A grounded theory describing factors in the adoption process of the alley farming technology by Yoruba women in Nigeria

Kristin Cashman
Iowa State University
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A grounded theory describing factors in the adoption process of the alley farming technology by Yoruba women in Nigeria

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Iowa State University, 1990

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A grounded theory describing factors in the adoption process of the alley farming technology by Yoruba women in Nigeria

by

Kristin Cashman

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TABLE OF CONTENTS

CHAPTER I. INTRODUCTION

Introduction 1
Background 2
Problem Area 2
The Need for the Study 5
Purpose and Objectives 6
Educational Significance 6
Operational Definitions 9
Summary 10

CHAPTER II. REVIEW OF LITERATURE

Introduction 12
Premise 1. Women's role in agricultural production 14
Premise 2. Women's Farming System and Alley Farming Alternatives 24
Premise 3. Diffusion of Alley Farming Innovations 32
Premise 4. A Concerns Based Approach to Adoption 36
Summary 40

CHAPTER III. METHODS AND PROCEDURES

Introduction 41
Defining Concept Indicators: Design Evolution 42
Building a Conceptual Framework 44
Discovering Core Variables 46
Theoretical Sampling 47
Triangulation in Data Collection 49
Coding and the Constant Comparative Method 53
LIST OF TABLES

Table 1. Occupations of adults in on-farm-research site in the derived savanna zone

Table 2. Occupations of adults in on-farm-research sites in the transitional and forest zones

Table 3. Distribution of female alley farmers by age

Table 4. Distribution of alley farming women by marital status

Table 5. Identification of household decision-maker

Table 6. Family size of alley farming women

Table 7. Level of education of female alley farmers

Table 8. Labor distribution of female adopters

Table 9. Land tenure patterns of female alley farmer

Table 10. Concerns of female nonadopters towards alley farming in derived savanna site

Table 11. Nonadopters concerns towards alley farming in transition and forest sites

Table 12. Female adopters' concerns towards alley farming in derived savanna site

Table 13. Female adopters' concerns towards alley farming in transitional and forest sites

Table 14. Level of alley farm use by female adopters in the derived savanna compared with the transitional and forest sites
LIST OF FIGURES

Figure 1. General cropping calendar for southwestern Nigeria 18
Figure 2. Concerns based adoption model 39
Figure 3. On-farm-research sites in southwestern Nigeria 42
Figure 4. Conceptual framework of the alley farming adoption process 45
Figure 5. Comparison groups used for theoretical sampling and saturation 48
Figure 6. Sketch of the grounded theory approach 54
CHAPTER I. INTRODUCTION

Introduction

"Alley farming" is an agroforestry, land management system that can replace slash-and-burn agriculture with sustainable in-place farming. Nitrogen producing trees with nutrient-rich leaves may be the key to sustaining plant food in the soil, increasing crop yields, and, thus, increasing income and food for village families (Harrison, 1987).

In alley farming food crops are grown between hedgerows of trees or shrubs. The practice has been demonstrated to be profitable and ecologically stable by incorporating regenerative features of bush-fallow, the centuries-old, tropical, farm management system into a continuously productive system (Kang, Wilson, & Lawson, 1984). Incorporating traditional methods with modern science may fulfill Africa's need for increasing food production and reversing environmental degradation. The nutrients released by periodically pruned and mulched tree leaves can support high yields and continuous cropping. Besides providing green manure or mulch for companion food crops, the leguminous trees fix nitrogen in the soil. Shade from the trees suppresses weeds during fallow. Prunings provide mulch for erosion and weed control, create conditions for beneficial soil organisms, and provide fodder and woody material for animal browse, plant staking, and firewood.

On-farm-research (OFR) in alley farming is conducted in Oyo State, southwestern Nigeria. This area of Nigeria is inhabited by the Yoruba people, where more than 60 percent of the population live in rural areas (Osunade, 1988). The Yoruba represent one of the three largest ethnic groups in Nigeria. The main industry of the Yoruba is agriculture; the unit of decision-making is the individual (Osunade, 1988). Nigeria contains between 105 to 115
million people, and has an average family size of seven, living on an average of $760 a year. The population is expected to double in 22 years (Population Crisis Committee, 1988).

Background

Africa's governmental, nonprofit, international and national organizations have tried to cope with accelerating ecological and sociocultural changes caused by increasing population. Seventy percent of Nigeria's population rely on small farms which are managed by bush-fallow rotation (Ekpere, 1986, p. 115). As new areas are brought under cultivation, much of the total arable land lays idle.

In Nigeria, as in most of Africa, an increasing population necessitates a shortening of fallow periods. Extremely fragile soil characterizes slash-and-burn agricultural systems. When fallow periods are shortened, soil is further degraded, crop yields decline, and insect pests and noxious weeds invade cultivated fields.

Alley farming as an innovation holds promise for small-scale farmers, many of whom are women, by increasing their access to land resources (Chew, 1989; Ezeribe & Palada, 1988; Cashman, 1985; Kang et al., 1984). The innovation's promise to reduce women's burdens, increase their land security, and enhance family welfare lies in greater, more stable supplies of food and fuel, while extending cropping. Alley farming can stabilize land tenure by offering profitable alternatives to shifting cultivation (Kang et al., 1984; Cashman, 1985).

Problem Area

Yoruba farm women in Nigeria, like many of their counterparts in other parts of Africa, lack access to essential farm resources. In Africa, women own less than one percent of the land (Helmore, 1985). Although women don't own land, they have usufruct rights to
Usufruct is the right to use land for farming (Davidson, 1988). Women's usufruct rights are temporary, but "endure perpetually so long as the land is used for agricultural purposes" (Famoriyo, 1980, p. 123).

Famoriyo noted that the customary rules of tenure ensure initial access to farm land. Customary tenure systems do not actually restrict women's farming endeavors but hamper them because of increasing land pressure. Kang et al. (1984) described how growing more food on less land with the agricultural system managed by shifting cultivators has resulted in a shortening of fallow periods. Overexploitation of fragile soils has led to soil degradation and a rapid decline in crop yields.

Although the quality and quantity of land affects all farmers, international development agencies are particularly interested in determining the appropriateness of alley farming for African farm women for a number of reasons.

First, in southwestern Nigeria, as in much of Africa, once a woman has permission to farm another's land, if she establishes a crop and maintains the plot, it is considered hers (Famoriyo, 1980; Rocheleau, 1987; Davidson, 1988). Female farmers try to unwisely extend cultivation periods because if they leave land fallow to regenerate, they forfeit tenancy rights. Many women cannot afford to clear new land as often as a rotational-fallow system requires. In order to avoid the labor and expense necessary to obtain and clear a new farm plot, female farmers unwisely try to extend the cultivation period before releasing it for fallow (Cashman, 1985, 1986).

Second, women's tenuous land rights are further exacerbated because they are usually relegated to more marginal land than are their male counterparts (Cashman, 1985; Staudt, 1987; Davidson, 1988). The result is that women's farms are extremely susceptible to soil erosion, weed and insect problems, and poor crop yields (Cashman, 1986; Staudt, 1987).
Third, their access to farmland is diminishing as increasing populations make arable land scarce. As forests are cleared for additional farmland women spend more time and walk greater distances in search of firewood.

Fourth, farmers recognize the need to increase soil fertility, extend cropping periods, and increase and diversify yields and are open to innovation (Endeley, 1987). However, it has been found that commercial fertilizers, when available, are not suitable as they do not add humus to the soil (United States Department of Agriculture, 1980). Shifting cultivation or slash-and-burn agriculture appears to be the only feasible modus operandi for soil regeneration.

The study of alley farming as a solution to women's land insecurity leads to a series of related problems facing limited-resource farmers. Although alley farming is a possible solution to many problems, the diffusion of the system, especially to women, faces additional barriers associated with introducing the innovation. These include:

1) An estimated 97 percent of all extension agents in Africa are male (Swanson and Rossi, 1981). Alley farming has been largely extended to male farmers by male educators (Francis & Atta Krah, 1987).

2) Extension personnel trained in agriculture often understand little about what rural women know. The difficulty is not only one of gender, but of articulating the rationality of the system from the receiver's viewpoint (Jiggins, 1986).

3) The use of trees in alley farming alienates women because only landowners can plant trees, and few women own land.

4) Since 1984, a number of men and women have planted alley farms, but few are maintained after the first year of establishment. Benefits can't be realized unless adoption is sustained (Caveness & Vogel, 1987).
The Need for the Study

Change agents are constantly faced with dilemmas related to managing and facilitating agricultural change. Although village farmers are intelligent, most are resource-poor and illiterate. Most of the 'resource poor and illiterate' clientele are women, producing 60 to 90 percent of the food in Africa (Helmore, 1985). Many women are farming in Nigeria, and Africa, but they need ways to increase their farms' productivity and maintain soil fertility (Endeley, 1987). Alley farming is a system of farming that creates more secure land tenureship and more profitable alternatives to shifting cultivation. Additional reasons why farming women may find alley farming superior to their traditional practices include:

1) Rural women forced from urban trading markets are seeking other forms of work to generate income. Alley farming offers a viable alternative because women can rely on indigenous mechanisms to secure access to resources (Jiggins, 1986).

2) Diminishing access to farmland forces women to use increasingly marginal land with poor soil limiting the range and yield of crops that can be grown. Alley farming offers potential solutions by regenerating soils for continuous cropping and crop diversification (Kang et al., 1984). In much of southern Nigeria, women own over 50% of the small ruminants. Alley farms can increase livestock value through added vigor and weight from nutritious fodder (Okali & Cassidy, 1985).

3) Women in many parts of Nigeria work one to two hours a day collecting firewood (Cashman, 1985), but deforestation adds distances to travel in search of fuel. Woody material from prunings provide excellent firewood (Kang et al., 1984).

4) Mulch prunings suppress weeds; a major advantage in small-scale farming where weeding often takes 30% of the labor used in crop production (Kang et al., 1984).
Purpose and Objectives

The purpose of this study was to use a grounded theory approach to study rural Yoruba women in southwestern Nigeria exposed to alley farming, an agroforestry technology. A theory of agricultural change was developed to provide a framework for alley farming research and extension. The theory describes the process through which farming women become aware of alley farming, adopt it, reject it, or modify the system, and then institutionalize it, or discontinue the practice, and relay their experience to their colleagues. This theoretical framework was used to assess the conditions that facilitate, alter, or inhibit the course of the innovation process. The objectives of the study were to:

1) identify sociocultural and gender variables influencing alley farming adoption;
2) compare the ideas and experiences of adopters and nonadopters of the alley farming;
3) identify what induced farmers to accept and maintain the practice of alley farming;
4) assess the number of successful male and female farmers who have adopted and continue to use alley farming; and
5) develop methods that incorporate gender issues to assist change facilitators involved in alley farming outreach.

Educational Significance

The educational significance of this study was threefold. This section highlights the significance of alley farming, presents a summary of a promising strategy that can be used either as a diagnosis and/or prescription for action in diffusion research, and discusses potential applications of the grounded theory research.
Alley farming itself is, "...arguably the single most important technology for the future of sustainable agriculture in Africa. Both national governments and international agencies should give it the priority and resources that it deserves" (Harrison, 1987, p. 57). Rather than offering rigid packages of instructions and inputs, Harrison stresses, "Education and extension in agroforestry need much more emphasis. We should begin by identifying some central problems and concerns that local farmers feel alley farming might solve."

The problems farmers experience when managing a new technology and their concerns in regard to the innovation were accurately described by Rogers (1983) in his comprehensive review of the diffusion research literature. Rogers was impressed with how much effort had been expended in studying "people" differences in the adoption process, that is, in determining the characteristics of the different adopter categories. While "Little effort has been devoted to analyzing innovation differences, that is, in investigating how the properties of an innovation are perceived by those who affect its rate of adoption" (p. 211).

The latter type of research can be of great value to change agents seeking to predict reactions of their clients to an innovation, and perhaps to modify certain of these reactions by the way they name and position an innovation and relate the new idea to existing beliefs (Brandner, 1961; Rogers, 1983; Cashman, 1987). The concerns based adoption model (CBAM) (Hall, Wallace, & Dossett, 1973) is relevant to adoption research on alley farming (Cashman, 1985, 1986, 1987, 1988). Rogers (1983) called for more predictive and explanatory studies in diffusion research. Along these lines, the CBAM can be used to solicit, explain, and predict farmers' reactions and behaviors related to the practice of alley farming during adoption.

The third area of significance subsumes the others. As a relatively new field of applied research, Raintree (1983) said that alley farming labors under a number of social, scientific
and institutional constraints. In order to promote sound alley farming research and extension to African farmers, Raintree (1987) advocates developing new methodological tools and procedures for overcoming these constraints.

Rogers (1983, p. 42) lamented that research on innovations should be to predict and assist in future adoption, but conventional research structure tends to limit investigations by enslaving scientists to prescribed procedures. As a result, he continues, "Most scientific research has been postdiction instead of prediction. ...The dependent variable is measured from past experience, and the independent variables are measured in the present. ...These are hardly predictors of an innovation's rate of success" (p. 212). Martin (1978) argued that educational research which reveals the complexities of the real world must derive from theory generated from that world. "The relative merits of a theory for predicting, explaining, and being relevant cannot be separated from the way it is generated" (Martin, 1978, p. 17).

Thomas Kuhn, in *The structure of scientific revolutions* (1970), differentiated between paradigmatic research and paradigm transcending research. Paradigmatic research uses existing models or theories (paradigms) and obeys the laws that are inherent in them. Examples in education include research that focuses on theory testing or verificational studies (Hutchinson, 1986). In contrast, 'grounded theory research' strives to be paradigm-transcending. Heretical and iconoclastic, such research goes beyond existing theories and preconceived frameworks in search of new understandings of social processes in natural settings (Stern, Allen, & Moxley, 1982).

Glaser and Strauss (1967) believed middle-range or substantive theories would be more useful in explaining specific areas of empirical inquiry. Grounded theory is a systematic approach for generating substantive theories that are born in and help explain the real world. Denzin (1970, p. 120) stated that qualitative or quantitative data serve four basic functions:
they initiate new theory or reformulate, refocus, and clarify existing theory. If little is known about a topic and few adequate theories exist to explain or predict a group's behavior, grounded theory is especially useful.

Agricultural educators need the freedom offered by grounded theory to explore the social-psychological consequences of learning intelligently and imaginatively. Grounded theory offers a systematic method to study the richness and diversity of human experience and to generate relevant, plausible theory which can be used to understand the contextual reality of social behavior (Conrad, 1982; Blase, 1982). Grounded theory may increase our understanding of clientele and relevant situations to plan and improve the quality of interventions.

Operational Definitions

Key words critical to understanding this study include:

**Alley Farming.** An agroforestry system that involves growing food crops between hedgerows of leguminous trees.

**Axiom.** That which is thought worthy or fit. That which commends itself as self-evident based on a presentation of supporting data (Reynolds, 1971).

**Concerns Based Adoption Model.** A standard classification system for describing the perceived attributes, concerns, and uses of innovations in universal terms.

**Concerns.** Seven discrete stages of psychological orientation (both users and nonusers), comprise the Concerns Based Adoption Model. Stages of concern (SoC) represent a composite description of the various motivations, perceptions, attitudes, and feelings experienced by a person in relation to an innovation (Hall et al., 1973).

**Congruence.** The degree to which an innovation is perceived as consistent with the existing values, past experiences (mneme), and needs of potential adopters.
**Diffusion.** The cumulative degree of influence upon an individual to adopt or reject an innovation, resulting from peer network activity toward an innovation in a social system.

**Discontinuance.** A decision to reject an innovation after having previously tried it.

**Grounded.** To set on a firm basis, to establish (an institution, a principle, belief, science, conclusion, or argument) by empirical evidence (Oxford English Dictionary, 1987).

**Grounded Theory.** Theory generated or developed from data systematically obtained and analyzed through the constant comparative method (Glaser & Strauss, 1967).

**Hypothesis.** An actual or possible condition or state of things considered or dealt with as a basis for action; alternatives. A supposition or conjecture put forth to account for known facts; a starting point for further investigation (Oxford English Dictionary, 1987).

**Innovation.** Any process or product that is new to a potential user.

**International Livestock Center for Africa - International Institute of Tropical Agriculture.** Two of 13 international agricultural research centers.

**Intervention.** An action(s) or event(s) that influences the use of an innovation.

**Premise.** To place, set forth before; describe before something else; to say or write by way of preface or introduction to the main subject (Oxford English Dictionary, 1987).

**Proposition.** Setting forth or presenting to view, or exhibition (Reynolds, 1971).

**Use.** Eight discrete levels of use (LoU) of an innovation that an individual demonstrates. These levels describe behaviors of innovation users.

**Usufruct.** An individual's right to use land for agricultural purposes.

**Summary**

The development of a grounded theory relies on the constant comparative method, in which data collection, coding, analysis, and theorizing are simultaneous, iterative, and progressive. Initially data collection was the primary activity; data was collected from a general sociological perspective. Nigerian women and an agricultural technology, alley
farming, form the axiomatic basis of this study. The axiom consists of the factors discussed in Chapter 1. Alley farming has warranted international attention and was developed because of its potential benefits and positive ecological impact. There are potential problems that arise because of the packaging and during the extending of the alley farming technology. As a result alley farming is out of the reach of the majority of African farmers, women, who often operate with a greater propensity to deplete the very resources it was developed to save. These problematic factors prevent women from adopting the technology. And although African women are credited with growing between 60-80% of the food consumed on the continent, designing a technology with a potential bias against them could have detrimental side effects.
CHAPTER II. REVIEW OF LITERATURE

The purpose of this study was to use a grounded theory approach to study rural Yoruba women in southwestern Nigeria exposed to an agroforestry technology 'alley farming.' The context and setting of this study, as well as conditions that facilitate, alter, or inhibit the course of the innovation process, are described in this chapter.

Introduction

In verificational or positivistic research, studies that test or are based on hypotheses, a literature review is completed prior to data collection and analysis (Ary, Jacobs, & Razavieh, 1985). Existing theoretical and methodological literature is used to build a rationale for the proposed research.

In contrast, Lincoln and Guba (1985) stressed, grounded theorists generate a theory based on behavior patterns observed in the field. The investigators then turn to the literature to find support for their emerging theory. "Through its correspondence with the real world," Hutchinson (1986, p. 65) emphasized, "reviews of literature establish a vital connection between theory and reality." For example, Gehrke (1981) discussed how her grounded hypotheses were supported by the literature in education. Blase (1982) presented a social-psychological grounded theory of teacher stress and burnout as an outgrowth of previous motivation theories.

Glaser and Strauss (1967) developed the grounded theory approach to formulate theoretical propositions from empirical data gathered during their research of American health institutions. Grounded theory finds its philosophical foundation in the work of George Herbert Mead and American pragmatism; its sociological roots are in the work of Herbert Blumer and symbolic interactionism (Lewis & Smith, 1980).
Smith (1982) and Spector (1984) described grounded theory as discursive, where data are gathered and analyzed throughout the research process. This process, called the 'constant comparative method,' because data collection and analysis are simultaneous, directing each step of the research (Glaser & Strauss, 1967). Emerging categories, themes, and subsequent hypotheses are "grounded" (have their initial foundation) in the data themselves.

Some years later, Strauss (1987) further described how the grounded theory process is used for the generation, rather than the testing, of hypotheses. Although initial premises structure inquiry, emerging propositions and hypotheses are eventually tied together in a theoretical framework. Propositions and hypotheses are discovered and conceptualized during specific interactional processes uncovered in the field. Resulting theory provides new ways of understanding perplexing situations (Glaser, 1978; Patton, 1980).

Sherman, Webb, and Andrews (1984) discussed criteria essential to the grounded theory approach. The researcher must gather data about the "lives" of participants (called "subjects" in experimental research) in order to understand patterns of experience. These pertinent patterns, Miles and Huberman (1984) believe, can only be detected when researchers immerse themselves in the social environment. Interviews and observations recorded during a "lived" experience help researchers understand and describe social structure and patterns of behavior. Participant observation, Blumer (1962) explained, allows the researcher to take the role of the people being studied. Whereas, Dobbert (1982) added, in-depth interviews of the participants lend meaning; observations by themselves are never enough because they beg misinterpretation. Interviews permit researchers to verify and clarify what they thought happened, to achieve full understanding of an incident (Lincoln & Guba, 1985).
Premise 1.
Women's Role in Agricultural Production

A major share of alley farming research has been conducted in southwestern Nigeria (Harrison, 1987; Chew, 1989). Therefore, as Nigerian women are 'defacto' representatives of their African counterparts, it is important to determine their role in food production.

Sociocultural changes occurring in rural southwestern Nigeria over the last two decades as a result of modernization must be taken into consideration. An expanding system of transport and communications has been viewed as a necessary condition for, and as a symptom of, economic advance and national integration in Nigeria. However desirable the end results of modernization may be, Illich (1982) said, some changes can cause drastic alterations in the fabric of society. Changes resulting from national development are examined in relation to the traditional division of labor by sex theory that has been used by social scientists to characterize agricultural activity in southwestern Nigeria.

Many studies on 'women in development' attempt to explain the degree of sexual equality within a particular society. Some have integrated their data with a general theory of women's role in modern society. Boserup's (1970) landmark study, *Women's Role in Economic Development*, concluded that far from incorporating women into the production process, the growth of the cash economy becomes an obstacle to their participation as equals in development. In line with this concept, Paulme (1971) demonstrated how colonialism has consistently destroyed the complementarity of male and female roles in tropical Africa. The transition to a cash economy has led to previously unknown status gaps between the sexes (Illich, 1982).

Outside efforts to raise the standard of living can have tremendous consequences, as Brokensha, Mock, and Riley (1980, p. 15) indicated in their study on the socioeconomic impact of rural road construction in Kenya.
There is a large and growing body of theoretical and methodological literature, especially project feasibility studies, but relatively little has been written concerning actual project results (p. 15).

**Roads and Transformations in the Sexual Division of Labor**

To illustrate the changing lifestyle of rural Yoruba women, Cashman (1985, 1986) collected and analyzed data between 1984 and 1985 under the auspices of an ILCA on-farm-research (OFR) program in southwestern Nigeria. ILCA introduced the alley farming technology to male farmers after completing a demographic survey of the area which concluded that few women were involved in own-account farming (Francis & Atta Krah, 1987). Curiously, women in the ILCA site kept more than 50% of the small ruminants. Still, in 1984 women’s participation in alley farming was minimal (Report to the Ford Foundation, 1984).

Cashman (1986) continued to gather data on rural Yoruba women during 1985-86 with an OFR project for the International Institute of Tropical Agriculture (IITA).

During 1984-86, Cashman’s observations revealed that a much higher proportion of the women in the area were engaged in own-account farming than previously thought or recorded (Francis and Atta Krah, 1987). This was despite the 1984 demographic survey in the ILCA site which showed that "only 29 percent of the women in the area farmed, most in collaboration with their husbands" (Okali and Cassidy, 1985, p. 10). In contrast, Cashman found that female farmers outnumbered male farmers (Blumberg, 1988).

**The Traditional Division of Labor by Sex Theory**

Historically, in Yorubaland, farming activities were based on long fallow and slash-and-burn techniques in a forest environment (Olayide & Bello-Osagie, 1980). Men and women contributed to farming, although to different degrees and in different capacities than are common in Western culture. Guyer (1980, p. 363) said that, "In fact one has to put aside the essentially European designation of 'farming' as a single occupational category in
order to understand the logic of the division of tasks in Yorubaland. Yoruba men cleared the forest, burned the bush, and made the yam heaps...."

Although men carried out much of the heavy farming tasks, women participated in planting, weeding, harvesting and processing of the farm produce, and transporting the finished products to town (Marshall, 1964; Fadipe, 1970; Spiro, 1980, 1984; Youdeowei, 1984). These two distinct halves made up the 'local tool kit' (Borremans, 1982). The Yoruba had a unique way of dividing the burden of existence, their grasp on reality, and the use of time and space (Mintz, 1971).

Historically, says Famoriyo (1980), the inability to maintain a permanent cultivated state was reflected in the vague approach to land ownership and control. But the characteristics of the sexual division of labor and the special conditions arising from the introduction of cocoa production made it possible for men to place greater importance on ownership and inheritance. Tree crop cultivation became the basis for establishing a form of permanent occupation of land. Land ownership rights, as opposed to usufruct rights, were vested in men.

The Yoruba expect women to maintain financially productive activities and to contribute substantially to the upkeep of their families (Marshall, 1964; Fadipe, 1970; Mintz, 1971). And although married women had basic land-use rights in their husbands' lineages (Famoriyo, 1980), their rights in regard to their husbands' labor and cash income were less secure (Mintz, 1971). The growth of commercial agriculture from tree crops kept most men on the land.

Women's trading activities have centered around two common income-earning food processes—palm fruit to oil and cassava to gari (Ottenberg, 1959; Mintz, 1971). A large share of women's income has always been and still is generated from trading the many products
processed from palm fruit (Cashman, 1986). The sexual division of labor is still manifest in
the processing and trading of palm fruit products.

**Palm Oil Processing.** The processing of palm fruit into oil has a great deal of
traditional symbolism in Yorubaland. Songs about *epo tupa* or red oil have been sung for
centuries and are still heard regularly throughout villages during processing season. Palm
oil (*epo tupa*) by-products include chaff (*ihya*), used as fuel; palm-nut kernels (*iikuro*), used to
make traditional soap (*ose dudu*); and palm kernel shells (*esan*) and sludge (*ogunso*)
remaining after the processing; both used as fuel. Although seasonal, processing is the most
lucrative occupation for females from age 10 in rural Yorubaland; even young girls miss
school to earn N1.50 ($2.80 in 1986) a day collecting firewood and water (Cashman, 1985).

Palm oil trees are a male dominion, and male tree climbers release the palm fruit
bunches. Cashman (1985, 1986) described how women carry out subsequent stages of
processing, from March through July annually. Their harvesting sequence requires 6 days
per batch, with 6 to 8 hours per day allocated to palm oil processing. Income from processing
palm fruit is divided between the tree owner and the processors. The processors are entitled
to all by-products.

During the season, palm oil brings the best price, but water is so scarce that the time and
energy women spend getting water for processing forces them to neglect their farming and
other work Cashman (1985, 1986). As the calendar (Figure 1) shows, early crop-production
work (clearing, heaping, and planting), and palm-oil processing peak at the same time.
Rural women's labor is irreplaceable in the production of palm-oil. Unless women can
secure enough money to hire labor, they are forced to plant later; they also weed less
frequently, harvest lower yields, and forfeit second-season cropping. Processing takes
preference because men own the palm oil trees, and it is a cultural imperative that women
must first meet their labor obligations to their husbands (Babalola and Dennison, 1988; Cashman, 1989).

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<th>Jan</th>
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<tr>
<td>Early tomatoes</td>
<td>Late okra</td>
<td>Melon</td>
<td>Early maize</td>
<td>Late yam</td>
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Cassava is planted during the rainy season and harvested all year round.

Cocoa harvest

Kola nut harvest

Plantains are harvested all year round.

Pawpaws are harvested all year round.

Land clearing and preparation

First harvest

Weeding

Palm fruit harvest

Pigeon pea

Cassava, leucaena, and giricilila are harvested for seed and pruned all year round.

* Second season cropping not commonly practiced on women's farms.

Note: Average size of women's farm is 200 - 500 ridges. (1 ridge = 1.3 sq.m.; 3,000 ridges = 1 ha.)

Figure 1. General cropping calendar for southwestern Nigeria

**Boom and Bust of a Petroleum-Based Economy**

Nigeria became independent in 1960. Seven years later a bitter civil war raged over the area containing the nation's petroleum resources and virtually stopped production. The civil war ended in 1970 with the surrender of the forces of Biafra; soon after the oilfields were pumping over one million barrels a day. Oil money came suddenly, into an economy whose propensity during the decade after independence was based almost entirely on internal trade (Onimode, 1988). Nicholas Harman (1986, p. 1) reports on a nation with a hangover:
"Nigeria has had a stupendous party, but the wine merchants forgot to collect their money in advance. Now the debt collectors have arrived to find the winnings spent, the bottles, and glasses mostly broken or stolen by the guests, and the soldiers who came in to keep order shooting each other."

Nigeria failed to make good use of the $100 billion earned from oil between the boom of 1973 and the bust in 1981.

On paper the oil boom created a once in a life-time opportunity for Nigeria, large enough to lay the basis of an economic revolution in Africa's largest nation. They hired advisers, opened banks, developed progressive taxation and rural electrification, and built roads. But today almost everything has turned out to be a disappointment. The boom years have left behind some half-good things. The whole country is criss-crossed by tarred primary roads (Harman, 1986), but many are cracking up for lack of maintenance. The oil revenues did not benefit over 60% of the population who earn their living as small-scale farmers (Osunade, 1988). It ruined their export trade, namely agriculture (during the 1970's Nigeria was the major exporter of cassava in Africa), brought in floods of cheap food imports that spoiled their domestic markets, and attracted men from the villages to life in the city (Mintz, 1971; Hahn et al., 1979; Population Crisis Committee, 1988; Onimode, 1988; Cashman, 1990).

The Growing Transportation Infrastructure

At first glance, the oil boom appears to have had only a positive impact. Rural communities have become used to paper money (the Naira) and the good things it can buy—bread and rice and radio-sets, cheap motorized mills which made food processing easier, and motor buses that made even the poorest people mobile for a few kobo (Harman, 1986).

Many roads, for example those connecting the ILCA and IITA sites to more urban areas (see Figure 3 in Chapter 3), were first constructed during the 1950's under the powerful political movement called the Cocoa Marketing Cooperative Society (Galletti, Baldwin, & Dina, 1956). As cocoa declined, the roads became unnavigable for much of the year.
(Marshall, 1964). However, road grading became fairly regular in the sixties when the
government built primary schools throughout Nigeria (Cashman, 1985).

After the civil war the government became acutely aware of the decline in national
food production (Hahn et al., 1979). Emphasis was on 'food self-sufficiency.' Rural five day
markets were encouraged and became more common during the 1970s. Greater national
interest ensured regular road grading and the construction of feeder roads gave smaller

Beginning in the seventies and continuing into the eighties, oil money was used to
finance schemes to improve village life. That meant providing an all-weather route for
trucks within about 5 miles of all farmland (Harman, 1986). Patterns in agricultural
production, as well as traditional gender roles began to change too (Illich, 1982; Cashman,
1985, 1989; Onimode, 1988). The discussion of palm oil processing was used to illustrate the
traditional division of labor by sex. The following section describes cassava processing to
illustrate many of the unsettling changes undermining traditional systems in Yorubaland.

**Cassava Processing.** Cassava processing and trade has been regarded as a major
income earning activity of Yoruba women. Mintz (1971) determined that the one economic
innovation that increased the capacity of women to deal as equals with men was the
introduction of cassava. Ironically, for much of this century Nigerians considered cassava
a "famine food" (Agboola, 1968). But as the century draws to a close, the more soil depleting
'rotational fallow' has replaced the traditional practice of shifting cultivation. With its
ability to produce under nutrient-poor soil regimes, cassava is considered the staple food for
Nigeria's burgeoning population (Hahn et al., 1979).

As cassava gained acceptance, processing became a major source of income for rural
women through the sale of cassava meal called 'gari' (Ottenberg, 1959). Gari is a
granulated flour; the final product after processing cassava (Kwatia, 1986).
Ottenberg (1959, p. 214) referred to the production and trade of gari as the "major source of change" for women. The sale of cassava products made rural Yoruba women independent of their husbands (Mintz, 1971). Women in Cashman's (1985, 1986, 1990) studies reported that palm oil and its by-products were a primary income source. But cassava production provided for income year-round and was essential to the family diet.

Ngoddy (1974) estimated that more than 70% of Nigeria's cassava crop is used to make gari. Although cassava is important nutritionally, as well as financially, food lost through traditional root and tuber processing methods amounted to about U.S. $90 million in 1977 (Idosogie & Olayide, 1777). Food losses have wider implications than the cash value of the lost material. In addition to these losses, large amounts of female labor are expended to harvest and process cassava, as well as the human and thermal energy exhausted from collecting and burning wood to fry gari.

Seventeen of thirty-five women interviewed by Cashman (1985) said that family labor was used to harvest and transport the roots. Hahn et al. (1979) reported cassava harvesting (i.e., uprooting and transporting the produce from field to homestead for processing) as one of the most labor-demanding operations in West Africa, totaling 500 hours per hectare.

The value of fresh cassava has always been low, but rural women reaped sizeable profits through processing and trading gari (Ottenberg, 1959; Mintz, 1971; Kwatia, 1986). But Blumberg (1988, p. 57) reported, "a more complete and provocative picture of Yoruba women's shifting involvement in trade versus farming comes from Cashman's 1985-86 fieldwork. Cashman illustrated how recent trends have negatively affected women's trading income and the need for the role of rural itinerant traders is bottoming out." (Cashman, 1985, p. 135).

What are the unfavorable recent trends now affecting women's trading? First, the oil boom resulted in both the building of roads and their use by large-scale male urban traders with sizeable trucks (Marshall, 1964; Mintz, 1971; Cashman, 1985, 1986; Harman, 1986).
As Mintz (1971) predicted, a growing commercial sector and cash economy has drastically changed the way cassava is processed and marketed.

Historically, a male farmer relied on his wives to buy his crop, unharvested, a field at a time. In turn women harvested their husbands' fields a little at a time (in other words, as much as they could carry), processed the crop so it could be transported long distances, and then traded it in the city (Hahn et al., 1979; Cashman, 1989). Women paid for the crop only after the whole field was harvested, processed, and traded. Today most cassava farmers deal directly with large-scale urban traders, who operate economies of scale. Urban traders own or secure trucks, come to villages to buy and harvest the field at once, and transport the raw material to cities for processing (Cashman, 1985, 1986).

Cashman (1989, p. 4) reported how this fairly recent phenomenon undercuts the rural itinerant food processor and trader in three areas. One, she cannot compete with the high bids offered by the urban trader for her husband's produce. Two, she lacks the labor necessary to harvest the field all at once, much less process it all before it spoils. Three, raw produce is now sold and processed in the city on a large scale, as well as among urban families. It is no longer economically viable for women to process food and trade. With few other means of income generation, more and more rural Yoruba women are farming.

Moreover, the better roads and transport mean that cassava can be brought to the city much faster. Since cassava rots in days after being harvested, "until recently, cassava was seldom sold in its natural state in the market" (Cashman, 1985, p. 29). Rather, it was almost always sold by rural female traders as gari, however:

Unprocessed cassava can now be purchased in most markets in southwestern Nigeria. ...The problem arises when a rural trader takes her gari to sell in the city, as she has been accustomed to doing for years. She is now witnessing more competition because urban women now have access to fresh cassava root and have taken up frying their own gari for family consumption (1985, pp. 29-30).
Farming versus Trading

Cashman (1985, 1986, 1989, 1990) consistently found rural women reporting that with the price of agricultural products rising, many have decided to farm on their own, as a better means to generate income. Among the 64 cases Cashman followed between 1984 and 1988, all but two women reported establishing their first farms within the last ten years.

Ironically, rural men have begun to preempt many of the traditionally female trading activities (Cashman, 1985). Surveys conducted in 1985 and 1986 support this observation (Cashman 1985, 1986). In 1986, Cashman recorded a total of 873 exits from the villages over a two week period; almost two-thirds were male travelers, reporting absences for longer periods of time than the female travelers, and trading was the reason given.

Traditionally, the terms of trade in Yorubaland involved women in more travel, over long distances, with absence for varying periods of time (Marshall, 1964). Recently, women's increasing involvement in their own farming enterprises has kept them more stationary. As women's own-account farming intensifies, farming men's burden of producing food to feed their families is lessened. With greater access to transport, men are becoming more involved in bulk trade. The very same constraints pressuring women out of trade and into own-account farming, are economic incentives for rural men (Cashman, 1990).

In addition, with the increased road infrastructure, research on gari production has focused on capital-intensive, mechanized-processing facilities (Hahn et al., 1979). The cost of mechanized gari production competes with costs of domestically produced gari; the price per unit of unprocessed cassava and processed gari is so low that it yields an acceptable profit only to large operators (Cashman, 1990). Half (33 of 64) of the women canvassed by Cashman (1985, 1986) reported processing and selling gari as a major income earning activity; in 1988, less than 20% of these women were still doing this.
The Changing Roles of Rural Women

In 1971, Mintz predicted that economic activity in Yorubaland would always be in the market place, but women's total economic activity from trade would decline. This decline, he said, would continue to grow with the increasing commercialization of other sectors of the economy. Today the expansion of economic opportunities for itinerant trading women is occurring in ways and at rates lagging behind the growth of other economic opportunities (Cashman, 1989).

Rural Yoruba women continue to be characterized as traders (Babalola & Dennison, 1988; Francis & Atta Krah, 1987; Okali & Cassidy, 1985; Watts, 1984; Williams, 1982). Modernizing trends have led to a shift among rural Yoruba women from active food processors and traders to full-time farmers (Cashman, 1990). The window that traditional rural traders have escaped through to become active farmers is rapidly closing too. Increasing pressure on land leads to more intensive agricultural techniques (Harwood, 1979) and commercial production. Modernizing trends, even those not necessarily in agriculture, are regulated by and taught principally to males. Women's traditional rights to land are often eroded with new agricultural innovations (Rocheleau, 1987; Davidson, 1988).

Premise 2.
Women's Farming System and Alley Farming Alternatives

"A comparison of Yoruba women's farming system and the potential benefits offered by alley farming indicates salient reasons for actively encouraging women to adopt and sustain the practice" (Cashman, 1990, p. 7).

Grounded theory studies grow out of questions researchers ask about people in specific contexts sharing common circumstances (Spector, 1984; Hutchinson, 1986). For example, the context of rural Yoruba women's lives provides a backdrop for the potential contributions alley farming can offer towards alleviating many of the constraints and hardships African
women face in food production (World Bank, Women in Development Division, personal communications, June, 1989). The previous section illustrated how the role of Yoruba women, well-known for their avid and extensive food processing and trading activities, are being dramatically altered by new marketing structures. In this section a scenario of women's farming systems is provided and contrasted with alternatives that could be realized through alley farming.

**Yoruba Women and Food Production**

As suggested earlier, rural women's involvement in trade versus farming has shifted. As a result, expectations between husbands and wives have changed. Yoruba women are establishing their own farms; nevertheless, they cannot "buy" themselves out of the obligation to work for their husbands (Cashman, 1985, 1986). Yoruba culture dictates that a woman who cannot hire labor to work on her farm to replace her own in certain stages of crop production, especially harvesting and weeding, must first meet her labor obligations on her husband's farm (Cashman, 1985; Babalola & Dennison, 1988). One field agent said during a 1988 interview (Cashman, 1990, p. 41):

More women do not participate in alley farming because to we Yoruba our women are useful on their husbands' farms. Even though they have their own farms, women work seriously for their husbands. Husbands cater to the feeding of the whole family. So it is compulsory for women to help their husbands. When a man harvests his yam, it is the duty of the wife to carry the yam from the farm to the road. When maize is harvested, it is the duty of the wife and children to harvest, shell, and carry the produce to market. During oil processing season, a husband may prevent the wife from doing any other activity. And during this time if a woman refuses to help her husband, he has the right to send her away. If he sends her away, who else will marry her? Who will help her? The husband will just marry another wife! And this new wife will certainly not help that man to cater for another wife's children. The ones who suffer most under those circumstances are the children. The Yoruba believe that when this situation happens, the children do not grow up to be good, productive members of society. Hence women feel obligated to obey their husband.
Cultural tradition favors being a wife in Yorubaland (Fadipe, 1970). All the incentives in the rural areas converge to encourage women to aspire to marriage and remain married. Security of access to land and inheritance for a woman's children depend on being married.

**Cassava Production**

Farming women's contribution to development in Nigeria can be better understood by looking into the relationship between the increasing dominance of cassava as a staple food and women's access to production resources. Annual African production of cassava in 1977 was 42 million tons, grown on 55% of the continent's total area under cultivation (Food and Agriculture Organization, 1981). It was estimated that today in many areas almost 50% of the total caloric consumption in African diets is met by cassava (Phillips, 1974).

As Africa's population grows, the demand for cassava is likely to increase by a comparable amount. As more area is 'opened-up' each year, increasingly more marginal land is brought under production. Although prices for unprocessed root are extremely low, only cassava can be sustained on such soil. Cassava monocropping on marginal land has led to widespread diseases, insect pests, and other constraints. Increases in production result from new acreage. With growing land scarcity, production is lagging far behind demand. The potential for increased production of this important staple food, therefore, is in higher yields/hectare.

**Cassava and Land Tenure.** Cassava is popular in Nigeria because it can produce under low fertility regimes and remain in the ground from 1-3 years depending on the variety (Hahn et al., 1979). This procedure permits tenant farmers, particularly women, to extend their tenure. Often it is the only crop that will grow on the marginal land usually given to women (Cashman, 1985, 1986).
Cassava Monocropping and Productivity. Until a decade ago cassava was intercropped with vegetables, yams, melon, maize, and legumes. Today, it is often monocropped because soil fertility has decreased and marginal land has been brought under production (Hahn et al., 1979). In the past, few pests attacked cassava because it was not indigenous to Africa. The pest situation is rapidly changing, however, with monocropping. The cassava mealy-bug, for example, was first reported in Zaire in 1973 (Hahn et al., 1979). Its rapid spread has caused severe tuber reduction in parts of Nigeria, and young cassava plants die from a severe attack of mealybug.

Cassava Cultivation. To facilitate subsequent weeding and harvest, heaps or ridges are made before planting cassava. Rural women have consistently reported paid-labor hired for heaping or ridging as the most costly annual farming expense (Cashman, 1985, 1986). In addition, planting cassava on ridges and mounds increases the chance of extreme soil temperatures, which reduce yields significantly (Okigbo, 1979). The highest yields are obtained when cassava is grown after a long bush fallow on undisturbed soil.

Cassava and Soil Erosion. Cassava's canopy develops slowly, promoting soil erosion, especially when monocropped, as high as 3, 87, 125, and 221 tons per hectare, respectively, on slopes of 1, 5, 10, and 15% (Hahn et al., 1979). Runoff ranged from 18 to 43%. Continuous cultivation of cassava, without adequate erosion control, results in irreversible soil degradation.

Cassava Yield. The most important consideration for farming women in Nigeria is the low risk involved in producing a modest crop of 5-6 t/hectare of cassava on soils with low nutrient content (Hahn et al., 1979). Cassava's role as a cash crop provides farming women with a large measure of economic independence (Cashman 1985, 1986). Much higher yields are easily achieved using commercial fertilizer, but the necessary financial investments increase the risk of growing cassava and are out of the reach of most farming women in
Nigeria (Agboola, 1968). Besides increasing overall yield, high potassium application improves dry matter and starch content and reduces hydrocyanide content of cassava root (Hahn et al., 1979).

**Cassava and Nutrition.** Cassava provides more than 50% of Africa's caloric requirements, but it is bulky, high in carbohydrates, low in protein, minerals, and vitamins, and, unless processed, it deteriorates rapidly after being harvested (Hahn et al., 1979, p. 203). An extension agent explained, "Women prefer to grow cassava, because their land is not as good as the men's and will not sustain maize" (Cashman, 1990, p. 42).

Yoruba women provide materially and maternally for their children. Land too poor for lucrative crops other than cassava, was the common complaint by women at ILCA and IITA project sites during village meetings Cashman (1990) held in 1988. Their concern over being delegated less productive farmland was not surprising. The relationship between diversified cropping and the family diet is strong, and the hazards of monocropping cassava are magnified by increasing malnutrition in Nigeria (Population Crisis Committee, 1988). Children whose diets are primarily cassava invariably suffer protein, vitamin, and/or mineral deficiencies (United Nations Children's Fund <UNICEF>, 1988).

**Cassava Propagation.** Processing cassava to gari is the most energy-intensive food process carried out by Yoruba women. Not surprisingly the trend for Yoruba women, says Cashman (1989), is to process gari only for their families and to sell even their own cassava roots to urban traders. One extension agent described women's intense involvement in cassava, "The crop requires less attention after initial establishment, which is important for women, especially during palm-oil season when they process oil for their husbands, as well as supply labor on his farm" (Cashman, 1990, p. 42).

Slow initial development makes cassava highly susceptible to weed competition during the first 10-12 weeks of growth. Delaying first weeding can reduce root yield 20%. Cashman
(in Mutsaers, 1988) found that depending on previous land history and soil fertility status, yield losses caused by uncontrolled weed growth on women's farms caused yield losses as high as 100%. Women try to secure labor, but with all farmers planting at the same time, demands for labor cannot be met. Male heads of households have first priority on family labor; wives hire labor. In addition to weeding, women supply most of the labor to harvest cassava in Yorubaland. With everyone planting at the same time (early after the rains begin), women have to harvest at the same time. Therefore, produce floods the market and prices plummet (Marek, 1986).

Alley farming may offer some relief to this dilemma, but economic information on alley farming is sparse (Hoekstra, 1985). With field data unavailable, data on the contributions alley farming make to increased production come from researcher-managed trials.

The Alley Farming Alternative

Land tenure. That alley farming potentially improves marginal land and extends tenure appeals to farming women. Soil regeneration as a result of the organic matter from prunings is immense. High yields were maintained over a six-year period of alley cropping *leucaena* on low fertility Entisol and Alfisol soils, characteristic of southwestern Nigeria (Kang et al., 1984). The soil-enriching capabilities of the system can be thought of as a renewable in-situ factory of organic fertilizer.

Multiple cropping and productivity. Several cassava-based, alley cropping studies, described by Ssecabembe (1984), showed land productivity higher under intercropping with alleys than with monocropping. Relay cropping is once again feasible. Crop yields increase with a gap between crops that make maximum demands on resources. Fewer insects attack cassava when grown in association with maize, beans, and vegetable (USDA, 1980). Most companion food crops grow lower to the ground than cassava does, thus reducing erosion
from the impact of rain and lowering soil temperature. Alley cropping enhances traditional intercropping systems and increases chances of producing a second-season crop.

**Tillage.** Kang et al. (1984) have consistently experienced improved soil tilth with alley farming, reporting that conventional clearing and tillage are not required. Tillage makes little difference so long as prunings, applied as mulch, are adequate. Experimental alley cropped plots at IITÂ receiving prunings maintained higher soil moisture than control plots. Mulch from prunings lowered soil temperature and enhanced biological (particularly earthworm) activity (Kang et al., 1984).

Kang et al. (1984) found that repeated applications of alley cropped luecaena prunings regenerated low-fertility soils and relatively high soil nutrients and organic matter were maintained, thus creating loose, friable soil for easy root harvest.

**Erosion control.** A mulch of prunings from an alley farm greatly reduces water runoff and soil erosion (Raintree, 1987). Mulching increases yields (Lal, 1975). High yields from mulched soils can be attributed to increased soil moisture, reduced temperature, and retained surface soil and plant nutrients. These factors prevent soil compaction from raindrop impact on bare surface soils.

**Yield.** Cassava root yields were significantly higher in mulched plots than on bare plots. Yields in Yorubaland can vary from 4 t/ha, under traditional practices to more than 40 t/ha on fields with substantial input of NPK (nitrogen, potassium, phosphorus) (Hahn et al., 1979).

In Yamoah's (1985) field trials, four prunings beginning 2 years after alley establishment (the last 3 prunings during the rainy season) made the following respective plant-nutrient contributions from *cassia* and *gliricidia* alley crops: 400 and 480 kilograms (kg) of nitrogen/hectare; 40 and 30 kg potassium/hectare; 200 and 300 kg phosphorus/hectare.
In southwestern Nigeria, maize/cassava alley cropped with *leucaena*, incorporating the prunings in the soil, increased yields 50% (Kang et al., 1984).

**Nutrition.** An important benefit, not fully realized by the development community, is that alley farming will support other more lucrative, nutrient-rich crops in addition to cassava (Cambell-Asselbergs, 1986). Thus such late-maturing or long-duration crops as cassava are compatible with such earlier maturing, protein rich crops as melon, cowpeas, soybean, maize, and vegetables.

**Weed control.** Mulch from an alley farm may delay planting without seriously increasing the labor required for weeding; alley farming allows farmers to choose a range of planting dates. Yamoah (1985, p. 110) reported that mulch from *cassia*-alley shrubs increased water-holding capacity of soil 23%. Soil moisture allows women to extend and stagger initial plantings of maize and cassava. Thus, harvests are staggered and pressure on women's farm labor for weeding and harvesting is reduced. The more extensive harvesting periods also reduce market-price volatility (Marek, 1986).

Yamoah (1985) reported that weeds were drastically reduced with *cassia*-alley shrubs on maize/cassava farms. Labor for weed control before planting was minimal. *Cassia* prunings decompose slowly, so weeds during the cropping season were minimal (Yamoah, 1985; Cashman, personal observation, 1986, 1988). Suppressing weeds was the benefit most commonly cited by practicing alley farmers, especially in reference to *cassia*-alley farms (Cashman, 1990).

Cassava, introduced by the Portuguese a few hundred years ago, was quickly adapted in traditional farming systems throughout tropical Africa (Agboola, 1968). Despite all the difficulties outlined in the previous sections, cassava will likely remain a high-priority crop for most women (Mintz, 1971).
Cassava production and alley farming share some common attributes. Each enterprise allows a farmer to extend her cropping period, offers a number of benefits or 'innovation bundles,' to the cultivator, requires tedious processes to reap major benefits, affords women more flexibility in their farming systems, and requires care and maintenance to pay-off.

Regardless of these similarities, one major difference exists. Without the advantages of modern communication, cassava spread rapidly because it was adaptable to the social framework of African farming communities. Although alley farming "retains the basic principles and components of traditional agriculture" (Kang et al., 1984), it has not spread rapidly or widely.

The third premise draws on socio-economic variables described in the first premise and the agronomic information provided in the second premise. The discussion highlights how development efforts can further deteriorate women's position relative to men or greatly enhance their access to innovation.

Premise 3.
Diffusion of the Alley Farming Innovations

The novelty and potential complexity of alley farming places a heavy burden on research and extension to come up with genuinely adoptable designs for adoption and diffusion (Raintree, 1983).

Grounded theory is based on the belief that human reality is socially and symbolically constructed (symbolic interaction) and always emerging relative to other facts in a social setting (Lewis & Smith, 1980). Grounded theorists interview and participate to understand the world as seen through the eyes of the participants and the basic social processes that organize that world. For example, Rogers (1983, p. 228) describes the crucial importance of understanding peoples' perceptions. "Peoples' perception of an innovation is colored by the
word and symbols used to refer to it. They are the thought units that structure our perceptions. And of course it is potential adopters' perception of an innovation's name and related attributes that affect its rate of adoption."

During the last two decades Rogers (1983), Havelock (1971), and many others dissected the diffusion of innovations paradigm. Cursory examination of Roger's (1983) work and Havelock's (1971) massive review and synthesis of the change literature provides immediate perspective on the enormous amount of data and models available to understand the change.

The majority of this effort, said Rogers (1983, p. 211), was on studying "people" differences in innovativeness with little research devoted to analyzing differences in perceived attributes of an innovation. As a result, he said, there is no set method of studying the attributes of innovations for predicting the future rate of adoption of innovations. "In any event, if data on the attributes of the innovation were gathered prior to, or concurrently with, individuals decisions to adopt it, success could be more easily calculated" (Tornatzky & Klien, 1981, p. 5).

Congruence

One of the most important attributes to consider in the adoption and diffusion of innovations is congruence (Brandner & Kearl, 1964). Congruence is the degree to which an innovation is perceived as consistent with the existing values, past experiences, and needs of potential adopters. But, Brandner (1961) warns, an innovation can be compatible or incompatible with sociocultural values and beliefs or with previously introduced ideas.

Brandner (1961) demonstrated how the incompatibility of an innovation with cultural values blocks adoption. Cashman (1987) described how residents in southwestern Nigeria perceived the practice of alley farming, planting trees (a male domain), as incompatible with their sociocultural values and beliefs.
Nigerian farmers, in general, like American farmers, place a strong value on increasing farm production. Soil conservation innovations are perceived as conflicting with this production value, and have generally been adopted very slowly (USDA, 1980; Cashman, 1987). This discussion echoes two very important principles, described below, used in the promotion and marketing of any new product or technology.

**Congruence with Previously Introduced Ideas**

An innovation must be compatible not only with cultural values but also with previously adopted ideas. Compatibility of an innovation with a preceding idea can either speed up or retard its rate of adoption (Brandner and Kearl, 1964). Old ideas are the main tools with which new ideas are assessed. Previous practice is the familiar standard against which the innovation can be interpreted, thus decreasing uncertainty (Rogers, 1983).

**Naming an Innovation**

The name given to an innovation often affects its rate of adoption. Not enough attention, said Rogers (1983), has been paid to what innovations are called by potential adopters and as a result many serious mistakes have been made.

Alley farming has been described as an age-old land management concept that has become a new field of organized research and development (Kang et al., 1984). As such, researchers must overcome certain social, scientific, and institutional constraints to expedite the development and diffusion of alley farming systems in Africa (Raintree, 1983).

Alley farming has been characterized by different choices to changing social, economic, and physical conditions (Raintree, 1983; Kang et al., 1984; Cashman, 1987). To overcome many of the constraints alley farming presents to farmers, the technology has to be introduced in a way that assures farmers of satisfying some currently felt production need. The technology and ensuing outreach efforts have to be gender sensitive if it is to reach the majority of farmers in Africa who are women, says Rocheleau (1987). A successful approach
used by Cashman (1987) was an example of direct, creative collaboration with farmers that can be transferred to other projects that require farmer participation (Volunteers in Technical Assistance, 1988).

**The Participatory Approach.** Cashman (1987) used a play to answer the questions and address concerns of farmers about alley farming. Land tenure and gender issues were initially avoided by referring to alley farming as "the fertilizer bush." The phrase conveys the positive connotation of fertilizer, which is the primary benefit of the alley farming system, while removing the initial threat of the permanency of trees. Enhanced adoptability became the basis of Cashman's (1987) presentation to farmers. The 'Fertilizer Bush' play presented interactions between a suffering farm couple and a knowledgeable, successful peer.

The prospects of alley farming were presented in the framework of a family squabble, where the husband tries to pass his worthless farm off to his wife and move away. Annoyed at the prospects, the wife felt pressured to take it despite its low worth, lest she be left with nothing. A friendly peer appeared on the scene, with advice on alley farming based on her own experience. The friend answered the couple's questions about alley farming in a gentle, almost casual way, describing benefits that are near-term as well as long-term. All the objections by the squabbling couple were handled, with an eye to involving all able-bodied family members in the experiment (Cashman, 1987).

**Taming the Tree.** The idea of planting a tree of no apparent economic value among annual food crops was contrary to any planned farming activity for the people in southwestern Nigeria. Cashman's (1987) referring to the trees used for alley farming as 'fertilizer bushes' was a deliberate attempt to dampen objections and calm any initial fears of its use. The alley farming friend answered questions, focusing attention on the management aspect of farming while reinforcing the attractive attribute of fertilizer.
All things start with the soil. To enhance the idea of adoptability, the play contrasted the short-term effects of using commercial fertilizer with the extended benefits offered by alley farming. An impressive list of potential crops made the farmers think of the possibilities that result from periodic applications of cuttings of natural alley farm regrowth (Cashman, 1987).


- involving all alley farming families in the group;
- helping each other translate their problems, insights and ideas into practical solutions;
- learning from other group members' experiences, ideas, practices;
- building group support and cohesiveness; and
- providing a forum to create an awareness of factors influencing the family farm.

This concept of participation in development research is not new. Grounded theorists are guided by a similar assumption. People do, in fact, have common patterns of experience which allow them to order, make sense of, and cope with different aspects of their environment (Blumer, 1962; Glaser & Strauss, 1967; Patton, 1980; Lincoln & Guba, 1985). As a result, participatory research is critical.

Premise 4.
A Concerns Based Approach to Adoption

People involved in the alley farming adoption process experience similar social-psychological needs or concerns that are not necessarily articulated or conscious but grow out of shared aspects in their lives (Glaser & Strauss, 1967; Glaser, 1978; Strauss, 1987). Strauss (1987, p. 306) suggested, "There is no reason not to use extant theory--providing that it too was carefully grounded in research--to direct the collection of new data. Existing
models can act as a springboard for laying out potential lines of research and enriching one's theoretical endeavors."

Hall, Wallace, and Dossett (1973, p. 1) developed a model of the adoption process, the concerns based adoption model (CBAM), from empirical evidence. The CBAM incorporates a participatory process where the problems and concerns individuals experience during adoption are resolved. The concerns and problems adopters experience with an innovation are basic socio-psychological processes, also called core variables by Glaser and Strauss (1967).

Raintree (1987, p. 35) purports that the great expectations that national and international organizations have for alley farming as a response to environmental and population pressures must be met with greatly improved adoption and diffusion research. But his colleague (Rocheleau, 1987, p. 79) added, "Although the importance of women is now routinely mentioned in alley farming research, it is often without a realistic assessment of their needs, motivations, and concerns as clients in their own rights."

Participatory research allows women to identify, create, or modify the most appropriate units of organization to represent their interests and mediate their participation in alley farming outreach activities (Cerna, 1985; Rocheleau, 1987; Cashman, 1988). The CBAM solicits the knowledge, needs, interests, problems, and concerns of people in the adoption process (Hall et al., 1973).

The Concerns-Based Adoption Model: An Overview

According to the World Bank (1984), most technical programs and projects for farmers have been based on an outside view of farmers and innovation. There is little information on farmers' opinions and reactions to technical assistance being offered to them. The CBAM deliberately solicits information to nurture the problem-solving capabilities of potential users and adopters (Hall et al., 1973).
The active presence of a facilitator, employing the CBAM, analyzes needs of individuals affected by the process of change and helps clients make informed-decisions (Hall, 1979). After data are collected, the facilitator makes interventions that are thoughtfully and appropriately planned to assist farmers to develop the skills necessary for alley farming to take root or become "institutionalized."

Concerns of Individuals in the Adoption Process

The stages of concern (SoC) dimension of the CBAM refers to the concerns individuals experience during change. These concerns reflect the feelings, thoughts, and reactions individuals face throughout the adoption process. The CBAM identifies seven different stages of concern.

In brief, the stages range from no concern, to initial concerns about "self," to concerns about "task," and finally levels of "impact." Particular stages are more intense than others and are developmental, meaning that as farmers learn the concept and techniques of alley farming, their concerns change. Rogers (1983) also pointed out that individuals have different information needs as they progress through the stages of adoption of an innovation.

Behavior Pattern Development

The second dimension of the CBAM examines behavior in relation to the innovation. This approach to describing and characterizing the acquisition of expertise is based on the concept of level of use (LoU).

The levels of use (LoU) component evaluates how individual performance changes as a farmer becomes more familiar and skillful with the new practice. Eight distinct levels characterize the process of skill acquisition (Hall, Loucks, Rutherford, & Newlove, 1975). The novice initially has no level of use, then proceeds to orientation and preparation. Eventually a farmer reaches a mechanical level of use, but with practice and support can progress to a routine level of performance.
Again, the CRAM assumes the existence of two primary systems—a user system and a resource system—and the establishment of a third, temporary system, a collaborative adoption system (Hall et al., 1973). The resource system is an agency or institution that has the capability to assist the adopters of an innovation. The term user system refers to the adopters of an innovation. Figure 2 illustrates how the collaborative system, the joint activity of the resource and user system, facilitates the adoption process. It is temporary in that it has a life expectancy equal to the time required by the user system to achieve independent use of an innovation.

![Figure 2. Concerns based adoption model](image-url)
Summary

The premises discussed in Chapter 2 guided the design and evolution of this study and were the basis of the final round of data collection and analysis described in Chapter 3. Four premises were presented within a general description of grounded theory research. The first premise provided a background to understand and assess how Yoruba women define their world. Yoruba women are, in a sense, defacto representatives of all African women in alley farming research. Therefore, it is important to understand their role in food production. The generation of grounded theory relies on discovering and conceptualizing the essence of specific interactional processes. Consequently, the second premise described potential influences between alley farming and Yoruba farming women. The third premise described factors affecting the adoption and diffusion of alley farming to illustrate how people interact through meaningful symbols. These premises illustrated the context where meanings evolved relative to women's social, cultural, and economic situation and the alley farming technology. The fourth premise described and illustrated the basic assumption and methodological foundation of grounded theory research. That is people involved in similar situations, for example the alley farming adoption process, experience similar social-psychological "problems," needs, and concerns that aren't necessarily articulated, but grow out of shared aspects in their lives.
CHAPTER III. METHODS AND PROCEDURES

The purpose of this study was to use a grounded theory approach to study rural Yoruba women in southwestern Nigeria exposed to an agroforestry technology called 'alley farming.' This chapter describes the methods and procedures used to assess how farmers become aware of alley farming; adopt, reject, or modify and institutionalize it, or discontinue the practice, and relay their experience to others.

Introduction

A grounded theory approach was used to study Yoruba women and alley farming to take advantage of the constant comparative method. Specifically, data collection, coding, analysis, and theorizing were simultaneous, iterative, and progressive (Patton, 1986). Factors existing at the local level comprised the "substantive theory" discussed in Chapter 5.

The grounded theory approach used in this study is described in nine sections identified by Strauss (1987, p. 23). They include:

1. defining concept indicators
2. building a conceptual framework
3. discovering core variables
4. theoretical sampling
5. triangulation of data collection
6. coding data with the constant comparative method
7. theoretical saturation
8. integrating theory through inductive analysis
9. validity and reliability of the theory
Defining Concept Indicators: Design Evolution

Data collection and analysis began in 1984 under the auspices of an On-Farm-Research (OFR) alley farming program in the Ogbomosho Local Government in southwestern Nigeria with the International Livestock Center for Africa (ILCA). Cashman's (1985) responsibilities were to encourage and document the involvement of Yoruba women in alley farming. Research in alley farming continued in 1985-86 with an OFR project for the International Institute of Tropical Agriculture (IITA). Cashman's (1986) responsibilities involved supervising an OFR project with an alley farming component in the Irewole Local Government in southwestern Nigeria. Cashman (1990) returned to the area in the summer of 1988, under the direction of the World Bank WID Division, to evaluate the alley farming component of these projects, as well as the only other existing on-farm-research project in Oyo State (Figure 3).

![Figure 3. On-farm-research sites in southwestern Nigeria](image-url)
Based on a recognized need for a perspective on rural African women and alley farming, as well as an organizing framework for further study, a grounded theory approach was used. Grounded theory provided a means of bringing a new point of reference and structure to existing assumptions surrounding Nigerian women and alley farming.

Several purposes were served by integrating data, referred to as grounding theory (Glaser & Strauss, 1967), about women and this unique approach to farming. First, theorizing helped summarize and put in order existing knowledge of relatively new areas of research, particularly farming women (Rocheleau, 1987) and alley farming (Raintree, 1987). Second, empirical data can provide new meaning to previously misunderstood events and relationships (Lincoln & Guba, 1985; Glaser & Strauss, 1967). Third, the development of this theory provides insights for further research.

During the period from 1984 through 1986 as hypotheses emerged, they were discussed with women and men in the project sites. Prior to a final round of interviews in the summer of 1988, these propositions were, again, presented to women at village meetings in three project sites. As data emerged that fit existing categories, the investigator began thinking in terms of the theoretical properties of the categories. Categories included various dimensions of alley farming, the relationship of these dimensions to other categories, and the conditions under which they were pronounced or minimized. This process involved a continual returning to the data (the field) until the categories became theoretically saturated.

Beginning in 1984-85 the investigator’s experience with and knowledge of alley farming, the Yoruba culture, the OFR sites, and the research institutes increased. Gradually, incidents began to coalesce. These incidents formed patterns which continued to surface and repeat themselves in other OFR sites in 1986. During 1985-86, premises regarding Yoruba women and alley farming were developed. A comparison of incident with incident led to a comparison of incident with the properties of particular categories.
Categories and their interrelationships to one another were further refined leading to the development propositions. Data supporting the propositions continued to surface. Recurring patterns formed higher level concepts of the theory. In 1988, the process of data collection was driven by the emerging theory.

Building a Conceptual Framework

The fieldwork involved multiple-site, multiple-case research. The initial framework was loosely constructed to allow for local idiosyncracies in the field. Terms such as "social conflict," "project control," or "role conflict" are what Miles and Huberman (1984) call 'bins' to structure the investigation. 'Bins' contain discrete events and behaviors. The bins in Figure 4 were based on the investigator's past experience with the innovation, settings, and actors.

Policymakers were assumed to influence linkers by providing technical assistance and other interventions in the linker and adopter network. The two-way arrows indicate specific within-role relationships. Figure 4 illustrates how the study focused more heavily on linker and adopter behavior, and implementation effectiveness, that is, on variables coming later in the causal chain indicated by the arrows.
Figure 4. Conceptual framework of the alley farming adoption process
The conceptual framework directed the formulation of research questions. For example, the third column, entitled "adoption decision," has component parts listed inside the bin, the decision to adopt, implementation, or requisite support for implementation. The task was then to decide what to find out about these topics—aspects essential to understanding women's involvement in the alley farming OFR process.

The procedure involved clustering specific questions under more general ones, as listed below:

**Research Questions Relating to Adoption and Retention**

- How was the adoption decision made?
  - Who was involved (for example, field technicians, scientists, extension agents, family members)? How was the decision made, collective-participative, or delegated styles?

- How much priority did the new farming system have for each adopter?
  - How much support and commitment was there from the OFR staff? How important was it for farmers in relation to their routine activities?

- What were the original implementation components?
  - This includes front-end training, monitoring, dealing with unexpected problems, and ongoing support. How precise and elaborate was the initial introduction? Were farmers satisfied with it? Did it deal with the problems anticipated?

- Were the requisite conditions for implementation assured before it began?
  - This includes commitment, understanding, materials and equipment, skills, time allocation, and institute backup. Were any important conditions seen as missing?

**Discovering Core Variables**

Discovering core variables is essential to grounded theory research (Glaser, 1978; Strauss, 1987). The core variables in this study were comprised of concerns experienced by farming men and women in the alley farming adoption process. Continuous reference to the data collected during 1984-86 yielded the variables. The core variables represented a "main theme" that described and predicted farmers' behavior and "what was going on with the data" (Glaser, 1978, p. 94).
Core variables contained three essential attributes, as described by Glaser and Strauss (1967): they re-occurred frequently in the data, they linked the data together, and they explained variation in the data. Following Glaser (1978, p. 100), "the basic social-psychological processes (BSP)" were regarded as 'concerns' experienced by farmers during the alley farming adoption process. These core variables became the "glue" for connecting categories, properties, and dimensions of the theory. Thus, BSPs or core variables were modified to fit the Concerns Based Adoption Model to guide data collection in 1988.

Theoretical Sampling

"Theoretical sampling is a means whereby the investigator decides on certain analytic grounds what data to collect next and where to find them. ...of course the more data one has to support one's theory the better" (Strauss, 1987, p. 38).

ILCA and IITA were selected because of their substantial contributions in the refinement and testing of the alley farming system (primarily in southwestern Nigeria) and the investigator's previous employment with them (Harrison, 1987; Chew, 1989). Interviews were conducted with the population (53) of female adopters, and their alley farms were visited. The financial resources, provided by the Women in Development Division of the World Bank, made it possible to secure the necessary human and material resources to interview and visit the farms of 110 male adopters. Although all female adopters on record were included in the study, some male adopters had died and others had migrated to cities.

Throughout the 1988 fieldwork 123 nonadopters were also canvassed to determine their understanding of, and perceptions towards, alley farming. Glaser and Strauss (1967) recommended maximizing differences between respondents to gain a more holistic understanding of the phenomena under study. A combination of 15 technicians and
extension agents and 15 scientists were also interviewed. This latter group included six national university faculty, three ILCA scientists, and six scientists from IITA.

The basic criteria governing the selection of comparison groups were their theoretical relevance for furthering the development of the theory and emerging categories. Initially, in 1984-85, categories and their properties emerged because of minimal differences between comparison groups (female adopters and nonadopters). With the emergence of a basic theoretical framework, 1986-87, differences between comparison groups were extended in an IITA field site (female and male adopters and nonadopters).

The comparison groups (Figure 5) were added in the 1988 fieldwork to maximize differences, as well as refine, and verify theoretical properties that had emerged during 1984-86. Earlier data were also used to further delimit and modify the concerns based adoption model (CBAM) to elucidate theoretical criteria. Additional data came from demographic surveys (Appendix A) administered in the three areas during various phases of the study. The data were used to make cross site comparisons between the ILCA site (Cashman, 1985), and IITA Ayepe (Cashman, 1986), and Alabata sites (Cashman, 1990).

![Figure 5. Comparison groups used for theoretical sampling and saturation](image-url)
Triangulation in Data Collection

Triangulation was accomplished with multiple data collection techniques, using human sources and nonhuman instruments (Patton, 1980). "Whatever the source," wrote Lincoln and Guba (1985, p. 287), "the human instrument must be the primary mode of collecting the information."

**The Human as Instrument**

The use of humans as instruments is not a new concept, especially with qualitative research methods. The following characteristics qualified the 'human instrument' as the major vehicle for data collection in this investigation.

1) Responsiveness. Humans sense and respond to personal and environmental cues. They can interact with situations to sense and explicate dimensions.

2) Adaptability. Humans can collect information about multiple factors, at multiple levels, simultaneously.

3) Holistic emphasis. Humans can grasp the world of any phenomenon and its surrounding context in one view.

4) Knowledge base expansion. Humans can extend their awareness of situations to others to lend depth and richness to their understanding of social, cultural, and organizational settings.

5) Processual immediacy. Humans can process data as soon as they become available. This is essential to grounding a theory as it allows the researcher to generate hypotheses and test them with respondents in the situation where they are created.

6) Opportunities to explore atypical responses. Humans can explore responses not only to test their validity, but to achieve a higher level of understanding.

7) Opportunities for clarification and summarization. Humans can summarize data and ask respondents for clarification, correction, and amplification (Lincoln & Guba, 1985, pp. 193-194).

**The Concerns Based Approach**

In 1988, the investigator modified the CBAM developed by Hall et al. (1973) to structure the interview questions and observations schedule. Interviews were administered and tape-
recorded and alley farms visited by the investigator and one of four trained assistants. Three female undergraduates from the University of Ibadan and a visiting male graduate student from Germany received training in open-ended interviewing techniques and participant observation. The German student carried out the majority of interviews and some of the farm visits with the population of male adopters.

During 1985, 1986, and again in 1988 expressed concerns of adopters and nonadopters were catalogued, as were farmers' demonstrated levels of using alley farming. Interview questions were constructed to solicit concerns and uses. In addition, the interviews solicited information on adopters' past history, motivations, needs, and feelings in regards to alley farming (Appendix B). Basically the same question format used to interview farmers was used to interview the two other groups. People and sites were observed and/or interviewed more than once. Not everything was riding on a single interview or observation.

Questions were asked in a chronological format to take the informant back to the original point of adoption and moved progressively forward. Probes were handled in various ways: as aids to help the interviewer flesh out answers or as prompts for items the informant may have overlooked. If the response opened up other doors, the interviewer was encouraged to go through them to obtain additional information. Often, upon reviewing the field notes and recordings, a response was uncertain or inaudible. In that case the question was asked again—perhaps differently—during the next site visit.

**Constructing Levels of Use.** Components of alley farming (i.e., animal fodder, green manure, staking material, firewood, etc.) provided definable and observable differences in use. Categorized hierarchically, components provided a "levels of use" scale.

Eight levels, including zero use, were applied. The levels consisted of two factors: knowledge and action. This differentiation is essential. A number of villagers could describe alley farming in detail, especially in the IITA Ayepe site where 'The Fertilizer
Bush' drama (described in Chapter 2) was presented in 1986. Although knowledge was a necessary condition for action, it was no substitute. The action scale indicated how advanced farmers were in using the alley farming technology. Direct observation was required for this scale. Seven behaviors relating to knowledge and action were recorded. Three behaviors dealt with self, three with the task (work), and two with the innovation's impact. The levels and "typical" behaviors were:

<table>
<thead>
<tr>
<th>Stages</th>
<th>Behaviors Exhibited</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self related</td>
<td></td>
</tr>
<tr>
<td>0. Nonadopter</td>
<td>No action being taken</td>
</tr>
<tr>
<td>1. Orientation</td>
<td>Farmer seeks more information</td>
</tr>
<tr>
<td>2. Preparation</td>
<td>Farmer prepares to use information</td>
</tr>
<tr>
<td>Task related</td>
<td></td>
</tr>
<tr>
<td>3. Mechanical</td>
<td>User managing alley farm poorly</td>
</tr>
<tr>
<td>4. Routine</td>
<td>User making few changes, established a pattern of use</td>
</tr>
<tr>
<td>5. Refinement</td>
<td>User strives to increase impact</td>
</tr>
<tr>
<td>Impact related</td>
<td></td>
</tr>
<tr>
<td>6. Integration</td>
<td>User collaborates with other alley farmers</td>
</tr>
<tr>
<td>7. Re-invention</td>
<td>User modifies or restructures recommended practice</td>
</tr>
</tbody>
</table>

Constructing Stages of Concern. When a complex innovation (i.e., including multiple components or benefits) like alley farming was introduced, farmers usually asked the following:

- How congruent was the practice with their value system, activities, skills?
- How congruent was the innovation with their goals and resources?
- How congruent were changes in the farming system with their personal goals?
Behavioral categories were derived by observing how farmers answered these questions during 1984-86. As farmers progressed from exploration, to trial, to integrating alley farming into their daily routine, they had to acquire new knowledge and learn new skills. In attempting to advance their skill in alley farming, they appeared to experience problems, frustrations, and knowledge voids. In short, farmers appeared to encounter various conflicts between their socio-cultural milieu and the alley farming innovation.

From initially "checking out" the innovation to subsequent knowledge and skills needed to manage the system, farmers encountered problems or "concerns." The progression of concerns was based on familiar expressions commonly repeated by farmers at specific levels of use of their alley farms. Listed below are concern stages that were determined by talking with alley farmers and analyzing what worried them, the problems they reported, the information or help they requested, and what pleased them. For example, the intensity of task and impact concerns appeared considerably less than the intensity of self-oriented concerns. As farmers' early, intense self-related questions were resolved and they became more adept at using the technology, then their task and impact concerns increased. Women's common concerns toward alley farming were:

<table>
<thead>
<tr>
<th>Concern Stages</th>
<th>Common Expressions</th>
</tr>
</thead>
<tbody>
<tr>
<td>0. Awareness</td>
<td>&quot;I don't know anything about alley farming.&quot; &quot;I am not concerned.&quot;</td>
</tr>
<tr>
<td>1. Informational</td>
<td>&quot;I would like to know more about it.&quot;</td>
</tr>
<tr>
<td>2. Personal</td>
<td>&quot;What will others think of me?&quot;</td>
</tr>
<tr>
<td>3. Management</td>
<td>&quot;Alley farming is too tedious.&quot;</td>
</tr>
<tr>
<td>4. Consequence</td>
<td>&quot;How can it benefit me and my family?&quot;</td>
</tr>
<tr>
<td>5. Collaborating</td>
<td>&quot;I'd like to know how others use it.&quot;</td>
</tr>
<tr>
<td>6. Refocusing</td>
<td>&quot;I have some ideas for how to make it better.&quot;</td>
</tr>
</tbody>
</table>
In addition to data gained from participant observation and interviews, primary and secondary material were gathered at each institution including: 1) participant lists and relevant field notes; 2) personal files of alley farmers; and 3) published and unpublished reports. These documents were extremely valuable in interpreting data gathered from interviews with farmers, as well as, scientists and administrators. Some of these sources constituted validity and reliability checks against other data.

Coding and the Constant Comparative Method

The circular nature of grounded theory research (Figure 6) allowed the researcher to change focus and pursue leads revealed through on-going data analysis. The procedures in Figure 6 illustrate the constant comparative process of joint collection and analysis of data while constantly comparing segments of data within groups and between groups. Incidents were compared with previous incidents in the same and different groups. Systematic collection, coding and analysis eventually generated a theory on women and alley farming that was integrated, consistent, and close to the data.

Coding

First level codes were based on Yoruba women’s role in the farming system of southwestern Nigeria which was reviewed in the first premise of Chapter 2. The second level codes, characteristics of the alley farming technology, were supported by first level codes. Third level codes, the stages of concern (SoC) and the levels of use (LoU) of the CBAM, were theoretical constructs derived from a combination of academic and clinical knowledge.

These constructs contributed meaning and scope to the theory (Glaser, 1978, p. 70). "Theoretical constructs conceptualized the relationship among the three levels of codes, weaving the fractured data back together again" (p. 116). The researcher compared each category with one another to ensure that they were mutually exclusive and covered all
behavioral variations as suggested by Reynolds (1971), Turner (1981), and Hutchinson (1986).

Figure 6. Sketch of the grounded theory approach
Memos

A journal was kept during the fieldwork and notes were written on what was puzzling or surprising about each site, as alternate hypotheses, to propose a specific new pattern code, and to integrate a set of marginal or reflective remarks already made on other documents. These memos were conceptual in content and were useful in tying different pieces of data together in clusters. Here is an example of a memo about on emerging patterns.

Within the IITA Alabata site, people—both men and women—are riding the innovation in a state of expectation; they believe they are on their way to somewhere via the projects and inputs they receive—other than alley farming—via the project.

Memos were dated, titled with key concepts being discussed, and anchored to particular places, to previous site analysis discussions, or to site summaries. As the study proceeded, under an inductive mode of inquiry, memos accumulated and were sorted into more comprehensive categories as recommended by Glaser (1978, p. 87). Memos made moving between data and conceptual levels easier, serving to refine and expand thoughts further. Memos initiated the development of key categories and, eventually, a more integrated theory.

Site Analysis Meetings

With the multiple-site nature of this study and a number of field workers, the meaning of what is happening at each site could have easily been lost. Therefore, site analysis meetings were held regularly and tape-recorded during the fieldwork. Those involved in data collection would meet to summarize the current status of events at each site. Questions guiding the meetings were:

1) What was puzzling, strange, or unexpected about recent site events?
2) What was the state of rapport with various people in key roles?
3) What additional analysis was needed on existing data to understand the site better?
4) What would happen over the next few days/weeks at the site?
These site analysis meetings were useful for forming preliminary descriptive and explanatory generalizations. This interaction helped keep fieldworkers focused and on track. Generalizations and impressions did not go unquestioned or unillustrated.

Site Summary

Site summaries were carried out with a German assistant. Findings were reviewed by looking carefully at the quality of the data supporting them. The site summaries included:

A. site
   1. geography, setting
   2. demographics of community
   3. description of key actors and their relationships

B. chronology
   1. adoption and description of the innovation
   2. planning, post-adoption results
   3. implementation up to present

C. current status of OFR research
   1. summary of what was known, unknown, puzzling
   2. community and household and OFR interaction
   3. adoption decisions
   4. external and internal assistance

D. causal network—both hypothetical and actual
   1. network of variables affecting production
   2. previous especially salient or relevant conceptual and empirical work on dissemination

Theoretical Saturation

During 1984-86 the study was guided by agricultural and sociological perspectives. Participant observations were made, personal interviews conducted, and documents reviewed until data collection and analysis added nothing new conceptually. Theoretical saturation existed when additional data fit established categories, patterns were clearly visible, and behavioral variation could be described and predicted (Glaser, 1978; Strauss, 1987).
Integrating the Theory through Inductive Analysis

Data accumulated in the field were analyzed inductively. This induction included subsuming raw units of information under higher level concepts or categories to define local working hypotheses or questions for follow-up (Lincoln & Guba, 1985, p. 203). In a similar vein, content analysis uncovered and explicated information about alley farming embedded in interview transcripts and documents (Berelson, 1952). Tape-recorded interviews were transcribed manually before further coding.

Following Turner's (1981) example, raw units of information from interviews and documents were categorized and thematically refined to define working hypotheses or questions for follow-up. Two essential sub-processes are involved, which Holsti (1969) termed "unitizing" and "categorizing." Unitizing is a process of coding, whereby, according to Holsti (p. 94) "raw data are systemically transformed and aggregated into units which permit precise descriptions of relevant content characteristics." For example, the stages of farmer concerns are units.

Content Analysis

Berelson (1952), Holsti (1969), and others describe how data can be organized into units and categories representing specific processes within a context or setting. Following Glaser and Strauss (1967), word phrases were assigned to categories on the basis of similar characteristics or themes. The Manual for Assessing Open-Ended Statements of Concern About an Innovation was used as a reference for scoring participants' answers (Newlove & Hall, 1976). Content analysis revealed participants' purposes, motives, and other characteristics in relation to alley farming.
The use of content analysis in this study involved making three general assumptions.

1) Inferences about the relationship between intent and content or between content and effect can validly be made.

2) The analysis of the manifest content of interviews is meaningful. Interview content was used as a "common meeting-ground" for the investigator and the participants. That is, "meanings" ascribed to the content and assigned to certain categories, correspond to the "meanings" intended by the communicator and/or understood by the audience.

3) The quantitative description of communication content is meaningful. The frequency within which various characteristics occur in the content is an important factor in establishing and grounding theory.

**Uses of Content Analysis**

Villagers reported receiving different messages about the alley farming intervention disclosed. Different "levels" of communication attracted different audiences (Berelson, 1952). A comparison between ILCA and IITA documents, scientists' interview content, and observations in the field indicated commitment to project objectives. In addition, the communication content of field agents reflected their understanding of the alley farming system, the on-farm-research objectives, as well as their relationship with adopters.

Analysis of farmers' interview content reflected the psychological state of farmers, as well as their attitudes, interests, and values. The interviews focused attention on the concerns of farmers and were critical in assessing farmers' attitudinal and behavioral responses to alley farming interventions.

**Coding the Content**

In addition to the tape-recorded interview, the research involved a comparative content analysis of 16 OFR methodological papers concerning adequacy of alley farming. The first task was to determine a basis for comparison by using a thematic analysis. After carefully reading the papers and transcribing the interviews, recurrent themes common to, and constitutive of the interviews and arguments in all were proposed.
Using several very large sheets of paper, a comparative table was created where each parameter was a column, and each study or interview a different row. Direct quotations from each study and interview concerning each parameter were copied in the tables. Where quotes were too lengthy, or discussion too segmented to reproduce as a quotation, brief summaries were used. However, the use of quotes was generally possible. Where the same points were made multiple times in the papers and interviews, statements were tallied, but not completely recorded.

Similarities and differences among interviews and studies content were inspected. The communication content surfaced concepts, ideas, and assumptions the participants had in relation to the alley farming technology. Emerging themes reflected the scope and range of the examples subsumed by the theme. Within each theme, the evolution of concerns across the history of alley farming, to adopters or technicians and agents or researcher, was traced.

Validity and Reliability

Negotiated outcomes were used for achieving closure at each of the field sites. The researcher validated the emerging propositions and themes by discussing them with groups of male and female farmers, as well as a number of field agents, scientists, and her assistants. Meanings emerging from the data were tested for their plausibility, sturdiness, and validity by confirming them with participants in the study. If all agreed on propositions, as a reasonable interpretation of the process, the visit was concluded. If there was disagreement, additional interviews were conducted to reach validation.

In many content analyses, the problem of validity is not a problem at all, said Berelson (1952). Particular words and phrases, and their synonyms, were counted. Assuming there is no doubt about the synonyms, there should be no doubt about the validity of the analysis. The cassettes from the recorded interviews provide proof if validity is questioned.
Reliability is used here in the standard statistical sense of measuring the degree to which the data are independent of the measurement instrument. The analysis of communication content rested upon two kinds of consistency: consistency among analysts, that is different coders produced the same results when they applied the same set of categories to the same content; and consistency through time—that is a single coder produced the same content at different times. Important questions were repeated using different words during the interview to assess reliability. This procedure measured the probability of receiving the same results using the same instrument in the same information gathering context.

The importance placed on context marks a fundamental difference between survey research and the grounded theory approach. The survey can generalize information for wider spread, but it assumes that the context in which the information was gathered was representative. The approach taken in this study probes for information indepth in a specific context. Grounded theorists can specify the extent to which the data are valid but they cannot statistically generalize its data with a specified degree of reliability.

Glaser and Strauss (1967, p. 3) said a grounded theory will "fit the situation being researched, and work when put into use. Fit means that the categories must be readily (not forcibly) applicable to and indicated by the data under study. Work means that they must be meaningfully relevant to and able to explain the behavior under study." Therefore, the concepts of "fit" and "work" are essential criteria for judging a grounded theory.

Summary

In 1988 the investigator adopted a broad interpretive framework, which guided the interview process. This framework consisted of a set of questions focused on earlier findings. Interviews were oriented toward testing, elaborating, and refining propositions that originated between 1984 and 1986.
CHAPTER IV. FINDINGS

Introduction

The purpose of this study was to use a grounded theory approach to study rural Yoruba women in southwestern Nigeria exposed to an agroforestry technology, 'alley farming.' A theory of agricultural change was developed to provide a framework for alley farming research and extension. The theory describes the process through which farming women become aware of alley farming, adopt it, reject it, or modify the system, and then institutionalize it, discontinue the practice, and/or relay their experience to their colleagues.

The findings presented in Chapter 4 support a series of propositions which are discussed in Chapter 5. The propositions form a theory of adoption presented in Chapter 5. The theory provides a framework for further hypothesis testing and refining. This theoretical framework was used to assess the conditions that facilitate, alter, or inhibit the course of the innovation process. The objectives of the study were to:

1) identify sociocultural and gender variables that influence the adoption of alley farming;
2) compare the ideas and experiences of adopters and nonadopters of the alley farming;
3) develop methods that incorporate gender issues to assist change facilitators involved in alley farming outreach;
4) assess the number of successful male and female farmers who have adopted and continue to use alley farming; and
5) identify what induced farmers to accept and maintain the practice of alley farming.
Site Demographics and History

Participating farmers in this study were from projects in the three ecological zones in Oyo State, southwestern Nigeria. A project in the derived savanna was directed by the International Livestock Center for Africa (ILCA), while the others in the transitional and forest zones were directed by the International Institute of Tropical Agriculture (IITA). Farming women in Oyo State usually cultivate 2-4 food crop fields with sizes of .2 -.4 hectares each. The most predominant type of system was based on a maize/cassava intercrop.

The ILCA Site in the Derived Savanna Zone

The ILCA project was conducted in collaboration with the Nigerian Livestock Projects Unit (NLPU). The project was to assess the relevance and acceptability of the alley farming system to farmers under their own management. The site was in two adjacent local governments, Ejigbo and Ogbomosho, in the villages of Owu-Ile and Iwo-Ate. This site was approximately 30 miles northeast of the city of Oyo, within the derived savanna of Oyo State.

A 1984 survey in the ILCA site showed that "only 27 percent of the women in the area farmed--most in collaboration with their husbands" (Okali & Cassidy, 1985). In 1985 Cashman found female farmers outnumbering male farmers at the ILCA site (Table 1).

Table 1. Occupations of adults in on-farm-research site in the derived savanna zone

<table>
<thead>
<tr>
<th>Occupation</th>
<th>Owu-Ile</th>
<th>Iwo-Ate</th>
<th>Nearby Hamlets</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>female</td>
<td>male</td>
<td>female</td>
</tr>
<tr>
<td>n=116</td>
<td>n=98</td>
<td>n=104</td>
<td>n=92</td>
</tr>
<tr>
<td>Traders</td>
<td>66</td>
<td>37</td>
<td>46</td>
</tr>
<tr>
<td>Farmers</td>
<td>69</td>
<td>63</td>
<td>60</td>
</tr>
<tr>
<td>Others</td>
<td>13</td>
<td>44</td>
<td>33</td>
</tr>
</tbody>
</table>

Note: Respondents often named more than one major occupation.
The ILCA 'model', on paper, was one where two-thirds of the prunings from the alley farm were to be used as mulch and the other third as animal fodder. Even though the fodder component held a minor position, ILCA's mandate (livestock production) was evident. Community members living in the ILCA site called the alley farming concept 'livestock feed.' Many farmers were not fully cognizant of the fertilizer value. Regardless, villagers interested in participating in the ILCA program were allowed to plant alternating rows of *Glicidium Sepium* and *Luecaena Leucophala* on farmland of any size. Although interest had been high, the number of women planting alley farms had been low except for 1985 when a female research associate lived on site (Francis & Atta Krah, 1987).

The IITA Sites in the Transitional and Forested Zones

The IITA Alabata site is situated just a five miles from the metropolis of Ibadan and only a few miles from IITA's main research station. The village lies in the transition zone between forest and derived savanna; many of the inhabitants farm in both ecologies.

Although Alabata is basically a farming community, it is heavily influenced by its proximity to Ibadan. Large urban traders have regular contacts in the village with whom they buy raw agricultural produce. Therefore, the intensity of food processing and trading by women is considerably lower than IITA's other, more remote site (Table 2).

<table>
<thead>
<tr>
<th>Occupation</th>
<th>Alabata</th>
<th>Avepe</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>female</td>
<td>male</td>
</tr>
<tr>
<td>Trader</td>
<td>80</td>
<td>31</td>
</tr>
<tr>
<td>Farmer</td>
<td>106</td>
<td>101</td>
</tr>
<tr>
<td>Other</td>
<td>4</td>
<td>7</td>
</tr>
</tbody>
</table>

Table 2. Occupations of adults in on-farm-research sites in the transitional and forest zones
The project objective was "to identify in cooperation with farmers acceptable new farming practices and materials that improve the farmers' production system and raise yields in a sustained way" (Mutsaers, 1988, p.2). These trials were to be jointly farmer-researcher managed. "Cooperating farmers were largely 'selected' on the basis of their farming practices. For a farmer to be further 'selected', he/she expresses a willingness to try a new technology and ability for cooperation is apparent" (Ezeribe & Palada, 1988, p. 7).

The alley farming initiative in Alabata was initiated in 1985; in 1988 the number of participating alley farmers was quite low. Farmers' fields were planted by IITA technicians, who also had a large role in the on-going management of these alley farms. Participation by the community was low; none of the viable alley farms were owned by women. The system did not appear likely to be adopted by other farmers in the area; diffusion seemed unlikely. Ezeribe and Palada (1988, p. 17) touched on the issue of trial complexity and the importance of informing the participants of the necessary management information. They felt that "the treatments could be narrowed down to the 1986 design for easier management and understanding.... Farmers should be enlightened more on the operation of the system to synchronize levels of management and reduce variation."

IITA's continued heavy involvement in the management and monitoring, as well as the strict parameters of the trials, inhibited farmers from regarding the technology as one that could be taken up without similar restrictions. In addition, the control exhibited by IITA was taken by farmers as an initial step to take over their land. Resistance to the alley farming concept was extensive.

The IITA Ayepe site was located in the forest zone 20 miles east of Apomu/Ikire in the Irewole Local Government of southwestern Nigeria. The site was approximately 60-90 minutes drive from Ibadan, depending on the seasonal status of the roads. This project was funded by the Ford Foundation to stimulate collaboration between National and IITA.
research units. More importantly the project mandate was to enhance relationships between IITA, the University of Ibadan, other academic institutions, and the Ministry of Agriculture and Natural Resources (MANR). One of the primary objectives of the project was to identify and test innovations which were acceptable to farmers and could increase agricultural production in the pilot area and in similar areas, in a sustainable manner.

Several approaches were used in 1986 to introduce and enlist area farmers. The first approach replicated the approach used in the Alabata site. The scientist in charge of the introduction enlisted five male farmers to plant alley farms. During this time, there was a great deal of confusion and misunderstanding as to what alley farming was all about.

The site manager received permission to develop her own mode of delivery and trial parameters. Shortly after the initial introduction, the phrase "alley farming" was changed to 'fertilizer bush.' The play described within the third premise of Chapter 2 was scripted and acted out by community members to present the salient features and critical concepts of the system. In addition, the participating farmers were allowed to devote any size farm field, use traditional measurements for spacing between alleys, in addition to planting Cassia siamea (a local leguminous tree) and Leucaena leucocephala in alternating rows. The elimination of the strict researcher controls resulted in 27 additional farmers in the area (45% women) establishing alley farms.

As of 1987, the trial parameters placed on the Alabata trials were reinstated in the Ayepe site. In 1988, only one of the 27 farms established without heavy researcher control in 1986 was viable. Of the 13 researcher managed alley farms established, nine remain viable. Although a large number of women are farming independently in the area (Table 2), there weren’t any women involved in the Ayepe alley farming trial in 1988.
Demographic and Sociocultural Characteristics of Female Adopters

**Age.** The mean age of the 53 alley farming women was 38 years. The summary of the data is presented in Table 3.

<table>
<thead>
<tr>
<th>Years</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>15-24</td>
<td>7</td>
<td>13.2</td>
</tr>
<tr>
<td>25-34</td>
<td>15</td>
<td>28.3</td>
</tr>
<tr>
<td>35-44</td>
<td>14</td>
<td>26.4</td>
</tr>
<tr>
<td>45-54</td>
<td>12</td>
<td>22.6</td>
</tr>
<tr>
<td>55-64</td>
<td>4</td>
<td>7.5</td>
</tr>
<tr>
<td>65 and above</td>
<td>1</td>
<td>1.8</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>5</td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

**Marital Status.** Nearly 70% of the alley farming women were married compared with 30% who did not have husbands (Table 4).

<table>
<thead>
<tr>
<th>Marital Status</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single</td>
<td>2</td>
<td>3.7</td>
</tr>
<tr>
<td>Married</td>
<td>38</td>
<td>71.7</td>
</tr>
<tr>
<td>Widow</td>
<td>11</td>
<td>20.8</td>
</tr>
<tr>
<td>Divorced</td>
<td>2</td>
<td>3.7</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>53</td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>
**Household Decision-Maker.** Of the married women, 37% reported being the only wife, while 63% of female adopters reported being co-wives. The majority of women identified someone else as the primary decision-maker in household matters (Table 5).

<table>
<thead>
<tr>
<th>Person</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Myself</td>
<td>13</td>
<td>25.0</td>
</tr>
<tr>
<td>Husband</td>
<td>28</td>
<td>52.8</td>
</tr>
<tr>
<td>Husband and self</td>
<td>1</td>
<td>1.7</td>
</tr>
<tr>
<td>Brother-in-law</td>
<td>8</td>
<td>15.0</td>
</tr>
<tr>
<td>Older male relative</td>
<td>2</td>
<td>3.8</td>
</tr>
<tr>
<td>Others</td>
<td>1</td>
<td>1.7</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>53</td>
<td>100.0</td>
</tr>
</tbody>
</table>

**Number of Children.** One-third of the female adopters had children of preschool age in 1988 (Table 6).

<table>
<thead>
<tr>
<th>Number of Children</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
<td>1.7</td>
</tr>
<tr>
<td>1-2</td>
<td>11</td>
<td>20.7</td>
</tr>
<tr>
<td>3-4</td>
<td>19</td>
<td>35.8</td>
</tr>
<tr>
<td>5-6</td>
<td>13</td>
<td>24.5</td>
</tr>
<tr>
<td>7-8</td>
<td>8</td>
<td>15.0</td>
</tr>
<tr>
<td>9-10</td>
<td>1</td>
<td>1.7</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>53</td>
<td>100.0</td>
</tr>
</tbody>
</table>
Level of Education. The majority of alley farming adopters had no formal education (Table 7).

Table 7. Level of education of female alley farmers

<table>
<thead>
<tr>
<th>Level</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>No formal education</td>
<td>31</td>
<td>58.4</td>
</tr>
<tr>
<td>Some primary education</td>
<td>12</td>
<td>22.6</td>
</tr>
<tr>
<td>Primary education</td>
<td>9</td>
<td>16.9</td>
</tr>
<tr>
<td>Secondary education</td>
<td>1</td>
<td>1.7</td>
</tr>
<tr>
<td>Total</td>
<td>53</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Labor. Table 8 illustrates that alley farming women undertook most farm operations themselves. It is common, though, for women in Yorubaland to supplement their own labor with labor provided by family members or hired laborers.

Table 8. Labor distribution of female adopters

<table>
<thead>
<tr>
<th>Source of Labor</th>
<th>Activity</th>
<th>Themselves</th>
<th>%</th>
<th>Family Members</th>
<th>%</th>
<th>Hired Labor</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td>Clearing</td>
<td></td>
<td>47</td>
<td>88.6</td>
<td>40</td>
<td>75.4</td>
<td>53</td>
<td>100.0</td>
</tr>
<tr>
<td>Cultivation</td>
<td></td>
<td>47</td>
<td>88.6</td>
<td>36</td>
<td>67.9</td>
<td>53</td>
<td>100.0</td>
</tr>
<tr>
<td>Planting</td>
<td></td>
<td>53</td>
<td>100.0</td>
<td>11</td>
<td>20.7</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Weeding</td>
<td></td>
<td>53</td>
<td>100.0</td>
<td>53</td>
<td>100.0</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Harvest</td>
<td></td>
<td>53</td>
<td>100.0</td>
<td>49</td>
<td>92.4</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Average</td>
<td></td>
<td>50.6</td>
<td>95.4</td>
<td>37.8</td>
<td>71.3</td>
<td>53</td>
<td>100.0</td>
</tr>
</tbody>
</table>
Land Ownership. Information on patterns of land tenure was difficult to obtain. Male and female farmers did not readily volunteer information on this subject. Men and women reported that good farmland was not easy to come by. Husbands complained about the shortage of good farmland to provide for their wives. Therefore, in polygamous households, women often borrowed land from other men in the village (Table 9).

Table 9. Land tenure patterns of female alley farmer

<table>
<thead>
<tr>
<th>Source of land</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Husband</td>
<td>28</td>
<td>52.8</td>
</tr>
<tr>
<td>Family</td>
<td>6</td>
<td>11.3</td>
</tr>
<tr>
<td>Rented</td>
<td>23</td>
<td>43.4</td>
</tr>
<tr>
<td>Village chief</td>
<td>2</td>
<td>3.7</td>
</tr>
<tr>
<td>Free hold title</td>
<td>2</td>
<td>3.7</td>
</tr>
</tbody>
</table>

Successful alley farming requires access to land, the most basic resource for production. Nigerian societies are patriarchal; men own land and ownership is passed down through male family members. The literature on alley farming and agroforestry in general commonly cites land tenure constraints as primary reasons that female farmers are not adopters. Women have been poorly represented in almost all agricultural projects, and projects in alley farming are no exception.

Land tenure issues were not examined and potential problems were not initially addressed in the planning of IITA's and ILCA's alley farming projects. The investigator discovered that the project planners assumed land tenure patterns identical to those found in Europe or the United States. In southwestern Nigeria, women have usufruct rights. Women, as wives or daughters of land-holding families, are entitled to enough land to feed themselves and their children.
Famoriyo (1980, p. 123) said that, "Under the Nigerian customary tenure systems, an individual's interest in land endures perpetually so long as the land is used for agricultural purposes. As for a customary tenant, continued tenancy depends upon the payment of annual tribute (called isakole in Yoruba) which is usually a small portion of the farmer's total output." Parsons (1970) noted that a profound factor influencing African customary tenure systems is the consequence of adapting introduced elements with other elements that are crucial in developing agriculture. Undermining local realities with Western attitudes of land tenure could alter relationships between genders and communities that could produce politically explosive situations.

Cashman (1985, 1986, 1990), Rocheleau (1987), Davidson (1988), and others have described how the packaging agricultural technologies can dramatically transform women's relation to land. Cashman (1985, 1986, 1990) stated that alley farming outreach programs could seriously erode Yoruba women's rights to land, intentionally or unintentionally. This technology can further marginalize or greatly enhance women's position in agriculture.

Cashman (1990, p. 31) addressed part of the land tenure issue with a male farmer. The farmer highlighted negative potentials when he said, "We are all so unsure of the outcome of this technique. To this day we see nothing; we don't understand. Men also fear releasing power to women who plant the 'livestock feed' <alley farming> because tree crops, for example cocoa, are for men." Uncertainties were addressed by explaining "the technology is like a 'fertilizer bush' which, like commercial fertilizer, provides no direct economic value, but increases the productive capacity of the land. After all," she said, "women can use as much fertilizer as they want, can't they?" "Oh yes!" His answer highlights a positive potential. "This 'fertilizer bush' would be good for both owners and women because women
pay for farmland in kind (isakole) or according to how much produce they harvest. If they plant the tree and use it as fertilizer, that will increase the owner's profit too."

**Concerns and Innovation Use**

As a farmer progressed from exploration, to trial, to integrating alley farming into her daily routine, she had to acquire new knowledge and learn new skills. In attempting to advance her skill in alley farming, she experienced problems, frustrations, and knowledge voids. She encountered various conflicts between her socio-cultural milieu and her alley farm. From initially "checking out" the innovation to subsequent knowledge and skills needed to manage the farm, she encountered problems or "concerns." The progression of concerns was categorized as expressions most frequently stated by farmers. Women's progression of concerns paralleled the alley farm levels of use. For example, the intensity of task and impact concerns were less than that of self-oriented concerns. As a farmer's early, intense self-related questions were resolved, she became more adept at using the alley farm, at this point her task and impact concerns increased.

The responses of female adopters can be interpreted from the concern scale. Many women, who have never heard of alley farming (stage 0), were interested in learning about it. Nonusers, who knew about alley farming, often had personal and informational concerns. For example, Table 10 data indicate that all women canvassed in the ILCA site were aware of alley farming, primarily for animal fodder. At a village meeting a woman with management concerns said that "although it sounds useful, the trees grow so much that they take some of our land. We can't spare the space just to grow food for a few animals." Their prior knowledge intensified the concerns of women in the ILCA site; still 31% of them wanted to plant the 'fertilizer bush.'
Table 10. Concerns of female nonadopters towards alley farming in derived savanna site

<table>
<thead>
<tr>
<th>Stage of Concern</th>
<th>Number of respondents</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 --no concern</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>1--informational concerns</td>
<td>29</td>
<td>40</td>
</tr>
<tr>
<td>2--personal concerns</td>
<td>42</td>
<td>57</td>
</tr>
<tr>
<td>3--management concerns</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>4--consequence</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>5--collaborating</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>6--refocusing</td>
<td>--</td>
<td>--</td>
</tr>
</tbody>
</table>

Note: Typical responses included:

Stage 1--Informational concerns
If we have no livestock, what do we need livestock feed for?
We do not need to plant because our neighbor provides us with enough cuttings from his farm to meet our livestock needs.
All we plant is cassava and we have been told that we must plant maize in an alley farm.
What if our soil is not good enough for maize?
Only our husbands know about alley farming so we continue to farm as before.

Stage 2--Personal concerns
After we plant the trees, won't ILCA come later to take our land?
Only our husbands can plant alley farms because ILCA agents stress land ownership.

Stage 3--Management concerns
There is no problem in planting the trees for alley farming but they take more space on the land and we don't see any benefit. It is this simple reason that keeps us from planting.

Interested nonusers were more prevalent within the ILCA site; many women in the IITA sites resisted alley-farming. The women, represented in Table 11, expressed Stage 2 concerns about their personal positions and well-being. Personal concerns seemed to take precedence over any interest in learning more about alley farming.
Table 11. Nonadopters concerns towards alley farming in transition and forest sites

<table>
<thead>
<tr>
<th>Stage of Concern</th>
<th>Number of respondents</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 — no concern</td>
<td>50</td>
<td>44</td>
</tr>
<tr>
<td>1—informational concerns</td>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td>2—personal concerns</td>
<td>39</td>
<td>35</td>
</tr>
<tr>
<td>3—management concerns</td>
<td>17</td>
<td>15</td>
</tr>
<tr>
<td>4—consequence</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>5—collaborating</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>6—refocusing</td>
<td>--</td>
<td>--</td>
</tr>
</tbody>
</table>

Note: Typical responses included:

Stage 0—Awareness
I do not use the technique, so why should I be concerned?

Stage 1—Information concerns
IITA agents say it can only be tried on good land.
We don't know how to use the system or how to manage it. It is IITA's product that
must be planted by IITA agents on men's farms.

Stage 2—Personal concerns
I have wanted to plant very much. Can you bring me the seeds very quietly?
We fear the white people will grab our land.

Stage 3—Management concerns
Seeding during fallow causes big weed problem with Leucaena.
After seeing others plant and fail, why try?

Users tended to have greater concerns at Stage 1 (informational) and Stage 3
(management). Female alley farmers who expressed management concerns were anxious
about time, logistics, or other managerial problems.
Table 12. Female adopters' concerns towards alley farming in derived savanna site

<table>
<thead>
<tr>
<th>Stage</th>
<th>Highest Concern</th>
<th>%</th>
<th>Second Highest</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Awareness---0</td>
<td>1</td>
<td>3</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Information--1</td>
<td>21</td>
<td>58</td>
<td>5</td>
<td>14</td>
</tr>
<tr>
<td>Personal--2</td>
<td>8</td>
<td>22</td>
<td>9</td>
<td>25</td>
</tr>
<tr>
<td>Management--3</td>
<td>3</td>
<td>8</td>
<td>5</td>
<td>14</td>
</tr>
<tr>
<td>Consequence--4</td>
<td>3</td>
<td>8</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Collaboration--5</td>
<td>--</td>
<td></td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Refocusing--6</td>
<td>--</td>
<td>--</td>
<td>2</td>
<td>5</td>
</tr>
</tbody>
</table>

These women also expressed other, less intense concerns. Secondary concerns are listed with major concerns. More than 50% of the women reported abandoning their alley farms because of managerial concerns—insufficient 'how to' information (Tables 12 and 13).

Table 13. Female adopters' concerns towards alley farming in transitional and forest sites

<table>
<thead>
<tr>
<th>Stage</th>
<th>Highest Concern</th>
<th>%</th>
<th>Second Highest</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Awareness--0</td>
<td>1</td>
<td>6</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Information--1</td>
<td>3</td>
<td>17</td>
<td>2</td>
<td>12</td>
</tr>
<tr>
<td>Personal--2</td>
<td>9</td>
<td>53</td>
<td>5</td>
<td>29</td>
</tr>
<tr>
<td>Management--3</td>
<td>4</td>
<td>24</td>
<td>3</td>
<td>17</td>
</tr>
<tr>
<td>Consequence--4</td>
<td>--</td>
<td></td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Collaboration--5</td>
<td>--</td>
<td></td>
<td>--</td>
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</tr>
<tr>
<td>Refocusing--6</td>
<td>--</td>
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</tbody>
</table>
Regardless of the concerns female alley farmers had, almost all wanted additional information. The few women with Stage 6 concerns indicated other ideas about alley farming and were interested in at least trying them. The women with re-invention concerns had ideas about drastically altering the innovation from the form intended by IITA or ILCA. Suggestions or ideas included:

- A value should be found for the seeds, then there will not be the problem of having the pods explode, go to seed, and cause all the weed problems.
- We should not make farmers plant in straight rows if they don't want to. Rather we should let them experiment as they see fit.
- We spend the most money to hire labor for ridging or making new heaps, then the straight alley-crop rows go right over heaps we have made.

Determining whether pruning was practiced was essential to interpreting results. Knowing the use level of each alley farming woman helped avoid making false assumptions and misleading interpretations. ILCA and IITA reported the number of farmers who initially planted alley farms (Chew, 1989). Francis (1987), Harrison (1987), Chew (1989), and others took number of alley farming adopters in on-farm-research (OFR) sites were on faith, rather than systematically documenting them. When a farmer planted an alley farm, OFR scientists assumed she or he maintained it. Ezeribe and Palada (1988) were surprised at the less than optimistic results from their on-farm alley cropping trials. When the innovation was not used correctly, scientists as well as farmers are disappointed in the results. The promised continuous cropping was not realized because prunings were not used effectively.

Information about how prunings were used explained poor results. Alley farming is not a bipolar use/nonuse phenomenon. Only 12 of the 53 women who participated in ILCA and IITA OFR alley-farming trials continued the practice at various levels (Table 14).
Table 14. Level of alley farm use by female adopters in the derived savanna compared with the transitional and forest sites

<table>
<thead>
<tr>
<th>Level of use</th>
<th>Derived savanna</th>
<th>Transitional and forest sites</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number of respondents</td>
<td>Number of respondents</td>
</tr>
<tr>
<td>Nonadopter--0</td>
<td>29</td>
<td>12</td>
</tr>
<tr>
<td>Orientation--1</td>
<td>3</td>
<td>--</td>
</tr>
<tr>
<td>Preparation--2</td>
<td>1</td>
<td>--</td>
</tr>
<tr>
<td>Mechanical--3</td>
<td>1</td>
<td>--</td>
</tr>
<tr>
<td>Routine--4</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Refinement--5</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Integration--6</td>
<td>--</td>
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</tr>
</tbody>
</table>

Assuming that alley farming and its treatment levels (fodder, green manure, etc.), once established, are sustained has greatly increased the occurrence of spurious reports. The stage of women's, as well as men's, concerns and the use levels that their farms exhibit appear to be highly important to understanding and enhancing adoption of alley farming.

Summary

Female adopters' mean age was 40 years, with 77% aged from 25 to 54. Nearly 70% of the alley-farming women were married, with more than half in polygamous households; about 30% did not have husbands (single, 4.1%; widowed, 20.8%; and divorced, 5.5%). One-third of this group had 3-4 children, 20% had 1-2 children, 24% had 5-6 children. More than 90% of the female adopters had no formal education. Fifty-three of the women had been farming, independent of spouses, from 3 1/2 to 12 years; all reported farming to alleviate family financial pressures. All the women reported a small margin over subsistence which
was marketed. This surplus was not planned for market and was achieved within the limits of labor availability particular to each woman.

Half the female adopters (including the 20% widowed) planted alley farms on their husband's land; 43% had alley farms on rented land, and 7% planted on land given to them by their fathers or mothers. Farmers, male or female, did not like to divulge how much land they cultivated, but rough estimates were made according to the amount of money women reported spending on ridging and heaping. Male farm labor was paid according to the area cultivated. Female farm labor was paid per day. Women farmed two to five farm plots that total less than 1/4 hectare to no more than 1/2 hectare. Most women thought they had sufficient access to land, although many complained about the quality. Although they feared that their land would be "snatched" by outsiders, all adopters and nonadopters agreed that ownership had little bearing on decisions to try alley farming.

More than 90% (110) of the men who planted alley farms between 1984-87 in ILCA's and IITA's OFR projects were interviewed in 1988, and their alley farms were assessed; 22% of the 110 male adopters and 23% of the 53 female farmers had maintained their alley farms.
CHAPTER V. DISCUSSION

Introduction

The purpose of this study was to use a grounded theory approach to study rural Yoruba women in southwestern Nigeria exposed to an agroforestry technology, alley farming. A theory of agricultural change was developed to provide a framework for alley farming outreach. The theory describes the process through which farming women become aware of alley farming, adopt it, reject it, or modify the system, and then institutionalize it, discontinue the practice, and/or relay their experience to their colleagues.

The objectives of the study were to:

1) identify sociocultural and gender variables influencing alley farming adoption;
2) compare the ideas and experiences of adopters and nonadopters of the alley farming;
3) identify what induced farmers to accept and maintain the practice of alley farming;
4) assess the number of successful male and female farmers who have adopted and continue to use alley farming; and
5) develop methods that incorporate gender issues to assist change facilitators involved in alley farming outreach.

Sociocultural and gender variables influencing adoption are discussed in the first section. Ideas and experiences of adopters and nonadopters are discussed in the second section. Variations in approach, the third section, highlight what induced farmers to accept and maintain the practice of alley farming. The fourth section addresses external conditions influencing the process of adoption and continued use. Finally, a grounded
theory is presented, including methods that incorporate gender issues to assist change facilitators involved in alley farming outreach.

Using Past Research as Rhetoric

Two sociocultural and gender variables that directly influenced the adoption of alley farming were perceptions of women's role in agriculture and land tenure assumptions. The typical procedure that is followed in social science research on the Yoruba in Nigeria includes a consultation of pertinent literature. However, deficiencies, resulting from the application of two commonly accepted theoretical approaches, pervade investigations of rural Yoruba women.

Many studies on alley farming referenced literature documenting Yoruba men's and women's work over time, their relative value in society, their access to production resources, and their complementarity in the broader economic system according to the division of labor by sex theory. The body of social science research on the Yoruba consistently referenced: Galletti, Baldwin, and Dina, *Nigerian Cocoa Farmers* (1956); Gusten, *Studies in the Staple Food Economy of Western Nigeria* (1968); and Upton, *Agriculture in Southwestern Nigeria* (1967). These studies were used to design data collection instruments for further research.

Recent studies referring to the division of labor by sex in southern Nigeria, where men were said to farm and women trade, were closely examined because the results did not coincide with the findings in this study. The major rationale given for each research endeavor was basically an extension of previous research.

As described within the first premise of Chapter 2, Yoruba women, well known for their trading activities, assisted their husbands during certain stages of farming. Complementary relationships of this nature gave rise to the division of labor by sex theory. Gender-restructuring brought about by modernization has had an adverse effect on women's
traditional trading activities in Nigeria. Today rural Yoruba women are actively farming on their own account. Galletti et al. (1956), Gusten (1968), and Upton (1967) are treated as seminal literature on the Yoruba and have been used to validate flawed research. As a result, research conducted in southern Nigeria (Guyer, 1980; Okali and Cassidy, 1985; and Francis, 1985) yielded information that appeared objective simply because it was consistent with these earlier studies.

Social science studies conducted in the three on-farm-research (OFR) sites referenced the previous three studies, most consistently. These studies were used to rationalize assumptions surrounding the division of labor by sex and explain low project participation by women. The purpose of past research was a given specific or unique meaning in subsequent publications on rural Yoruba women. Guyer (1980) identified herself as a product, or next step, emerging from earlier studies. Guyer (1980, p. 356) illustrated this tactic when she said that her research "...was to test and build on the varied and theoretical propositions that have been advanced about the determinants of the sexual division of labor" among the Yoruba. Illich (1982) identified Guyer as a seminal paper in terms of sexual division of labor. And again, a few years later Okali and Cassidy (1985) and Francis (1987) described themselves as logical next steps emanating from these previous studies.

Scholarly articles on Yoruba women's role in farming used past literature to create a tradition external to themselves, not only to validate the design of their research, but their results. Gephart (1986) gave this practice a general label, "next-stepping." Past studies are transformed into resources or reasons to explain present research efforts. Resulting data were arbitrarily transformed to fit a preferred theory.

Francis' (1987, pp. 175-177) study on "Land tenure systems and the adoption of alley farming in southern Nigeria" contained this error. He used figures derived from Okali and Cassidy (1985), which stated that only seven percent of the women in ILCA's project site...
farmed independent of their husbands. Francis used the data with Galletti et al. (1956), Upton (1967), and Gusten (1968) to support ILCA's exclusion of women in their OFR outreach. He concluded that "...customary occupational roles and the prevailing structure of economic opportunity ...as such explain the low participation of women."

Ezeribe and Palada (1988) associated the low participation of women and the less than significant results of some alley farming trials with land tenure. Studies such as Chew's (1989, p. 26) provide justification for this bias, "projects have simply avoided land tenure problems by limiting project coverage to farmers," mostly men, "who have title to their land." Cashman (1985), Rocheleau (1987), Davidson (1988), and others have documented how African women's traditional rights to use land for farming have been largely ignored in agroforestry projects.

Most sociocultural studies conducted within the IITA and ILCA project sites have taken pre-existing explanations of the Yoruba for granted, obscuring their failure to investigate the changed reality. In this way, social scientists hand down cliches, such as division of labor by sex or Euro-American land tenure assumptions, learned from existing resources, to future social scientists. Errors are perpetuated.

**Land Tenure, Gender, and Ad Hoc Features of Measurement Theory**

As Francis and Atta Krah (1987) found, measurement discussions in studies on Yoruba women did not discuss or justify the omission of how subjects interpret items on a questionnaire. The sexual division of labor theory in literature on rural Yoruba women was an ad hoc resource that failed to describe social and interpretive aspects inherent in measurement activities and practices. An analysis of studies on women and alley farming indicates how the strategy of next-stepping was preserved. Measurement concepts were selectively employed and interpreted in ways that justified or supported prevailing theory on division of labor by sex and Euro-American assumptions about land tenure.
Francis and Atta Krah (1987) noted that previous studies reported that few rural Yoruba women in southwestern Nigeria considered themselves farmers. But the findings in this study indicate that the actual figure was much higher. Other studies have reported difficulties in the transfer of the alley farming technology because the planting of trees is problematic for tenant farmers, especially women. But land ownership did not surface as a major concern during the interviews with women. Francis and Atta Krah (1987) noted discrepancies between Cashman's findings and similar studies done in the same area. Upon closer examination of her research they concluded that it was men, who dominated the OFR team, who contacted farming men in the villages. In fact they found that neither women's involvement in trading nor land tenure restrictions had anything to do with their low profile in alley farming research.

Literature on the sexual division of labor and land tenure in Yorubaland were ad hoc resources that failed to describe the local reality. There appeared to be sociocultural and interpretive assumptions inherent in Western-based measurement activities and practices. Meanings were assumed by outsiders; as a result Yoruba women's real meanings were consigned to nonexistence.

Chalmers (1978, p. 27) convincingly points out that contrary to the belief of the purity of empiricism, that "theory often precedes observation." He described how theory plays a substantial role in determining what the observer sees. Characterizing gender by the sexual division of labor has contributed to women's low participation in alley farming outreach. Likewise, Euro-American notions of land ownership have disrupted customary practices of land tenure that ensured women's rights to use land for agricultural production. Yoruba women are able to gain access to land for farming, but their limited access to other resources, such as technological innovation, can undoubtedly inhibit production.
The Dual Dimension of Knowledge Systems

The ideas and experiences of men and women are different; indigenous knowledge of the Yoruba can be characterized by this duality. To explain some of the evidence he encountered in anthropological studies, Edwin Ardener (1975) used "dominant" and "muted." Perceiving a masculine bias in the rules for encoding knowledge in anthropology, he directed his initial efforts to describing the silence/absence of women. He asked why women, who theoretically comprised at least half of a social scientist's sample, did not command at least half the attention. He showed how the exclusion of women has resulted in their becoming relatively invisible. Ardener was extremely critical of researchers who, without reference to half the population, claimed to have cracked the code of a community. "The fact is," Shirley Ardener stated, "no one could come back from a study of another culture, having talked only to women about men, without professional comment and some self-doubt." But "the reverse... happens constantly" (1975, p. 3).

The Ardeners (1975) stated that the models (meaning, theories, and knowledge) that exist for understanding other cultures were formulated by males and validated by reference to other males. That is, men made up the meanings for those societies and checked with other men to see if the meanings were accurate. Defining reality, being the prerogative of men, made them the dominant group. The problem, as Edwin Ardener put it, was to find some means of access for the locked out women.

In OFR research, Yoruba women formed the muted group. Excluded from formulating and validating meanings in relation to alley farming, rural women were denied the means of expressing themselves. The role gender played in the formulating of meaning surrounding alley farming corresponds with Ardener's views. Again, Francis and Atta Krah (1987) admitted that it was the exclusion of women at all levels of OFR that led to female farmers' marginalization.
A woman reluctant to participate in alley farming or one that does not sustain the practice, for whatever reason, masks her fears and fabricates a reason for not practicing alley farming. She takes her lead from the inquirer, saying it is because she does not own the land or even that she does not farm. Such fabrications become accepted as facts by culturally ignorant outsiders, as shown in refereed research papers such as Francis (1985, 1987) and Okali and Cassidy (1985) to cite only a few. This literature is often regarded as gospel once published or as indicated in the last section, used as a next step to validate further flawed research. Regardless of a female farmer's private feelings (suspicion, anxiousness, or irritation), she receives the visitors well, and nervously responds in ways she hopes will avoid penalties.

Historically, whose hands Nigerian land fell into was vague because of the practice of shifting cultivation. During colonization tree production increased the importance of inheritance for men by extending men's role in cultivation. It created a form of permanent occupation of land with land ownership rights vested in men. As a result, women have been largely excluded from the production of forms of thought, images, and symbols for expressing and ordering any innovation involving trees.

Exclusion from the production of meaning creates what Smith (1978) called a "circle effect. Men attend to and treat as significant only what other men say," she explained. "The circle of men whose writing and talk was significant to each other extends backwards in time as far as our records reach. What men were doing was relevant to men, was written by men about men for men" (p. 281).

A common complaint encountered during this fieldwork was that suggestions by women at village gatherings were not "taken up." When men make the same suggestions, sometimes only minutes later, they are treated seriously. One woman said:
I ask myself if it's because I'm a woman. Maybe it's being a woman that disqualifies me, so they don't hear what I have to say. But a man can come up with the same idea five minutes later. Everybody listens and says 'this man is a thinker.' Now has he stolen my idea or has he even heard it? When I complained, well, there wasn't any response, like nothing ever happened when I said it. Didn't anyone hear me the first time or didn't it count? Does it have to come from a man for others to listen?

In the presence of men, women must give way. In mixed-sex talk, village women were a muted group, unable to develop their topics in a manner consistent with their own experience. Another female participant said, "There is no need to argue about whether the problems we felt were real when the men are not present."

Promoting symbols with a masculine slant supports the visibility and primacy of males. "We learn to see the male as worthier, as a superior sex, and we divide and organize the world along these lines" (Spender, 1985, p. 212). Female alley farmers had the impression that their participation in alley farming was not important. They saw themselves as neither represented nor included when farming systems specialists explained the technology. During the investigation of Cashman's (1985) research, Francis and Atta Krah (1987) came to a similar conclusion.

When asked how alley farming was explained to them and what they thought of it Yoruba men thought the technology was meant for them as a means of increasing productivity. The women cited many reasons why they thought the innovation was not for women, particularly that "trees are a man's crop." In addition, men took up the technology because the presentation process involved them; women were reluctant to plant because the process excluded them. Women did not feel their involvement was important. The emphasis on men led women to deny their heavy involvement in own-account farming for fear that their land would be confiscated.

Differences in perceptions of the same presentation created differences in the local knowledge system. This dual dimension reflects features of the Ardener model of dominant/muted groups. The model can be used to understand the subtle effects occurring
when development personnel construct presentations to transfer knowledge. The mismatch between the technology that women visualized and the surface structure that scientists intended to portray caused female farmers to avoid planting alley farms.

The dominant group, having recognized the features of knowledge, did not need to modify their understanding; they did not encounter female symbols. The muted group, farming women, had to determine whether they were included in the project or not. There were women able to look beyond the masculine explanations to examine the alley farming technology, but the "tree factor" made their participation problematic. In essence, what the dominant group can take for granted was problematic to the muted group.

How does one convey the sensitivity of this problem to OFR scientists or field technicians? The inquiry, "Are you including women in your discussion?" is treated as unreasonable. On many occasions a patronizing answer was received, "Of course I mean women as well when I say men. Everyone knows that 'man' is used generically to include woman." Everyone might be told that the term man embraces the term woman, but, everyone does not operate under that rule.

Using Indigenous Meanings in Development Language

To live in the world, we must name it. Names are essential in constructing reality (Brouwer and de Haan, 1987). By assigning names, we impose a pattern and a meaning that allows us to manipulate the world (Goonatilake, 1984). In evaluating the transfer of the alley farming technology, women's reluctance to plant trees was identified: tree crops are a male domain. Another problem was that no equivalent existed in the local Yoruba dialect for the word "alley."

Names are human products, according to Brouwer and de Haan (1987), and as such they are the outcome of a particular world view; there is no one-to-one correspondence between languages. Professionals realize that they depend on names, but they are mistaken
if they do not appreciate that names are imperfect representations and are often misleading. That is, perhaps, a major reason why people are not led to the same view of the world or universe by the same physical evidence. The alley farming case is an example; naming is not a neutral or random process.

Names that cannot draw on past experiences are meaningless (Brandner & Strauss, 1958). However, new names that systematically link with established meanings are sometimes locked into existing discrepancies in the knowledge system concerned. In developing the alley farming technology, scientists selected a name that reinforced a bias that excluded women. An assumed monodimensional reality perpetuated the absence of women in alley farming projects, giving male farmers the right to use the innovation. Such mistakes can be avoided by conscious efforts to identify meanings that are generated, encoded, and legitimized by women, as well as men.

Variations in Approach

All fifteen scientists involved in OFR with alley farming said that farmer involvement is a necessary element in research. But differences in the level of farmer participation existed between IITA's and ILCA's OFR projects. ILCA stressed having farmers plant and maintain their alley farms. IITA, on the other hand, provided station inputs and labor to plant and maintain the alley farms. Perhaps IITA felt it needed such controls to secure agronomic data and statistically significant results. ILCA adopters could plant alley farms of any size; IITA participants could not.

IITA alley farms, as the only female technician put it, "...should be researcher managed for at least 2 years on each farm, for a good establishment. If they plant it themselves, they will make a mess of it; we must show them how to do it properly." IITA alley farming participants must meet the farm-size requirement; agree to plant oil palm,
plantain, or banana trees (prohibitive for women); and be willing to follow other restrictions put on the trial.

ILCA site villagers seemed more aware than IITA villagers of alley farming or at least more willing to express their knowledge. Contrasts between the institutes' approaches to off-station research was useful in determining initial project success. ILCA reported more than 200 alley farming men and women, who planted and maintained their farms. In 1988 no such evidence or confirmation of spontaneous adoption was found. Each institute lacked what the other had gained. IITA had few farmers willing to participate in its alley farm trials, but tight controls produce meaningful agronomic data. ILCA had induced many people to plant alley farms on the technology's own merit, but could not secure 'scientific' data from its farmer-managed trials. The biggest problem for both institutes was farmers not sustaining the practice as their own.

ILCA and IITA OFR scientists view adoption of alley farming as an event. A clear point of integrating alley farming into the lifestyle of any farmer was rarely discernible. Adopters in the IITA sites did not fare well after external support lapsed; most discontinued the practice. A few IITA farmers tried alley farming "to get to improved seed varieties and other capital inputs." They regularly discontinued after such support was stopped. Obviously, a committed social network that can sustain alley farming when project support lapses was missing.

Conditions Influencing the Process

Several conditions in the ILCA and IITA OFR projects accounted for the uniform discontinuance and the variation in numbers of farmers initially trying alley farming. Flexibility in organizational control of the ILCA OFR program encouraged individual decisions and interactions among innovators. ILCA recognized that valid agronomic data
were not possible. Instead they used numbers of farmers adopting as an indication of success. In contrast, IITA OFR projects inadvertently undercut alley farming projects by demanding tight control to gather scientific data. Project controls forced field staff to avoid involving farmers in the adoption process, which reduced the likelihood that they would continue alley farming.

The few successful alley farms tended to be along desirable roadside land in the ILCA and IITA sites. Chambers (1983) popularized the development bias he calls 'rural tourism.' The better the road, the more attention and assistance farmers receive from field staff, and the more likely visitors are brought to see the alley farms and be misled about an innovation's success. Few successful alley farms were off the 'beaten path.' Services near main roads are better staffed; most such farms are men's.

The Adoption Agent

Expert alley farmers are not born; they are made, and change agents should play primary roles in the farmers' process of becoming experts. Change agents as well as farmers need assistance in developing the skills necessary for alley farming. None of the fifteen field agents received any training specifically designed for them. All felt that they needed more training or 'tools' to deal effectively with the affective and behavioral dimensions that alley farming evokes when undergoing the adoption process. They hold the potential to transform data about alley farmers' needs and uses into action plans that resolve the concerns they have. Sensitivity towards farming women, even of male change agents, can be vastly augmented by the uses and concerns scales, which provide strong clues to necessary interventions.

When alley farming has been introduced by project personnel, details of the technology are well understood. Details of the sociocultural context have been less understood. These details can be labeled as problems of merit and worth. Merit refers to the intrinsic logic of
the technology. Worth refers to the applicability or fit to the situation. Change agents must
have a good understanding of the merit, or hardware, of alley farming and the worth, or
software, for successful extension programming. The technical concepts of alley farming
can be applied in many different contexts other than the research station in which it was
developed. Sociocultural contexts are very factual. Briefly, concepts are transferrable,
whereas facts rarely are.

The Theory

As the adoption process unfolded, farmers' concerns were resolved, and use of the alley
farming system progressed. Concern stages were determined by talking with alley farmers
and analyzing what worried them, the problems they reported, the information or help they
requested, and what pleased them.

A farmer may have simultaneously expressed different levels of concerns and use
associated with different facets of alley farming. For example, the ILCA site adopters were
often at a late stage of concern about pruning for animal fodder and at an earlier stage
(awareness) about prunings for green manure.

If adoption was progressing satisfactorily, each level of use should have had a
congruent concern stage. In the more dynamic ILCA site, farmers' concerns ran ahead of
use, and most nonadopters were aware of alley farms. But in both IITA sites, use preceded
concerns. However many women and men at those sites hid intense personal concerns by
reporting that they "knew nothing about alley farming." Most of the labor required by the
innovation was done by IITA field staff, so adopters were "witnessing" more than
"practicing" alley farming and had little knowledge of its function. One field agent offered
that, "Planting alleys for farmers means that you are forcing the method and rendering
them useless; they rely on you. Farmers will never use their initiative or attempt to plant on their own."

The relationship between concerns and use demonstrates the potential for dramatically decreasing the time required to complete the adoption process. It may also prevent the adoption process from aborting—the norm in all three OFR sites. A stage of concern carries an indicator for action needed to resolve the concern. A user may have reached a mature level of use, then reverted to early concerns as IITA pulls out when, theoretically, the innovation should have become integrated. When IITA agents plant, establish, and maintain farmers' alley plots, then try to hand those responsibilities to farmers, farmers abort the project and revert to traditional practices. Intense personal concerns must be reduced before such farmers can view alley farming objectively.

*Individual Concerns with Innovations*

Farmers' concerns include feelings and thoughts, or stages of concern (SoC), experienced when exposed to alley farming. The concern stages range from lack of concern, to initial concerns about "self," to concerns about "task," and finally "impact." All those involved, farmers, extension agents, scientists, and administrators, have different sets of concerns about alley farming.

*Assessment Procedures*

A practical procedure for adoption facilitators starts with informal interviews. During personal interviews facilitators try to identify farmers' concerns, feelings, and worries about alley farming. More probing may further clarify intense concerns.

*Benefits of Identifying Stages of Concern* Learning the initial components of the desired behavior, for example, planting, pruning, and mulching on an alley farm, differs widely from maintaining the behavior as a habit. Alley farming projects thus far have had
high attrition between initial learning stages during establishment and when the innovation's necessary management became routine.

Field assessment revealed a range of attitudes, feelings, and reactions to the management techniques associated with alley farming. High rates of abandonment stemmed from intense informational and personal concerns. Diagnosis and intervention, using a concerns-based approach, encouraged many to re-establish alley farms.

**Behavior Development**

Farmers implement, access, and practice or use the alley farming system in a number of ways. The level of use (LoU) dimension examines ways to evaluate changes as a farmer becomes more familiar and skillful with the new practice. There are six levels of use characterizing the mastery of alley farming skill. From no idea about using an innovation, a novice proceeds to orientation, preparation, and then reaches a mechanical level of use. Practice and support are essential before the practice becomes routine.

**Assessment Procedures**

A checklist describing levels of use (LoU) can document the parts of the system that are being used. The checklist can indicate ideal, acceptable, and unacceptable variations of the system. Information gathered with the checklist can tell the facilitator what is necessary to adjust the program to fit the individual, and show where help is needed to move a farmer toward routine adoption. This can only be determined by personal visits to farms.

Alley farming can be made operational in different ways by different farmers. How does this happen? As an alley farm is used by different farmers, the innovation is adapted; the changes may be slight or very large, but they are likely to be adapted to fit the needs and context of each farmer. Alley farming can be defined in terms of its parts or components. Delineating components is necessary if change agents and farmers are to understand
expectations for what should happen on their farms. Uses of components vary with each farmer, with some components simply present or absent.

Some of the variations are viewed as acceptable, while others may be inappropriate. Regardless, distinctions must be made between essential and related components. Program developers, change facilitators, and prospective and practicing farmers need to have a clear picture of the operational forms of alley farming.

Change facilitators will find the idea of component variations useful in helping alley farmers establish objectives and relating them to practice. The continuous-cropping component of alley farming requires that farmers' instruction be guided by a particular sequence of objectives, then helped in developing skills to use their farms effectively. And it should be made clear to the farmer that this component variation is important.

Case studies demonstrated that a woman's concerns range from those typical of nonadopters to those of fairly sophisticated users. For a nonuser, concerns about "what alley farming is" and "what it means for me" are relatively intense. As she considers planting the alleys, more personal concerns predominate: "Won't the trees I plant overtake my land?" "Will my land be snatched?" As adoption progresses, management concerns increase: If I lose control of the trees and they go to seed, weeds will infest my farm, then the land owner will be annoyed."

Once the change process is handled effectively and a woman finds alley farming appropriate, consequence concerns dominate, which indicate an experienced alley farmer. This study showed that it takes a great deal of skill by alley farmers and change facilitators to handle concerns and maintain alley farms.
Stage 0. Awareness Concerns. Perhaps the farmer has heard little about alley farming, but perceives that it has no implications for her. Experienced alley farmers may also be relatively unconcerned; the system is no longer viewed as new or as requiring extra thought or energy. The following interventions proved relevant and were used successfully:

a) Acknowledge that concern about alley farming is appropriate;
b) share some information about the system, hoping to arouse some interest in it;
c) tie the innovation to an area that concerns the woman; and
d) encourage the person to talk with others.

To create general awareness among whole communities, a drama entitled "The Fertilizer Bush" was developed to incorporate the above suggestions (Cashman, 1986). The phrase 'fertilizer bush' made the alley farming system appealing, as it conveyed the primary attribute of alley farming and reduced the fear of planting trees. Villagers who could not attend the play and only heard others discuss it, got a general idea of an alley farm's primary attribute. The play addressed a number of concerns, but was used primarily to create a general community awareness.

Stage 1. Information Concerns. Farmers' wanted to learn more about alley farming. "Sounds like the fertilizer bush would be beneficial, but I don't know enough to say much about it." For women with informational concerns, facilitators must provide descriptive information, such as the following.

a) Share general information about alley farming through conversation, the "Fertilizer Bush" presentation;
b) provide more detailed, technical information to students through the school system;
c) contrast what women are doing against what alley farming would entail;
d) provide an opportunity for visit to sites where alley farming is used effectively;
e) express enthusiasm; involve others who are excited about their alley farms; and
f) state realistic expectations about benefits and costs associated with alley farming.
Giving school children alley farming information provides an avenue to households that might otherwise be inaccessible. Among the Yoruba, as in many polygamous societies, a woman's children are a measure of her worth. She wants the best for them so their educational activities are a high priority.

Educating students about alley farming is often less obtrusive and more culturally acceptable. They reduce mis-communications between farmers and change agents of different genders and socio-cultural backgrounds. Students can take home to parents comprehensive information, practical experience, and seed. Having children in school allows women, especially those with informational concerns, which change agents find difficult to address in local dialects, to plant alley farms without "going public."

Stage 2: Personal Concerns. Women with stage 2 concerns perceived alley farming as a personal threat, especially women in the IITA OFR sites. IITA's rigid research controls caused intense personal discomfort and uncertainty. Valid or invalid, the concerns were real. When personal concerns were clearly innovation related, these interventions were useful:

a) Establish rapport and give assurance of personal adequacy;

b) gingerly encourage alley farming; do not push unnecessarily;

c) clarify how alley farming relates to each woman's other priorities;

d) show how an alley farm can be gradually introduced rather than as an all-encompassing leap (set reasonable, easy-to-meet expectations); and

e) provide personal support and assistance through easy access to change facilitators or others; and

f) Legitimize expressions of personal concern and doubt.

When planning for alley farming projects, facilitators need to anticipate targeted farmers' self concerns, then initiate actions to resolve them. Actions not relevant to a farmer's personal concerns increase intensity. One woman, disturbed and annoyed, said
she abandoned her alley farm because she was left on her own to manage such a big and novel task.

You have to approach the situation carefully, she said. Because of some oversights or wrong impressions, men got the power of cocoa trees. So you must approach a tree situation carefully. Let women plant one, two, or three trees every year. They will see the difference in yam planted near the fertilizer bush (she prefers that name to livestock feed) and yam planted where there is no fertilizer bush.

Stage 3. Management Concerns. Inexperienced alley farmers commonly have management concerns. Those still using alley farms often expressed management concerns regarding coordination, logistics, and time consumed by the practice. "It takes all of my time to prune my farm." "The work is too tedious; I have more pressing things to do."

Interventions for farmers with management concerns include:

   a) Acknowledge the appropriateness of management concerns; offer assurance that they can be resolved;

   b) provide answers that easily address small, specific "how-to" issues;

   c) show how alley farming can be coordinated with other aspects of a woman's day, so it is perceived as fitting in, rather than added on;

   d) demonstrate effective use of an alley farm by providing "hands on" experience;

   e) have others share information about successful and unsuccessful practices; and

   f) establish a buddy system.

Interventions should focus on "how-to-do-it." Large-group demonstrations were not effective because voiced concerns were idiosyncratic. At the IITA Ayepe site, the author held an informal session with those who had established alley farms. Farmers more facile in pruning and mulching provided advice to others, and area alley farmers established a support group called "children of the soil" to support and assist each other.
Stage 4. Consequence Concerns. Consequence concerns are the first of the impact concern stages. At this stage, alley farmers become concerned about how the technology is affecting farm production and how to maximize its influence. Typical expressions were:

"I wonder how I can use the tree pods, without pruning during the dry season, so they don't go to seed and cause a big weed problem."

"I increase yields more when I use the prunings from the alleys as mulch during the rainy season and as fodder only during the dry season when livestock feed is scarce."

The few women and men who reached Stage 4 concerns received much attention from ILCA and IITA OFR teams. However, scientists and field staff should not neglect others while attending to farmers with impact concerns. Others need more assistance. Appropriate interventions for farmers with impact concerns included:

a) Encourage and reinforce regularly;

b) advertise the farmer's potential for sharing skills with other alley farmers; and
c) send the farmer to workshops to explain their skills to others or to refine their use.

Stage 5. Collaboration Concerns. It was not farmers with intense Stage 5 concerns, but rather IITA and ILCA scientists, field technicians, and extension agents who expressed collaboration concerns. It is quite difficult for field-based change agents to fulfill their responsibilities; all were concerned over how to work effectively with adopters of alley farming.

As one agent said, "If I were as well briefed and trained on the human aspects of alley farming as I am on the technical requirements, I could do a much better job relating it to farmers." Another technician said, "I have found that working and exchanging ideas and experiences with other technicians increases our influence and understanding of what is happening with alley farmers."

Scientists with stronger stage 5 concerns end up as leaders of the change effort. Specific interventions now focused on collaboration concerns are underway for scientists
involved with alley farming research. ILCA and IITA have established a multi-donor project, 'Alley Farming Network for Tropical Africa,' a collaborative research network between national and regional centers to promote discussion and research on alley farming. Similar interventions crucial to facilitating the adoption process should be designed for field-based adoption agents, including:

a) Meetings of change agents to exchange ideas;

b) opportunities for change agents to circulate more and to work with others who are less knowledgeable;

c) encourage advocacy and promotion of collaboration among farmers verbally and with materials and linkages for collaboration; and

d) bring in an organization-development expert on a regular basis to help develop skills and resources.

ILCA and IITA tend to promote alley farming as a single-product innovation. ILCA promotes prunings for animal fodder and IITA emphasizes prunings for mulch or green manure. Regardless of the benefit highlighted, the 163 alley farmers overwhelmingly indicated they were encouraged to plant in hopes of continuous cropping.

Continuous cropping, a tentative promise for alley farming is, perhaps, the most difficult benefit to secure from the system. But if it is not accomplished, the abandoned 'fertilizer bush' will become trees and will take over—to come under men's influence or areas of slash-and-burn. That would give both alley farming and fertilizer bush negative connotations that could not be overcome. Negative, unpleasant congruence is considered even stronger than positive pleasant congruence. The change agents' role is to help farmers increase confidence and competence in alley farming.

Stage 6. Refocusing and Re-invention Concerns. Alley farming considered adopted is likely to be "adapted." Alley farming is an innovation bundle that has taken on many forms and functions for farmers. Some are only minor modifications, or perhaps even improvements of what the scientist had in mind. Others are such drastic mutations that a
scientist might disclaim any association. Interestingly, field-based change agents and farmers do not always agree with scientists regarding what constitutes an acceptable form of alley farming. The arrangement or configuration of an alley farm can consist of forms the innovation takes as different farmers make it operational.

To ensure that the benefits of alley farming are realized, as well as the component a farmer wants to maximize, a checklist can be drafted to identify the essential components and ways each varies.

Farmers with stage 6 concerns have strong opinions about how to establish and use the alley farming system. A farmer may have an idea about another approach that she thinks would be more effective than one the change agent proposes. "This fertilizer bush will not work best that way. I have another way to plant it that I think will work better."

Farmers with stage 6 concerns are self-starters with established goals. They tend to be extremely creative, divergent, and self directed. The alley farming effort, particularly in IITA's OFR, is often perceived as antagonistic to farmers' opinions and concerns. Yet guidelines must be designed to set limits in which one can deviate from the mainstream and still reap the benefits of the system. The following interventions are useful:

a) Help farmers focus their energy in a productive direction for themselves and others;

b) involve them in the adoption process;

c) encourage individuals to act on their concerns; and

d) provide them with resources and assess other materials that they think may help; encourage them to pilot test the idea to find out if it will succeed.

Data confirming effectiveness are limited to a few instances, but the concepts discussed come from successful experiences with farmers in various stages of the alley farming process.
Summary

Primary constraints that development people thought applied to alley farming were attributed to land tenure. Primary constraints inhibiting women from adopting alley farming were associated with the past experiences of Yoruba farm families.

Development assistance can unknowingly and unwisely exclude sympathetic consideration of alternatives that reflect local views. A grounded theory proposes a series of concepts and processes for identifying and overcoming constraints to accepting and enhancing farmers' use of alley farming. The findings presented in Chapter 4 support a series of propositions including: standard demographic variables do not appear to influence adoption; rather the state of the user system, such as interventions and conditions associated with it appeared more pervasive; interventions and conditions associated with OFR often undermine customary norms beneficial to acceptance; and farmers' concerns have a direct effect on performance.
CHAPTER VI. SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

Alley farming is an ecologically stabilizing process to increase and sustain crop production by replenishing soil nutrients. When farmers regularly prune and mulch nutrient-rich trees planted among their food crops, the trees act as 'fertilizer bushes.' Sustained use rewards alley farmers with the long-term benefits of fertile soil and higher yields. By deferring fallow, farmers can extend their hold on farmland, and increase the variety of crops grown for family consumption and sale. In the short-term, alley farming is an innovation bundle with the immediate, visible benefits of animal fodder, crop staking material, firewood, and mulch for erosion control and moisture retention. But farmers often plant alley farms on land already used for some time without realizing that more depleted soil takes longer to replenish. Most farmers tend to operate in the short-run and 'over-access' the more visible benefits. When the long-term goal is not immediately realized, farmers are disappointed and frustrated and discontinue the practice. Further adoption is constrained.

Three on-farm-research (OFR) alley cropping projects directed by the International Livestock Center for Africa (ILCA) and the International Institute of Tropical Agriculture (IITA) were evaluated. One site was located in a derived savanna, another in a transitional zone, and the last in a forested area of southwest Nigeria. The focus was on women, but the results are applicable to men, and other areas in tropical Africa.

Based on a recognized need for a perspective on women and alley farming, a theoretical framework was developed and tested for enhancing adoption. This framework described and measured the process where farmers become aware of alley farming, then
adopt, reject, or modify it, and then integrate the practice into their farming system, discontinue it, or disseminate it to others.

The concerns based adoption model (CBAM) was adapted from Hall, et al. (1973) and modified according to experiences with farmers exposed to and involved with alley farming. Examples demonstrate how the CBAM provides a diagnosis of farmers' needs, as well as prescriptions for action. If the practice is sustained, farmers should demonstrate successively higher levels of use or expertise. Farmers acquire the expertise to master and sustain the practice with paced interventions designed for seven stages of farmer concern and six levels of alley farm use. Stages of concern focused on feelings toward, and perceptions of, alley farming. Levels of use described the behaviors and actions of farmers with the technology.

The concept of alley farming configurations was also developed because when alley farming was adopted, it was often adapted. A checklist identified practices essential if adopters want to realize, and capitalize on, particular benefits.

Conclusions

Demographic data collected on male and female adopters appeared to have no relationship to adoption. The only apparent indicator of successful alley farming was the proximity of the successful farms to the roadside. Neither gender nor other standard demographic factors differed between adopters and nonadopters.

The most crucial contribution field agents could have made was resisting scientists' personal preferences and making adoption process more interpersonal. This action would put alley farming into a community's socio-cultural context, making it more collective or at least less egocentric.
When alley farming was introduced in a way congruent with local sociocultural circumstances, women and men adopted in equal numbers. In 1988, few adopters were still alley farming. Attrition was almost 80% in all three sites; men and women discontinued in equal proportions. Field personnel felt helpless because they were unable to deal effectively with the complex affective dimensions and behavioral changes this technology presents to farmers. Information from mixed-sex discussions can be enhanced by single-sex consultations that can lead to better understanding of local realities.

Several major factors inhibited and facilitated adoption and diffusion. These factors included the clarification of Yoruba women's role in farming; crucial, but less visible, reasons for specifically targeting women in alley farming outreach; socio-cultural conflicts and congruence factors; undermining local realities by ignoring indigenous land tenure norms which give women usufruct rights to farmland; power exertion from outside the culture; and compromises negotiated through change agents.

We cannot expect farmers, completely naive about alley farming one day, to be expert and sophisticated users the next. Rather, this study established developmental levels indicative of farmers' progress as they became increasingly confident and competent users. Alley farming involves drastic changes for farmers, but the threat of change can be reduced using the CBAM.

Uncertainties and concerns farmers have toward alley farming must be addressed. Hoekstra (1985, p.30) stated emphatically that "Uncertainty about the outcome of alley farming will lead to a lower valuation of benefits than risk because the outcome is more 'unknown.' Addressing uncertainties is of particular importance when introducing a new agroforestry system unknown to farmers." Farmers' uncertainties and concerns must be alleviated before higher level concerns and more impact oriented alley farm use emerges.
Can a theory generated in a specific context be generalized to a larger population? Can a theory of alley farming adoption in an ethnic group be expected to be relevant to farming women in another country? This substantive theory is valid only for the population studied—Yoruba farm women in southern Nigeria. The generalizability of this study's grounded theory can only be established through more verificational fieldwork.

Recommendations and Implications

Farmers and policy-makers alike don't recognize that the changes desired from the alley farming practice take time and expertise! As a result, OFR researchers often try to force the technology on farmers. For change to be successful there needs to be support for research on implementation and continuity to this support.

New information, skills, sensitivities, and techniques are needed to help adopters make the transition from a lifestyle based on shifting cultivation to a new form of production that requires regular and consistent management. For example, new terminologies could be proposed to help change agents establish and sustain technologies by creating names that match indigenous ideas and values acceptable to farm women. To acquire expertise in alley farming, a farmer must change values and attitudes. While farmers change old habits for new ones, they need support, encouragement, and help from facilitators (Cashman, 1985, 1986, 1987). Strategies are needed to raise users' concerns, especially within the IITA sites, to a more mature level in order to lend more relevance to the adoption process. A few key recommendations are offered to those structuring a program to induce change in a farming system or what is, essentially, a lifestyle.

Agricultural educators and extensionists must increase their commitment to and involvement in action oriented, field-based, research if any significant impact on global problems is to be made. One way of increasing our effectiveness in this area is to teach more
rigorously, and thoroughly, the where-with-all of more humanistic research methods, not laden with the cultural-baggage of the U.S. research paradigm.

In addition, educators and extensionists must increase their understanding of their vital role in international agriculture. This can achieved from our home-base, as well as abroad, by increasing our understanding of the land-grant philosophy as it applies to Title XII, its directives, and it use and misuse in other countries. We must accept the responsibility to teach international students skills that they can readily apply to those situations they will face when they return home. This responsibility, especially includes developing an appreciation of one to one work with farmers and a feel for and value of grassroots research.

**Change as a Process, Not an Event**

It cannot be assumed that a farmer who has planted an alley farm (an event) will maintain it as a routine (the behavior). The changes expected from alley farming require time, energy, and resources in various amounts.

**Development Involves Affective and Behavioral Dimensions**

Activities designed to support alley farming require more than technical requirements of seeds, the extension service, and management tools. Facilitators must address adopters' affective needs (Cashman, 1988).

**Systematic Nature of Change**

Research on the adoption and diffusion of alley farming (Cashman, 1985, 1986) illustrates how activities targeted for one purpose induce ripple effects with unanticipated results. Farmers may feel obliged to seriously modify their farming routines to meet the qualifications imposed by a project scientist. As a result, farmers will likely practice alley farming in form (mechanical level of use), not substance, and never assimilate the technique as their own. Many become alienated and withdraw from the program.
"<Alley farming> development projects must initiate a process of spreading and replicating in order to contribute towards rehabilitation and maintenance of land resources on a large scale" (Adelhelm and Kotschi, 1986, p.100). But illusive goals in alley farming research and extension have been those of adoptability and sustainability. Well-conceived designs are essential. Alley farming is not a "socially neutral" technology; there may be unanticipated negative effects, particularly on women and other disadvantaged groups. It is essential to assess the social impact of this technology and design measures to avoid them.

The concerns-based model is capable of integrating research and extension activities because it embodies a strong applied bias. All major actors (scientists, field agents, and farmers) can use it to overcome constraints and avoid problems. A checklist, mentioned in Chapter 5, should be used to diagnose, monitor, facilitate, and evaluate an alley farmer's development effort. Certain steps in the creation of the checklist require interactions of several individuals; developing clarity is essential. Procedures used for developing this checklist and identifying variations in alley farming include the following steps:

Step 1: Identify operational components of an alley farm. Interview the creators of alley farming to develop a tentative list. For example: Describe alley farming. What do farmers do with it? How do change agents extend it? What are the essential components?

Step 2: Identify additional components and variations. This process should include a wide range of individuals who have experienced alley farming so that many variations are noted. Alley farm observation should focus on the process, procedures, roles, and resources used with the innovation.

Step 3: Construct a tentative checklist. This format is based on arranging the variations of each component so that the "ideal" variation and "unacceptable" variations are placed on a continuum. Some farmers vary uses, to the point that they are not productive.
Herrera (1981, p. 27), in a perceptive article on innovation in developing nations, wrote:

...Two essential elements of rural innovation...are the utilization of local knowledge and the participation of the local people in the whole process.

Herrera's advice has long been recognized by the development community. Still Gamser (1988) found that the absence of interaction between foresters and local agriculturalists was the essential obstacle to the successful establishment of afforestation projects. Because of all the considerations in introducing alley farming, Kang and Wilson (1987, p. 239) believed that, "...a group participatory approach appears to be more successful than individual approaches...." But "Central among these prerequisites," said Cernea (1985, p. 209), "is the existence of a unit of social organization and a structure capable of sustaining innovation. ...the penalty for ignoring this is failure. Both practitioners and action-oriented social researchers have to cooperate, search, test, predict, verify, monitor, learn, redesign, and retest." With this in mind, Kang (Sept. 8, 1989, personal communications) suggested "...the use of the adopter questions (Appendix B) and the concerns-based approach model to the Alley Farming Network for Tropical Africa (AFNETA). It is better to have a comprehensive framework and working model for introducing and evaluating this technology."
LITERATURE CITED


APPENDIX A.

GENERAL HOUSEHOLD INFORMATION SURVEY
General Household Information

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<th>Date:</th>
<th>Village</th>
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<th>Name: List household members according to seniority</th>
<th>Male (M)</th>
<th>Female (F)</th>
<th>Position in the household</th>
<th>Individual occupation or enterprise (List all.)</th>
<th>Number of farm plots</th>
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Name of household members who farm. Who owns each farm plot or land? If alley farmer, was it problematic to plant? Who helps on the farm? What labor is provided? Be specific about family and hired labor? What kind of work do they do? Are they reimbursed in kind, money (how much), or not at all?

<table>
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<tr>
<th>Name of household members who farm.</th>
<th>Who owns each farm plot or land? If alley farmer, was it problematic to plant?</th>
<th>Who helps on the farm? What labor is provided? Be specific about family and hired labor?</th>
<th>What kind of work do they do? Are they reimbursed in kind, money (how much), or not at all?</th>
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What enterprises or occupations performed by family members are considered the most important? Can you rank them?

What enterprise contributes the most to the household income? Is this in money? in kind? If farming, what crop is the most valuable?
APPENDIX B.

INTERVIEW QUESTIONS
## Adopter Questions

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<th>Name</th>
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<th>Village</th>
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1. Explain what you know about alley farming?
2. What do you think about alley farming?
3. What do you like and don't like about the alley farming?
4. What do you expect to see happen from alley farming?
5. How did you learn about alley farming? Where did you get the information?
6. How was alley farming explained to you?
7. Where do you go for additional information or help with your alley farm?
8. In the beginning, what encouraged you to try alley farming?
9. How do you use and manage your alley farm? For example, when and how often do you prune? What do you use the prunings for?
10. Have others asked you about alley farming? What do they ask? What do you tell them?
11. Have you or others you know changed your alley farming practices to better suit you farm? How?
12. Do you have any suggestions for us on how to improve alley farming and get more farmers to try it?
13. How big is your alley farm? Have you expanded, or do you plan to expand your alley farm? Why or Why not?
1. How do you explain alley farming to farmers?

2. When you think about your role in alley farming, what concerns and worries do you have?

3. What are your impressions and your personal feelings about the alley farming system?

4. Have you ever been approached by farmers with questions and concerns about alley farming? What do they ask you? What do you tell them?

5. Do you have any suggestions for improving alley farming on-farm-research and outreach?

6. How do you advise farmers on their management and use of their alley farms?

7. Do you know any farmers who have deviated from the suggested recommendations and use of alley farming to better suit their own situation?

8. To your knowledge, have any farmers adopted alley farming on their own? How?

9. What interests female farmers to adopt or try alley farming? What inhibits female farmers from adopting alley farming?

10. Why do you think there is such a big difference between the number of women who adopt alley farming and the number of men who adopt alley farming?

11. Have you ever received any formal training in alley farming on-farm-research? Explain?

12. What do you think about the future development and extension of alley farming in Nigeria?
1. How do you think alley farming should be presented and explained to farmers? Why?

2. What concerns do you have when you think about the future development and diffusion of alley farming in Africa?

3. What are your impressions and feelings about the current status of on-farm-research in alley farming?

4. Do you have any opinions or suggestions for improving the dissemination of alley farming?

5. How do you see your role in alley farming research and development?

6. What are your feelings concerning gender and alley farming?

7. What nationals do you work with on the research, development, and extension of alley farming?
ACKNOWLEDGEMENTS

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