ages had never been recorded. In certain instances, interviewers resorted to estimation using important past events as a frame of reference.
Farm income ($X_3$) Farm income was measured by calculating the total reported income from all farm sales made by respondents during the 1979/80 cropping season.

Farm size ($X_4$) Farm size was estimated by the number of bushels respondents had broadcast during the 1979/80 cropping season. In Sierra Leone, it is often estimated that farmers broadcast an average of one bushel per acre of cleared land. In the case of plantation crops, the number of trees planted by respondents was used in estimating farm size.

Hired labor ($X_5$) Hired labor was measured by the total number of people respondents hired for their farm operations during the 1979/80 cropping season.

Individual goal ($X_6$)
Farmers' level of aspiration was used for measuring respondents' goals in farming. Respondents were asked to indicate whether they farm to: (1) produce just enough food for the family, (2) produce enough food for the family and sell some for other necessities, (3) produce enough to increase farm size and profit, or (4) other reasons. Scores of 1, 2, and 3 were given to respondents for the first, second, and third responses, respectively. All responses were within the first three categories.

Economic constraints ($X_7$)
Respondents' need for farm loans and their inaccessibility to such loans was the measure used for economic constraints. A score of (1) was given to each respondent that needed a farm loan and another (1)
for inaccessibility to such loans.

Motivation Variables

The motivation variables include: communication, demonstration farm visits, perceived benefits, appropriateness of technology, and farmer recognition.

Communication ($X_8$)

In this study, communication which included program delivery was measured by the frequency of visits per month to respondents on their farms by the ACRE project extension personnel.

Demonstration farm visits ($X_9$)

The frequency of visits made by clients to demonstration farms was used to measure respondents' demonstration farm visits.

Perceived benefits ($X_{10}$)

The usefulness of the free mini-kits offered to ACRE project contact farmers was used as a measure of perceived benefits. A score of (1) was given to respondents who indicated that the free mini-kit was useful, and (0) to those who say it was not useful.

Appropriateness of technology ($X_{11}$)

The compatibility of some recommended ACRE project technologies with respondents' existing farming practices was a measure of the appropriateness of technology used in this study. Agronomic practices such as dibbling, improved crop varieties, fertilizer application, crop spacing,
double cropping, and intercropping were compared with respondents' broadcasting, local varieties, nonfertilizers, random planting, single cropping, and traditional mixed cropping, respectively.

A score of (5) was given for recommended agricultural innovations that respondents believed were much better, (4) for those that were considered better, (3) for those that were about as good, (2) for those considered to be worse, and (1) for those that were much worse than the respondents' traditional agricultural practices.

Farmer recognition ($X_{12}$)

A multiple indicator approach was used to measure the degree to which respondents were recognized at farmers' meetings through the radio, pictures, certificates, farm labels, and house labels, respectively. Respondents were asked to indicate how much they were recognized through the radio, pictures, certificates, farm labels, and house labels. For each method of recognition, a score of (5) was given for very great recognition, (4) for great recognition, (3) for somewhat, (2) for a little, and (1) for not at all. A composite score for each respondent was obtained by summing the scores for the different recognition types.

Adoption ($X_{13}$)

The number of recommended agricultural practices in full and continuous use by respondents was the measure of adoption scores used in this study. Respondents were asked to indicate if they have adopted each selected recommended agricultural innovation. A score of (1) was given to each respondent for adopting each of the 10 selected
agricultural innovations including improved rice, improved cassava, improved sweet potatoes, improved maize (corn), fertilizer application, time of planting, crop spacing, participation in demonstration farm visits, use of free mini-kits, and participation in farmer training. A composite score for each respondent was obtained by summing their adoption scores for all the selected recommended agricultural innovations. Three aspects of farmer adoption were included in this study: (1) the adoption of those crops which satisfy basic security needs, such as improved rice, improved cassava, improved sweet potatoes, and improved corn; (2) the use of new technologies such as fertilizers, time of planting, crop spacing, and the use of the free mini-kits; and (3) participation in specific ACRE program activities including demonstration farm visits and farmer training.

Statistical Analysis

The statistical techniques in any research are largely influenced by the objectives of the study, the nature of the data, and the measurement level of the variables. Considering this fact, percentages, means, variances, and standard deviations are used for describing basic sample characteristics in this study. To test the relationships postulated in the third and fifth objectives of the study, Pearson zero-order correlation analysis is used as a measure of association.

To determine specific variables affecting the processes of farmer motivation and the dependent variable (adoption), a stepwise multiple analysis procedure is used on the raw data and a 0.05 level of significance chosen for statistical decisions.
CHAPTER 5. ANALYSIS AND DISCUSSION

In the last chapter, the research setting, sampling procedures, and statistical techniques used in analyzing the data were described. The major focus in this chapter is to present the research findings in relation to the research problem and the objectives of the study. Specifically, the main objectives in this chapter are to:

1. Present selected basic characteristics of the sample;
2. Determine the extent to which ACRE project contact farmers have adopted the recommended farm practices;
3. Determine the relationships between farmers' characteristics and the adoption of recommended agricultural innovations;
4. Determine whether contact farmers perceive ACRE project practices as viable alternatives to their present patterns of crop production; and
5. Determine the relationships between farmer motivation and the adoption of ACRE project recommended agricultural innovations.

Objective 1: Selected Basic Characteristics of the Sample

Age

Ages among ACRE contact farmers ranged from 25 to 74 years, with an average of 51.96 years and a median of 51.55 years. The non-contact farmers, however, were younger, having an age range from 19 to 78 years, with a mean of 45.68 years and a median of 43.25 years (Table 1).
Farm income

Table 1 shows the income distribution of farmers as measured by reported income from farm products during the 1979-80 cropping season. As illustrated in Table 1, ACRE contact farmers have higher income than noncontact farmers. Incomes ranged from Le.0 to Le.1996, with an average of Le.162.70, and a median of Le.79.62 among the contact farmers, while the noncontact farmers reported an income range from Le.0 to Le.1260, with a mean of Le.104.80 and a median of Le.42 (Table 1) (Le.1 = $.88).

Years in farming

The ACRE contact farmers have been farming slightly longer than the noncontact farmers (Table 1). Among the contact farmers, years in farming ranged from 1 to 55 years, with a mean of 22.44 years, and a median of 21.25 years. Among the noncontact farmers, years in farming ranged from 1 to 50 years, with a mean of 17.73 years and a median of 15.56 years.

Farm size

ACRE project contact farmers also tend to operate larger farms than the noncontact farmers, as illustrated in Table 1. Farm sizes ranged from 1 to 26 acres, with a mean of 4.62 acres and a median of 3.76 acres among the ACRE project contact farmers, while the noncontact farmers operate farms ranging from 1 to 30 acres, with a mean of 3.75 acres and a median of 3.12 acres.
<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Range</th>
<th>Mean</th>
<th>Median</th>
<th>Standard deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>Contact farmers</td>
<td>25-74</td>
<td>51.96</td>
<td>51.55</td>
</tr>
<tr>
<td></td>
<td>Noncontact farmers</td>
<td>19-78</td>
<td>45.68</td>
<td>43.25</td>
</tr>
<tr>
<td>Farm income</td>
<td>Contact farmers</td>
<td>0-1996</td>
<td>162.70</td>
<td>79.62</td>
</tr>
<tr>
<td></td>
<td>Noncontact farmers</td>
<td>0-1260</td>
<td>104.80</td>
<td>42.00</td>
</tr>
<tr>
<td>Years in farming</td>
<td>Contact farmers</td>
<td>1-55</td>
<td>22.44</td>
<td>21.25</td>
</tr>
<tr>
<td></td>
<td>Noncontact farmers</td>
<td>1-50</td>
<td>17.73</td>
<td>15.56</td>
</tr>
<tr>
<td>Operation size</td>
<td>Contact farmers</td>
<td>1-26</td>
<td>4.62</td>
<td>3.76</td>
</tr>
<tr>
<td></td>
<td>Noncontact farmers</td>
<td>1-30</td>
<td>3.75</td>
<td>3.12</td>
</tr>
<tr>
<td>Family labor</td>
<td>Contact farmers</td>
<td>2-36</td>
<td>7.59</td>
<td>5.71</td>
</tr>
<tr>
<td></td>
<td>Noncontact farmers</td>
<td>0-33</td>
<td>5.77</td>
<td>4.26</td>
</tr>
<tr>
<td>Hired labor</td>
<td>Contact farmers</td>
<td>3-300</td>
<td>84.56</td>
<td>60.00</td>
</tr>
<tr>
<td></td>
<td>Noncontact farmers</td>
<td>0-240</td>
<td>77.08</td>
<td>65.50</td>
</tr>
</tbody>
</table>
Family labor

The amount of family labor utilized by ACRE project contact farmers ranged from 2 to 36 mandays, with a mean of 7.59 mandays and a median of 5.71 mandays. On the other hand, family labor utilized by non-contact farmers ranged from 0 to 33 mandays, with a mean of 5.77 mandays and a median of 4.26 mandays (Table 1).

Hired labor

ACRE project participant farmers tend to hire a greater amount of nonhousehold labor than nonparticipants (Table 1). The amount of hired labor ranges from 3 to 300 mandays, with a mean of 84.56 mandays and a median of 60 mandays among ACRE project contact farmers, while among the noncontact farmers, hired labor ranged from 0 to 240 mandays, with a mean of 77.08 mandays and a median of 65.5 mandays.

Membership and Positions in Selected Social Organizations

More ACRE project contact farmers tend to belong to social organizations except for membership in rotary workforces, and thrift and credit societies. Moreover, the ACRE project contact farmers tend to have greater formal power, because more of them belong to village and chiefdom councils than the noncontact farmers (Table 2).

Goals in farming

There is no significant difference between ACRE project contact and noncontact farmers in their goals in farming (Table 3). Among the contact farmers, 70 respondents (37%) say they farm just to produce enough food for the family, 114 (60.4%) farm for food and to sell some for
Table 2. Membership in social organizations among ACRE project contact and noncontact farmers

<table>
<thead>
<tr>
<th>Organization</th>
<th>Contact farmers</th>
<th>Noncontact farmers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Absolute frequency</td>
<td>Relative frequency (%)</td>
</tr>
<tr>
<td>Farmer cooperatives</td>
<td>27</td>
<td>14.3</td>
</tr>
<tr>
<td>Thrift and credit societies</td>
<td>1</td>
<td>0.5</td>
</tr>
<tr>
<td>Rotary workforce</td>
<td>71</td>
<td>37.6</td>
</tr>
<tr>
<td>Rotary credit</td>
<td>34</td>
<td>18.0</td>
</tr>
<tr>
<td>Village council of elders</td>
<td>79</td>
<td>41.8</td>
</tr>
<tr>
<td>Chiefdom council</td>
<td>50</td>
<td>26.5</td>
</tr>
<tr>
<td>Religious organizations</td>
<td>168</td>
<td>88.9</td>
</tr>
</tbody>
</table>

Table 3. Goals in farming among ACRE project contact and noncontact farmers

<table>
<thead>
<tr>
<th>Goals</th>
<th>Contact farmers</th>
<th>Noncontact farmers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Absolute frequency</td>
<td>Relative frequency (%)</td>
</tr>
<tr>
<td>Just enough food for family</td>
<td>70</td>
<td>37.0</td>
</tr>
<tr>
<td>Enough food for family and sell some for other basic necessities</td>
<td>114</td>
<td>60.4</td>
</tr>
<tr>
<td>Enough to increase farm size and make a profit</td>
<td>5</td>
<td>2.6</td>
</tr>
</tbody>
</table>
other necessities, while only 5 respondents (2.6%) farm to increase their farm sizes and to make a profit. Among the noncontact farmers, 75 respondents (40.1%) farm just to produce food for family consumption, 108 respondents (57.8%) farm for food and to sell some for other necessities, while only 4 respondents (2.1%) farm to increase profits.

Level of education

More ACRE project contact farmers have had some kind of formal education (47.6%), than the noncontact farmers (40.6%). In general, both contact and noncontact farmers tend to have more Arabic schooling than English schooling. The number of years spent in the English school among ACRE project contact farmers ranges from 0 to 14 years with a mean of 1.59 years and a median of 0.13 years. In the case of Arabic schooling, among contact farmers it ranges from 0 to 30 years, with a mean of 7.9 years and a median of 7 years. On the other hand, the number of years of English schooling among the noncontact farmers ranges from 0 to 12 years with a mean of 1.43 years and a median of 0.11 years. Arabic schooling is also slightly higher among this group, which ranges from 0 to 25 years, with a mean of 5.80 and a median of 4.90 years (Table 4).

Economic constraints among ACRE project contact farmers

Nearly all contact farmers (179) reported the need for farm loans. However, only 106 (56.1%) reported having access to farm loans, while 71 (32.6%) respondents had no access to farm loans (Table 5). When asked the reasons they had no access to farm loans, 55 (29.1%)
Table 4. Years and type of formal education among ACRE project contact and noncontact farmers

<table>
<thead>
<tr>
<th></th>
<th>Contact farmers</th>
<th>Noncontact farmers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Type of school</td>
<td>Type of school</td>
</tr>
<tr>
<td></td>
<td>English</td>
<td>Arabic</td>
</tr>
<tr>
<td></td>
<td>Arabic</td>
<td>English</td>
</tr>
<tr>
<td>Range</td>
<td>0-14</td>
<td>0-12</td>
</tr>
<tr>
<td>Mean</td>
<td>1.59</td>
<td>1.43</td>
</tr>
<tr>
<td>Median</td>
<td>0.13</td>
<td>0.11</td>
</tr>
<tr>
<td>Standard deviation</td>
<td>3.54</td>
<td>3.31</td>
</tr>
</tbody>
</table>

Table 5. Reasons for lack of farm loan among ACRE project contact farmers

<table>
<thead>
<tr>
<th>Reasons for lack of farm loan</th>
<th>Absolute frequency</th>
<th>Relative frequency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No lender</td>
<td>55</td>
<td>29.1</td>
</tr>
<tr>
<td>High interest charged by lenders</td>
<td>8</td>
<td>4.2</td>
</tr>
<tr>
<td>No reliability (poor credit risk)</td>
<td>5</td>
<td>2.6</td>
</tr>
<tr>
<td>Have enough</td>
<td>5</td>
<td>2.6</td>
</tr>
<tr>
<td>No mortgage (collateral)</td>
<td>3</td>
<td>1.6</td>
</tr>
<tr>
<td>Not applicable</td>
<td>113</td>
<td>59.9</td>
</tr>
</tbody>
</table>
respondents believed it was due to lack of lenders. High interest charged by lenders was the next reason given by 8 (4.2%) of the respondents. Being a poor credit risk and not needing money were equally important reasons given by 5 (2.6%) respondents in each case. The reason least mentioned was lack of mortgage.

One hundred eighty farmers (95.2%) indicate they would increase their participation in the ACRE project if they had access to a farm loan, as shown in Table 6. Only 8 (4.2%) respondents say they would not increase their participation if given a farm loan.

Economic Factors Limiting Farmers' Participation in the ACRE Project

As Table 7 illustrates, among the factors limiting farmers' participation in the ACRE project, 122 (65.2%) say lack of farm helpers, 106 farmers (56.7%) say lack of money, 87 farmers (46.5%) indicate lack of credit facilities, 24 farmers (12.8%) say lack of farm land, 23 farmers (12.3%) say lack of markets for farm produce, while 22 farmers (11.8%) say it is the low prices for farm produce, in that order. From Table 7, the most mentioned limitations are lack of farm helpers, lack of money and lack of credit facilities, all three of which are interrelated.

Adoption of Nine Recommended Agricultural Innovations Among ACRE Project Contact and Noncontact Farmers

Table 8 shows that as a group, ACRE project contact farmers adopted all the 9 selected recommended agricultural innovations, while the
Table 6. Distribution of ACRE project contact farmers who will increase participation in the project if given farm loan

<table>
<thead>
<tr>
<th>Would increase participation in ACRE project if given farm loan</th>
<th>Absolute frequency</th>
<th>Relative frequency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>180</td>
<td>95.2</td>
</tr>
<tr>
<td>No</td>
<td>8</td>
<td>4.2</td>
</tr>
<tr>
<td>Don't know</td>
<td>1</td>
<td>0.5</td>
</tr>
</tbody>
</table>

Table 7. Economic constraints preventing farmers from participating in the ACRE programs

<table>
<thead>
<tr>
<th>Economic constraint</th>
<th>Number (#)</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of farm helpers</td>
<td>122</td>
<td>65.2</td>
</tr>
<tr>
<td>Lack of money</td>
<td>106</td>
<td>56.7</td>
</tr>
<tr>
<td>Lack of credit facilities</td>
<td>87</td>
<td>46.5</td>
</tr>
<tr>
<td>Lack of farm land</td>
<td>24</td>
<td>12.8</td>
</tr>
<tr>
<td>Lack of markets for farm produce</td>
<td>23</td>
<td>12.3</td>
</tr>
<tr>
<td>Low prices for farm produce</td>
<td>22</td>
<td>11.8</td>
</tr>
</tbody>
</table>

Table 8. Extent of adoption of nine selected agricultural innovations among ACRE project contact and noncontact farmers

<table>
<thead>
<tr>
<th>Contact farmers</th>
<th>Adoption score</th>
<th>Number</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
<td>1</td>
<td>0.5</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>25</td>
<td>13.2</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>28</td>
<td>14.8</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>21</td>
<td>11.1</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>33</td>
<td>17.5</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>45</td>
<td>23.8</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>25</td>
<td>13.2</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>6</td>
<td>3.2</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>3</td>
<td>1.6</td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>2</td>
<td>1.1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Noncontact farmers</th>
<th>Adoption score</th>
<th>Number</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
<td>87</td>
<td>46.5</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>70</td>
<td>37.4</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>17</td>
<td>9.1</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>10</td>
<td>5.3</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>2</td>
<td>1.1</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>1</td>
<td>0.5</td>
</tr>
</tbody>
</table>
noncontact farmers adopted only 5 of the 9 selected recommended agricultural innovations. Among the contact farmers, only 1 farmer (0.5%) did not adopt any of the recommended practices, while 87 farmers (46.5%) did not adopt any of the recommended practices among the noncontact farmers. Moreover, among the contact farmers, 81 (43%) adopted 5 or more of the recommended practices, while only 1 farmer (0.5%) adopted up to 5 recommended agricultural practices among the noncontact farmers.

In Table 9, it can be seen that the contact farmers adopted an average of 3.89 recommended agricultural innovations, with a median of 4.10 and a standard deviation of 1.89. On the other hand, the noncontact farmers adopted an average of 0.79 recommended agricultural innovations, with a median of 0.59 and a standard deviation of 0.95.

Based on the figures in Tables 8 and 9, it can be seen that the ACRE project contact farmers adopted more recommended agricultural innovations than the noncontact farmers.

Table 9. Summary of adoption of nine recommended agricultural innovations among ACRE project contact and noncontact farmers

<table>
<thead>
<tr>
<th></th>
<th>Range</th>
<th>Mean</th>
<th>Median</th>
<th>Standard deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contact farmers</td>
<td>0-9</td>
<td>3.89</td>
<td>4.10</td>
<td>1.89</td>
</tr>
<tr>
<td>Noncontact farmers</td>
<td>0-5</td>
<td>0.79</td>
<td>0.59</td>
<td>0.95</td>
</tr>
</tbody>
</table>
Summary of Basic Sample Characteristics

The average age, years in farming, farm income, farm size, family labor, hired labor, and level of education are slightly higher among ACRE project contact farmers than the noncontact farmers, which suggests that the ACRE project contact farmers are relatively older, operate larger farms, obtain higher farm income, use more family labor, hire more nonfamily labor, and have higher levels of formal education than the noncontact farmers. However, both groups tend to have similar aspiration levels, although contact farmers are relatively more powerful than the noncontact farmers. The differences in these characteristics are reasonably consistent with most findings in the classical adoption and diffusion research, which has indicated that extension agents often contact the more powerful members of a community, who tend to operate larger farms, have higher farm income, and have higher formal education than other members of the community in which they live.

Objective 2: Level of Adoption of Recommended Agricultural Innovations Among ACRE Project Contact Farmers

The extent to which ACRE project contact farmers have adopted the selected ten recommended agricultural innovations is the second objective of this dissertation. In Table 10, adoption score refers to the number of the ten recommended agricultural innovations which ACRE project contact farmers have adopted. A total of 110 farmers (58.2%) have adopted between 1 and 5 recommended agricultural innovations, while 78 farmers (41.3%) have adopted between 6 and 10 recommended agricultural
Table 10. The extent of adoption of the ten selected recommended agricultural innovations among ACRE project contact farmers

<table>
<thead>
<tr>
<th>Adoption score</th>
<th>Absolute frequency</th>
<th>Relative frequency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
<td>0.5</td>
</tr>
<tr>
<td>1</td>
<td>10</td>
<td>5.3</td>
</tr>
<tr>
<td>2</td>
<td>24</td>
<td>12.7</td>
</tr>
<tr>
<td>3</td>
<td>28</td>
<td>14.8</td>
</tr>
<tr>
<td>4</td>
<td>18</td>
<td>9.5</td>
</tr>
<tr>
<td>5</td>
<td>30</td>
<td>15.9</td>
</tr>
<tr>
<td>6</td>
<td>44</td>
<td>23.3</td>
</tr>
<tr>
<td>7</td>
<td>23</td>
<td>12.2</td>
</tr>
<tr>
<td>8</td>
<td>6</td>
<td>3.2</td>
</tr>
<tr>
<td>9</td>
<td>3</td>
<td>1.6</td>
</tr>
<tr>
<td>10</td>
<td>2</td>
<td>1.1</td>
</tr>
<tr>
<td>Total</td>
<td>189</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Mean = 4.677
Median = 4.95
Standard deviation = 2.062

innovations. Among these, 2 farmers (1.1%) report adopting all the 10 recommended agricultural innovations. Only 1 farmer (0.5%) reports not adopting any of the recommended agricultural innovations.

From the figures in Table 11, it can be seen that more ACRE project contact farmers adopted improved rice (164 or 86.8%), Sierra Leone's staple crop, than the other recommended practices. Next is the use of free minikits, adopted by 149 or 78.8% respondents, followed by fertilizer application (134 or 70.9%), participation in demonstration

1Use of minikit was included in this analysis.
Table 11. Distribution of ACRE project contact farmers' adoption of selected agricultural innovations

<table>
<thead>
<tr>
<th>Agricultural innovation</th>
<th>Number</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improved rice</td>
<td>164</td>
<td>86.8</td>
</tr>
<tr>
<td>Use of free mini kit</td>
<td>149</td>
<td>78.8</td>
</tr>
<tr>
<td>Fertilizer application</td>
<td>134</td>
<td>70.9</td>
</tr>
<tr>
<td>Participation in demonstration farm visits</td>
<td>115</td>
<td>60.8</td>
</tr>
<tr>
<td>Time of planting</td>
<td>107</td>
<td>56.6</td>
</tr>
<tr>
<td>Improved cassava</td>
<td>61</td>
<td>32.3</td>
</tr>
<tr>
<td>Participation in farmer training</td>
<td>49</td>
<td>25.9</td>
</tr>
<tr>
<td>Improved sweet potatoes</td>
<td>43</td>
<td>22.8</td>
</tr>
<tr>
<td>Improved maize (corn)</td>
<td>33</td>
<td>17.5</td>
</tr>
<tr>
<td>Crop spacing</td>
<td>29</td>
<td>15.3</td>
</tr>
</tbody>
</table>

farm visits (115 or 60.8%), time of planting (107 or 56.6%), improved cassava (61 or 32.3%), participation in farmer training (49 or 25.9%), improved sweet potatoes (43 or 22.8%), improved maize (33 or 17.5%), and crop spacing (29 or 15.3%).

Objective 3: Relationships Between ACRE Project Contact Farmers' Characteristics and Adoption of Recommended Agricultural Innovations

General hypothesis 1: There will be a relationship between farmers' characteristics and the adoption of recommended agricultural innovations

This hypothesis was designed to meet the third objective of this study, namely to determine the relationships between farmers' characteristics and the adoption of recommended agricultural innovations. Seven empirical hypotheses (E.H: 1.1 through E.H: 2.1) were derived to test
the relationships between farmers' individual characteristics and the adoption of agricultural innovations.

Table 12 contains Pearson correlation coefficients between characteristics of the contact farmers and recommended practice adoption scores. Three of the seven hypotheses (hired labor, individual goal, and economic constraints) were supported at the .05 level of significance. Two other hypotheses (farm income and farm size) were supported at the .1 level of significance. Two hypotheses (age and social participation) were not supported or at least there were no relationships. As expected, most of the variables (farm income, farm size, hired labor, and individual goal) were positively related to adoption. These data support three of the seven empirical hypotheses.

<table>
<thead>
<tr>
<th>Empirical hypothesis (cross classified)</th>
<th>Variable</th>
<th>Zero order correlation</th>
<th>Test result (significant at .05 level)</th>
</tr>
</thead>
<tbody>
<tr>
<td>E.H: 1.1</td>
<td>Social participation</td>
<td>No relationship</td>
<td></td>
</tr>
<tr>
<td>E.H: 1.2</td>
<td>Farm income</td>
<td>.08*</td>
<td></td>
</tr>
<tr>
<td>E.H: 1.3</td>
<td>Farm size</td>
<td>.06*</td>
<td></td>
</tr>
<tr>
<td>E.H: 1.4</td>
<td>Hired labor</td>
<td>.16</td>
<td>Supported</td>
</tr>
<tr>
<td>E.H: 1.5</td>
<td>Individual goal</td>
<td>.19</td>
<td>Supported</td>
</tr>
<tr>
<td>E.H: 1.6</td>
<td>Age</td>
<td>No relationship</td>
<td></td>
</tr>
<tr>
<td>E.H: 2</td>
<td>Economic constraint</td>
<td>-.19</td>
<td>Supported</td>
</tr>
</tbody>
</table>

*Statistically related at 0.1 level of significance.

For the purpose of identifying the specific contributions made by each individual and social characteristics variable, in explaining
adoption of the recommended agricultural innovations, a stepwise multiple regression analysis was used by regressing the individual and social characteristics variables (social participation, age, farm size, farm income, hired labor, goals in farming, and economic constraints) on the recommended agricultural innovations adoption score.

The first variable to enter the equation was individual goal in farming. It explained 10% of the variation. Social participation (5%), hired labor (3%), age (2%), economic constraints (1%), farm size (0%), and farm income (0%) were next to enter the equation in that order.

Based on the observed values, it can be concluded that individual goal in farming makes the greatest contribution in affecting the amount of adoption of the ACRE project recommended agricultural innovations and is statistically significant. Overall, 21% of the variation in the adoption of the recommended agricultural innovations by the ACRE project contact farmers is explained by the individual and social characteristics (Table 13).

The F distribution in the table indicates that the probability of getting an F ratio equal to or greater than 2.654 with 7 and 70 degrees of freedom is less than .05%.

Objective 4: Contact Farmers' Perception of the ACRE Project Recommended Agricultural Innovations

To determine whether contact farmers perceive the ACRE project recommended agricultural innovations as viable alternatives to their existing patterns of crop production, respondents were asked to (a) compare selected ACRE project recommended agricultural innovations
Table 13. Summary of regression on adoption of recommended agricultural innovations on farmers' individual and social characteristics variables

<table>
<thead>
<tr>
<th>Variables</th>
<th>Multiple R</th>
<th>$R^2$ change</th>
<th>Beta</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Goal in farming</td>
<td>.29</td>
<td>.10</td>
<td>.10</td>
<td>.38**</td>
</tr>
<tr>
<td>Social participation</td>
<td>.37</td>
<td>.14</td>
<td>.05</td>
<td>.23*</td>
</tr>
<tr>
<td>Hired labor</td>
<td>.41</td>
<td>.17</td>
<td>.03</td>
<td>.18</td>
</tr>
<tr>
<td>Age</td>
<td>.44</td>
<td>.20</td>
<td>.02</td>
<td>.13</td>
</tr>
<tr>
<td>Economic constraints</td>
<td>.45</td>
<td>.20</td>
<td>.01</td>
<td>-.12</td>
</tr>
<tr>
<td>Farm size</td>
<td>.46</td>
<td>.21</td>
<td>.00</td>
<td>.08</td>
</tr>
<tr>
<td>Farm income</td>
<td>.46</td>
<td>.21</td>
<td>.00</td>
<td>.02</td>
</tr>
</tbody>
</table>

Overall $F = 2.654$

Degrees of freedom = 7, 70

Probability < .05

*Probability < .05.

**Probability < .01.

with their existing farming practices, and (b) indicate how compatible the recommended ACRE project agricultural innovations are with their traditional farming practices. Data are presented in Tables 14, 15, and 16.

As Table 14 illustrates, fertilizer application with an average evaluation of 4.44 is shown to be the technology that tends to be the most superior alternative among the technologies compared. Next are improved crop varieties with a mean of 4.14, followed by double cropping (3.98), intercropping (3.71), crop spacing (3.62), and dibbling (2.77), in that order.

Table 15 shows that the number of farmers adopting the recommended agricultural innovations increases with an increase in the perceived
Table 14. Summary of farmers' evaluation of ACRE project recommended agricultural innovations with traditional practices

<table>
<thead>
<tr>
<th>Recommended agricultural innovation</th>
<th>Mean</th>
<th>Median</th>
<th>Standard deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fertilizer vs. nonfertilizer</td>
<td>4.44</td>
<td>4.42</td>
<td>0.55</td>
</tr>
<tr>
<td>Improved vs. local varieties</td>
<td>4.14</td>
<td>4.21</td>
<td>0.84</td>
</tr>
<tr>
<td>Double vs. single cropping</td>
<td>3.98</td>
<td>4.17</td>
<td>1.08</td>
</tr>
<tr>
<td>Intercropping vs. traditional cropping</td>
<td>3.71</td>
<td>3.41</td>
<td>0.95</td>
</tr>
<tr>
<td>Crop spacing vs. random planting</td>
<td>3.62</td>
<td>3.51</td>
<td>1.02</td>
</tr>
<tr>
<td>Dibbling vs. broadcasting</td>
<td>2.77</td>
<td>2.82</td>
<td>1.72</td>
</tr>
</tbody>
</table>

When asked how compatible the ACRE project recommended agricultural practices were with respondents' existing agricultural practices, 65 (34.4%) respondents indicate the recommended technologies are not at all compatible, 55 (29.1%) respondents say they are not very much compatible, 59 (31.2%) respondents say they are well compatible, while only 8 (4.2%) respondents indicate they are very well compatible (Table 16). Based on these figures, it can be concluded that about two thirds of the respondents do not consider the ACRE project recommended agricultural innovations compatible with their existing agricultural practices.
Table 15. Adoption breakdown according to farmers' evaluation of the ACRE project recommended agricultural innovations

<table>
<thead>
<tr>
<th>Evaluation</th>
<th>Fertilizers vs. non-local fertilizers</th>
<th>Improved vs. local varieties</th>
<th>Double vs. single cropping</th>
<th>Intercropping vs. traditional cropping</th>
<th>Crop spacing vs. random planting</th>
<th>Dibbling vs. broadcasting</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number adopting</td>
<td>Mean adoption</td>
<td>Number adopting</td>
<td>Mean adoption</td>
<td>Number adopting</td>
<td>Mean adoption</td>
</tr>
<tr>
<td>Much better</td>
<td>83</td>
<td>5.04</td>
<td>68</td>
<td>5.25</td>
<td>60</td>
<td>4.77</td>
</tr>
<tr>
<td>Better</td>
<td>91</td>
<td>4.69</td>
<td>89</td>
<td>4.63</td>
<td>70</td>
<td>4.97</td>
</tr>
<tr>
<td>About as good</td>
<td>5</td>
<td>3.60</td>
<td>22</td>
<td>4.27</td>
<td>15</td>
<td>5.33</td>
</tr>
<tr>
<td>Worse</td>
<td>0</td>
<td>0.00</td>
<td>5</td>
<td>4.20</td>
<td>14</td>
<td>5.28</td>
</tr>
<tr>
<td>Much worse</td>
<td>0</td>
<td>0.00</td>
<td>3</td>
<td>2.67</td>
<td>7</td>
<td>4.52</td>
</tr>
</tbody>
</table>
Table 16. Overall compatibility of ACRE project recommended agricultural innovations with farmers' present agricultural practices

<table>
<thead>
<tr>
<th></th>
<th>Absolute frequency</th>
<th>Relative frequency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not at all</td>
<td>65</td>
<td>34.4</td>
</tr>
<tr>
<td>Not very much</td>
<td>55</td>
<td>29.1</td>
</tr>
<tr>
<td>Well</td>
<td>59</td>
<td>31.2</td>
</tr>
<tr>
<td>Very well</td>
<td>8</td>
<td>4.2</td>
</tr>
<tr>
<td>Not applicable</td>
<td>2</td>
<td>1.1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>189</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

Objective 5: Relationships Between ACRE Project Contact
Farmers' Motivation and Adoption of the
Recommended Agricultural Innovations

General hypothesis 3: There will be a relationship between farmer motivation variables including communication, demonstration farm visits, perceived benefits, appropriateness of technology, and farmer recognition and adoption scores

This hypothesis was included to determine the relationship between farmer motivation and adoption scores. Five empirical hypotheses (E.H: 10 through E.H: 14) were derived to test the relationships between farmer motivation and adoption of the ACRE project recommended agricultural innovations. Zero order correlations are presented in Table 17, and the results of the statistical tests for these hypotheses are presented in Tables 18 and 19.

As Table 18 illustrates, four of the five empirical hypotheses (demonstration, farm visits, perceived benefits, appropriateness of
Table 17. Zero order Pearson correlations between ACRE project contact farmers' characteristics and motivation variables

<table>
<thead>
<tr>
<th>Variables</th>
<th>$X_1$</th>
<th>$X_2$</th>
<th>$X_3$</th>
<th>$X_4$</th>
<th>$X_5$</th>
<th>$X_6$</th>
<th>$X_7$</th>
<th>$X_8$</th>
<th>$X_9$</th>
<th>$X_{10}$</th>
<th>$X_{11}$</th>
<th>$X_{12}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social participation</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td>.11*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Farm income</td>
<td></td>
<td>.11*</td>
<td>.02</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Farm size</td>
<td></td>
<td>.17**</td>
<td>.08*</td>
<td>.26***</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hired labor</td>
<td></td>
<td>.15**</td>
<td>.01</td>
<td>-.01</td>
<td>.09</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Goal in farming</td>
<td></td>
<td>.12**</td>
<td>-.20**</td>
<td>.15**</td>
<td></td>
<td>.12**</td>
<td>.01</td>
<td></td>
<td></td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Economic constraints</td>
<td></td>
<td>.08</td>
<td>-.01</td>
<td>-.02</td>
<td>.07</td>
<td>-.03</td>
<td>-.07</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Communication</td>
<td></td>
<td>.05</td>
<td></td>
<td>.16**</td>
<td>.03</td>
<td>.04</td>
<td>.01</td>
<td>.033</td>
<td>.09</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Demonstration farm visits</td>
<td></td>
<td>-.07</td>
<td>-.28***</td>
<td>.04</td>
<td>.33***</td>
<td>.06</td>
<td>.20**</td>
<td>-.07</td>
<td>.07</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perceived benefits</td>
<td></td>
<td>-.00</td>
<td>-.12**</td>
<td>.11</td>
<td>.06</td>
<td>.07</td>
<td>.15**</td>
<td>-.07</td>
<td>-.18**</td>
<td>.08</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Appropriateness of technology</td>
<td></td>
<td>-.04</td>
<td>-.12**</td>
<td>.11**</td>
<td>.15**</td>
<td>.06</td>
<td>.04</td>
<td>-.23**</td>
<td>.04</td>
<td>.37***</td>
<td>.11*</td>
<td>1.00</td>
</tr>
<tr>
<td>Farmer recognition</td>
<td></td>
<td>.06</td>
<td>-.11*</td>
<td>.12**</td>
<td>.12**</td>
<td>.09*</td>
<td>.08</td>
<td>-.23***</td>
<td>.15*</td>
<td>.24**</td>
<td>.20**</td>
<td>.51***</td>
</tr>
<tr>
<td>Adoption</td>
<td></td>
<td>.03</td>
<td>-.05</td>
<td>.08*</td>
<td>.06*</td>
<td>.16**</td>
<td>.19**</td>
<td>-.19**</td>
<td>.12*</td>
<td>.22***</td>
<td>.12**</td>
<td>.21***</td>
</tr>
</tbody>
</table>

*,**,***Significant at .1, .05, and .01 level of significance, respectively.
Table 18. Pearson correlation analysis of the relationships between ACRE project contact farmers' motivation and adoption of recommended agricultural innovations scores

<table>
<thead>
<tr>
<th>Empirical hypothesis</th>
<th>Variable (cross-classified)</th>
<th>Zero-order correlation</th>
<th>Test result (significant at .05 level)</th>
</tr>
</thead>
<tbody>
<tr>
<td>E.H: 10</td>
<td>Communication</td>
<td>.12</td>
<td>Not supported</td>
</tr>
<tr>
<td>E.H: 11</td>
<td>Demonstration farm visits</td>
<td>.22</td>
<td>Supported</td>
</tr>
<tr>
<td>E.H: 12</td>
<td>Perceived benefits</td>
<td>.12</td>
<td>Supported</td>
</tr>
<tr>
<td>E.H: 13</td>
<td>Appropriateness of technology</td>
<td>.21</td>
<td>Supported</td>
</tr>
<tr>
<td>E.H: 14</td>
<td>Farmer recognition</td>
<td>.33</td>
<td>Supported</td>
</tr>
</tbody>
</table>

Table 19. Summary of regression analysis on ACRE project contact farmers' adoption scores on the independent motivation variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Multiple R</th>
<th>R²</th>
<th>R² change</th>
<th>Beta</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farmer recognition</td>
<td>.33</td>
<td>.11</td>
<td>.11</td>
<td>.27*</td>
<td>6.262</td>
</tr>
<tr>
<td>Demonstration farm visits</td>
<td>.38</td>
<td>.15</td>
<td>.03</td>
<td>.16</td>
<td>2.038</td>
</tr>
<tr>
<td>Perceived benefits</td>
<td>.41</td>
<td>.17</td>
<td>.03</td>
<td>.18</td>
<td>2.599</td>
</tr>
<tr>
<td>Communication</td>
<td>.42</td>
<td>.17</td>
<td>.01</td>
<td>.10</td>
<td>0.743</td>
</tr>
<tr>
<td>Appropriate technology</td>
<td>Did not enter</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Overall F = 3.98795
Degrees of freedom = 4, 73
Probability < .01

*Probability < .05.
technology, and farmer recognition) were found to be statistically significant at the 0.05 level, thus supporting four of the five empirical hypotheses (E.H: 11 through E.H: 14). The fifth hypothesis (communication) was related to adoption at the 0.1 level of significance.

For the purpose of isolating the contributions of each motivation variable in explaining adoption scores, a stepwise multiple regression was performed in which the motivation variables (communication, demonstration farm visits, perceived benefits, appropriateness of technology, and farmer recognition) were regressed on ACRE project contact farmers' adoption scores. In Table 19, the first variable to enter the equation was farmer recognition, which explained 11% of the variation.

Demonstration farm visits and perceived benefits were second and third, each explaining 3% of the variation, respectively. Communication was fourth and explained 1% of the variation. Appropriateness of technology was so weakly related that it did not reach the tolerance level. Among the four variables in the equation, farmer recognition and perceived benefits were the only two that were statistically significant at the 0.05 level with F values of 6.262 and 2.599, respectively.

Overall, 18% of the variation in the adoption of the recommended agricultural innovations by contact farmers is due to the motivation variables. The F test distribution in the table indicates that the possibility of getting an F ratio equal to or greater than 3.98795 with 4 and 73 degrees of freedom is less than .05%.
General Hypothesis 2: There is a relationship between farmers' characteristics and the level of motivation including frequency of the extension agents' visits (communication), demonstration farm visits, perceived benefits, the appropriateness of technology, and farmer recognition.

This hypothesis was included to determine the relationship between farmers' characteristics and the motivation levels provided by the extension agents. Thirty-five empirical hypotheses (E.H: 3.1 through E.H: 9.5) were derived to test the relationships between farmers' characteristics and the level of motivation.

The Pearson zero-order correlations between farmer characteristics and the frequency of the extension agents' visits (communication) are presented in Table 20. Among the seven hypothesized relationships between farmer characteristics and communication, only age was found to be statistically significant. The remaining six hypothesized relationships were in the right direction but not statistically significant. Thus, only one hypothesis (age) was statistically supported among the seven expected relationships.

A stepwise multiple regression was performed to determine the specific contributions made by each individual and social characteristic variable in explaining the frequency of the ACRE agents' visits (communication). A summary of the test results is presented in Table 21.

The first variable to enter the equation was age, explaining 3% of the variation, followed by economic constraints (1%). Goal in farming and farm income together explained less than one percent of the variation. Social participation, farm size and hired labor were so weakly related that they did not enter the equation.
Table 20. Pearson correlation analysis of the relationships between frequency of ACRE agents' visits (communication) and ACRE project contract farmers' individual and social characteristics

<table>
<thead>
<tr>
<th>Empirical hypothesis</th>
<th>Variable (cross classified)</th>
<th>Zero-order correlation</th>
<th>Test result (significant at .05 level)</th>
</tr>
</thead>
<tbody>
<tr>
<td>E.H: 3.1</td>
<td>Social participation</td>
<td>.05</td>
<td>Not supported</td>
</tr>
<tr>
<td>E.H: 4.1</td>
<td>Age</td>
<td>.16</td>
<td>Supported</td>
</tr>
<tr>
<td>E.H: 5.1</td>
<td>Farm income</td>
<td>.03</td>
<td>Not supported</td>
</tr>
<tr>
<td>E.H: 6.1</td>
<td>Farm size</td>
<td>.04</td>
<td>Not supported</td>
</tr>
<tr>
<td>E.H: 7.1</td>
<td>Hired labor</td>
<td>.01</td>
<td>Not supported</td>
</tr>
<tr>
<td>E.H: 8.1</td>
<td>Goal in farming</td>
<td>.03</td>
<td>Not supported</td>
</tr>
<tr>
<td>E.H: 9.1</td>
<td>Economic constraints</td>
<td>-0.09</td>
<td>Not supported</td>
</tr>
</tbody>
</table>

Table 21. Summary of regression analysis on the frequency of ACRE agents' visits on farmers' individual and social characteristics

<table>
<thead>
<tr>
<th>Variable</th>
<th>Multiple R</th>
<th>R²</th>
<th>R² change</th>
<th>Beta</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>0.17</td>
<td>0.03</td>
<td>0.03</td>
<td>0.18</td>
<td>2.983</td>
</tr>
<tr>
<td>Economic constraint</td>
<td>0.19</td>
<td>0.04</td>
<td>0.01</td>
<td>-0.10</td>
<td>1.029</td>
</tr>
<tr>
<td>Goal in farming</td>
<td>0.21</td>
<td>0.04</td>
<td>0.00</td>
<td>0.07</td>
<td>0.487</td>
</tr>
<tr>
<td>Farm income</td>
<td>0.21</td>
<td>0.04</td>
<td>0.00</td>
<td>0.02</td>
<td>0.043</td>
</tr>
<tr>
<td>Social participation</td>
<td>Did not enter</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Farm size</td>
<td>Did not enter</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hired labor</td>
<td>Did not enter</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Overall F = 1.02636  
Degrees of freedom = 4, 90  
Probability > .05
On the basis of the observed values, it can be concluded that age has the greatest influence on the frequency of the extension agents' visits, although its influence is minimal and not statistically significant. The overall F test of farmers' characteristics affecting communication is not statistically significant. Apparently, the individual and social characteristics have little effect on frequency of ACRE agent visits.

Relationships Between Farmers' Characteristics and Demonstration Farm Visits

In Table 22, the relationships between ACRE project contact farmers' characteristics and the frequency of demonstration farm visits is presented. Among the seven hypotheses, two (farm size and goal in farming) were found to be statistically related to the frequency of demonstration farm visits at the .05 level of significance. One hypothesis (age) was found to be statistically related to demonstration farm visits at the 0.1 level of significance. Farm size was positively related to demonstration farm visits, while age was found to be negatively related to demonstration farm visits. Social participation and economic constraints were also negatively related to demonstration farm visits, but were not statistically significant. Farm income and hired labor were positively related to demonstration farm visits, but they were also not found to be statistically significant.

From the summary of the stepwise multiple regression analysis (Table 23), the first variable to enter the equation was farm size, explaining 11% of the variation. Next was age (10%), followed by
Table 22. Pearson correlation analysis of the relationships between frequency of demonstration farm visits and ACRE project contact farmers' individual and social characteristics

<table>
<thead>
<tr>
<th>Empirical hypothesis</th>
<th>Variable (cross classified)</th>
<th>Zero-order correlation</th>
<th>Test result (significant at .05 level)</th>
</tr>
</thead>
<tbody>
<tr>
<td>E.H: 3.2</td>
<td>Social participation</td>
<td>-.07</td>
<td>Not supported</td>
</tr>
<tr>
<td>E.H: 4.2</td>
<td>Age</td>
<td>-.28</td>
<td>Not supported</td>
</tr>
<tr>
<td>E.H: 5.2</td>
<td>Farm income</td>
<td>.04</td>
<td>Not supported</td>
</tr>
<tr>
<td>E.H: 6.2</td>
<td>Farm size</td>
<td>.33</td>
<td>Supported</td>
</tr>
<tr>
<td>E.H: 7.2</td>
<td>Hired labor</td>
<td>.06</td>
<td>Not supported</td>
</tr>
<tr>
<td>E.H: 8.2</td>
<td>Goal in farming</td>
<td>.20</td>
<td>Supported</td>
</tr>
<tr>
<td>E.H: 9.2</td>
<td>Economic constraints</td>
<td>-.07</td>
<td>Not supported</td>
</tr>
</tbody>
</table>

Table 23. Summary of regression analysis on frequency of demonstration farm visits on farmers' individual and social characteristics

<table>
<thead>
<tr>
<th>Variable</th>
<th>Multiple R</th>
<th>R² change</th>
<th>R² change</th>
<th>Beta</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farm size</td>
<td>0.338</td>
<td>0.11</td>
<td>0.11</td>
<td>0.38**</td>
<td>11.786</td>
</tr>
<tr>
<td>Age</td>
<td>0.460</td>
<td>0.21</td>
<td>0.10</td>
<td>-0.29**</td>
<td>11.607</td>
</tr>
<tr>
<td>Economic constraints</td>
<td>0.47</td>
<td>0.22</td>
<td>0.01</td>
<td>-0.1</td>
<td>1.251</td>
</tr>
<tr>
<td>Goal in farming</td>
<td>0.481</td>
<td>0.23</td>
<td>0.01</td>
<td>0.11</td>
<td>1.589</td>
</tr>
<tr>
<td>Farm income</td>
<td>0.486</td>
<td>0.24</td>
<td>0.00</td>
<td>-0.07</td>
<td>0.570</td>
</tr>
<tr>
<td>Social participation</td>
<td>0.489</td>
<td>0.24</td>
<td>0.00</td>
<td>-0.07</td>
<td>0.601</td>
</tr>
<tr>
<td>Hired labor</td>
<td>0.490</td>
<td>0.24</td>
<td>0.00</td>
<td>0.03</td>
<td>0.148</td>
</tr>
</tbody>
</table>

Overall F = 5.10987
Degrees of freedom = 7, 113
Probability < .001

**Probability < .001.
economic constraints (1%) and goal in farming (1%). Farm income, social participation and hired labor together accounted for about one percent of the explained variation. Among the seven variables in the equation, farm size and age were statistically significant at the 0.05 level.

Overall, 24% of the variation in the frequency of demonstration farm visits among ACRE project contact farmers is due to all the individual and social characteristics. The F test indicates that the possibility of getting an F ratio equal to or greater than 5.10987 with 7 and 113 degrees of freedom is less than .05%.

Relationships Between Farmers' Characteristics and Perceived Benefits

Table 24 shows a summary of the Pearson zero-order correlations between ACRE project contact farmers' characteristics and perceived benefits. One hypothesis (goal in farming) was found to be statistically related to perceived benefits at the .05 level of significance, among the seven expected relationships. Age was found to be statistically related to perceived benefits at the .10 level of significance. Three hypotheses (farm income, farm size, and hired labor) were positively related to perceived benefits but were not statistically significant. Thus, only one hypothesis (goal in farming) was supported.

A summary of the stepwise multiple regression is presented in Table 25. Goal in farming was the first variable to enter the equation explaining 2% of the variation, followed by age (1%). Hired labor,
Table 24. Pearson correlation analysis of the relationships between ACRE project contact farmers' perceived benefits and individual and social characteristics

<table>
<thead>
<tr>
<th>Empirical hypothesis (cross classified)</th>
<th>Variable</th>
<th>Zero-order correlation</th>
<th>Test result (significant at .05 level)</th>
</tr>
</thead>
<tbody>
<tr>
<td>E.H: 3.3</td>
<td>Social participation</td>
<td>-0.00</td>
<td>Not supported</td>
</tr>
<tr>
<td>E.H: 4.3</td>
<td>Age</td>
<td>-0.12</td>
<td>Not supported</td>
</tr>
<tr>
<td>E.H: 5.3</td>
<td>Farm income</td>
<td>0.05</td>
<td>Not supported</td>
</tr>
<tr>
<td>E.H: 6.3</td>
<td>Farm size</td>
<td>0.06</td>
<td>Not supported</td>
</tr>
<tr>
<td>E.H: 7.3</td>
<td>Hired labor</td>
<td>0.07</td>
<td>Not supported</td>
</tr>
<tr>
<td>E.H: 8.3</td>
<td>Goal in farming</td>
<td>0.15</td>
<td>Supported</td>
</tr>
<tr>
<td>E.H: 9.3</td>
<td>Economic constraints</td>
<td>-0.07</td>
<td>Not supported</td>
</tr>
</tbody>
</table>

Table 25. Summary of regression analysis on perceived benefits on farmers' individual and social characteristics

<table>
<thead>
<tr>
<th>Variable</th>
<th>Multiple R</th>
<th>R² change</th>
<th>R²</th>
<th>Beta</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Goal in farming</td>
<td>0.15</td>
<td>0.02</td>
<td>0.02</td>
<td>0.12</td>
<td>2.151</td>
</tr>
<tr>
<td>Age</td>
<td>0.180</td>
<td>0.03</td>
<td>0.01</td>
<td>-0.10</td>
<td>1.668</td>
</tr>
<tr>
<td>Hired labor</td>
<td>0.193</td>
<td>0.04</td>
<td>0.00</td>
<td>-0.10</td>
<td>0.912</td>
</tr>
<tr>
<td>Economic constraints</td>
<td>0.204</td>
<td>0.04</td>
<td>0.00</td>
<td>-0.10</td>
<td>0.645</td>
</tr>
<tr>
<td>Farm size</td>
<td>0.210</td>
<td>0.04</td>
<td>0.00</td>
<td>0.05</td>
<td>0.379</td>
</tr>
<tr>
<td>Social participation</td>
<td>0.270</td>
<td>0.05</td>
<td>0.00</td>
<td>-0.05</td>
<td>0.409</td>
</tr>
<tr>
<td>Farm income</td>
<td>0.22</td>
<td>0.05</td>
<td>0.00</td>
<td>0.03</td>
<td>0.105</td>
</tr>
</tbody>
</table>

Overall F = 1.1384
Degrees of freedom = 7, 161
Probability > .05
economic constraints, farm size, social participation and farm income together accounted for an additional two percent of the variation.

Based on observed F and the standard regression coefficient (beta) values, it can be seen that goal in farming has the greatest influence on farmers' perceived benefits from the ACRE program, even though it was a weak influence. None of the variables was statistically significant.

The overall F test of farmers' characteristics affecting perceived benefits (Table 25) shows that 5% of the variation in perceived benefits is due to farmers' characteristics (social participation, age, farm size, farm income, hired labor, goal in farming, and economic constraints) operating jointly. However, the overall equation was insignificant at the 0.05 level.

Relationships Between Farmers' Characteristics and the Appropriateness of Technology

A summary of Pearson zero-order correlations between ACRE project farmers' characteristics and the appropriateness of technology is illustrated in Table 26. Three of the seven hypotheses (farm income, farm size, and economic constraints) were found to be statistically related to the appropriateness of technology at the .05 level of significance. One hypothesis (age) was statistically related to appropriateness of technology at the .1 level of significance. Farm income and farm size were positively related to appropriateness of technology, while age and economic constraints were negatively related to appropriateness of technology. The remaining three hypotheses (social
Table 26. Pearson correlation analysis of the relationships between appropriateness of technology and ACRE project contact farmers' individual and social characteristics

<table>
<thead>
<tr>
<th>Empirical hypothesis</th>
<th>Variable (cross classified)</th>
<th>Zero-order correlation</th>
<th>Test result (significant at .05 level)</th>
</tr>
</thead>
<tbody>
<tr>
<td>E.H: 3.4</td>
<td>Social participation</td>
<td>-.04</td>
<td>Not supported</td>
</tr>
<tr>
<td>E.H: 4.4</td>
<td>Age</td>
<td>-.12</td>
<td>Not supported</td>
</tr>
<tr>
<td>E.H: 5.4</td>
<td>Farm income</td>
<td>.11</td>
<td>Supported</td>
</tr>
<tr>
<td>E.H: 6.4</td>
<td>Farm size</td>
<td>.15</td>
<td>Supported</td>
</tr>
<tr>
<td>E.H: 7.4</td>
<td>Hired labor</td>
<td>.06</td>
<td>Not supported</td>
</tr>
<tr>
<td>E.H: 8.4</td>
<td>Goal in farming</td>
<td>.04</td>
<td>Not supported</td>
</tr>
<tr>
<td>E.H: 9.4</td>
<td>Economic constraints</td>
<td>-.23</td>
<td>Supported</td>
</tr>
</tbody>
</table>

participation, hired labor, and goal in farming) were not statistically significant. Thus, three of the seven hypotheses (farm income, farm size, and economic constraints) were supported.

In the summary table of the stepwise multiple regression analysis (Table 27), economic constraints was the first variable to enter the equation explaining 5% of the variation. Next was farm size (3%), followed by age (2%). Farm income, hired labor, and social participation each explained less than 1% of the variation, respectively.

Considering the observed F and the standard regression coefficient (beta) values, it can be concluded that economic constraint has the greatest influence on the appropriateness of technology, followed by farm size and age in that order. Those three variables were also the only ones found statistically significant at the .05 level.

The overall F test of farmers' characteristics affecting the appropriateness of technology (Table 27), which was statistically
Table 27. Summary of regression analysis on the appropriateness of technology on farmers' individual and social characteristics

<table>
<thead>
<tr>
<th>Variable</th>
<th>Multiple R</th>
<th>$R^2$</th>
<th>$R^2$ change</th>
<th>Beta</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Economic constraints</td>
<td>0.234</td>
<td>0.05</td>
<td>0.05</td>
<td>-0.25**</td>
<td>11.421</td>
</tr>
<tr>
<td>Farm size</td>
<td>0.294</td>
<td>0.10</td>
<td>0.03</td>
<td>0.17*</td>
<td>4.948</td>
</tr>
<tr>
<td>Age</td>
<td>0.328</td>
<td>0.11</td>
<td>0.02</td>
<td>-0.15*</td>
<td>4.208</td>
</tr>
<tr>
<td>Farm income</td>
<td>0.334</td>
<td>0.11</td>
<td>0.00</td>
<td>0.10</td>
<td>0.943</td>
</tr>
<tr>
<td>Hired labor</td>
<td>0.337</td>
<td>0.11</td>
<td>0.00</td>
<td>0.04</td>
<td>0.359</td>
</tr>
<tr>
<td>Goal in farming</td>
<td>0.339</td>
<td>0.11</td>
<td>0.00</td>
<td>-0.03</td>
<td>0.201</td>
</tr>
<tr>
<td>Social participation</td>
<td>0.339</td>
<td>0.11</td>
<td>0.00</td>
<td>0.01</td>
<td>0.018</td>
</tr>
</tbody>
</table>

Overall F = 3.11
Degrees of freedom = 7, 168
Probability < .01

*Probability < .05.
**Probability < .001.

significant at the 0.01 level, indicates that 12% of all the variation in the appropriateness of technology is due to the farmers' characteristics. Further reference to the F test distribution in the statistical table shows that the possibility of getting an F ratio equal to or greater than 3.11, with 7 and 168 degrees of freedom, is less than .05%.

Relationships Between Individual and Social Characteristics, and Farmer Recognition

Table 28 illustrates a summary of the zero-order correlation between ACRE project contact farmers' characteristics and farmer recognition. Among the seven hypotheses, three (farm income, farm size, and economic constraints) were statistically related to farmer recognition at the .05 level of significance. One hypothesis (age) was
Table 28. Pearson correlation analysis of the relationships between farmer recognition and ACRE project contact farmers' individual and social characteristics

<table>
<thead>
<tr>
<th>Empirical hypothesis (cross classified)</th>
<th>Variable (cross classified)</th>
<th>Zero-order correlation</th>
<th>Test result (significant at .05 level)</th>
</tr>
</thead>
<tbody>
<tr>
<td>E.H: 3.5</td>
<td>Social participation</td>
<td>.06</td>
<td>Not supported</td>
</tr>
<tr>
<td>E.H: 4.5</td>
<td>Age</td>
<td>-.11</td>
<td>Not supported</td>
</tr>
<tr>
<td>E.H: 5.5</td>
<td>Farm income</td>
<td>.12</td>
<td>Supported</td>
</tr>
<tr>
<td>E.H: 6.5</td>
<td>Farm size</td>
<td>.12</td>
<td>Supported</td>
</tr>
<tr>
<td>E.H: 7.5</td>
<td>Hired labor</td>
<td>.09</td>
<td>Not supported</td>
</tr>
<tr>
<td>E.H: 8.5</td>
<td>Goal in farming</td>
<td>.08</td>
<td>Not supported</td>
</tr>
<tr>
<td>E.H: 9.5</td>
<td>Economic constraints</td>
<td>-.23</td>
<td>Supported</td>
</tr>
</tbody>
</table>

found to be statistically related to farmer recognition at the .1 level of significance. Among the three statistically related hypotheses, farm income and farm size were positively related, while age and economic constraints were negatively related to farmer recognition. Thus, three hypotheses (farm income, farm size, and economic constraints) were supported.

In the stepwise multiple regression analysis summary (Table 29), economic constraint was the first variable to enter the equation, explaining 10% of the variation. Farm size (2%) was next, followed by age (2%), farm income (1%), and hired labor (1%). Social participation and goal in farming each explained less than 1% of the variation.

On the basis of the observed F and the standard regression coefficient (beta) values, it can be concluded that economic constraint has the greatest influence on farmer recognition. Moreover, economic constraints was the only variable found to be statistically significant at
Table 29. Summary of regression analysis on farmer recognition on farmers' individual and social characteristics

<table>
<thead>
<tr>
<th>Variable</th>
<th>Multiple R</th>
<th>$R^2$</th>
<th>$R^2$ change</th>
<th>Beta</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Economic constraints</td>
<td>0.239</td>
<td>0.10</td>
<td>0.10</td>
<td>-0.24**</td>
<td>10.297</td>
</tr>
<tr>
<td>Farm size</td>
<td>0.277</td>
<td>0.10</td>
<td>0.02</td>
<td>0.12</td>
<td>2.486</td>
</tr>
<tr>
<td>Age</td>
<td>0.303</td>
<td>0.10</td>
<td>0.02</td>
<td>-0.12</td>
<td>2.462</td>
</tr>
<tr>
<td>Farm income</td>
<td>0.314</td>
<td>0.10</td>
<td>0.01</td>
<td>0.10</td>
<td>1.314</td>
</tr>
<tr>
<td>Hired labor</td>
<td>0.324</td>
<td>0.10</td>
<td>0.01</td>
<td>0.10</td>
<td>1.305</td>
</tr>
<tr>
<td>Social participation</td>
<td>0.327</td>
<td>0.11</td>
<td>0.00</td>
<td>-0.05</td>
<td>0.384</td>
</tr>
<tr>
<td>Goal in farming</td>
<td>0.327</td>
<td>0.11</td>
<td>0.00</td>
<td>0.02</td>
<td>0.047</td>
</tr>
</tbody>
</table>

Overall F = 2.87686
Degrees of freedom = 7, 168
Probability < .05

**Probability < .001.

the 0.05 level.

The overall F test of farmers' characteristics affecting farmer recognition (Table 29) indicates that 11% of the variation in farmer recognition is due to farmers' characteristics operating jointly. Further reference to the F test distribution indicates that the possibility of getting an F ratio equal to or greater than 2.87686, with 7 and 168 degrees of freedom, is less than .05%.
CHAPTER 6. SUMMARY AND CONCLUSIONS

Introduction

In this final chapter, the empirical findings in Chapter V are discussed in more detail in relation to the theoretical framework and the objectives of the study. Following the discussion of each objective, implications of the findings and policy ramifications are discussed. Finally, a general summary and conclusions of the study will be presented.

Objective 1: Selected Basic Sample Characteristics

An understanding of the characteristics of the target group is fundamental for the successful design, implementation, and evaluation of extension programs such as the ACRE project in Sierra Leone. In determining farmers' characteristics, data were obtained from both ACRE project contact farmers and noncontact farmers.

In general, it was found that the farmers selected for direct contact with the ACRE project extension agents tend to be older, they operate larger farms, obtain higher farm income, use more family and hired labor, are more influential, and have more formal education. These findings are consistent with the findings of the classical adoption and diffusion research reviewed in this study. Extension agents generally contact the more influential members of a community, who tend to be richer, operate larger farms in the case of agricultural innovations, have higher education, and live on access roads, thus ignoring the poorer and less powerful segment of the community.
The study also reveals that most farmers need a source of capital such as farm loans. Most respondents indicate they would increase their participation in the ACRE project if they have access to a farm loan. A major problem limiting farmers' access to farm loans, according to the findings, is the unavailability of lenders and the very high interest rates charged by the few local lenders. Another problem which places a constraint on farmers' participation in the ACRE project is the unavailability of farm helpers.

One objective of the ACRE project is to influence farmers to adopt the recommended agricultural innovations. It was found that the ACRE project contact farmers have adopted more of the recommended agricultural innovations than the noncontact farmers. This is not surprising, considering the greater frequency of contact between the contact farmers as opposed to the noncontact farmers.

The first implication of these findings relates to the characteristics of farmers selected for extension programs such as the ACRE project. The findings imply that poorer people in rural communities, who are also less powerful and less influential, have much lower probabilities of benefitting from extension programs. According to the findings of this study, they are contacted less by extension agents. In terms of policy ramifications, it is necessary to include a broader cross section of the clientele in the selection of contact farmers for any agricultural development project. The alternative is to create the impression among the target population that extension programs are for the exclusive benefit of the more influential members of the community.
Moreover, the concentration on the economically more powerful clients will only widen the already existing gap between the haves and have-nots in the community.

A main objective of the ACRE project is to improve agricultural productivity among rural communities in Sierra Leone. However, the economic problems encountered by farmers are those certain to impede agricultural development. Hence, a second implication relates to the farmers' expressed need for farm loans to which they have no access. This limitation is noteworthy and points to a basic real need among Sierra Leone farmers. Not surprisingly, the findings also indicate that farmers will increase their participation in the ACRE project if they have access to reasonable and meaningful farm loans, such as supervised credit. Maddox supports the need for capital supplementation among rural communities in developing countries by concluding that "substantial capital grants combined with technical assistance in organizing and managing public services may be many times more effective in solving some of the immediate problems of underdeveloped countries than the introduction of technical knowledge alone" (Maddox, 1956:17). Thus, the findings strengthen the need for capital supplementation in a subsistence economy, especially at critical periods. For example, in Sierra Leone, a critical period for farmers is during the rainy season, when they have to buy their basic staple food (rice) and take care of other social obligations. The absence of reasonable credit facilities in the rural areas renders farmers increasingly dependent on, and vulnerable to the exploitation of the few local lenders who often charge
prohibitive interest rates. The continued dependence on high interest lenders could force farmers into a vicious circle of indebtedness to local elites. This results in the ineffectiveness of extension programs such as the ACRE project in Sierra Leone, because farmers will be less likely to obtain the much needed surpluses for other development programs.

A third implication of the findings concerns the unavailability of farm helpers. In the first chapter of this study, one reason suggested for the low agricultural productivity in Sierra Leone was the out-migration from the rural areas to urban centers for job opportunities and modern facilities. One result of migration is manifest in the unavailability of farm workers. However, rural migration tends to be more of a national problem. This could be resolved by more decentralized planning, such as providing basic social and economic infrastructure (good roads, safe water supply, accessible markets, and rural job opportunities). Hopefully, such decentralized planning will offset the necessity for people to leave their villages for distant urban centers, where they are often unproductive because they lack the necessary skills to compete for the very few technical and semi-technical jobs available.

Objective 2: Level of Adoption of Recommended Agricultural Innovations Among ACRE Project Contact Farmers

The second objective of this study was to determine the extent to which ACRE project contact farmers have adopted the recommended agricultural innovations. The basic rationale for this objective was to ascertain the extent to which farmers were responding to the ACRE
project. Implicit in this objective is the desire to understand the extent to which farmers have adopted the recommended agricultural innovations and which recommended agricultural innovations have been adopted most.

Among the ten selected recommended agricultural practices, it was found that more than half of the contact farmers sampled have adopted between five and ten. However, only two farmers have adopted all of the recommended agricultural practices.

The study also reveals that farmers have adopted improved rice varieties most, followed by the use of free minikits, fertilizer application, participation in demonstration farm visits, and time of planting, all of which have been adopted by more than 50% of the sample population. Other selected agricultural practices which have been adopted by less than 50% of the population include improved cassava, participation in farmer training, improved sweet potatoes, improved maize, and crop spacing, respectively.

Relative to the previously negative attitudes of farmers towards the ACRE project, the findings imply that farmers are changing their attitudes towards the ACRE project. Apparently, the influence of time is reducing the psychological barrier to change such as fear of the unfamiliar. Moreover, farmers may be developing greater confidence in the extension agents and the ACRE program.

A second implication relates to the recommended agricultural practices adopted most. The very high adoption score for improved rice lends support to the literature reviewed in this study, which indicates
that farmers prefer to adopt those agricultural innovations which satisfy their security needs. Therefore, it is not surprising that improved rice is the most adopted agricultural practice, because it is Sierra Leone's staple crop. The popularity of the free minikits is also consistent with the social expectations in gemeinschaft communities. For example, the common sharing relationships among rural Sierra Leoneans seems to project into the people's perceived expectations of and their relationships with government institutions including extension programs such as the ACRE project. There is also the tendency to try new commodities especially if they are free samples. The findings also imply that farmers will prefer those agricultural practices which demand less time, less labor, and are less complex.

From a program planning perspective, it is necessary for farmers to participate in the decisions relating to the type of crops which they may prefer to grow. Moreover, the current research efforts by the ACRE project should continue so as to identify those agricultural technologies which are less complex, and less time and labor consuming.

Objective 3: Relationships Between Farmers' Characteristics and Adoption Scores of Recommended Agricultural Practices

The main reason for the third objective of the study is to determine the extent to which ACRE project contact farmers' individual and social characteristics affect the level of adoption of the recommended agricultural practices. This is necessary because the personal attributes of potential adopters, communication of the innovation, and the availability of resources constitute the conditions for the adoption of
innovations.

The findings indicate that individual goals in farming have the greatest influence on farmers' adoption scores. Implicitly, the findings point to the increasing need to emphasize a motivation strategy which may raise farmers' levels of aspiration. Consistent with the theoretical framework of this study, high goals in farming need to be induced because "a society with a generally high level of achievement will produce more rapid economic development" (McClelland, 1961:205).

From a program policy perspective, high achievement need among farmers in rural Sierra Leone could be induced through farmer training to promote self reliance. Additionally, farmer recognition and emphasis on goal attainment are possible strategies for promoting high need achievement among Sierra Leone farmers.

Objective 4: Contact Farmers' Perceptions of the ACRE Project Recommended Agricultural Innovations

In social psychological and rural sociological research, a widely accepted notion is that people's perception of a given situation influences their behavior. "If human beings define situations as real, they are real in their consequences" (Thomas, 1931:189). Following this perspective, this study tried to determine the ACRE project contact farmers' perception of the recommended agricultural innovations. Farmers' perception of the recommended agricultural innovations offers opportunities to understand the compatibility of the recommended agricultural practices with the farmers' existing agricultural practices.
An understanding of these perceptions could also enhance the process of planning, implementing, evaluating, and, if necessary, modifying the ACRE project for a more effective impact on the target population.

As the study shows, at least two thirds of the ACRE project farmers do not perceive the recommended agricultural innovations as viable alternatives to their existing agricultural practices. It was also found that farmers' adoption scores were positively related to the perceived quality of the recommended agricultural innovations. Among the six recommended agricultural innovations evaluated, the findings indicate that fertilizer application is the most widely accepted alternative, followed by improved crop varieties, double cropping, intercropping, crop spacing, and dibbling, in that order. Thus, besides double cropping, there is a tendency for farmers to appreciate those recommended agricultural technologies which seem to be less labor intensive and less time demanding. For example, farmers may spend less labor and time adopting improved crop varieties and fertilizer application than intercropping, crop spacing, or dibbling. This is not surprising because in Sierra Leone, farmers depend on manual labor for all forms of agricultural production. In such situations, it is more rational for farmers to be inclined to favor those agricultural technologies which seem to be less labor intensive and less time demanding.

Additionally, the complexity of the technology may affect farmers' perception. For example, the findings in this study seem to indicate a tendency for a decrease in the farmers' perceived quality of the recommended agricultural practice as its complexity, such as making
precise measurements for spacing increases. Moreover, the fear of the unfamiliar syndrome may influence farmers' perceptions. Hence, most Sierra Leone farmers are used to traditional random planting and may be less familiar with intercropping, crop spacing, and dibbling than fertilizer application, use of improved varieties, and double cropping. Apparently, there may also be greater perceived risks in adopting the less familiar agricultural practices.

In terms of policy ramifications, one recommendation is to intensify the existing agronomic and extension research efforts which will enhance the identification of the most appropriate technologies acceptable within the social, economic, and cultural framework of the clientele groups served. In other words, the ACRE project needs to pay more attention to those technologies which maximize output and minimize costs. In the future, it may be necessary to include potential adopters in the planning process. This will be helpful in identifying those agricultural crops which farmers need to grow the most.

Objective 5: Relationships Between Farmer Motivation and Adoption Scores

A major aspect of this study is to determine how farmer motivation as a modification of the classical adoption/diffusion model affects farmers' adoption scores. In general, the study reveals that there is a strong relationship between farmer motivation and adoption scores. The regression analysis further indicates that farmer recognition has the greatest influence on farmer adoption scores followed by perceived benefits.
The above findings support the theoretical model in this study which suggests that increased farmer adoption scores will result from farmer motivation. Moreover, from an exchange theory perspective, people engage in and tend to repeat those activities which offer them the greatest rewards and least cost. Therefore, the great influence of farmer recognition and perceived benefits on adoption scores is not surprising, considering the fact that farmer recognition is a kind of reward for participating in or adopting the ACRE project recommended agricultural innovations. This is also consistent with the utilitarian orientation to adoption in the theoretical model.

From the Parsonian perspective adopted in the theoretical model, farmer recognition and perceived benefits (goal attainment) are within the personality domain in the process of farmer motivation. Implicitly, such motivation at the individual level will influence other members of the society, who may wish to derive similar benefits and recognition by adopting the ACRE project recommended practices. The inclusion of other community members will enhance social integration such as increased farmer attendance in training programs and demonstration farm visits, which may be designed for the achievement of common goals. In turn, the participation in such social functions will influence a cultural change resulting from the increased use of new technologies in place of older ones. With time, these new practices become a new cultural phenomenon which is then transmitted to succeeding generations through the process of communication. Eventually, the continuous use of the innovations may result in a social change such as increased farm
incomes and higher levels of aspiration.

From a program delivery standpoint, the findings indicate the need for greater emphasis on farmer recognition such as offering program participants certificates, house and farm labels, and recognizing them at farmers' meetings, or agricultural shows, in group photographs, and through the radio. Such recognition will serve as a status booster and also enhance the process of motivation. It is also necessary to identify and recommend those agricultural technologies which offer the greatest benefits to farmers.

Farmers' Characteristics and Level of Motivation

Because of the assumed differences in actual program delivery among the target population, this study similarly assumed that farmer motivation levels will vary among different members of the rural communities served. The data presented in this study seem to suggest that this is largely the case.

Among the motivation variables evaluated, it was found that age was the most influential factor affecting the frequency of the extension agents' visits. This is consistent with the literature reviewed in this study which suggests that extension agents pay more attention to the more influential, older people in the community. Moreover, since age ranks high in the social status hierarchy in a typical traditional setting such as the Sierra Leone rural communities, it is not surprising that extension agents, who themselves are products of the traditional culture, will tend to pay more visits to older rather than the younger farmers in the community. However, considering the insignificant
relationship between age and farmers' adoption scores, it may be more advisable for extension agents to pay more attention to the middle-aged and younger farmers than the older people in the community.

In another finding, the study indicates that farmers who operate larger farms are more frequent attenders of demonstration farm visits. Additionally, the study reveals that older farmers are the least frequent attenders of demonstration farms. This is surprising considering the earlier findings in this study which indicate that older farmers are more frequently contacted by extension agents. However, since older farmers are likely to be more traditional, their less frequent visits to demonstration farms compared to younger farmers may be due to a lower desire for new ideas. Moreover, older farmers may find it more difficult to visit demonstration farms if they are located far away from their villages.

The study further shows that individual goal in farming is the most influential factor affecting farmers' perceived benefits in the ACRE programs. However, considering the fact that farmers who have higher goals in farming operate larger farms, there is the implication that large farm operators also derive greater benefits than small farm operators. This finding further lends support to the need to raise farmers' levels of aspirations previously discussed. The implicit assumption in advocating raising farmers' levels of aspiration is that it will result in the desire to increase farm sizes for the purpose of achieving higher goals. Fortunately, among farmers in Sierra Leone, farm sizes could be increased without necessarily paying for extra land.
Larger farms will in turn result in greater perceived benefits, which will induce increased adoption among clientele groups.

In the case of the appropriateness of the technology, the findings reveal that economic constraint is the greatest influencing factor on the perceived appropriateness of the technology. Specifically, farmers who experience greater economic constraint also perceive the recommended agricultural innovations as less appropriate. In addition, the study indicates that older farmers who experience higher economic constraints perceive the recommended agricultural innovations as less appropriate. From a social psychological perspective, older farmers who may tend to be more traditional may perceive the recommended agricultural practices as less appropriate. In the case of economic constraints, those farmers who have limited access to resources will find it difficult to purchase farm inputs and will therefore perceive the ACRE project recommended practices unattainable and therefore inappropriate. On the other hand, farmers who operate larger farms may have greater access to resources and a greater potential for taking risks and therefore could perceive the recommended agricultural practices as more appropriate.

Since farm size and economic constraints are highly related in this study, the findings further strengthen the previously discussed need for a kind of supervised farm loan to potential adopters of the ACRE project and other recommended agricultural innovations in Sierra Leone.

Lastly, the study shows that economic constraint has the greatest influence on farmer recognition. Implicitly, farmers who have fewer resources and operate smaller farms are recognized less by the extension
agents than those who have more resources and operate larger farms. Also implicit in these findings is the fact that poorer farmers who are contacted less often by extension agents, who rarely appear at demonstration farms, who perceive the recommended agricultural innovations as less appropriate, who derive the least benefits from the ACRE project, and who are also the lowest adopters of the ACRE project recommended practices, are naturally the least recognized by the extension agents. This is also consistent with the adoption/diffusion research findings which maintain that poor farmers are often ignored by extension agents and are therefore less likely to benefit from extension programs such as the ACRE project in Sierra Leone. To reverse this trend, it is necessary to include more of the middle-aged and younger farmers in extension programs and also provide rural farmers with the kind of supervised loans for farm operations.

Conclusions

In general, the findings indicated mixed support for the motivation model adopted in the study. Of the three general predictions made prior to the analysis, one (relationship between farmer motivation and adoption scores) was supported. On the other hand, farmers' characteristics had limited effects on either farmer motivation or adoption scores. Moreover, selective aspects of farmer motivation including farmer recognition and perceived benefits from the ACRE project were important.

The implications of the findings are perceived from three levels. First, there are theoretical implications. To some extent, the findings are consistent with the recent findings of the classical adoption/diffusion research, which indicates that extension agents often contact
the more influential members of a community and tend to ignore the less prominent people in the community. Implicitly, farmers' characteristics influence the amount of the extension program delivered including farmer motivation. Moreover, a basic assumption of many extension programs in Sierra Leone and other developing countries is that farmers' adoption of the recommended agricultural innovations will increase incomes in rural communities and hence improve living conditions in rural areas. In future, therefore, it is necessary to study the consequences of farmer adoption of the ACRE project recommended agricultural innovations. Lastly, adoption/diffusion research has paid little attention to the effect of economic constraints on farmers' adoption of new agricultural practices. This study has shed light on farmers' need for farm loans, if they should be actively involved in agricultural development programs such as the ACRE project in Sierra Leone. Moreover, the study has indicated the need to further understand the role of farmer motivation in implementing extension programs among rural communities in developing countries.

Secondly, there are implications for program design and implementation. The study shows that planners need to take many factors into consideration in designing extension programs in developing countries. Factors such as farmers' characteristics, their economic constraints, and their social and cultural environments should be considered together with the opportunity to include them in the program planning process, so that they are given the chance to make meaningful inputs into the programs designed to benefit their communities. There is also
the need to include more middle-aged and if possible younger farmers among the extension contact groups, because as the study shows, they seem to have greater potentials for adopting the recommended practices. A more representative inclusion of participant farmers also means contacting the less influential members of the community, who often are more needy than rural elites. The overwhelming evidence presented in the study points to the need for an organized farm loan system among farmers in Sierra Leone. There is also need to pay greater attention to farmer recognition as a motivation strategy for inducing farmer adoption of the recommended agricultural practices. Lastly, it is necessary to raise farmers' level of goal achievement during training sessions and at every contact with the extension agents.

Thirdly, there are methodological implications. From the analysis, it was evident that certain measures have been inadequate and that some variables did not relate to the dependent variables as hypothesized. In the future, it is necessary to identify better measures and include more variables in the model. In light of these observations, it is necessary to conduct further studies which will shed more light into understanding farmers' characteristics including their limitations and how to effectively get rural farmers to appreciate and adopt recommended extension practices which have been proven to be beneficial to the target population.

Limitations of the Study and Suggestions for Future Research

The results of the study do not overwhelmingly support the motivation model in the study. In many of the analyses, the variations
explained were significantly small, perhaps due to inadequate operationalization of the concepts and measurement errors. It is also possible that some element of bias could not be totally avoided due to the use of nonparticipant farmers within the ACRE project villages. The use of such homogeneous respondents may have resulted in the lack of variation in the measures. Additionally, it was necessary to use estimations in some of the measures due to the very high illiteracy rates among our respondents. The use of estimates for variables such as age, farm size, and farm income can result in imprecise measurement that may bias the results of the analysis.

A number of questions about farmer motivation remained unanswered due to the limitations of this research and should be addressed by future research. First, as already suggested, more accurate measures should be employed. Second, perceived benefits should have included farmers' perceived need for the innovations. Furthermore, future research on farmer motivation should address the problem of determining which specific variables will significantly induce farmers to participate in, and hence adopt extension programs such as the ACRE project recommended agricultural practices. Future research should also determine the specific farmer recognition strategies which will influence farmer adoption. Finally, another possible area for research is to determine which crops or farm enterprises are most favorable to farmers for the purpose of including them in the extension program.
BIBLIOGRAPHY

Airey, A., J. A. Binns and P. K. Michell
1979 "To integrate or ---? Agricultural development in Sierra Leone." Institute of International Development Studies 1014:20-27.

Alao, J. A.

Apodaca, Anacleto

Ascroft, Joseph, Niels Roling, Joseph Kariuki and Fred Chege

Atala, T. K.

Barker, Anthony

Beal, George M. and Joe M. Bohlen

Beltrans, Luis Ramiro

Benvenuti, B.
Biggs, Stephen  

Blake, Robert and Jane Moulton  

Blau, Peter M.  

Bohlen, J. M.  

Bohlen, J. M. and G. M. Beal  

Carr, Stephen  
1971  "Agricultural research or extension services: Which has failed?" Rural African 16:1-5.

Carter, C. F. and B. R. Williams  

Castillo, Gelia T.  

Chambers, Roger  

Chesterfield, Ray and Kenneth Puddle  
Christiansen, James E. and Robert E. Taylor
1966  The Adoption of Educational Innovations Among Teachers of Vocational Agriculture. Department of Agricultural Educa­tion Bulletin. Ohio State University, Columbus, Ohio.

Clark, Robert C. and I. A. Akindode
1968  Factors Associated with Adoption of Three Farm Practices in the Western State, Nigeria. Ile-Ife, Nigeria: University of Ife Press.

Copp, James H.
1956  Personal and Social Factors Associated with the Adoption of Recommended Farm Practices Among Cattlemen. Kansas Agri­cultural Experiment Station Technical Bulletin No. 83.

Currens, Gerald E.

Diaz-Bordenave, Juan

Dichter, Earnest

Drake, G. F.

Fliegel, Frederick C. and Joseph E. Kivlin

Foster, George M.

Francis, David G.

Gibson, Terry L.
Guimaraes, Lytton L.

Gupta, Ashok K.

Hagen, Everett E.

Han, Yong Kin

Herzberg, Frederick

Hess, C. V. and L. F. Miller
1954 Some Personal and Economic and Sociological Factors Influencing Dairymen's Actions and Success. Pennsylvania Agricultural Experiment Station Bulletin 557.

Homans, George

Hruschka, E. and H. Rheinwald

Hursh, Gerald D.

Isaac, Barry L.

Jackson, I. C.
Jarret, H. R.

Jordan, H. D.
1965 "Rice in the economy of Sierra Leone." World Crops 17 (No. 4):68-74.

Katz, Daniel

Klausmeier, Herbert

Kroeber, A. L.

Lee-Sechrest, Stephen G., Melinda A. West, Robin Redner Phillips and William Yeaton

Lerner, D.

Lewin, Kurt

Lewis, Robert B.

Lioberger, H. F. and C. M. Coughenour
1957 Social Structure and Diffusion of Farm Information. Missouri Agricultural Experiment Station Research Bulletin 631.

Lodahl, Thomas M. and Mathilde Kejner

Macgregor, Gordon
Maddox, James G.  
1956 United Nations Technical Assistance to Mexico. Mexico City  
D.F.: American University Field Staff.

Maslow, A. H.  

McClelland, David C.  

Mendez, Alfred D.  
1968 "Social structure and the diffusion of innovations." Human  
Organization 27:241-249.

Merton, Robert K.  

Morrison, Denton E.  
1964 "Achievement motivation of farm operators: A measurement  

Mosher, A. T.  
1978 An Introduction to Agricultural Extension. New York: Agricultural  
Development Council.

Mulford, Charles Lee and Gerald E. Klonglan  
1972 "Attitude determinant of individual participation in organized  
voluntary action." In David H. Smith, Richard D. Reddy, and  
Burt R. Baldwin (eds.), Voluntary Action Research. Lexington,  
Massachusetts: Lexington Books.

Mulford, Charles L., Richard D. Warren, Gerald E. Klonglan, William D.  
Lawson, and Paula C. Morrow  
1977 "Organizational effectiveness and impact: A planning guide."  
Sociology Report No. 136. Department of Sociology and  
Anthropology, Iowa State University, Ames, Iowa.

Neisser, Charlotte S.  
1955 "Community development and mass education in British Nigeria."  

Niehoff, Arthur  
1964 The Primary Variables in Directed Cross-Cultural Change.  
Alexandria, Virginia: George Washington University, Human  
Resources Research Office.

Norman, D. W.  
1969 "Economic and non-economic variables in village surveys."  
Norman, D. W.  

Opler, Moris E. and Rudra Datt Sigh  

Palmore, James A. and Ronald Freedman  

Parra, S. R.  

Parsons, Talcott  

Patton, Michael Q.  

Petrini, Frank  

Philips, Jane  

Polgar, Stephen  

Price, James L.  

Quay, Herbert C.  
Roca, L.
1969 "Los intereses economicos y la orientacion de noticias sobre el movimiento campesino." Campesino Peru 1:37-52.

Rogers, Everett M.
1961 "The adoption period." Rural Sociology 26:72-82.

Rogers, Everett M. and F. Floyd Shoemaker

Roling, Niels G., Joseph Ascroft, and Fred Wa Chege

Roy, Prodipto, Frederick C. Fliegel, Joseph E. Kivlin and Lalit K. Sen

Ryan, Bryce and Neal Gross

Sigh, Ram N.

Smith, David H. and Richard D. Reddy

Thomas, W. I.

U.S. Department of Agriculture

Vago, Stephen
Van Dersal, William Richard

Voh, Jacob Padeino

Warwick, Donald P. and Charles Lininger

Whiting, Gordon C.

Wilkening, E. A.

World Bank

Yadav, Dharam P.

Yarbrough, Paul, Gerald E. Klonglan and Joe M. Bohlen
1972  "Communications and the adoption of technology and social change." Seminar Paper on Technology and Social Change in Foreign Cultures. Iowa State University, Ames, Iowa.
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Finally, I wish to thank Carolyn Taylor for her patience in producing the final copy of this dissertation from the many cut and paste originals.
APPENDIX A: QUESTIONNAIRE USED TO GENERATE THE DATA
GOOD MORNING/EVENING: I am working for Njala University. We are currently studying participation in the ACRE Project by farmers in this area. We hope to use the information to improve the ACRE programs. I would like to talk to you about how the ACRE program could best serve farmers in your community. Your response in this interview is voluntary. However, please bear in mind that the success of this study depends on the accuracy of the information we obtain from you and other farmers. Your identity and the information you provide us will remain confidential. If you have any questions now or during the interview, I will be very glad to answer them.

We very sincerely appreciate your cooperation.
To begin with, I would like to ask some questions about your farm:

1. How many years have you been farming?

2. What is the size of your farm? (How many bushels of rice seed can you broadcast on your farm?) _______________ acres/bushels.

3. Has the size of your farm increased, decreased, or stayed the same during the past three years?
   - Increased ____ Why? ________________________________
   - Decreased ____ Why? ________________________________
   - Same ____ Why? ________________________________
   - Don't know

4. Which of the following farming systems do you operate?
   (Interviewer, check (✓) system)
   - Mixed upland rice
   - Dry season inland valley swamp
   - Wet season inland valley swamp
   - Boliland rice
   - Plantation crops
   - Mangrove swamp
   - Others (specify)

   ________________________________
   ________________________________
   ________________________________
5. Do you own any animals?

Yes ____
No ____ (If no, skip to 6)

(If yes), how many of each of these animals do you own?
(Interviewer, check (✓) animals owned.)

<table>
<thead>
<tr>
<th>Animals</th>
<th>No. owned</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cows</td>
<td></td>
</tr>
<tr>
<td>Sheep</td>
<td></td>
</tr>
<tr>
<td>Goats</td>
<td></td>
</tr>
<tr>
<td>Pigs</td>
<td></td>
</tr>
<tr>
<td>Fowls (chickens)</td>
<td></td>
</tr>
<tr>
<td>Ducks</td>
<td></td>
</tr>
<tr>
<td>Rabbits</td>
<td></td>
</tr>
<tr>
<td>Others (specify)</td>
<td></td>
</tr>
</tbody>
</table>

6. Do you own any of the following farm equipment?

(Interviewer, check (✓) equipment owned)

<table>
<thead>
<tr>
<th>Equipment</th>
<th>No. owned</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hand operated simple machines</td>
<td></td>
</tr>
<tr>
<td>(Special type)</td>
<td></td>
</tr>
<tr>
<td>Wheel-barrows</td>
<td></td>
</tr>
<tr>
<td>Axes</td>
<td></td>
</tr>
<tr>
<td>Hoes</td>
<td></td>
</tr>
<tr>
<td>Cutlasses</td>
<td></td>
</tr>
<tr>
<td>Crop</td>
<td>Check (✓)</td>
</tr>
<tr>
<td>-----------------------</td>
<td>-----------</td>
</tr>
<tr>
<td>Upland rice</td>
<td></td>
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<tr>
<td>Swamp rice</td>
<td></td>
</tr>
<tr>
<td>Boliland rice</td>
<td></td>
</tr>
<tr>
<td>Groundnuts</td>
<td></td>
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<tr>
<td>Corn (maize)</td>
<td></td>
</tr>
<tr>
<td>Yams</td>
<td></td>
</tr>
<tr>
<td>Cassava</td>
<td></td>
</tr>
<tr>
<td>Black-eyed beans</td>
<td></td>
</tr>
<tr>
<td>Sweet potatoes</td>
<td></td>
</tr>
<tr>
<td>Cow peas</td>
<td></td>
</tr>
<tr>
<td>Benniseed</td>
<td></td>
</tr>
<tr>
<td>Cacao</td>
<td></td>
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<tr>
<td>Coffee</td>
<td></td>
</tr>
<tr>
<td>Millet</td>
<td></td>
</tr>
<tr>
<td>Sorghum</td>
<td></td>
</tr>
</tbody>
</table>

7. Which of these crops did you grow on your farm last year? (If yes), how much did you grow? Did you sell any of the crops? (If yes), how much did you sell? How much money did you make from each of these crops? Did you grow any crops which I have not mentioned here?
Crop | Check (✓) | Amount of crops grown | Amount of crop sold | Est. income from crop
--- | --- | --- | --- | ---
Oranges | | | | 
Vegetables | | | | 
Others (specify) | | | | 
| | | | 
| | | | 
8. (a) What is your main goal in farming? ____________________________________________
   ____________________________________________
   ____________________________________________
(b) Do you farm to:
   _____ produce just enough food for the family?
   _____ produce enough food for the family and sell some to make money for buying necessities?
   _____ produce enough to increase the size of your farm and make a profit?
9. (a) Do you belong to ____________________ (Interviewer, check ✓ members)
   (b) How long have you been a member of ____________________?
   (c) What position do you hold in ____________________?
   (d) Where are the meetings for ____________________ usually held?
   (e) How far is this from your village?

<table>
<thead>
<tr>
<th>Organization</th>
<th>Length of M/ship</th>
<th>Position held</th>
<th>Meeting Dist. from place your vill.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farmers Coop.</td>
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<td></td>
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</tr>
<tr>
<td>Thrift &amp; Credit Soc.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Organization</td>
<td>Length of Position</td>
<td>Meeting</td>
<td>Dist. from place your vill.</td>
</tr>
<tr>
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<td>---------</td>
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</tr>
<tr>
<td>Communal Work Force</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Rotary Credit (Osusu)</td>
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<td></td>
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<tr>
<td>Vill. Council of Elders</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Chiefdom Council</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Religious Groups</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Others (specify)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(f) What other things make you important in your village? ______

10. Have you ever taken part in ______ during the past three years? (If yes), how many ______ have you attended in the past three years? Who organized the ______ you attended? Was the ______ helpful? (If yes), how helpful was the ______? (If no), why was it not helpful?

<table>
<thead>
<tr>
<th>Event</th>
<th>Number Attended</th>
<th>Organizer</th>
<th>Was it helpful?</th>
<th>Extent of helpfulness</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Demonstration Farm visit</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Farmer Training</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Agric. Show/Field Day</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Others (specify)</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

\(^{1}\text{NH = not helpful; LH = a little helpful; H = helpful; VH = very helpful.}\)
11. Do you ever visit any big town?
   (Interviewer, if more than one mentioned, get information for all.)

   Yes _____  No _____

   (If yes),

   (a) Which big town do you visit?   _______   _______   _______

   (b) How often do you go there?     _______   _______   _______

   (c) How far is the town from your village?   _______   _______   _______

Now I would like to talk to you about the ACRE Program:

12. Do you participate in the ACRE program? For instance, do you take part in the crop trials/demonstrations, farmer training or farm visits organized by ACRE agents?

   Yes _____  No _____ (Skip to 30)

13. How long have you been involved in the ACRE program? _______

   (Interviewer, calculate time)

   (a) How did you learn about the ACRE program?

   (b) When did you get this information?

   Source of Information:                             Date of Information

   ______________________________________________

   ______________________________________________

   ______________________________________________

   ______________________________________________

   ______________________________________________

   ______________________________________________

   ______________________________________________

   ______________________________________________

   ______________________________________________
(c) How important were each of the following in making your decision to participate in the ACRE program?

<table>
<thead>
<tr>
<th></th>
<th>Rate of importance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>VU</td>
</tr>
<tr>
<td>ACRE agent</td>
<td>1</td>
</tr>
<tr>
<td>Friend(s)</td>
<td>1</td>
</tr>
<tr>
<td>Relative (specify)</td>
<td>1</td>
</tr>
<tr>
<td>Village chief</td>
<td>1</td>
</tr>
<tr>
<td>Section Chief</td>
<td>1</td>
</tr>
<tr>
<td>Paramount Chief</td>
<td>1</td>
</tr>
<tr>
<td>Radio Broadcast</td>
<td>1</td>
</tr>
<tr>
<td>Trader(s) (Hawkers)</td>
<td>1</td>
</tr>
<tr>
<td>Neighbor(s)</td>
<td>1</td>
</tr>
<tr>
<td>Demonstration farm visit</td>
<td>1</td>
</tr>
<tr>
<td>Free mini-kit (fert., seeds, etc.)</td>
<td>1</td>
</tr>
<tr>
<td>Compensation</td>
<td>1</td>
</tr>
<tr>
<td>Recognition</td>
<td>1</td>
</tr>
<tr>
<td>Performance of trial crops</td>
<td>1</td>
</tr>
<tr>
<td>Price of farm crops</td>
<td>1</td>
</tr>
<tr>
<td>Nearness to market</td>
<td>1</td>
</tr>
<tr>
<td>Desire to try new ideas</td>
<td>1</td>
</tr>
<tr>
<td>Others (specify)</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>1</td>
</tr>
</tbody>
</table>

\[1\] VU = very unimportant, SU = somewhat unimportant, NINU = neither important nor unimportant, SI = somewhat important, VI = very important.
14. Do you feel that the ACRE program meets the needs that you have as a farmer?
Yes _____ No _____
Explain: ____________________________________________

15. How many of the crops you need for food in your household does the ACRE program include? Does it include none ____, a few ____, some ____, most ____, or all ____ of the crops you need for food in your household?

16. Would you increase your participation in the ACRE program if more of the crops you need for food in your household were included? 
Yes _____ No _____

17. Are there any crops not included in the ACRE program that you feel should be?
Yes _____ No _____
(If yes), what are they? ____________________________________________

18. Have you been offered free seeds, fertilizers, pesticides, or other inputs (mini-kits) by the ACRE agents for use on your farm?
Yes _____ No _____
(If yes), have you used these free items (mini-kit)?
Yes _____ No _____
(If yes), was it useful?
Yes _____ No _____
(If yes), explain: ____________________________________________
(If not), why not? ____________________________________________

_________________________________________________________________

19. Do you like receiving free mini-kits?
   Yes _____    No _____
   (If yes), what do you like about the free mini-kit? __________
   ___________________________________________________________________
   ___________________________________________________________________
   (If no), what do you dislike about the free mini-kit? __________
   ___________________________________________________________________

20. (a) Do you ever have need for a farm loan?
   Yes _____    No _____
   (If yes), can you get a farm loan when you need it?
   Yes _____    No _____
   (If no), for what reason are you not able to get a farm loan?
   ___________________________________________________________________

   (b) Would you increase your involvement in the ACRE program if
   you could get a reasonable farm loan?
   Yes _____    No _____

21. Does the ACRE agent give you information for __________?
   Yes _____    No _____
   (If yes), (a) how much information does he give?
   (b) how reliable is the information he gives?
Choosing crop varieties | Yes | No | NE | ARA | TM | VU | UR | UD | R | VR
--- | --- | --- | --- | --- | --- | --- | --- | --- | --- | ---
Fertilizer application | | | 1 | 2 | 3 | 1 | 2 | 3 | 4 | 5
Pest control | | | 1 | 2 | 3 | 1 | 2 | 3 | 4 | 5
Planning farm work | | | 1 | 2 | 3 | 1 | 2 | 3 | 4 | 5
Seed dressing | | | 1 | 2 | 3 | 1 | 2 | 3 | 4 | 5
Crop processing | | | 1 | 2 | 3 | 1 | 2 | 3 | 4 | 5
Crop storage | | | 1 | 2 | 3 | 1 | 2 | 3 | 4 | 5
Time of planting | | | 1 | 2 | 3 | 1 | 2 | 3 | 4 | 5
Others (specify) | | | 1 | 2 | 3 | 1 | 2 | 3 | 4 | 5

1 NE = not enough, ARA = about the right amount, TM = too much.

2 VU = very unreliable, UR = unreliable, UD = undecided, R = reliable, VR = very reliable.

22. How many times per month does the ACRE agent visit you to give you advice on your farm work? _________________________________

23. Do you see the ACRE agent as often as you need to?
Yes ____ No ____

24. Would you increase your involvement in the ACRE program if the agent(s) visited you more often?
Yes ____ No ____ Don't know ____

Now I would like to ask about the decisions you make about your participation in the ACRE program:

25. (a) Who makes most of the decisions in your ACRE program farm work?

_______________________________
(b) How much does each of the following affect your decisions in ACRE Project farm work?

<table>
<thead>
<tr>
<th></th>
<th>Not at all</th>
<th>A little</th>
<th>Much</th>
<th>Very much</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yourself</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>ACRE agent</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Relative(s) (specify)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Village/town elders</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Friends</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Neighbors</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Others (specify)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

26. Do you prefer the ACRE agent to:

_____ provide you no information or help in decision making?
_____ provide you information for making decisions?
_____ help you in making decisions?
_____ tell you what you should do?
_____ tell you what you must do?

27. How good are the ACRE practices compared to your old farming practices? Do you think _______________ is (much better), (better), (about as good), (worse), (much worse) than _______________?

<table>
<thead>
<tr>
<th></th>
<th>Much better</th>
<th>Better</th>
<th>About as good</th>
<th>Worse</th>
<th>Much worse</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dibbling-broadcasting</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recommended varieties - Local varieties</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Practice</td>
<td>Much better</td>
<td>Better</td>
<td>About as good</td>
<td>Worse</td>
<td>Much worse</td>
</tr>
<tr>
<td>--------------------------------------</td>
<td>-------------</td>
<td>--------</td>
<td>---------------</td>
<td>-------</td>
<td>------------</td>
</tr>
<tr>
<td>Fertilizer -</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No application</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recommended spacing -</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Randomized planting</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Double cropping -</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single cropping</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recommended intercropping -</td>
<td></td>
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<tr>
<td>Traditional intercropping</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

28. How well do practices recommended by the ACRE agents fit in with your present farming practices:

   ____ Not at all
   ____ Not very well
   ____ Well
   ____ Very well

29. Do the ACRE agents do anything special to give you recognition in your community for participating in the program?

Yes ____ No ____ (skip to 32)

(If yes), how much are you recognized by the following methods?

<table>
<thead>
<tr>
<th>Amount of recognition</th>
</tr>
</thead>
<tbody>
<tr>
<td>NA</td>
</tr>
<tr>
<td>-------------------------</td>
</tr>
<tr>
<td>At farmers meetings or training programs</td>
</tr>
<tr>
<td>Through the radio</td>
</tr>
<tr>
<td>Through pictures in the newspapers</td>
</tr>
<tr>
<td>Through certificates from the ACRE Project</td>
</tr>
<tr>
<td>Through group photographs</td>
</tr>
</tbody>
</table>

^NA = not at all, AL = a little, S = somewhat, G = great, VG = very great.
Introduction in agric shows
Through labels or signs on houses
Others (specify)

<table>
<thead>
<tr>
<th>Amount of recognition</th>
</tr>
</thead>
<tbody>
<tr>
<td>NA</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>1</td>
</tr>
</tbody>
</table>

1NA = not at all, AL = a little, S = somewhat, G = great, VG = very great.

(Skip to 32)

30. Have you ever heard about the ACRE program?
   Yes ____  No ____ (Skip to 32)

   (If yes), have you thought of participating in the program?
   Yes ____  No ____

   (If yes), for what reasons would you like to participate? ____

   (If no), are there reasons you have not considered participating?

31. The following might be some reasons for farmers not participating in the ACRE program. Do any of these keep you from participating in the ACRE program? (If yes), how important are they in preventing you from participating in the ACRE program?
<table>
<thead>
<tr>
<th>Lack of money to purchase inputs (seeds, fertilizer, tools, labor, etc.)</th>
<th>Yes</th>
<th>No</th>
<th>VU</th>
<th>SU</th>
<th>NINU</th>
<th>SI</th>
<th>VI</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Lack of reasonable credit facilities</td>
<td></td>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Lack of market for farm products</td>
<td></td>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Lack of enough land for farming</td>
<td></td>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Low prices for farm products</td>
<td></td>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Lack of enough farm helpers</td>
<td></td>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Lack of awareness</td>
<td></td>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Others (specify)</td>
<td></td>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

1 VU = very unimportant; SU = somewhat unimportant; NINU = neither important nor unimportant; SI = somewhat important; VI = very important.

32. Have you ever heard about any other agricultural extension program besides the ACRE program that tries to help farmers?

Yes ____ What program(s) ____________________________

No ____ (Skip to 33)

(If yes), did you participate in the program(s)

Yes ____ No ____

(If no), why did you not participate? ____________________________ (Skip to 33)

(If yes), how helpful was the program in improving your farming or helping you to be a better farmer? ____________________________
33. Have you ever heard about any non-agriculture extension programs such as the literary campaign, community development, or child development?

Yes ____ (What program?) ____________________________

No ____ (Skip to 34)

(If yes), did you participate in the program?

Yes ____ No ____ (Skip to 34)

(If yes), how helpful was this program? ____________________________

Now, I would like to ask about some practices you may use in your farm.

34. Do you use ___________ in your farm operation?

(If yes), (a) When did you first use the practice?

(b) What influenced you most in making the decision to use this practice?

<table>
<thead>
<tr>
<th>Practice</th>
<th>Yes</th>
<th>No</th>
<th>Yr.first used</th>
<th>Influencing factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improved seed rice</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Improved cassava varieties</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Improved groundnut varieties</td>
<td></td>
<td></td>
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<tr>
<td>Improved sweet potatoes</td>
<td></td>
<td></td>
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<tr>
<td>Improved maize</td>
<td></td>
<td></td>
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<tr>
<td>Amazon cocoa varieties</td>
<td></td>
<td></td>
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<tr>
<td>Robusta cocoa varieties</td>
<td></td>
<td></td>
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<tr>
<td>Fertilizer application</td>
<td></td>
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<tr>
<td>Time of planting</td>
<td></td>
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<tr>
<td>Spraying for pests</td>
<td></td>
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<tr>
<td>Weed control</td>
<td></td>
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<tr>
<td>Seed dressing</td>
<td></td>
<td></td>
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</tbody>
</table>
Now, I would like to ask about the labor that was used on your farm last year (1981):

35. How many members of your household, including yourself, worked on your farm during 1981? ________________

36. During 1981, did anyone else work on your farm including hired labor or communal work force (bembe)?
   Yes ____  No ____
   (If yes), about how many man-days of hired labor or the communal work force worked on your farm in 1981? ________________

Now, I would like a little information about you and your household:

37. (a) How old are you? ____ years. (Interviewer, please use 2nd world war, independence, or any recognizable events as basis for calculating ages).
   (b) Sex (Male ____, female ____)
   (c) Are you married?  Yes ____  No ____
   (d) Did you attend any English or Arabic school?
Yes _____ No _____

(If yes), how many years of schooling did you have in:

_____ English school _____ years

_____ Arabic school _____ years

I have really enjoyed talking with you and would like to thank you for your time and patience.
APPENDIX B: HUMAN SUBJECTS FORM
INFORMATION ON THE USE OF HUMAN SUBJECTS IN RESEARCH
IOWA STATE UNIVERSITY

(Please follow the accompanying instructions for completing this form.)

1. Title of project (please type):
   Farmer Motivation Patterns in Participating in Adaptive Crop Research Trials/Demonstrations in Sierra Leone

2. I agree to provide the proper surveillance of this project to insure that the rights and welfare of the human subjects are properly protected. Additions to or changes in procedures affecting the subjects after the project has been approved will be submitted to the committee for review.

   Typed Name of Principal Investigator: Amadu Muhamed Bangura
   Date: 11/17/81
   Signature of Principal Investigator: [Signature]

   805 Pammel Court or 412 East Hall
   Campus Address: 292-8754 or 294-8012
   Campus Telephone:

3. Signature of others (if any): [Signature]
   Date: 11/17/81
   Relationship to Principal Investigator: Major Professor
   Co-major Professor:

4. ATTACH an additional page(s) (A) describing your proposed research and (B) the subjects to be used, (C) indicating any risks or discomforts to the subjects, and (D) covering any topics checked below. CHECK all boxes applicable.

   □ Medical clearance necessary before subjects can participate
   □ Samples (blood, tissue, etc.) from subjects
   □ Administration of substances (foods, drugs, etc.) to subjects
   □ Physical exercise or conditioning for subjects
   □ Deception of subjects
   □ Subjects under 14 years of age and(or) □ Subjects 14-17 years of age
   □ Subjects in Institutions
   □ Research must be approved by another institution or agency

5. ATTACH an example of the material to be used to obtain informed consent and CHECK which type will be used.
   □ Signed Informed consent will be obtained.
   □ Modified Informed consent will be obtained.

6. Anticipated date on which subjects will be first contacted: Jan 25 1982
   Anticipated date for last contact with subjects: March 15 1982

7. If Applicable: Anticipated date on which audio or visual tapes will be erased and(or) identifiers will be removed from completed survey instruments:

8. Signature of Head or Chairperson: [Signature]
   Date: [Date]
   Department or Administrative Unit: [Department or Administrative Unit]

9. Decision of the University Committee on the Use of Human Subjects in Research:
   □ Project Approved □ Project not approved □ No action required

   Name of Committee Chairperson: [Name]
   Date: [Date]
   Signature of Committee Chairperson: [Signature]