The Journal of International Agricultural and Extension Education is the official refereed publication of the Association for International Agricultural and Extension Education. The purpose is to enhance the research and knowledge base of agricultural and extension education from an international perspective.

Articles intended for publication should focus on international agricultural education and/or international extension education. Articles should relate to current or emerging issues, cite appropriate literature, and draw out implications for international agricultural and extension education. Manuscripts should not have been published or be under consideration for publication by another journal.

Three types of articles are solicited for the Journal - Feature Articles; Commentary Articles; Tools of the Profession Articles.

**Feature Articles**

Feature articles focus on philosophy, current or emerging issues, and the methodology and practical application of specific research and appropriate technologies, which have implications for developed and developing countries. Feature articles go through the Journal's blind review process utilizing peer reviewers to evaluate content and readability. Reviewers are usually selected from the membership of the AIAEE. In the blind review process all reference to author(s) is removed before the manuscript is sent to reviewers.

**Commentary Articles**

Commentary articles state an opinion, offer a challenge, or present a thought-provoking idea on an issue of concern to international agricultural and extension education, including a published article in the Journal. Commentary articles are reviewed by two members of the editorial board for appropriateness and relevance to the Journal, and for readability.

**Tools of the Profession Articles**

Tools of the Profession articles report on specific techniques, materials, books and technologies that can be useful to agricultural and extension educators in a global context and/or in a country/region. Tools of the Profession articles are reviewed by two members of the editorial board for appropriateness and relevance to the Journal, and for readability.

The Journal is distributed in one of three formats: printed copy ($25), computer disk ($15), or email ($10). Subscriptions should be made payable to AIAEE and mailed to Dr. Latif Lighari, Cooperative Extension System, The University of Connecticut, West Hartford Campus, 1800 Asylum Avenue, West Hartford, CT 06117.

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# Journal of International Agricultural and Extension Education

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Spring 1998

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From the Editor

Two years ago, the Journal’s editorial board was expanded to enable a more balanced representation of professional expertise reflecting agricultural and extension education thinking and experience from different regions of the world. New ideas and varied experiences have been brought to bear on the Journal’s editorial and business policies and procedures, and the manuscript review and publication processes. We feel the Journal has been improved as a result of this effort. Continuing this tradition of inclusiveness and to further improve the editorial function, two associate editor positions have been created in the editorial board to oversee the commentary and tools of the profession sections of the Journal during 1998. Jim Long, who has been on the board since January 1996, will be the Associate Editor (Commentary). Cathy Hamilton, who has helped with the Journal for the last two years, will join the board as Associate Editor (Tools of the Profession). Both individuals bring talent, energy, and fresh thinking to invigorate the editorial team. I look forward to working with them. Readers should see the fruits of their labor through the year.

Three issues of volume 5 of the Journal are planned for 1998 - two regular issues in spring and fall, and a special 1998 annual conference issue this summer.

This issue offers several interesting articles. In the Feature Articles section, the first piece by Etling and Radhakrishna is a case study of the way in which a leadership curriculum for nonformal educators evolved, and was taught and received at Penn State University and in Monterrey, Mexico. The authors commend wide adoption of the curriculum to improve the competencies of community-based educators in both the U.S. and Mexico. The next two articles are set in Malaysia. Ahmed and Ismail found that men and women have specific roles in agricultural operations and suggest that extension programs establish objectives, and organize training programs and staffing that take into account the needs of both groups. Muhamad and Teh show how local organizations successfully organized self-sustaining development activities in a Malaysian village and delineate factors facilitating the perpetuation of such groups. Shifting focus to a rice development project in Nigeria, Alonge and Martin found that participation in the Farming Systems Research/Extension approach was the single most powerful predictor of adoption of a rice technology package, and suggest that the approach be strengthened by increasing farmers’ participation. Redmann, Schupp and Richardson round out this section with a study of the international agriculture knowledge of students in a U.S. land grant university.

In the commentary section, Acker and Scanes provide a rationale for globalizing programs in U.S. colleges of agriculture to enhance quality of education and prepare students for an increasingly interdependent world; Karunadasa advocates an agriculture-environmental protection synergy for urban areas of Sri Lanka; Mwangi uses personal experiences in his work in Kenya to show what happens when extension education principles are observed or violated.

Hamilton reviews two companion books from Australia focusing on participative action management strategies in the Tools of the Profession section.
THE EVOLUTION OF A CURRICULUM TO PREPARE NONFORMAL EDUCATORS

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Abstract

Many training programs have been developed in diverse settings to prepare nonformal educators for specific tasks. A comprehensive curriculum for nonformal educators, however, has eluded international educators. This article describes a case study in curriculum development and evaluation which was undertaken in Pennsylvania and Mexico to remedy this gap. A manual was developed, and evaluated by university students and extension agents in Pennsylvania. It was then used to teach similar audiences in Monterrey, Mexico. Evaluations of the curriculum in the classroom and in workshops indicated that the curriculum was well received in these settings. Gaps and weaknesses in the manual were identified. A revised and expanded version of the curriculum was developed which has promise for a variety of nonformal education settings around the world. It has potential for organizations that promote community development, youth development, health education, adult education, and nonformal leadership development.

A comprehensive curriculum to prepare nonformal educators has been a dream of international extension educators for years. Curricula for specific training programs have been developed by the U.S. Peace Corps, by funded projects, and by governmental and non-governmental organizations (Center for International Education, 1982; Coombs, 1974; Etling, 1975; Food and Agriculture Organization, 1978; Hoxeng, 1973; Samanta, 1993). These training programs have often been successful in preparing educators for specific tasks, but they have limited application to other sites. They seldom attempted to develop a comprehensive base curriculum which could be adapted to a variety of settings.

This article describes how such a curriculum evolved as the first author (referred to as Etling hereafter) and his colleagues, all nonformal educators, responded to immediate needs. Not all curricula are developed using Tyler's (1950) classic model of (a) establishing objectives, (b) selecting learning experiences appropriate to the objectives, (c) organizing the selected learning experiences into a teaching plan, and (d) evaluating accomplishment of the objectives. In the evolution of this curriculum, however, Tyler's curriculum development rationale was followed. The culmination of the evolution process came during the 1995 spring semester when a Fulbright program of teaching and research at the University of Monterrey.
(UDEM) in Nuevo Leon, Mexico provided the opportunity to test and strengthen the curriculum.

**Background**

The stages in the evolution of the curriculum are shown in Figure 1. The curriculum began with research on characteristics of facilitators in a nonformal education project of the University of Massachusetts in Ecuador (Etling, 1975). In that research, the competencies (skills, knowledge, and attitudes) of effective nonformal educators in Ecuadorian villages were identified using a modified Delphi questionnaire. A taxonomy of competencies was established to design training for nonformal educators in other settings.

That taxonomy was used, along with research on the competencies of extension educators (Itulya, 1973), to develop the extension education major at the University of Arizona in 1975, which was then taught and refined between 1976 and 1979. This major included a comprehensive curriculum, based on the Tyler rationale, to prepare nonformal educators at the undergraduate level. The curriculum was research-based, focused on competencies, evaluated extensively, and documented the accomplishment of program objectives (Etling, 1979).

Later, much of the curriculum was incorporated into a Cooperative Extension manual to train community leaders to conduct extension (nonformal education) programs in local communities, using the Tyler rationale. The manual, *Getting Results: A Guide to Effective Leadership* (Dunn, Etling & Williams, 1987), was written for group or individual self-study in small Arizona communities where a trainer and technology for distance education were not available. It was pilot tested, evaluated, and used across the state with positive evaluations from its users.

Subsequently, Etling developed a university course (INTAG 497: Community Development in International Agriculture) and workshops for extension agents and volunteers at The Pennsylvania State University using the Arizona manual as the primary reference. Evaluations of the classes and workshops were conducted using instruments approved by the faculty at Penn State. The manual was well received both by university students and extension agents.

The manual was seen by Extension administrators to have potential to meet the needs of Latinos in Pennsylvania as well. An Extension Committee on Outreach to Diverse Audiences was especially interested in generating relevant materials for Spanish-speaking immigrants to Pennsylvania. Cooperative Extension materials in Spanish were collected from Puerto Rico, Arizona, New Mexico, Texas, and California. These materials covered many technical topics in agriculture and family living. Materials on leadership and community development, however, were missing.

A review of literature in Spanish on leadership and community development uncovered few sources. Some theoretical books and articles existed, but almost none were written for practical training applications at the local level. One of the few practical sources found, the Family Community Leadership (FCL) material (Tilson, 1987), was available in Spanish under the title *Familia, Comunidad, Liderato*. The content of FCL left many gaps, however, and the material was not freely accessible.

As a result of these experiences and the literature review, the Arizona manual was translated into Spanish. The Fulbright program in Mexico was proposed to determine how the manual would be evaluated by Mexican audiences. Evaluations of the manual by participants in university courses and workshops for educators in Pennsylvania and Mexico were proposed for comparison.
**Purposes**

The purposes of this curriculum evaluation in Mexico were:

1. Test the existing curriculum in Mexico.
2. Compare scores of Mexican and Pennsylvanian participants.
3. Identify gaps in the content of the curriculum.
4. Develop a revised curriculum to prepare nonformal educators.

At this point, research studies to test the validity and reliability of the curriculum could be designed.

**Procedure**

Etling was assigned for his Fulbright scholarship to the UDEM Psychology Department where Professor Evangelina Reyes was teaching a course on community development as well as working with local communities in outreach programs. She also had professional experience with the federal adult education agency (INEA) and the contacts to arrange workshops for nonformal educators employed by INEA.

An announcement for the community development course was developed and it was offered at UDEM in the spring semester of 1995 (Jan 17-May 23). The course was team taught by Professor Reyes and Etling. The class met twice a week, 75 minutes each time, which is comparable to a three-credit semester course at Penn State. Twenty students took the course. They evaluated the course using instruments which were translated versions of those used previously at Penn State.

INEA agreed to sponsor a workshop for its employees to learn skills for nonformal educators in community development. The workshop met 7 times, 3 hours each time. Nineteen zone coordinators, whose responsibilities are similar to county extension agents in Pennsylvania, were selected as workshop participants.

A second workshop was presented at UDEM to a mixed group of faculty, students, and other interested community educators. As a result of that workshop, a monthly discussion group was organized where members evaluated the chapters of the manual, and helped make editorial revisions.

The two groups who received instruction using the curriculum, namely university students in the formal course, and nonformal educators in the inservice workshop, evaluated the curriculum. These groups corresponded to the groups who were instructed in the same curriculum at Penn State, i.e., university students in a formal course, and Pennsylvania extension agents (nonformal educators) who participated in inservice workshops. Comparisons were made among the four groups.

Professor Reyes, who team taught the class, and Dr. Zeta M. Triana, Head, UDEM Psychology Department, visited the class three times and completed a Spanish version of the standard Penn State peer evaluation instrument. Their scores were compared to those of Penn State professors who had evaluated the course in 1993 and 1994 when Etling taught the course at Penn State. The peer evaluations focused on both content and instruction.

The INEA workshop was team taught by Etling and Professor Reyes for a group of 19 zone coordinators employed by INEA. These coordinators organize educational programs outside the school system. They hire and supervise the educators. An extension workshop evaluation instrument from Pennsylvania Cooperative Extension was used by participants to evaluate 5 of the 7 workshop sessions. Evaluation scores of Mexican coordinators and Pennsylvania extension agents taught the same topics in their respective workshops were compared.
Peer evaluations were administered during the workshops. These evaluations were compared with peer evaluations for extension workshops in Pennsylvania.

UDEM students and workshop participants evaluated their textbook (the Spanish version of the Arizona manual) for readability, usefulness, and increase in knowledge. These scores were compared with similar scores for Penn State students.

Gaps in the Arizona manual were determined from three sources: (a) all of the evaluations described above, (b) review of other leadership training materials (Bennett, 1987; Etling, 1975; Hastings, Rennekamp & Gerrhard, 1988; Tillson, 1987), and (c) observations by the mixed discussion group at UDEM. As these gaps became apparent, Etling added content to the Arizona manual, and reformed the content from 15 chapters into 79 modules.

Findings

Testing the Curriculum in Mexico

Three instruments were used to evaluate the curriculum - the Student Rating of Teaching Effectiveness instrument for preservice students to rate the community development course, the Peer Evaluation instrument for UDEM faculty to rate the community development course, and the Extension Workshop Evaluation instrument for course and workshop participants to rate the manual. All three instruments used in the evaluation of the curriculum in the formal course and workshop settings, and the manual, had a 7-point response scale, 1 signifying the lowest (unacceptable) rating and 7 the highest (exceptional) rating. A rating of 5 on this scale was considered to be an acceptable score. Evaluation of teaching was also included because some of the questions addressed content of the curriculum and provided another perspective on the acceptability and effectiveness of the curriculum.

Evaluations of the community development course were completed by students and faculty (peer evaluation). Similarly, evaluations for the workshops were completed by participants and faculty (peer evaluation). Evaluation scores are summarized in Tables 1, 2, and 3.

As shown in Table 1, student and faculty evaluations of course content and instruction, both at PSU and UDEM, were higher than that considered to be acceptable (5 on a 7-point scale). Nonformal educators in Pennsylvania and Mexico also rated the workshops higher than 5 for content and instruction (Table 2).

Table 1

<table>
<thead>
<tr>
<th>Participants</th>
<th>N</th>
<th>Content</th>
<th>Instruction</th>
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</thead>
<tbody>
<tr>
<td>Students</td>
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<td></td>
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<tr>
<td>PSU</td>
<td>39</td>
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<td>UDEM</td>
<td>20</td>
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a Scale: 1 = lowest-worst; 7 = highest-best
Table 2

Evaluation of Workshop Content and Instruction by Participants and Faculty.

<table>
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<tr>
<th>Participants</th>
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<td>1</td>
<td>6.00</td>
<td>6.00</td>
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</table>

a Scale: 1 = lowest-worst; 7 = highest-best

The data in Table 3 show that all five groups of participants rated the content of the manual above 5, except Penn State students who rated chapters 2, 8, 11, and 15 below 5 in the evaluation which was done prior to 1996, and UDEM students who rated chapter 11 below 5.

Comparison of Evaluations of Mexican and Pennsylvania Participants

Penn State students rated the community development course higher than the UDEM students (Table 1). In contrast, the INEA group (Mexican nonformal educators) rated the workshops higher than Pennsylvania Cooperative Extension agents (Table 2). The data in Table 3 show that the nonformal educators' ratings of the chapters of the manual were generally higher than the ratings of university students, and that the INEA group's ratings were consistently higher than the ratings of the other groups.

Identifying Gaps in Curriculum Content

The evaluations indicated gaps and weaknesses in the curriculum. Etling (1975), Bennett (1987), and Hastings, Rennekamp and Gerhard (1988) had also identified gaps in the content of the textbook. Their lists of competencies were used to expand the topics addressed in the textbook.

Developing a Revised Curriculum to Prepare Nonformal Educators

The Spanish text used in Mexico for the class and the workshops was edited by the UDEM discussion group. The suggested revisions were made and a copy of the edited manuscript in hard copy as well as on computer disk was left at UDEM. The English translation of chapters of the document, Comunidades para el siglo 21: El rol del liderazgo educativo (Etling, 1995a) are listed below.

1. What is your leadership style?
2. Habits and attitudes of leaders
3. Group identity and direction
4. Teamwork
5. Getting people to support your cause
6. Motivating people in volunteer groups
7. Speaking up for yourself
8. Teaching others
9. Resolving differences
10. Resolving conflicts
11. Moving from ideas to action
12. Managing projects
13. Making formal meetings work
14. Making informal meetings work
15. What's wrong and how to fix it
Table 3

Evaluation of Community Development Manual Chapters by PSU and UDEM Students, INEA Workshop Participants, and UDEM Discussion Group.

<table>
<thead>
<tr>
<th>Chapters</th>
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<td>6.25</td>
<td>6.75</td>
<td>6.20</td>
</tr>
<tr>
<td><strong>Chap 15. Program Evaluation</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PSU^b</td>
<td>7</td>
<td>3.29</td>
<td>3.00</td>
<td>2.71</td>
</tr>
<tr>
<td>UDEM</td>
<td>19</td>
<td>6.16</td>
<td>6.26</td>
<td>6.00</td>
</tr>
<tr>
<td>UDEM Discussion Group</td>
<td>5</td>
<td>6.00</td>
<td>6.00</td>
<td>6.20</td>
</tr>
<tr>
<td>INEA Workshop</td>
<td>9</td>
<td>6.33</td>
<td>6.33</td>
<td>6.00</td>
</tr>
<tr>
<td>PSU^c</td>
<td>6</td>
<td>6.80</td>
<td>6.80</td>
<td>6.20</td>
</tr>
</tbody>
</table>

^a Scale: 1 = lowest-worst; 7 = highest-best
^b Evaluation of manual chapters (prior to 1996)
^c Evaluation of revised manual chapters (1996)
The English version of the text was rewritten to organize the 15 chapters into 35 shorter modules to correspond to competencies needed by nonformal educators. Forty-four new modules were added so that the competencies identified in the studies cited above were all incorporated into a new, expanded version of the textbook. A copy of the revised English modules, Preparing community-based educators (Etling, 1995b), was also left at UDEM in hard copy as well as on computer disk. The following is a list of the contents.

INTRODUCTION
   Purpose of this Curriculum
   How the Curriculum was Developed
   Philosophical Base

LEADERSHIP
   L-1 Styles
   L-2 Teamwork
   L-3 Conducting Meetings
   L-4 Small Group Dynamics
   L-5 Personal Goals
   L-6 Organizing Committees
   L-7 Self Image
   L-8 Mentoring
   L-9 Decision Making

EDUCATIONAL DESIGN
   E-1 Learning Theory
   E-2 Principles of Adult Education
   E-3 Nonformal Education
   E-4 Program Planning
   E-5 Needs Assessment
   E-6 Setting Priorities
   E-7 Writing Objectives
   E-8 Assessing Resources
   E-9 Writing a Plan
   E-10 Program Evaluation
   E-11 Calendar of Activities
   E-12 Curriculum Development
   E-13 Mission Statement
   E-14 Organizational Philosophy

PROGRAM MANAGEMENT
   M-1 Social Action Process
   M-2 Implementing a Plan
   M-3 Managing Conflict
   M-4 Time Management
   M-5 Stress Management
   M-6 Using Advisory Groups
   M-7 Resource Development/Marketing Programs
   M-8 Budgets
   M-9 Reporting to Sponsors
   M-10 Inter-organizational Coordination

VOLUNTARISM
   V-1 Basic Human Needs
   V-2 Job Descriptions
   V-3 Recruitment
   V-4 Motivation
   V-5 Orientation
   V-6 Supervision
   V-7 In-service Training
   V-8 Recognition
   V-9 Legal Considerations

PERSONAL DEVELOPMENT
   P-1 Ages and Stages
   P-2 Family Strengths
   P-3 Values Development
   P-4 Cultural Awareness
   P-5 Career Skills
   P-6 Current Issues
   P-7 Problem Solving

COMMUNICATION
   C-1 Interpersonal
   C-2 Listening
   C-3 Public Speaking
   C-4 Writing
   C-5 Nonverbal
   C-6 Preparation to Teach
   C-7 Teaching Behaviors
   C-8 Using Learning Techniques

LEARNING/TEACHING TECHNIQUES
   LT-1 Workshop
   LT-2 Lecture
   LT-3 Brainstorming
   LT-4 Overhead Transparencies
   LT-5 Slide Sets
   LT-6 Newsletters
   LT-7 Farm-Home Visit
   LT-8 Technical Bulletin
   LT-9 Tour and Field Trip
   LT-10 Self Training
LT-11 Simulation Games  
LT-12 Public Policy Education  
LT-13 Role Play  
LT-14 VCR  
LT-15 Case Study  
LT-16 Educational Fair  
LT-17 Judging  
LT-18 Method Demonstration  
LT-19 Telephone  
LT-20 Correspondence  
LT-21 Exhibits, Posters and Bulletin Board  
LT-22 Cone of Experience

**Conclusions**

1. Student and peer evaluations of the course indicate that it was as well received at UDEM as at Penn State. Apparently teaching style and course content were as compatible with UDEM and its Mexican culture as with Penn State and its US culture.

2. Evaluations by participants and peers indicate that the workshop content and instruction were as well received in Nuevo Leon as in Pennsylvania.

3. The manual chapters were rated as high or higher by the Mexicans than by the class at Penn State. With the exception of chapter 11, all scores by Mexicans exceeded the criterion of 5 on a scale of 7. The manual, therefore, appears to be appropriate for use at UDEM and in workshops for nonformal educators in Nuevo Leon.

4. No cultural biases were found in the manual which would prevent its use in other Mexican states. Because Mexican culture varies from state to state, however, testing and evaluation will be necessary to determine if the manual can be used across the country. Mexican academics from other state universities indicated interest in piloting the textbook in their states.

5. INEA workshop participants rated the chapters higher than university students at either UDEM or Penn State. This may indicate that the workshop setting was more appropriate than the classroom for this subject. It may also indicate that participants with more experience appreciate the chapters more than students with limited or no experience in community work. Both explanations are probably responsible, to some degree, for the difference in evaluations by the groups involved.

6. More course and workshop evaluations in both settings would help clarify and support or refute the above conclusions.

7. Gaps and weaknesses in the textbook were identified. The new expanded version of 79 modules was used by Penn State students during the fall of 1995. Their evaluations were higher than the two previous Penn State classes with regard to the textbook content. Therefore, the new modules have more promise than the 15 chapters for the preservice preparation of nonformal educators, at least in the U.S.

8. Evaluation is needed to determine the impact of the participants’ learning in the courses and workshops. A separate study will be needed with a new evaluation design.

9. Based on the evaluation scores and interest for these training materials by educators in Monterrey and other sites in Mexico, similar workshops should be offered in other Mexican states and possibly in other countries in Latin America.

10. As a result of this effort, institutional linkages were developed among Penn State, UDEM, and INEA. Such linkages become increasingly important as we look to the 21st century.

**Educational Importance**

In the course taught at UDEM, three student community development projects were successfully completed. These projects involved educational services beyond the classroom to neighborhoods around the UDEM campus. They provided experiential learning opportunities for the students.
The UDEM discussion group examined the need for an academic program at UDEM in community development/nonformal education. Participants indicated interest in exploring that possibility. Etling promised to communicate UDEM's interest to faculty in the community development minor offered in the Department of Agricultural Economics and Rural Sociology at Penn State. Subsequently, during the fall semester of 1995, Professor Reyes taught the community development course at UDEM. Etling, likewise, taught the course at Penn State during the same semester. Evaluations completed in 1996 indicated that the revised manual with 79 modules is an improvement over the original version.

In 1996 and 1997, UDEM faculty arranged for publication in Mexico of the manual which was to be disseminated throughout Latin America. Dissemination of the manual should provide opportunities for UDEM and Penn State faculty to consult on programs to prepare nonformal educators. Faculty from both institutions are working on evaluation instruments to test the outcomes of the curriculum on university students and nonformal educators. These instruments will document the impact of the curriculum on the participants after they have a chance to apply their new competencies to their diverse community development projects.

A curriculum that strengthens the competencies of community-based educators has great potential to strengthen communities in both the U.S. and Mexico. Such a curriculum also has potential for organizations that promote community development, youth development, health education, adult education, and leadership development. This curriculum is already changing the way that UDEM and Penn State prepare nonformal educators, both preservice and inservice, to assist communities. The institutional linkage between UDEM and Penn State is enabling the development of a stronger curriculum in terms of quality and transferability.

References

Bennett, M. B. (1987). *A review and synthesis of professional competencies needed by extension agents in the United States and selected developing countries*. University Park, PA: The Pennsylvania State University, Department of Agricultural and Extension Education.


GENDER ROLES IN MALAYSIAN AGRICULTURE:  
IMPLICATIONS FOR EXTENSION PLANNING

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Abstract

Understanding the roles of women and men in agriculture, and planning programs relevant to their roles and needs is a prerequisite for the success of agricultural development programs. This study analyzes patterns of involvement of farm wives and husbands in agricultural tasks associated with the production of rubber, cocoa, and oil palm. Wives performed repetitive, tedious and time-consuming tasks such as rubber tapping, collecting and processing of latex, rubber sheet drying, harvesting of cocoa pods, and collecting of loose oil palm fruits. Their husbands performed tasks that required technical and operational skills, muscle strength, and the handling of money. These tasks included applying fertilizers, weedicides, and insecticides, pruning oil palm fronds, and harvesting oil palm bunches. Implications of the findings for extension programs include establishing objectives, and organizing training programs and staffing that take into account the needs of both men and women.

Women are important in Malaysia’s labor force, and play a crucial role in agricultural and overall development. In 1990, 47% of the country’s women were employed in the labor force, with 28% of employed women working in the agricultural sector (Government of Malaysia, 1991). This is a decline from the figure of 49% of employed women in the agricultural sector reported in 1980 (Department of Statistics, 1983). The overall count of women’s work in official demographic and economic statistics has long been underestimated because it has excluded their contribution in the form of seasonal, part-time, and unpaid family labor (Beneria, 1982; Dixon, 1985). Despite this deficit, their contribution is substantial.

Women’s participation in the agricultural sector has been the highest in rubber, oil palm, and cocoa production (Ministry of Labor, 1989). If the contribution of women to agriculture is not recognized, it could lead to their exclusion as project beneficiaries, as well as deny them access to appropriate technology, extension
services, and training, thus depriving them of the chance to achieve their full potential.

The issue of misconception and non-recognition of the role of women in agricultural development has been gaining momentum since the early 1970s. It is gradually being recognized that the role of women in agriculture is important, and that the neglect of women in development interventions is a major reason why many programs fail to reach targeted goals (Roling, 1988). There is also increasing recognition of the need to integrate women in mainstream agricultural development. From a global perspective, the Food and Agriculture Organization of the United Nations developed a plan of action for strengthening the role of women in agricultural development (Food and Agriculture Organization, 1990). In Malaysia, an analysis of non-formal education programs for rural women conducted by extension organizations showed that the content of these programs tended to concentrate on the domestic role of women rather than on their economic role in agricultural production. It was recommended that program planners should examine the role of women both in household and agricultural production so that a more balanced program reflecting their actual role could be planned (Ahmad, 1994). In this context, Grown and Sebstead (1989) point out that the poorer the households, the more time women devote to working in low-return economic activities.

Development programs designed to increase the productivity and efficiency of rural women in agriculture will only be meaningful if program planners consider the role played by women. Loutfi (1987) notes that development organizations tend to train men in new techniques for tasks which are actually women’s work. The result is that resources are misplaced, and time and skills are wasted. This suggests the need to examine the work roles of women and men, and improve skills associated with these work roles, which should lead eventually to better performance.

Earlier, it was indicated that women have high levels of participation in the production of rubber, oil palm, and cocoa. Examining their roles, as well as the roles of men, is thus a prerequisite to planning relevant and inclusive programs which will be likely to succeed. The study reported in this paper was undertaken for the purpose of determining the pattern of involvement of women and men in producing these crops so as to strengthen extension program planning.

The specific objectives of the study were:

1. To compare women and men on the agricultural tasks performed by them in the production of rubber, oil palm, and cocoa.

2. To compare patterns of involvement of women and men based on the types of agricultural tasks performed.

**Methodology**

Study respondents consisted of 310 farm wives who were involved in the production of rubber, oil palm, and cocoa. For rubber, data were gathered from 100 farm wives in two districts in the state of Perak. For oil palm and cocoa, 105 farm wives were studied for each enterprise in a district in the state of Johor. Farm wives and their husbands had cultivated the crops. At the time of the study, the crops had reached production stage. When production stage is reached the tapping of rubber trees, and the harvesting of oil palm and cocoa fruits are done throughout the year.

Data were gathered through personal interviews using three inventories of farm tasks, one for each crop, to identify tasks performed by women and men. Interviewers, consisting of university students, were trained to assist the researchers in data gathering. Data from women involved in rubber production were gathered in 1992, while data from women involved in oil palm and cocoa production were gathered in 1993.

**Purpose and Objectives**
For each crop, farm wives were asked to indicate the extent to which they and their husbands were involved in each task in the respective inventory, using the response categories provided. The response categories were (1) wife only, (2) wife more than husband, (3) wife equal to husband, (4) husband only, and (5) husband more than wife. The data for each crop were analyzed to determine the percentage of women in each category for the several tasks included in the inventory. The percentages for response categories 1 and 2 were combined to give an overall percentage for a “wife only/wife more than husband” category. The percentages for the response categories 4 and 5 were similarly combined to give an overall percentage for a “husband only / husband more than wife” category. The percentage for response category 3 was unaltered. Through this procedure the five response categories were reduced to three analytical categories. This was done to simplify the presentation and interpretation of the data to show tasks done mostly by wives, equally by wives and husbands, and mostly by husbands.

**Results**

**Involvement of Wives and Husbands in Agricultural Tasks**

With regard to agricultural tasks in rubber production, it was found that slightly over one-fourth of the wives were exclusively involved or more involved than the husbands in rubber tapping, collecting and processing latex, and drying rubber sheets (Table 1). These tasks were shared equally by about one-half of the wives. Wives were much less involved in applying fertilizers and weedicides, and in marketing, these tasks being almost exclusively performed by husbands.

With respect to cocoa, wives were more involved in tasks at the later stage of production, while husbands were more involved at the early stages. Tasks performed exclusively by wives or shared equally with husbands included harvesting, collecting, splitting, and drying cocoa pods (Table 2). Tasks performed exclusively by men or to a greater extent than wives included application of fertilizers, weedicides and insecticides, watering, and marketing.

The involvement of wives in the several tasks associated with oil palm production was very small compared with the involvement of husbands. The only task in which the wives were involved to any significant extent was collecting oil palm fruits that fell from the trees (Table 3).

**Involvement of Women and Men by Type of Agricultural Task**

Tables 4 and 5 show the patterns of involvement of women and men, respectively, in various types of tasks associated with the production of rubber, cocoa, and oil palm. Repetitive, time-consuming, and tedious tasks were performed by women, while tasks requiring muscle strength, operational skills to handle tools, technical skills to handle chemicals, and the expertise to handle money in marketing the crops were performed by men. For example, tapping and collecting latex from rubber trees has to be done daily, and takes considerable time. These tasks, as well as the tedious tasks of harvesting cocoa pods and collecting fallen oil palm fruits, are done by women. Branches and shoots hinder the collection of cocoa pods, while the collection of loose oil palm fruits which fall to the ground requires women to bend their backs for long periods of time. By contrast, men are more involved in applying chemicals requiring technical and operational skills in the harvesting and pruning of oil palm fronds which require muscle strength, and in the marketing of crops for which expertise in managing money is needed.
### Table 1

**Involvement of Wife and Husband in Rubber Farming Tasks.**

<table>
<thead>
<tr>
<th>Task</th>
<th>Wife only/wife more than husband (%)</th>
<th>Wife and husband equally (%)</th>
<th>Husband only/husband more than wife (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fertilizer Application</td>
<td>3.0</td>
<td>38.5</td>
<td>58.5</td>
</tr>
<tr>
<td>Weedicide Application</td>
<td>2.0</td>
<td>24.0</td>
<td>74.0</td>
</tr>
<tr>
<td>Rubber Tapping</td>
<td>28.0</td>
<td>57.0</td>
<td>15.0</td>
</tr>
<tr>
<td>Collecting Latex</td>
<td>28.0</td>
<td>58.0</td>
<td>14.0</td>
</tr>
<tr>
<td>Processing of Latex</td>
<td>27.0</td>
<td>51.0</td>
<td>22.0</td>
</tr>
<tr>
<td>Drying of Rubber Sheets</td>
<td>28.0</td>
<td>47.0</td>
<td>25.0</td>
</tr>
<tr>
<td>Marketing</td>
<td>9.0</td>
<td>11.5</td>
<td>79.5</td>
</tr>
</tbody>
</table>

**Note:** Number of respondents = 100.

### Table 2

**Involvement of Wife and Husband in Cocoa Farming Tasks.**

<table>
<thead>
<tr>
<th>Task</th>
<th>Wife only/wife more than husband (%)</th>
<th>Wife and husband equally (%)</th>
<th>Husband only/husband more than wife (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fertilizer Application</td>
<td>2.0</td>
<td>33.0</td>
<td>65.0</td>
</tr>
<tr>
<td>Weedicide Application</td>
<td>1.1</td>
<td>6.1</td>
<td>92.8</td>
</tr>
<tr>
<td>Watering</td>
<td>8.7</td>
<td>56.6</td>
<td>34.7</td>
</tr>
<tr>
<td>Insecticide Application</td>
<td>1.1</td>
<td>11.2</td>
<td>87.7</td>
</tr>
<tr>
<td>Harvesting Cocoa Pods</td>
<td>20.2</td>
<td>68.1</td>
<td>11.7</td>
</tr>
<tr>
<td>Collecting Cocoa Pods</td>
<td>40.4</td>
<td>49.0</td>
<td>10.6</td>
</tr>
<tr>
<td>Splitting Cocoa Pods</td>
<td>62.0</td>
<td>36.0</td>
<td>2.0</td>
</tr>
<tr>
<td>Drying Cocoa Seeds</td>
<td>24.0</td>
<td>52.0</td>
<td>24.0</td>
</tr>
<tr>
<td>Marketing</td>
<td>5.0</td>
<td>3.0</td>
<td>92.0</td>
</tr>
</tbody>
</table>

**Note:** Number of respondents = 105.

### Table 3

**Involvement of Wife and Husband in Oil Palm Farming Tasks.**

<table>
<thead>
<tr>
<th>Task</th>
<th>Wife only/wife more than husband (%)</th>
<th>Wife and husband equally (%)</th>
<th>Husband only/husband more than wife (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fertilizer Application</td>
<td>5.0</td>
<td>43.0</td>
<td>52.0</td>
</tr>
<tr>
<td>Weedicide Application</td>
<td>2.1</td>
<td>16.5</td>
<td>81.4</td>
</tr>
<tr>
<td>Insecticide Application</td>
<td>0.0</td>
<td>25.0</td>
<td>75.0</td>
</tr>
<tr>
<td>Pruning of Fronds</td>
<td>4.2</td>
<td>10.8</td>
<td>85.0</td>
</tr>
<tr>
<td>Harvesting</td>
<td>2.2</td>
<td>22.3</td>
<td>75.5</td>
</tr>
<tr>
<td>Collecting Loose Fruits</td>
<td>42.3</td>
<td>44.4</td>
<td>13.3</td>
</tr>
<tr>
<td>Marketing</td>
<td>0.0</td>
<td>20.0</td>
<td>80.0</td>
</tr>
</tbody>
</table>

**Note:** Number of respondents = 105.
Table 4

Pattern of Involvement of Women in Rubber, Cocoa, and Oil Palm Production By Type of Task.

<table>
<thead>
<tr>
<th>Type of Task</th>
<th>Rubber</th>
<th>Cocoa</th>
<th>Oil Palm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Repetitive</td>
<td>Tapping Latex Collecting</td>
<td>Harvesting Splitting Cocoa Pods</td>
<td>Collecting Loose Oil Palm Fruits</td>
</tr>
<tr>
<td></td>
<td>Processing of Latex</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time-Consuming</td>
<td>Tapping Latex Collecting</td>
<td>Harvesting Splitting Cocoa Pods Collecting Cocoa Pods</td>
<td>Collecting Loose Oil Palm Fruits</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tedious</td>
<td>Tapping Processing of Latex</td>
<td>Harvesting</td>
<td>Collecting Loose Oil Palm Fruits</td>
</tr>
</tbody>
</table>

Table 5

Pattern of Involvement of Men in Rubber, Cocoa, and Oil Palm Production By Type of Task.

<table>
<thead>
<tr>
<th>Type of Task</th>
<th>Rubber</th>
<th>Cocoa</th>
<th>Oil Palm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Requiring Muscle Strength</td>
<td>None</td>
<td>None</td>
<td>Harvesting and Pruning of Fronds</td>
</tr>
<tr>
<td>Requiring Operational Skills in Handling Tools</td>
<td>Weedicide Application</td>
<td>Weedicide and Insecticide Application</td>
<td>Weedicde and Insecticide Application</td>
</tr>
<tr>
<td>Requiring Technical Skills in Handling Chemicals</td>
<td>Fertilizer and Weedicide Application</td>
<td>Fertilizer and Weedicide Application</td>
<td>Fertilizer, Weedicde and Insecticide Application</td>
</tr>
<tr>
<td>Handling Money</td>
<td>Marketing</td>
<td>Marketing</td>
<td>Marketing</td>
</tr>
</tbody>
</table>

Discussion

The findings of this study are corroborated by studies conducted in other crops, and other countries.

Johari et al. (1991) showed that tedious and repetitive manual tasks are often done by women rice farmers in Malaysia. These tasks included manual ploughing, preparing seedlings for planting, transplanting, weeding, winnowing, and drying. Fertilizers and weedicides were applied by men. Overall, women were more involved in agricultural tasks than their husbands. It is interesting that, with mechanization, the involvement of farm wives in rice production becomes minimal as they are displaced from their traditional roles of transplanting, weeding, and harvesting while men take on tasks that require mechanical and operational skills, and the muscle strength to handle machines (Dagoy, 1989).
In the Philippines, women in rice farming were predominantly involved in transplanting, weeding, harvesting, non-mechanical threshing, and selection and preservation of seeds (Illo, Leones, Ignacio, Jacob & Pineda, 1987). The main tasks performed by men included land preparation, chemical and fertilizer application, seedbed preparation, and mechanized farm operations.

A similar pattern of women’s participation in soybean production was found in Indonesia in that seed selection, harvesting, drying, threshing, and cleaning of grains were mainly done by women (Saenong, Akiib, Zubachtirodin & Mawan, 1993). Cutting stubble, drainage work, weeding, fertilizer application, irrigation, and pest control were done by men.

Stratigaki’s (1988) study of farm women and their husbands in vineyards and olive orchards in Greece found that women were involved in farm tasks requiring nimble fingers and a strong back for repetitive stooping, while men did farm tasks requiring a machine. The tasks that women did also required more time. In the vineyard, these tasks included picking up from the ground the branches that were pruned by men using a machine, manual cutting of small branches, manual leaf cutting, branch binding, grape lowering, grape harvesting, and raisin spreading. On the other hand, men machine-ploughed the land, pruned and applied weedicides to the crop, treated raisins, and transported the produce. In olive orchards, women gathered and sacked olives. Machine-tillage, tree shaking, and mechanical pruning were done by men.

The above findings show that women have an important role in agriculture. However, the observed patterns of involvement of women and men in agricultural tasks indicate gender differences associated with various farming tasks, and the tools and technology involved therein. Since women are not involved in the use of farming tools and farm technology, there is a high possibility that they are excluded from the technology diffusion and adoption processes. Leckie’s (1996) study of 32 farm girls from Southern Ontario, Canada, revealed that farm girls were frequently excluded from agricultural resources, including information, due to the gender division of labor. Another reason for the exclusion could be socialization processes, operating both inside and outside the farm family unit. Bandura and Walters (1963) posit that as individuals are socialized into their culture, they begin to learn that males and females are expected to be different in many ways, including the roles they perform. Women in this study could have learned through gender role socialization that it is the appropriate thing for them to do repetitious, tedious farm tasks. The established extension system could also be a contributing factor. Rural women generally have poor access to agricultural information, and extension services. A study reported by the Food and Agriculture Organization found that in countries where women represented 80% of the food producers, they received only 2-10% of the extension services (Food and Agriculture Organization, 1990). According to Ludgate, Priyanti and Soedjana (1990), although attempts have been made to transfer agricultural technology to women in Southeast Asia, these attempts have been constrained by poor extension delivery networks. Reasons for this poor performance included: (a) male extension agents were not sensitive to gender-related issues in agricultural production, and (b) there were relatively few women extension agents providing agricultural services. For instance, in Malaysia in 1994, the Department of Agriculture had only 213 female agricultural technicians providing extension services compared to 1,147 male technicians (Wahab, N., personal communication, December 8, 1994). In 1993, the Rubber Industry Smallholders’ Development Authority, an agency responsible for providing extension services to rubber farmers, had only 133 female extension agents compared to 1,233 male extension agents (Kadiman, K., personal communication, December 1994). This means that agricultural extension institutions have largely been staffed and directed by men, and extension delivery structures have been based upon the assumption that men are the primary producers of agricultural crops.
The use of tools and technology, such as sprayers and chemicals, could also be discussed from the power relations perspective. Huber’s gender stratification theory (Huber, 1995) postulates that in any society the most power and prestige accrue to those people who have control over the use of valued goods, including tools and technology, beyond the family. In an agrarian society based on manual labor, the level of equality in the distribution of power between men and women was high. The introduction of sprayers and chemicals and the use of tools and technology brought about an unequal distribution of power. Men gained more power and prestige than women, compared to the time when both men and women performed repetitious and tedious farming tasks. An interesting question in this context is whether women will get access to and control production tasks as these are mechanized. For instance, the harvesting of oil palm requires muscle strength and is mainly done by men. What would happen if this task is mechanized? If strength matters less as machines replace human power, could one expect an increase in the use of machines by women? Is this expectation likely to be realized? The results of this study have shown that biology alone cannot explain the prevailing gender stratification in agriculture.

Stratigaki (1988) also found that the reasons given by farm women for the lack of involvement in mechanical and heavy manual tasks included lack of muscle strength, lack of technical skills to operate machines or tools, and established identity as ‘male’ tasks. This would suggest (a) gender-typing of tasks - machine use and skills connected with men, and long, repetitive, tedious and back-bending tasks with women, and (b) unequal power relations.

**Implications**

Several implications for extension planning can be drawn from the findings of this study. Extension education program objectives aimed at increasing crop production should be based on the needs of both men and women farmers consistent with their roles. Therefore, it is necessary that extension program planners recognize and utilize gender role analysis as an important component of program planning.

Despite the active involvement of women in agriculture, an analysis of the content of extension education programs conducted by the Department of Agriculture, the Farmers Organization Authority, and the Community Development Division of the Ministry of Land and Rural Development in Malaysia revealed that the content of programs for women was related to their domestic role (Ahmad, 1994). Program content and the organization of extension services need to be reviewed to focus on increased participation of women. Attention should be given to both the domestic role and the productive role of women so that they do not become marginalized from important agricultural resources, including information and technology.

Considering women as potential beneficiaries of agricultural technology development, there is also a need to recruit more women extension workers. This would increase contact with women farmers. An improved balance between male and female extension staff, including administrators, can enhance the information flow between women farmers and extension staff. Hence, any form of technology and mechanization introduced in agriculture would be directed to both men and women so that women have an equal share of the benefits of technology and mechanization, and are not displaced from farming.

The apparent gender-typing of agricultural tasks suggests the need for male extension workers and male farmers to be made aware of these differences through appropriate training. This would ensure that underlying assumptions and attitudes associated with gender-typing which could work to the disadvantage of farm women would be overcome.
With regard to generalization of the findings, the pattern of women’s and men’s involvement in agriculture observed in this study was similar to patterns in some of the other Southeast Asian countries. Whether one would find similar patterns in other countries around the world is debatable. However, it would appear that the role of women in developing countries is generally perceived to be domestic. As a result, extension systems have a preponderance of male extension workers, and are organized around the needs of male farmers. It is conceivable that one would find similar patterns of male and female involvement. Therefore, it is believed that the findings of this study and implications drawn could be extended to extension educators in other parts of the world where women contribute significantly to agricultural development.

References


LOCAL ORGANIZATION FOR SUSTAINABLE RURAL DEVELOPMENT
IN A MALAYSIAN VILLAGE

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Abstract

This case study of local organization established to organize development activities in a Malaysian village demonstrates the ability of local groups to sustain development. A mixed quantitative-qualitative methodology was used. Local organization was an important means of continuous economic and social development. Factors contributing to the perpetuation of local groups included acceptance by the community, institutionalization of the groups, able leadership, member gratification with group goals and functioning, ability of the groups to adapt to changing situations, democratic and self-management practices, and support from external agencies. It was concluded that local organization, with appropriate guidance from development agencies, can organize development efforts that are internally sustained by a community.

Introduction

Organizations are structures of recognized and accepted roles, operating on a formal or informal basis (Uphoff, 1986). In the rural sector, a local organization, meaning a collective of local groups, is fundamentally an institutional system performing social, economic, administrative and/or political functions. The system contributes to rural development by increasing the efficiency of resources used in the development effort (Esman & Uphoff, 1984).

Sustainable development can be viewed as a process of improving the economic and social conditions of a community, and perpetuating this improvement over time. Sustainable development requires dependence on local rather than outside resources (Oakley & Marsden, 1984). It implies the need for community self-management, and is also referred to as internally sustainable development. This kind of development is desirable for a developing nation like Malaysia, because available government resources cannot continuously meet the development needs of all communities. Furthermore, sustainability implies self-reliance, meaning independence from external assistance.

Development becomes possible through individual and collective efforts. Local groups provide the structure for collective actions. The question that can be posed in this regard is "What is the role and influence of local organization in developing and sustaining progress in a community?" This question was addressed by examining local groups in Perlok, a village in Jerantut district, Pahang State, Malaysia.

The backdrop of this case study of Perlok village is a regional agricultural development project in the western part of the state of Pahang. The project was started in 1985, and is
known as the West Pahang Integrated Agriculture Development Project (IADP). Perlok is one of the villages included as a pilot under the West Pahang IADP. The project was aimed at coordinating the activities of government agencies within a specific area, and fostering agriculture and a rural development system that would take into account field conditions and the views and needs of local people (Ibrahim, Daut, Yaakub, Omar & Mustafa, 1993).

Perlok was first settled in 1961 by a group of landless farmers from neighboring villages. The village covers an area of about 900 hectares and is inhabited by 450 persons (72 families), the majority (70%) of whom are Malay. The average age of the heads of households was 53 years. The villagers' main economic activity is farming: planting cocoa, paddy, rubber, and fruit trees, and rearing cattle and fresh water fish. Except for rubber and cocoa which are sold, the families are primary consumers of the farm products.

The introduction of IADP brought to Perlok a more organized and systematic delivery of inputs and services by participating government departments, which included the Departments of Agriculture, Fisheries and Veterinary Services, the Federal Agricultural Marketing Authority, the Agricultural Bank, and the Farmers’ Organization Authority. Extension agents from these agencies advised villagers on matters related to farm production. An officer from the West Pahang IADP head office coordinated the extension agents. The extension service was also responsible for managing the community's local groups. To facilitate the utilization of recommended technologies and to give a head start to new projects, limited inputs like planting materials, fingerlings (baby fishes), and calves were subsidized by the IADP.

**Objectives**

The specific objectives of the study were:

1. Determine the organizational setup, functions, and characteristics of local groups in Perlok.

2. Determine villagers' perceptions of local groups in Perlok, and factors contributing to the perpetuation of these groups.

**Methodology**

A mixed methodology, qualitative and quantitative inquiry, was used to gather data for objectives 1 and 2, respectively.

Qualitative data were gathered through in-depth interviews with 11 key informants. Nine informants were chosen purposively to represent Perlok’s local groups. The other two informants were the most influential men in the village, namely the village head (formal village leader), and the secretary of the Village Development and Security Committee (the main governing local institution in Perlok). A set of questions focusing on the organizational structure, purpose, and features of local groups was used to guide the interviews. The interviews were recorded on audiotape and transcribed verbatim. Two researchers who stayed in the village for one week to collect data observed the activities of the local groups chosen for study. These observations complemented the in-depth interviews and were recorded as field notes. Both the interviews and field notes were read carefully, noting the themes that emerged. Related content was grouped together as a theme. Some of the emerging themes were consistent with the research questions, while some were new. The new themes were those that were categorized as factors that contribute to the perpetuation of local organizations, such as institutionalization of local groups, capable leadership, member gratification, and effective programming.

Quantitative data were gathered through structured personal interviews focused on the
perceptions of villagers regarding their participation and role in local groups, and characteristics of these groups. Twenty-three leaders and villagers were randomly chosen from the total population of 72 heads of households to be interviewed. The selection was done by picking the names from a container in which the 72 names of heads of households were placed. The 23 respondents selected for this part of the study were different from the 11 informants interviewed earlier. The data were analyzed for frequencies and means using the statistical package SPSS for MS Windows Release 6.0.

Results and Discussion

Local Organization

Nine institutions existed in Perlok, namely the Village Development and Security Committee (JKKK), Agricultural Commodities Groups, Small Agricultural Unit, Village Cooperative, Youth Association, Women Extension Group (KPW), Mosque Committee, People Volunteer Corps, and Political Group. The study showed that 88.9% of the respondents were members of a local group. A majority (62.5%) was found to belong to more than one group. Generally, respondents were members for about 9 years, and spent an average of 4.6 hours per month participating in their group's activities. Most (66.7%) were members of the Village Cooperative. This was followed by the Political Group (25.9%), Agriculture Commodities Group (25.6%), Small Agricultural Unit (22.6%), Mosque Committee (18.5%), Youth Association (14.8%), JKKK (14.8), and KPW (7.0%).

The Village Development and Security Committee (JKKK) is the main governing institution in Perlok. It is made up of elected village leaders and representatives of organizations in the village. Chaired by the village headman, JKKK consists of committee members and heads of bureaus. A bureau is a group of four to six people that provides leadership to the community on a particular concern or project. For example, the bureau of agriculture is concerned with village farming activities. The JKKK is responsible for planning, coordinating, monitoring, and evaluating the village development program. Through the bureau heads, the JKKK also acts as a platform for interaction among the various village institutions. Some JKKK members are also leaders of economic groups, such as the cocoa farm group. Members holding multiple positions facilitate communication between the JKKK and the particular projects they lead. As an extension of the district office administration, the JKKK also acts as liaison between the village and the government.

A number of agriculture commodity groups were established in Perlok with the aim of dealing with various agricultural activities. These included cocoa, aquaculture, cattle, and rubber. The cocoa group was the most popular. Although cocoa has the potential to bring good return, villagers could not plant the crop on a larger scale due to limited farm size and lack of capital. To overcome this problem, the Department of Agriculture (DOA) advised farmers to practice group farming. They quickly took to the idea. Group farming generally entails the cultivation of a crop on a contiguous piece of land by a group of farmers. The group has its own management structure, rules, and regulations. By operating the farm collectively and adopting recommended practices, cocoa production in Perlok has increased from 1.2 to 2.6 metric tons per hectare. To market cocoa and other farm produce, a village cooperative was set up. The cooperative also provides credit facilities, sells/loans farm inputs, and implements and operates post harvest-processing facilities.

The Women Extension Group (KPW) serves to enhance the quality of family life by promoting leadership and involvement of women in agro-based economic activities. The group conducts education programs on vegetable gardening, food-processing, nutrition, and child care. The Youth Association was set up to encourage the youth to participate in village projects and cultural activities. The association also serves
as a "school" to groom the village's future leaders.

The Political Group, United Malay National Organization (UMNO), its women's wing, Wanita UMNO, and its youth wing, Pemuda UMNO, are the ruling government political arms of the village. The group is responsible for assuring that the ruling party has strong allegiance from villagers. Matters related to the villagers' religious concerns are under the jurisdiction of the Mosque Committee. Daily prayers and religious classes are conducted at the mosque.

Characteristics of Local Organization

All respondents agreed that the community accepted the groups' existence. A majority (96.3%) reported that the groups have an organizational structure. They (74%) foresee that the groups would continue to be accepted by the community. The groups communicated well (92.6%) with each other, mostly (69.2%) through the JKKK Bureaus. From these observations, it could be inferred that the groups have been institutionalized as the village’s local organization.

Most groups in Perlok cooperate in local activities. This is known as "gotong royong". Through "gotong royong", members voluntarily and cooperatively undertake to perform specific tasks, such as construction of public buildings, clearing of farmland, and preparing of wedding feasts. A majority of the respondents (96.3%) reported that they were involved in "gotong royong". Most (92.6%) contributed an average of 5.2 hours per month to this activity. When they were asked about the future of "gotong royong", a majority (77%) believed that the activity would be practiced by the next generation.

With reference to involvement in farm groups, more than half the respondents reported that they were involved according to their own interests. On the question as to who normally makes decisions in the project group, 76% said members did, while 20% reported that group leaders and committee members made decisions for the group.

Characteristics of farm groups as reported by respondents included fairness in member selection (72.7%), fairness in site selection (72.7%), specification of every member's responsibility (90.9%), and specified project procedure (72.7%).

With regard to the future, a majority believed that characteristics of local groups would continue to be observed, and the groups themselves would continue to exist. However, the percentage of respondents holding this belief varied: 100% for Youth Organization, 96.2% for JKKK, 92.6% for Mosque Committee, 88.9% for Village Cooperative, 57.7% for Commodity Farm Group, and 50% for Small Agricultural Unit.

Factors Contributing to the Perpetuation of Local Organization

Evidence from the study reveals factors that suggest local groups in Perlok will be perpetuated and contribute to its development.

Acceptance by the community. The survey showed that the respondents accepted the existence of local groups. Almost all respondents had been members of an organization of some form for a long time (about 9 years) and are likely to continue into the future. This finding suggests that the village values and accepts local organization as a part of its system. With this recognition and acceptance, organizations are likely to continue to exist and function.

Institutionalization of local groups. The respondents believed that systematic, organized, and consensual efforts through some form of institution makes a difference in their desire to develop. Local groups have been institutionalized in Perlok as an essential ingredient of development. Institutionalization refers to the process through which organizations are given structure, and social actions and interactions are made predictable.
As reported by almost all respondents, the structure of the various local groups was clearly defined. Clear structure and procedure facilitate the management and functioning of the group since members are aware of their roles and responsibilities, and ways to get things done (Cernea, 1993). For example, JKKK has established divisions or bureaus to look after specific activities, such as agriculture, education, youth, and religion. Respondents indicated that each bureau is given a free hand to plan and implement its own program as long as it is consistent with JKKK's development objectives. These institutionalized systems and sub-systems, each contributing to the whole, should produce a holistic development approach in Perlok.

Capable leadership. A capable leader is essential for an effective group (Shaw, 1981). In Perlok, leaders of groups have been the major actors in development efforts. For example, JKKK leaders were reported to be able, committed, dedicated, knowledgeable, skillful, and optimistic. They work relentlessly to continuously develop the village. Chairpersons of the JKKK have had wide government and political contacts, and command high respect from the villagers. What is more important is that the villagers believe that these leaders can contribute to the attainment of Perlok's development goals.

Member gratification. According to Gale (1991), development can be sustained when it is appropriate to the concern of local people. Members continue to participate in a group if they are gratified with the group, with the group's goal, and the norms they have helped to set (Mills, 1967; Shaw, 1981). In Perlok, most of the groups were established to deal with differing needs of villagers. For example, the Youth Association served as a platform for youth participation, KPW met the needs of women, the Village Cooperative was set up to address the problem of marketing agricultural products, and villagers participated in the farm group out of self-interest and the benefits gained from collective farming. Therefore, as long as individual and group needs are met, and members are gratified, local groups can be expected to endure.

Ability to adapt. The ability of a group to adapt to changing situations is crucial for its survival. Local groups in Perlok demonstrate that they are sensitive to their environment. For example, recognizing that farmers and most of the village leaders are getting older, the Youth Association conducted projects to encourage members to participate in agricultural activities and to groom them to provide future leadership to the community. In a similar manner, the Agriculture Commodity Groups encouraged their members to learn the management of their farms as well as agronomic practices. Learning and improving themselves in these ways will increase the ability of local groups to adapt to changing situations, and continue to facilitate village development.

Democracy and self-management. Open and free participation of group members in group activities and decision making is essential to effective organization (Gale, 1991; Oakley & Marsden, 1984). There was consensus in Perlok on the selection of group leaders and sites for group projects. Group members were involved in decision making. This participatory approach is a major factor that has helped to realize Perlok's development goal. Self decision making by the local groups with minimum long term involvement of outsiders enabled the villagers to participate in the management of their own community, thus empowering them to control their own lives. Self-dependence contributes to sustainable development.

Effective programming. Generally, programs carried out by the groups were well planned in collaboration with all involved: group members, group leaders, and change agents. According to Boone (1985), continued interaction and collaboration between the client and change agent leads to more effective programs that are systematically planned and implemented, and constantly monitored. According to the respondents, the JKKK screened, monitored, and evaluated the planned programs to assure their appropriateness and
effectiveness. Furthermore, JKKK ensured that facilities or services directed at the villagers were accounted for, which confirms the role of local organizations in keeping a check on rural administration (Uphoff & Esman, 1974).

External support. Government departments participate in Perlok's development. However, the intervention strategy used is designed to make people more independent, rather than dependent upon the agencies. This approach has potential for long-term, as well as immediate and intermediate, positive consequences (Carter, 1989). The organization of villagers into viable economic and social groups to take care of their own activities and welfare could be attributed to IADP's philosophy and management, and promotion efforts. For example, the cocoa farm group which the Department of Agriculture helped establish received guidance and training for leaders and members from the extension agent. In the beginning, the agent made frequent visits to farms. The visits became less frequent as farmers became more knowledgeable and skilled to manage the group and the project themselves.

The alignment of the village political group with the ruling party is another dimension that has contributed to the prosperity and development of Perlok. This association has brought both material and moral support to the village from district and state politicians who want to reward the villagers for their continuous support, as well as making their own presence felt.

Conclusions

The institutionalization of local organization is essential for the long-term economic and social development of the rural sector. Evidence from this study suggests that Perlok village has accomplished a level of institutionalization through the establishment and nurturing of local groups to meet specific and differing needs of people. Significant contributing factors include acceptance of these groups by the community at large; operating structures and procedures enabling efficient and effective group functioning; capable group leadership; satisfaction of group members' needs; the ability of groups to adapt to changing situations; democratic decision making and self-management; sound programming; and judicious external support that inculcates and promotes self-reliance.

Perlok's development founded in large measure on institutionalized local organization is in line with the philosophy and aspirations of IADP's management, and extension system. Increased reliance on villagers' knowledge and skills, as well as collective group efforts, can free up resources so that IADP can facilitate development in other villages of West Pahang.

References


Abstract

A higher education challenge grant from the Cooperative State Research Service of the U.S. Department of Agriculture was awarded to the College of Agriculture (COA) at Louisiana State University (LSU) to foster student awareness of the global agricultural environment. A series of workshops was held to assist COA faculty voluntarily add an international dimension to their courses/curricula. To measure the international agriculture knowledge of graduating seniors in the COA, an exit questionnaire was developed, tested, and administered on a voluntary basis. The findings indicated that the responding students were somewhat deficient in their knowledge of international agriculture. It was difficult to develop a single instrument to measure knowledge of international agriculture among students in the diverse curricula of the COA, even though only small knowledge differences were found by disciplinary area.

Introduction

A number of factors suggest that today’s college of agriculture student should become more knowledgeable of the international aspects of agriculture. An increasing number of businesses are becoming involved in handling imported products or are producing goods for export. The passage of NAFTA (North American Free Trade Agreement) and recent changes in GATT (General Agreement on Tariffs and Trade) have encouraged U.S. agricultural firms to develop...
plants in other countries or to become involved in formal relationships with firms abroad. Other factors include growth in the proportion of the U.S. population with international exposure and knowledge, increased sensitivity to and acceptance of cultural diversity in the U.S., and improved preparation among U.S. citizens for leadership roles in a global society (King & Martin, 1994). These and other comparable changes are encouraging firms to seek new employees who are more internationally literate. As the demand for internationally literate employees grows, both in the U.S. and abroad, it becomes more important for graduates from U.S. colleges of agriculture to know more about agriculture and food consumption in other countries, and to have a sound understanding of the U.S. role in the international food market.

Several recent studies have addressed the need for increased international knowledge among graduates of U.S. colleges of agriculture (Bjoraker, 1987; Brandt, 1987; Kellogg, 1984; Merritt, 1984; Moos, 1982; Scully, 1985). Surveys of agribusiness employers indicate that knowledge of international agriculture, other cultures, and global issues is an important factor influencing selection among prospective employees (LSU Office of Research, 1995).

Some U.S. colleges of agriculture have courses that are expressly designed and taught to provide students knowledge of or experiences with international agriculture, and/or an understanding of how U.S. agriculture fits into the international food and fiber market. The international content in these courses likely differs within and among colleges. Students in colleges of agriculture also have contact, both inside and outside the classroom, with students and faculty who have had personal experiences in other countries. Such opportunities can enable students to become more knowledgeable of international agriculture. “Agricultural Globalization” is a term that describes the incorporation of international content, materials, activities, and understanding into a college of agriculture’s teaching, research, and public service functions for the purpose of enhancing the relevance of the college and its various functions in an interdependent world (Henson & Noel, 1990).

A review of previous work on the subject of determining students’ knowledge of international agriculture indicates limited effort in the development of an appropriate measurement instrument that can be used across traditional agricultural disciplines/departments. Student performance in specific international agriculture courses, and/or a specific discipline, is relatively easy to measure and some work was found in this area. For example, Mason et al. (1994) developed an instrument to measure the international perspective of sophomore students in agronomy. The instrument contained questions on world demographics, trade, environmental issues, crop origin, and comparisons of agriculture in the U.S. and other countries. They used the instrument with 277 students in agronomy classes at the University of Nebraska, and found that overall knowledge, and knowledge on most of the topics was low.

A higher education challenge grant from the U.S. Department of Agriculture to the Louisiana State University College of Agriculture (hereinafter referred to as COA or College) in 1995 included (a) a series of globalization workshops to encourage faculty and departments/schools in the College to voluntarily add more international content to their courses and curricula, and (b) an evaluation of the international agriculture knowledge of graduating College seniors to include the design, testing, and use of an appropriate measurement instrument. Results of the evaluation are reported in this article.

**Objectives and Methods**

The purpose of this study was to measure the international agriculture knowledge of graduating seniors in the College of Agriculture at Louisiana State University, a U.S. land grant university.
The specific objectives of the study were:

1. Develop, test, and administer a questionnaire to measure the international agriculture knowledge of seniors graduating from the College.

2. Determine the international agriculture knowledge of seniors graduating from the College.

3. Identify relationships of COA graduating seniors’ curriculum, gender, and grade point average with their international agriculture knowledge.

An instrument to measure international agriculture knowledge of graduating seniors in the College was developed, pretested, and administered. Potential questions were solicited from faculty in one-third of the departments/schools in the College. Questions selected for the instrument were those considered appropriate to students in any of the 14 departments/schools of the College. These questions were reviewed by a different sample of College faculty using the appropriateness criterion. The instrument was then pretested on a small sample of upper class students (who were not part of the survey) within two departments in the College, and then further revised.

Given the disciplinary orientation of individual faculty in the College, the development of generic-type questions was emphasized. The authors selected those questions which they felt were not discipline-focused. The 11 questions selected fell into three categories: (a) economic relationships between the U.S. and other countries, (b) food and nutritional needs of countries, and (c) currencies, locations, time zones, and metric measurements. Three demographic questions were also included as part of the survey: graduation curriculum, gender, and grade point average. The questions were answered by graduating seniors from departments/schools during “exit” interviews conducted by the Associate Dean of the College.

The survey instrument was completed by small numbers of graduating seniors in the fall 1994 through fall 1995 semesters, and by larger numbers in the fall 1996 and spring 1997 semesters. A total of 93 students completed the questionnaire. Since the decision to respond to the survey was voluntary, a large number of students did not complete it for time and other reasons. Responding and non-responding graduating seniors appeared to be similar in grade point average and gender, but dissimilar by curriculum. The authors, therefore, have no basis for assuming differences in international agriculture knowledge between the two groups. Chi-square analyses were used to evaluate the association of gender, grade point average, and graduation curriculum with the responses of graduating seniors to the 11 questions.

Results

Responses of graduating seniors to the questionnaire are presented for the three categories of questions. For each question in a category, the question as asked is stated, and the percentages of students selecting specific answers are shown. The correct answer and response percentage are italicized.

Knowledge of World Economic Relationships

Graduating seniors were asked to respond to five economic-type questions relating to the United States and other countries:

1. As a percentage of the federal budget, the amount of money (foreign aid) the U.S. has given to other countries has (increased - 82%, decreased - 18%) over the last four decades.

2. When the U.S. helps other countries grow food, what is likely to happen to agricultural exports from the U.S. to those same countries (decrease - 65%, increase - 35%)?

3. Other things being equal, when the value of the U.S. dollar rises relative to the yen, the U.S. trade imbalance with Japan is likely to (worsen - 40%, be unchanged - 12%, improve - 48%).
4. With which of the following four countries does the U.S. currently not have a free trade agreement (Canada - 5%, Israel - 67%, Mexico - 9%, United Kingdom - 19%)?

5. Thanks to the NAFTA trade agreement, Levi Strauss can now more cheaply manufacture textiles in (Brazil - 3%, Europe - 11%, Canada - 2%, Mexico - 84%).

In response to Question # 1, the large majority of the students erroneously felt (82%) that U.S. foreign aid had increased over the last 40 years. Nearly two thirds of the graduating seniors incorrectly believed that U.S. agricultural aid to other countries harms agriculture trade with those same countries (question # 2). This is also a common misconception among agricultural producers. While 40% of the students were aware that an increase in the value of the dollar relative to the yen worsens the U.S. trade imbalance with Japan, the majority incorrectly believed that the trade imbalance with Japan would be unchanged (12%) or improved (48%).

The two trade-related questions brought mixed results. While the students mostly recognized that NAFTA would allow U.S. firms to produce more cheaply in Mexico, two thirds of the students incorrectly selected Israel as a country with which the U.S. does not have a free trade agreement. Only 19% correctly selected the United Kingdom.

Knowledge of World Food and Nutrition Needs

The students did better on the food needs and nutrition questions:

1. Which one of the following agricultural commodities is most widely consumed around the world (corn - 9%, rice - 76%, wheat - 15%)?

2. A typical meal in a poor country consists of: (Meat, vegetable and a dairy product - 0%, Cereal grains and a side dish of vegetables - 70%, Meat or fish and cereal grains - 23%, An egg or dairy product, vegetables, and fruit - 7%).

3. The focal point of individuals for meeting daily food needs in developing countries is (the business community - 7%, the local community - 22%, the family - 41%, the government - 30%).

4. Which one of the following four countries has had to depend on imports to meet its food needs over the past 20 years (Bangladesh - 17%, India - 31%, Rumania - 7%, Thailand - 0%, Don't Know - 46%).

Students were, in general, knowledgeable of agricultural commodity use and what people consume in poor countries. Nearly three-fourths of them knew that rice, cereal grains, and vegetables are staple foods around the world.

Given that government (30% of respondents) and the business community (7% of the respondents) are much less important in developing countries than in mature economies, these two choices should have been unacceptable. However, the remaining choices received 63% of the responses, with “families” getting 41%, and community 22%.

Only 17% of the students correctly identified Bangladesh as the country consistently needing food imports. It is one of the poorest and most food deficient countries in the world (Chad and Rwanda are also food deficient but were not on the list.). To the students’ credit, however, none chose Thailand as consistently needing food imports. Thirty-one percent chose India, and 7% chose Rumania.

General Knowledge

General knowledge questions covered population, currencies, locations, time zones, and measurement units.
1. The current world population is approximately (4 billion - 16%, 6 billion - 66%, 8 billion - 18%) people.

2. You have a container that weighs 160 pounds and has a volume of 20 gallons. What are these measurements in kilograms and liters? (72 kilograms and 76 liters - 51%, 330 kilograms and 7 liters - 9%, None of the above - 16%, and Don’t know - 24%)

3. If it is 6 am in Baton Rouge, it is: (2 am in Alaska - 33%, 2 p.m. in South Africa - 18%, Noon in Japan - 8%, Don’t know - 41%)

4. Match country and currency: (Australia (35% chose dollar), India (52% chose Rupee), Israel (66% chose Shekel), Japan (97% chose Yen), and Mexico (98% chose Peso) (Currency choices: Dollar, Nila, Peso, Pounds, Rand, Rupee, Shekel, and Yen).

5. Match country and continents in which located: (Belize (14% chose North America), Cambodia (67% chose Asia), Finland (89% chose Europe), Iceland (55% chose Europe), New Zealand (81% chose Australia), Paraguay (79% chose South America), and Zimbabwe (97% chose Africa) (Continent choices: Africa, Asia, Australia, Europe, North America, and South America).

Two thirds of the respondents correctly estimated the current world population at 6 billion, while 16% chose 4 billion, and 18% chose 8 billion. Half of the seniors correctly converted pounds and gallons into metric equivalents. Knowledge of time zone differences was much lower as only a third of students correctly recognized that Alaska was four hours earlier than Central time.

Respondents were asked to match countries with currencies and continents. On currency, they did best with Japan and Mexico. About two thirds recognized the shekel as Israel’s currency but only one-half associated the rupee with India. An even smaller group (35%) associated Australia with the dollar.

Respondents did well in recognizing the continents wherein the designated countries were located, with the exception of Belize and Iceland. Most students did not recognize that Belize was in North America, and that Iceland was actually a part of Europe.

Relationships between International Agriculture Knowledge of Graduating Seniors and Selected Demographics

Fifty-four respondents were female, the remainder male. Thirty-six were graduating in human ecology; 16 in agronomy; 14 in agricultural economics; 12 in the animal sciences; 8 in forestry, wildlife and fisheries; 3 in vocational education; 2 in food science; 1 in rural sociology; and 1 in horticulture. Of those responding, 49 had GPAs of 3.0 or lower, and 45 had GPAs exceeding 3.0.

The chi-square test was used to assess the relationships between graduation curriculum, gender, and grade point average and the international agriculture knowledge of graduating seniors. The restrictions of this test--no zero expected values and no more than 20% expected values of 5 or less (Conover 1980)--force the elimination of categories with zero-expected values, and the combining of other categories to remove low expected values. In several instances, recombining of categories eliminated or reduced these violations, while in other cases no recombining of categories was possible. Therefore, suspected significant differences in distribution could not be evaluated. In those cases where minor violations remained, they are noted in footnotes to the tables.

Graduating seniors’ responses to the statement regarding change in proportion of the federal budget being contributed to foreign aid differed statistically by gender and grade point average (Table 1). Male graduating seniors were more likely to respond correctly, as were seniors with grade point averages greater than 3.0.

Responses to the statement regarding the impact of U.S. agricultural aid to developing countries
on U.S. agricultural exports differed by graduation curriculum and gender. Students from animal systems and food science more accurately responded to this statement than students in the other departments/schools. Again, male students responded more accurately than female students (Table 2).

Student responses to the statement regarding the impact of NAFTA on production costs in selected countries differed by gender. A larger proportion of males than females responded correctly (Table 3).

Graduating seniors’ responses to statements regarding the correct identification of currency with its country differed only for Israel (Table 4). Students with GPAs less than 3.0 were more likely to choose the correct currency for Israel than students with higher GPAs.

Table 1.

Relationships between Students’ Gender and Grade Point Average and Students’ Responses to the Question on Change in U.S. Foreign Aid’s Share of the Federal Budget over last 40 years.

<table>
<thead>
<tr>
<th>Student Characteristic</th>
<th>Correct N</th>
<th>Incorrect N</th>
<th>Chi-Square</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td>2.640</td>
<td>0.10</td>
</tr>
<tr>
<td>Female</td>
<td>7</td>
<td>47</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>10</td>
<td>28</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grade Point Average</td>
<td></td>
<td></td>
<td>10.334</td>
<td>0.001 *</td>
</tr>
<tr>
<td>2.0-3.0</td>
<td>3</td>
<td>45</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;3.0</td>
<td>14</td>
<td>29</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall (%)</td>
<td>18</td>
<td>82</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\* Chi-Square violation in percentage of expected values of less than 5.

Table 2.

Relationships Between Students’ Graduation Curriculum and Gender and Students’ Responses to the Question on Estimation of Influence of U.S. Agricultural Aid on U.S. Exports to Aided Countries.

<table>
<thead>
<tr>
<th>Student Characteristic</th>
<th>Correct N</th>
<th>Incorrect N</th>
<th>Chi-Square</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Graduation Curriculum</td>
<td></td>
<td></td>
<td>11.152</td>
<td>0.025 *</td>
</tr>
<tr>
<td>Animal Systems, Food Science</td>
<td>8</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Human Ecology</td>
<td>7</td>
<td>27</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Forestry, Wildlife, Fisheries</td>
<td>9</td>
<td>7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Horticulture, Agronomy</td>
<td>2</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td>4.089</td>
<td>0.043</td>
</tr>
<tr>
<td>Female</td>
<td>14</td>
<td>39</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>17</td>
<td>19</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall (%)</td>
<td>35</td>
<td>65</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\* Chi-Square violation in percentage of expected values of less than 5.
Table 3.

Relationship of Students’ Gender with Students’ Responses to the Question on Estimation of Change in Production Costs Resulting from NAFTA.

<table>
<thead>
<tr>
<th>Student Characteristic</th>
<th>Correct N</th>
<th>Incorrect N</th>
<th>Chi-Square</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>39</td>
<td>14</td>
<td>4.997</td>
<td>0.025a</td>
</tr>
<tr>
<td>Male</td>
<td>35</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall (%)</td>
<td>81</td>
<td>19</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*a Chi-Square violation in percentage of expected values of less than 5.

Table 4.

Relationship of Students’ Grade Point Average with Students’ Responses to the Question on the Identification of Currency of Israel.

<table>
<thead>
<tr>
<th>Student Characteristic</th>
<th>Correct N</th>
<th>Incorrect N</th>
<th>Chi-Square</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade Point Average</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.0-3.0</td>
<td>36</td>
<td>10</td>
<td>5.584</td>
<td>0.018</td>
</tr>
<tr>
<td>&gt;3.0</td>
<td>24</td>
<td>19</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall (%)</td>
<td>66</td>
<td>34</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Summary, Conclusions, and Limitations

The results of the study indicate that the sample of graduating seniors in the College may be somewhat deficient in their knowledge of international agriculture. This finding is not unexpected given that most courses taken by the majority of students present only a cursory treatment of issues related to international agriculture. Despite recent efforts to globalize curricula, courses, and instruction, the LSU College of Agriculture has much to do in accomplishing this objective.

Some seniors responding to the questionnaire did not feel that they had a satisfactory knowledge of international agriculture. In particular, two students admitted they had a very low level of knowledge. Others indicated a desire for more training in international agriculture as they recognized its growing importance.

The authors found it difficult to develop a single instrument to appropriately measure graduating seniors’ knowledge of international agriculture given the diversity of disciplines in the College. Included in the College are traditional departments, such as agronomy and animal science, as well as the Schools of Human Ecology, Vocational Education, and Forestry, Wildlife and Fisheries. One or more of the latter are assigned to other colleges at other land grant universities. Forty-six percent of the respondents to the survey were graduating from three departments/schools in the College -- human ecology, agronomy, and agricultural economics. Further investigation is needed on the selection of questions for the questionnaire, and its reliability with respect to disciplinary areas.

While the instrument used in this study was constructed and reviewed by a diverse group of faculty in the College, it represents only a preliminary step in the process of measuring
knowledge of international agriculture among graduating seniors in a college of agriculture. Additional work is needed to enlist input on the survey instrument from major employers, large multinational agribusiness firms, and other agencies that employ or are influential in the employment of graduates from an agricultural college. Potential employers can indicate what knowledge of international aspects of agriculture they expect prospective employees to have at the undergraduate level.

Only limited differences in international agriculture knowledge were found by disciplinary area. While knowledge level, as measured by the instrument, was relatively low throughout the College, some disciplines may need to work harder than others to improve the international agriculture knowledge of their students.

Male graduating seniors appeared to be slightly more knowledgeable than female graduating seniors. Whether this difference represents more interest in international issues among males than females cannot be ascertained from the study. Research is needed to address this issue.

Grade point average was not consistently related to the level of international agriculture knowledge of graduating seniors. Whereas higher GPA students more accurately answered some statements, lower GPA students did better on other statements. Since the knowledge required to reply to these statements can be obtained from sources other than college courses, it is unlikely that grade point average would be consistently associated with international agriculture knowledge.

The researchers encountered several limitations during the course of the study. One was the large proportion of graduating seniors over the study period who either did not participate in the Associate Dean’s exit interview process, or chose not to respond to the questionnaire at the close of the interview. A second limitation was the difficulty in developing questions which were not in some way biased toward students in a given discipline. A third limitation was the validity criterion imposed by the chi-square test.

This preliminary attempt to measure the international agriculture knowledge of graduating seniors was designed to assist teaching faculty and policy makers in course/curriculum development to better prepare students for an international work environment. Responses to the three sets of questions indicate a need for more training on the impact of macroeconomic factors on agriculture in the U.S. and other countries. In general, it was found that students need additional preparation to raise their knowledge of international agriculture. Colleges of agriculture and faculty will have to be creative in developing curricula and courses which fulfill this need without adding to curriculum length and course complexity.

References


Note: Louisiana Agricultural Experiment Station Manuscript #97-05-0369.
IMPACT OF THE FARMING SYSTEMS RESEARCH/EXTENSION APPROACH ON LOWLAND RICE IN THE BIDA AGRICULTURAL DEVELOPMENT PROJECT, NIGERIA

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Abstract

Accountability is a major challenge for the Farming Systems Research/Extension approach. After its enthusiastic embrace in the 1970s and 80s, calls have gone out to provide evidence to justify the large investments that have been made. This paper presents the results of a study carried out in the middle-belt region of Nigeria to evaluate the impact of an FSR/E project implemented by the International Institute of Tropical Agriculture on the adoption of a package of technology for lowland rice by resource-poor farm-households. FSR/E participants, in comparison to non-participants, showed statistically significant higher adoption rates. Participation in FSR/E was also the single most powerful predictor of adoption, while classical diffusion variables were poor predictors. It is recommended that rather than discard the FSR/E model, steps should be taken to strengthen farmers’ participation and to make the model more responsive to the needs of resource-poor farmers.

Introduction

The persistent low levels of agricultural output in sub-Saharan Africa in the face of untapped technological production possibilities have engaged the attention of agricultural development experts for several decades. Despite the implementation of a number of agricultural development models over the past four decades, food production in the region is still largely dominated by subsistence, low technology-utilizing producers. Many improved technologies with the potential to dramatically reduce the food-deficit problems facing nations in this region have simply remained on the shelf due to their non-adoption by African farmers (Feder, Just & Zilberman, 1985).

Beginning in the late 1970s and through the early 1980s, development experts agreed that classical technology-diffusion models which relied largely on research station experimentation were inappropriate for resolving the complex farming systems constraints that confronted resource-poor farmers in the less-developed countries of Africa, Asia, and Latin America (Aboyade, 1990). The newly emerging Farming Systems Research and Extension (FSR/E) model which emphasized increased farmer participation in the technology development process through diagnostic surveys and other on-farm adaptive research and extension activities was seen as a viable alternative to the top-down approach of
those models (Shaner, Philipp & Schmehl, 1982). It was widely applauded for its holistic approach towards understanding the dynamics of resource-poor farming systems, and for adopting a farmer-centered, bottom-up, participatory technology development methodology (Biggs, 1989; Merrill-Sands, et. al, 1990).

By the mid-1980s, the FSR/E approach had generated so much enthusiasm that literally hundreds of projects in the less developed countries (LDCs) had adopted it. Anderson (1985) estimated that approximately 15% of the total budget of the International Agricultural Research Centers was being devoted to FSR/E activities, while many LDCs had begun the process of incorporating the model into their national agricultural research systems.

By the late 1980s the enthusiasm that greeted the emergence of the FSR/E model was being replaced by strong criticism from many practitioners who felt the approach might have promised more that it could deliver. In terms of theory, Marcotte and Swanson (1987) argued that since the FSR/E model shared a similar theoretical root as structural functionalism, it represented only a change in form, not in substance, and hence was no different from other top-down transfer of technology models. Participation of farmers, the core of the FSR/E approach, received the most scathing criticisms. Biggs (1989), and Chambers and Jiggins (1987) contended that existing institutional rigidities in both international and national agricultural research systems were antithetical to the implementation of a truly bottom-up participatory technology development model. Sumberg and Okali (1988) observed that many so-called participatory, on-farm research projects were nothing more than on-farm validation of technologies that were developed primarily through on-station research. With regard to impact of FSR/E on technology adoption, Chapman and Castro (1988) reported widespread concern within the donor community that the huge resources already committed to FSR/E might not have resulted in a concomitant level of technological application by resource-poor farmers. On the need for evaluation, Norman (1989) observed that 25 years after its over-enthusiastic acceptance, the challenge to FSR/E in the 1990s was the dilemma of accountability, and the measured withdrawal by donor agencies just when many national programs were in the process of institutionalizing the approach. With this background on FSR/E in mind, the authors felt a study to assess a specific FSR/E project in Nigeria would give valuable information about its impact.

**Purpose of Study**

The purpose of the study was to evaluate the impact of farmers’ participation in the Bida Agricultural Development Project (BADP) on the adoption of a lowland rice technology package.

The specific objectives were:

1. Compare FSR/E participants and non-participants on demographic and socioeconomic characteristics, and institutional variables.

2. Determine impact of the FSR/E project by comparing FSR/E participants and non-participants on adoption of a lowland rice technology package.

3. Determine the extent to which farmers’ participation in the FSR/E project and selected demographic and socioeconomic characteristics can predict the adoption of improved rice varieties.

**Methodology**

The study was conducted between 1991 and 1993 in the original BADP enclave located in the middle belt of Niger State. BADP was one of the World Bank financed agricultural development projects implemented in different parts of Nigeria starting in the late 1970s. An FSR/E project was implemented in BADP by the International Institute of Tropical Agriculture (IITA) to develop and test a
prototype technology for rice production in the project’s inland valley farming systems.

The study used a descriptive survey design. The population consisted of an estimated 94,934 farm-households serviced by the BADP (Niger State Agricultural Development Project, 1990). To gain insight into the dynamics of the farming systems in the project area, substantive data collection was preceded by three months of exploratory data collection consisting of non-participant observation and unstructured group interviews in ten villages (Alonge, 1993). The villages were purposively selected to represent the different farming systems in the project area. The insight gained from these exploratory surveys provided the framework for the substantive study.

To determine the impact of the FSR/E project on the adoption of lowland rice technology, two comparable samples representing FSR/E participants and non-participants were selected. Due to the limited number of FSR/E participants, all 149 collaborating farm-households were included in the participant sample. A combination cluster and random sampling procedure was adopted in the selection of non-participants. The first stage sampling consisted of a random selection of five villages from each of the four local government councils (counties) located within the project area. With the assistance of the extension agent and the ward/village head, a sampling frame was developed for each selected village, by compiling a list of all farm-households. A random sample of 20 farm-household heads was selected from each village/ward to give a total sample size of 400 non-participant households. However, due to incomplete data or unwillingness to participate in the survey only 364 survey instruments were useable from the non-participant households, representing a 91% response rate. All 149 FSR/E farm-households participated in the survey, representing a 100% response rate.

A structured interview instrument was used for data collection. The instrument was pretested on 30 farm-households not included in the final survey. Instrument validation was done by a team of experts drawn from Iowa State University, University of Ibadan, Nigeria, and IITA. Interviews were conducted by individuals fluent in Hausa and Nupe, the two major languages spoken in the area. The interviewers received three days of training on the instrument, including mock interviews to ascertain their proficiency with the instrument and the interview procedure. A test-retest reliability check was conducted on each interviewer during data collection by re-interviewing a random sample of the respondents. A reliability coefficient of .95 was obtained for the interviewers. A post-hoc Cronbach reliability coefficient of .91 obtained during data analysis further attested to the reliability of the data.

The SAS statistical package on Iowa State University’s mainframe computer was used for data analysis. Descriptive and inferential statistics -- frequencies, means, standard deviations, chi-square, t-test, and multiple regression -- were used to analyze the data.

**Results and Discussion**

**Characteristics of FSR/E Participants and Non-participants**

Comparability of the samples of FSR/E participants and non-participants was determined by performing (a) t-test analysis of socioeconomic and demographic characteristics, and (b) chi-square analysis of relative access to selected institutional services.

The data in Table 1 show that FSR/E participants and non-participants were comparable on demographic characteristics, as there were no significant differences in age, level of education, and family size. On socioeconomic characteristics, however, non-participants had significantly higher rice acreage compared with participants, but the latter indicated a higher mean earned income from rice. This could be due to either higher yield per acre, or greater commercialization by FSR/E participants. FSR/E participants also had a
higher mean amount of agricultural credit than non-participants, but this difference may not have any significant practical implication because of the low mean credit amounts for the two groups.

To further test the comparability of the two groups, a chi-square analysis was conducted to compare the percentage of each group having access to different forms of agricultural support services, 12 months prior to the survey. Results in Table 2 indicate there were no significant differences between FSR/E participants and non-participants in terms of their access to extension, input supply, and agricultural credit. However, non-participants had significantly higher levels of access to agricultural shows, radio and television programs, and irrigation facilities.

Table 1

Non-paired t-test Analysis of Socioeconomic and Demographic Characteristics of FSR/E Participants and Non-participants.

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>FSR/E Participants (N=149)</th>
<th>FSR/E non-participants (N=364)</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean age (years)</td>
<td>43.31 13.57</td>
<td>45.88 16.72</td>
<td>-1.60</td>
</tr>
<tr>
<td>Mean schooling (years)</td>
<td>1.56 3.72</td>
<td>1.30 3.26</td>
<td>0.72</td>
</tr>
<tr>
<td>Mean family size (number)</td>
<td>8.52 4.52</td>
<td>9.70 6.04</td>
<td>-1.49</td>
</tr>
<tr>
<td>Rice farm size (acre)</td>
<td>1.66 1.32</td>
<td>2.42 2.56</td>
<td>-3.33*</td>
</tr>
<tr>
<td>Income from rice (N)(^a)</td>
<td>3394.72 3438.83</td>
<td>2156.33 2318.70</td>
<td>4.06*</td>
</tr>
<tr>
<td>Agricultural credit (N)(^a)</td>
<td>343.60 1131.00</td>
<td>28.41 130.00</td>
<td>4.48*</td>
</tr>
</tbody>
</table>

\(^a\) N = Nigerian currency (N15 = $1 US in 1991)

* p \leq .05

Table 2

Chi-square Analysis of Differences Between FSR/E Participants and Non-participants With Access to Agricultural Support Services.

<table>
<thead>
<tr>
<th>Services</th>
<th>Percent having access</th>
<th>FSR/E Participants (N=149)</th>
<th>FSR/E non-participants (N=364)</th>
<th>Chi-square</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extension</td>
<td>50.34</td>
<td>45.83</td>
<td></td>
<td>0.77</td>
</tr>
<tr>
<td>Input supply center</td>
<td>29.53</td>
<td>31.82</td>
<td></td>
<td>0.23</td>
</tr>
<tr>
<td>Agricultural credit</td>
<td>10.74</td>
<td>6.06</td>
<td></td>
<td>2.91</td>
</tr>
<tr>
<td>Agricultural shows</td>
<td>27.52</td>
<td>39.39</td>
<td></td>
<td>5.89*</td>
</tr>
<tr>
<td>Agricultural radio programs</td>
<td>96.64</td>
<td>84.09</td>
<td></td>
<td>14.88*</td>
</tr>
<tr>
<td>Agricultural television programs</td>
<td>9.40</td>
<td>18.94</td>
<td></td>
<td>6.62*</td>
</tr>
<tr>
<td>Irrigation facilities</td>
<td>5.41</td>
<td>12.12</td>
<td></td>
<td>4.88*</td>
</tr>
</tbody>
</table>

* p \leq .05
Based on data in Tables 1 and 2, FSR/E participants and non-participants were comparable on demographic characteristics, and in their relatively poor access to agricultural support services. Since BADP was set up to improve the quality of agricultural support services, the results reported in Table 2 call into question the sustainability of the project. Similar findings regarding the poor quality of agricultural support services available to Nigerian farmers have been reported by Osuntogun and Adeyemo (1986).

Impact of FSR/E on the Adoption of Lowland Rice Technology Package

Impact of the FSR/E project on the adoption of a lowland rice technology package was determined by comparing the adoption rates for participants and non-participants using chi-square and t-test analyses. Adoption was operationalized using four parameters:

1. Differential adoption rate: percentages of FSR/E participants and non-participants adopting components of the rice technology package -- fertilizers, improved varieties, water control, seed dressing, insecticides, herbicides.

2. Improved rice variety adoption intensity: proportion of total rice acreage covered by improved varieties.

3. Fertilizer adoption intensity: average number of fertilizer bags used per acre.

4. Overall adoption index: average number of technology components adopted by each group.

The results of the chi-square analysis of differential adoption rates for FSR/E participants and non-participants reveal an overall low adoption rate for seed dressing, insecticides, and herbicides by both groups. FSR/E participants, however, indicated statistically significant higher adoption rates than non-participants for water control (81.88% vs. 64.02%), improved varieties (74.15% vs. 18.94%), and insecticides (11.41% vs. 3.41%). The only component in which non-participants showed a statistically significant higher adoption rate than FSR/E participants was seed-dressing (33.71% vs. 18.12%).

The differences in the adoption rates for fertilizers and herbicides for the two groups were not statistically significant. With a combined adoption rate of 95%, fertilizer use has almost become routine within the project area. Until recently, fertilizer was a highly subsidized input whose use was greatly promoted by various government programs.

The data in Table 3 also show a wide variation in adoption of the several components within groups. This implies that farmers did not adopt the technologies as a package, as was promoted by the project, but rather in a selective and piece-meal manner. Similar findings regarding selective adoption were reported in a study in the Mexican Altiplano (Byerlee & de Polanco, 1986).

Results of t-test analysis of the comparative adoption intensities for improved rice varieties and fertilizers, and the overall adoption index for FSR/E participants and non-participants are presented in Table 4. FSR/E participants showed significantly higher adoption intensities for improved rice varieties and fertilizers. FSR/E participants planted 52% of their total rice acreage to improved varieties compared to 15% for non-participants. It is interesting that when a dichotomous measure was used statistically significant differences in fertilizer adoption rates between FSR/E participants and non-participants were not found (Table 3). But when fertilizer adoption was measured as a continuous variable (number of bags/acre), statistically significant differences were found with participants averaging 4.91 bags/acre compared to 3.61 bags/acre for non-participants. This is a significant finding because in a farming system in which fertilizer use on rice has become almost routine the important research question is not just who has adopted and who has not, but the intensity of that adoption.
When the data in Tables 3 and 4 are taken together, it is seen that households participating in the FSR/E project achieved higher overall adoption rates for lowland rice-production technology than non-participants. Amin, Ahmed, Chowdhury and Ahmed (1994) in their study in Bangladesh also reported the positive impact of women’s participation in income-generating development projects on their adoption of contraceptives.

### Predictability of Rice Technology Adoption

The results of univariate and bivariate analyses in Tables 3 and 4 support the proposition that farmers’ participation in FSR/E had a positive impact on the adoption of rice technology.

#### Table 3

**Chi-square Analysis of FSR/E Participants and Non-participants Adopting Components of Technology Package for Lowland Rice.**

<table>
<thead>
<tr>
<th>Technology Component</th>
<th>Percent adopting</th>
<th>FSR/E Participants (N=149)</th>
<th>FSR/E non-participants (N=364)</th>
<th>Chi-square</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fertilizers</td>
<td>93.96</td>
<td>98.18</td>
<td>0.09</td>
<td></td>
</tr>
<tr>
<td>Water control</td>
<td>81.88</td>
<td>64.02</td>
<td>14.60*</td>
<td></td>
</tr>
<tr>
<td>Improved varieties</td>
<td>74.15</td>
<td>18.94</td>
<td>118.24*</td>
<td></td>
</tr>
<tr>
<td>Seed dressing</td>
<td>18.12</td>
<td>33.71</td>
<td>11.46*</td>
<td></td>
</tr>
<tr>
<td>Insecticides</td>
<td>11.41</td>
<td>3.41</td>
<td>10.33*</td>
<td></td>
</tr>
<tr>
<td>Herbicides</td>
<td>4.03</td>
<td>5.68</td>
<td>0.54</td>
<td></td>
</tr>
</tbody>
</table>

* p ≤ .05

#### Table 4

**t-test of Differences in the Intensity of Technology Adoption Between FSR/E Participants and Non-participants.**

<table>
<thead>
<tr>
<th>Technology</th>
<th>Mean</th>
<th>FSR/E participants (N=149)</th>
<th>FSR/E non-participants (N=364)</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adoption intensity: improved rice</td>
<td>0.52</td>
<td>0.15</td>
<td></td>
<td>9.56*</td>
</tr>
<tr>
<td>varieties (0=0%, 1=100% adoption)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adoption intensity: fertilizer</td>
<td>4.91</td>
<td>3.61</td>
<td></td>
<td>4.31*</td>
</tr>
<tr>
<td>(bags/acre)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adoption index: number of</td>
<td>2.82</td>
<td>2.78</td>
<td></td>
<td>0.50</td>
</tr>
<tr>
<td>technology components adopted</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(range=0-6)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* p ≤ .05
Table 5

Multiple Regression Analysis of the Predictive Power of Farmers’ Participation, and Demographic and Socioeconomic Variables in the Adoption of Improved Rice Varieties (MV).

<table>
<thead>
<tr>
<th>Explanatory Variables</th>
<th>Regression coefficients</th>
<th>Proportion ($R^2$)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>% of Variance</td>
</tr>
<tr>
<td>Participation in FSR/E</td>
<td>29.27***</td>
<td>22.98</td>
</tr>
<tr>
<td>Profitability of MV</td>
<td>12.00***</td>
<td>8.23</td>
</tr>
<tr>
<td>Access to irrigation</td>
<td>6.10***</td>
<td>2.44</td>
</tr>
<tr>
<td>Age</td>
<td>-0.41***</td>
<td>2.15</td>
</tr>
<tr>
<td>Membership in village council</td>
<td>15.33***</td>
<td>2.74</td>
</tr>
<tr>
<td>Availability of MV</td>
<td>7.73**</td>
<td>1.27</td>
</tr>
<tr>
<td>Relative advantage of MV</td>
<td>2.28***</td>
<td>2.59</td>
</tr>
<tr>
<td>Yield advantage of MV</td>
<td>5.50*</td>
<td>0.95</td>
</tr>
<tr>
<td>Maturity advantage of MV</td>
<td>3.86*</td>
<td>0.95</td>
</tr>
<tr>
<td>Access to agricultural radio program</td>
<td>-0.18</td>
<td>1.14</td>
</tr>
</tbody>
</table>

Multiple $R^2=0.4543$

* $p \leq .05$
** $p \leq .01$
*** $p \leq .001$

However, since such analyses do not control for the possibility of socioeconomic and demographic variables confounding the effect of participation, multiple regression analysis was used to determine the best predictors of farmers’ adoption of improved rice varieties (MV). Using a stepwise entry procedure, the multiple regression model produced nine statistically significant predictors (Table 5). However, the model predicted only 45.43% of the variance in the adoption of improved rice varieties.

Farmers’ participation in the project was the single most powerful predictor of farmers’ adoption of improved varieties, accounting for 22.98% of the variance in adoption. However, with the exception of access to irrigation facilities ($R^2 = 2.44$) and age ($R^2 = 2.15$), other demographic and socioeconomic variables such as education, family size, and farm size did not meet the minimum threshold to enter into the regression equation. Hence, they were poor predictors of farmers’ adoption of improved rice varieties.

Other variables that emerged as predictors of farmers’ adoption of MV were the farmers’ perception of the comparative advantages of modern rice varieties over traditional varieties. For instance, perception of comparative profitability of MV accounted for 8.23% of the variance in adoption, while availability, relative, yield and maturity advantages of MV explained very small proportions of the variance. The household head’s membership in the village council, a dummy variable to measure access to local leadership power, was also an important predictor of MV adoption ($R^2 = 2.74$).

Conclusions

Based on the findings of this study, several conclusions were drawn.

Farmers’ participation in FSR/E activities had a positive impact on the adoption of a lowland rice technology package. Instead of de-emphasizing or discarding the FSR/E approach, it would be more productive to take appropriate steps to fine-tune the model and make it more responsive to the needs of resource-poor farmers. A step in this direction would be to strengthen farmers’ participation in FSR/E, which was demonstrated in this study to be a strong predictor of innovation adoption.
Demographic and institutional variables were poor predictors of differential adoption rates between FSR/E participants and non-participants. This may be due to the homogeneity of the samples, but a more plausible explanation is that it points to the failure of classical diffusion model variables to predict the adoption of technology by resource-poor farm households.

While the project adopted a technology package approach, farmers’ adoption decisions were selective and piece-meal. Hence, as suggested and corroborated by past studies such as Byerlee and de Polanco (1986), the technology package approach will remain ineffective in LDCs until adequate attention is devoted to the removal of institutional constraints, such as inefficient agricultural support bureaucracies, poor infrastructure, and poor government policies, which hamper innovative behavior by resource-poor farmers. Additionally, greater research effort should be devoted towards developing improved varieties that do not require high inputs.

References


COMMENTARY

A CASE FOR PROMOTING URBAN AGRICULTURE AND ENVIRONMENTAL PROTECTION IN SRI LANKA

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Abstract

The growth of urban areas around the world represents a special problem for the environment in terms of exploitation of natural resources beyond the assimilative capacity of the environment. Many cities in Sri Lanka are in a similar situation. One solution to this problem is urban agriculture. It provides a more diversified and fresh food basket for the urban population while managing the urban waste in an efficient and environmentally sound way. Empirical evidence from a recent study in Southern Sri Lanka reinforces this view. The role of agricultural extension in promoting urban agriculture is described.

Introduction

The natural environment can be thought of as that special asset of naturally occurring stock of resources, such as air, water, land, forests, and fisheries which is available to human beings for use. As we utilize these resources to produce and consume goods and services, waste is generated into the environment (World Commission on Environment and Development, 1987). Although the environment has a natural assimilative capacity to absorb waste, and reconvert it into harmless or useful products, environmental pollution and/or damage can occur if more waste is generated than the environment's assimilative capacity.

The growth of urban areas around the world represents a special problem for the environment. By the year 2000, the United Nations Development Program (UNDP) estimates that 50% of the world's population of 6 billion people will live and work in urban areas (UNDP, 1996).

Heavy concentrations of people on limited land in cities and towns result in high rates of exploitation of resources. Urban areas reportedly occupy 2% of the world's land surface, but use 75% of the world's resources, discharging excessive amounts of waste into local and global environments (UNDP, 1996).

One solution to this problem is urban agriculture. Urban agriculture is a significant economic activity, central to the lives of many millions of people around the world. It involves farmers and agribusinesses, both small and large, and provides a diversified and fresh food basket for urban populations living in towns, cities, and metropolises. In addition to its potential to utilize and manage urban waste in an efficient and environmentally sound way (IFPRI, 1989; UNDP, 1996), urban agriculture is having an impact on the nutrition of urban people, particularly the poor (Maxwell, 1993).

In 1995, 21% of Sri Lanka's population of 18.1 million lived in urban areas (Central Bank, 1996). Many of these areas are faced with problems of high population density, improper land use, increased traffic congestion and pollution, lack of green space, and increased vulnerability to
As a result, ecological sustainability of urban areas is threatened (Karunadasa, 1995).

One way of alleviating this situation in Sri Lanka is for urban people to use domestic waste in growing home gardens of fruits, vegetables, trees, leafy vegetables, and ornamental plants, and raising poultry and pigs (Department of Agriculture, 1987). This can not only improve nutrition, but also provide a source of income for lower-income people (Karunadasa, 1995). Large quantities of garbage are generated from homes which need to be used in a suitable manner for lasting benefits to people and the environment.

There is limited information regarding the extent of incidence of urban home waste disposal, and/or factors that might influence promotion of urban agriculture in Sri Lanka. A study was undertaken to fill this void, and provide background for this commentary article.

**Methodology**

The Matara Urban Council (MUC), a major town in Southern Sri Lanka, with a population of 47,883 people was selected as the study site. Six locations with high population density in the MUC were included. A sample of 30 urban dwellers was randomly chosen from each location using lists provided by the MUC. The total study sample was limited to 180 respondents due to resource constraints.

Data were collected by personal interview using a prepared survey containing questions on size and use of land, personal characteristics, leisure time, knowledge-information on urban agriculture, disposal of domestic waste, and mass media preferences. The questionnaire was pretested with 15 urban dwellers not in the sample. Questions were modified accordingly.

**Survey Results**

**Size and Use of Land**

A majority (54%) of the respondents had more than 20 perches (0.05 hectare) of land, and 92% owned their land. While a majority (71%) of the respondents were involved in agricultural activities, only 25% or less of the land in gardens was used to cultivate fruits, vegetables, ornamental plants, and mushrooms, and to raise animals. Home gardening was the major agricultural activity for 88% of the respondents.

**Personal Characteristics**

Females outnumbered males in the sample by a ratio of 6 to 4. Two-thirds of the respondents were between 20 and 60 years of age, and could be classified as the working population. One-fifth of the respondents were below 20 years of age, and 12% over 60 years old.

Employment data revealed that 75% were working in the government or private sectors, 5% were farmers or unskilled labor, and 20% were not working. Employed respondents were asked how many hours of leisure time they had per week. One fifth of the respondents (20%) reported having more than 30 hours of leisure per week, 26% had 21-30 hours, and 54% had 11-20 hours (27%) and 0-10 hours (27%).

**Knowledge-Information on Urban Agriculture**

Nearly 60% of the respondents had some knowledge about urban agriculture, but just over one-half of them were using this knowledge in urban agricultural activities. Furthermore, only 15% of the respondents had received information/advice from the agricultural extension service concerning agriculture, and only one respondent who received the information said it was sufficient.
Disposal of Domestic Waste

Respondents were asked how they disposed off their household garbage. Most (43%) reported placing the garbage on the roadside, 31% put it into a pit, 23% burnt the waste, and 3% dropped it into a stream of water. Given that there is no satisfactory method of pickup, disposal or recycling of domestic waste one can foresee dangerous health and environmental hazards.

When respondents were asked if they used household garbage for agricultural purposes, a majority of them did not, including those who were involved in home gardening or animal husbandry. None of them knew that garbage could be put to use in agriculture, hence they threw it away.

Waste water in urban areas can be used in agriculture. However, only 24% of the respondents used waste water in this manner. The rest removed waste water to roads, canals or streams.

Mass Media Preferences

In Sri Lanka, as in many countries, mass media are commonly used by extension services to disseminate information about agriculture. A majority (70%) of the respondents preferred to receive information about urban agriculture through television. Radio (18%) was the second most preferred source, with leaflets (7%) and newspapers (5%) having a low preference. Reasons why respondents chose television as the most preferred medium were easy access (62%), easy to understand (16%), and no special effort needed (15%). Forty-six percent of the respondents indicated that the most suitable time to watch television programs on urban agriculture was evenings or weekends. Women are free during these periods and can devote time to watch such programs.

Implications

Although this is a limited study of one urban area in Southern Sri Lanka, what was found is probably true of other urban areas in the country. It would appear that the implications of the study can have wider application.

Hilhorst (1984) studied three villages in Matara district of Sri Lanka, and reported that home gardening, animal husbandry, and agro-based industries found in the urban areas had not received much attention from the agricultural extension service of Sri Lanka. However, the results of this study support the notion that urban agriculture in the context of environmental protection needs to be promoted and supported as a public strategy by public institutions in Sri Lanka. This suggestion is based on the following specific findings:

1. People typically had enough land, but only 20% of them were raising gardens or animals.

2. The young and elderly, totaling 32% of the sample, have the potential to actively participate and/or assist with agricultural activities.

3. Nearly one-half of the employed people had more than 20 hours of leisure time per week, some of which could probably be devoted to urban agriculture.

4. While people may know something about urban agriculture most of them were not using this knowledge or being reached with adequate information.

5. Appropriate disposal of household garbage and waste water is non-existent, both on an individual and collective basis, thus providing motivation and potential for an optimal system.

Given the situation found in the study, it is important that the agricultural extension service develops an urban agriculture program to educate the general public about the benefits of urban agriculture in the diet, health, and income of urban residents, and provides information on appropriate disposal and use of domestic waste as
a means of increasing home garden and animal production, while protecting the environment. As shown in the study, television and radio programs were preferred sources of information and could be important in making the public aware of urban agriculture. However, other contact methods and supporting education materials will also have to be used.

It is significant that 80% of the respondents in the study believed that environmental problems can be reduced by doing urban agriculture activities in a systematic manner. It is important that public institutions in Sri Lanka such as the agricultural extension service and agencies responsible for the needed resource infrastructure support this conviction by appropriate development and education strategies.

References


A CASE FOR GLOBALIZING U.S. COLLEGES OF AGRICULTURE

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Abstract

This is a commentary on the rationale for globalizing programs in U.S. colleges of agriculture. Arguments for globalizing undergraduate education, graduate education, faculty experience, research collaboration, and outreach are presented. The principle of integration of a global perspective into all aspects of higher education, research, and outreach in agriculture is described and supported with examples. The authors argue that the globalization of agriculture programs will be a key pathway to continuous improvement of quality at U.S. land-grant institutions in the 21st century.

What is the purpose of international programs in U.S. colleges of agriculture? This is a frequently asked question in the post cold war era because resources for traditional agricultural development activities which were common during the period 1950-1990 are now much scarcer. It may be argued that in these days of shrinking budgets and increased public accountability, all programs, including international programs, need to be evaluated for effectiveness, relevance, and impact. The core thesis advanced in this commentary is that international components are essential, integral, and central to the education, research, and outreach missions of a college of agriculture. The quality of all programs -- education of undergraduates, development of the next generation of scientists as graduate students and post-doctoral fellows, research projects, extension programs, economic development of the state or region, and support of the strategic goals of the agribusiness sector -- is enhanced when they are pervaded by multiple international dimensions. However, the rationale for globalizing each may vary.

Globalizing Undergraduate Education

Why is there a need for globalizing the education of undergraduates in agriculture? The primary reason for existence of a college of agriculture is to provide a quality education as a foundation for lifelong learning. In 1995-96, U.S. colleges of agriculture, forestry, and natural resources awarded 24,246 undergraduate degrees (FAEIS, 1998). The importance of providing a global perspective to such a large number of students and their faculty instructors
cannot be overemphasized. This applies whether students ultimately opt for a career overseas or in the U.S. in production agriculture, agribusiness, education, or professions such as law and veterinary medicine in which they will experience constant interaction with the world’s marketplace. Multinational companies seek employees with cross-cultural and language skills. The ability to speak the other language is an important entree into another culture, and the building of personal bridges and friendships. It is important for students to have an appreciation for the diversity of cultures, history, and customs and learn the agricultural and economic systems of other countries.

Part of a quality education is the introduction of students to an international experience. Currently, U.S. colleges of agriculture need to dramatically expand such offerings to infuse a global perspective into the undergraduate learning experience (Dale, 1997). However, this need is not new. From a near-term historical perspective a major movement toward internationalization of curricula was launched in 1989-90 with the North Central Region Curriculum Committee Project (1989) and the Washington State University Conference on Internationalizing U.S. Universities (1990). A specific example of programs already instituted is Iowa State University, where students have participated in short courses or semester-long experiences in sites as diverse as Costa Rica, Mexico, People's Republic of China, Slovakia, Ukraine, and Uzbekistan.

Research and Science

Why is globalization valuable to research and to training the next generation of scientists? It is increasingly evident that quality science is occurring throughout the world. Governments recognize the link between research and both sustainable economic development and the quality of life of people. Scientific advances can be attained much more rapidly with scientist-to-scientist collaboration irrespective of whether they are in the same building, institution, state, or country. Concurrently, training of future scientists is both quantitatively and qualitatively enhanced. An example might be a U.S. agricultural scientist working closely with a colleague in the European Community, Mexico, Australia, or Japan, following reciprocal exchange visits to each other’s laboratories and classrooms. Alternatively, a graduate student or visiting scientist from another country may spend time in an American college of agriculture. This will not only add to the magnitude and quality of a research effort in the American college of agriculture but, in the case of developing countries, act as a "seed" for the development of strong science and foster a long-term institutional relationship when the individual returns to the home country.

International scientific collaboration can also benefit researchers at U.S. colleges of agriculture when the partner institution has unique techniques, facilities, equipment, or germ plasm. For instance, use of winter nursery research facilities in Mexico and Puerto Rico enabled Iowa State University researchers to expedite progress in corn and soybean breeding. Unique germ plasm exists in every country and serves as a valuable foundation for scientific cooperation. In addition, international collaborative research of animal or plant populations can identify the genetic basis of key production-related traits. For instance, research using Chinese pigs enabled Iowa State University researchers to identify a gene that increases the number of piglets per litter.

Partnerships between institutions can be fostered by making available unique
capabilities, facilities, or germ plasm sources. A publication, "Engaged Globally," (NASULGC, 1993) presents nearly 30 examples of such linkages. More importantly, a college should encourage its scientists to link up internationally in various synergistic manners. This encouragement can take the form of sabbaticals or faculty improvement leaves, short sojourns in other laboratories, hosting of international visiting scientists, and the removal of disincentives that hamper faculty creativity and entrepreneurism as they relate to the international dimensions of their programs.

Globalizing Agriculture Outreach

Why is globalization pivotal to college of agriculture outreach programs? The ultimate goal for the outreach program of a college of agriculture is the economic well-being and quality of life of the citizens of the state, region, nation, and world. International trade is increasingly becoming the economic engine responsible for improving standards of living at home and overseas. Exports can provide a rationale for extension services to take a significant international role. In 1996, U.S. agricultural exports reached almost $60 billion; this does not include agricultural chemicals, pharmaceuticals for livestock, biologics, seeds, machinery, or consulting. A strong case can be made that technology and knowledge transfer to the Pacific Rim region offers a tremendous growth opportunity for commodity grains (wheat, corn, soybeans) and value-added meat. Not only is the United States ideally placed geographically and highly competitive agriculturally, but the countries of the Pacific Rim region, with their growing economies, have the ability to pay for U.S. produced food and animal feed. A second opportunity is the sale of U.S. technology (machinery to germ plasm to "know-how") worldwide, particularly in the countries of eastern Europe and the former Soviet Union, which have similarities to the United States in climate (and hence crops) but whose technological/economic systems require rejuvenation. Outreach efforts include working directly to aid economic/technological development in other countries and, on return to the United States, provision of knowledge in home communities of opportunities and constraints for exports. Another aspect of the outreach effort is attracting foreign companies, particularly the research and development arm, to agricultural research hubs frequently associated with U.S. land grant colleges of agriculture.

Globalization: Paradigm of the Future

Are there caveats to globalizing U.S. colleges of agriculture? Until the early 1990s many U.S. colleges of agriculture relied heavily on federal sources to fund their active engagement in international programs. We think the paradigm for the 21st century will be that international programs will be funded from multiple sources including international, federal, and state government, and the private sector in recognition of the direct benefits of these programs to multiple stakeholders. Relationships between institutions must be based on long-term commitments. When funding is scarce, institutions may use reciprocity or "barter" to build or maintain programs. It should be stressed that much closer and stronger linkages between the international agricultural research centers and colleges of agriculture should be developed and fostered to the mutual advantage of both. Indeed, it may be argued that the ability to feed the expanding human population will only be met through a partnership between U.S. colleges of agriculture and the global agricultural research and outreach system, including the international centers.

Particularly noteworthy in elaborating this new paradigm is the recent work of a national task force on Globalizing Agricultural Science and Education Programs for America. The report of the task force was recently endorsed and adopted by the Board on Agriculture of the National Association of State Universities and Land Grant Colleges as a national road map for globalizing U.S. college of agriculture programs for the next century (NASULGC, 1997). Also, the strategic plan prepared by the International Committee on Organization and Policy (NASULGC, 1997) elaborates on the directions
needed to advance action under this global paradigm.

In summary, we consider that U.S. colleges of agriculture are in a global environment and subject to global competition. To prosper, achieve their mission, and serve their stakeholders, U.S. colleges of agriculture must globalize their programs. In the 21st century globalization will be a key pathway to continuous improvement of quality in college of agriculture programs.

References


Abstract

Using appropriate, research-based, agricultural technologies to promote food security is a major priority for many developing nations. Since farmers differ in their socioeconomic backgrounds, academic levels, learning needs and problems, these technologies must be communicated to them using proven extension education principles and appropriate teaching methods. Seven principles and five technology characteristics related to the transfer and adoption of a new innovation are discussed, and examples given of what could happen when they are observed or violated. To be successful in technology transfer, extension personnel must understand farmers' learning needs, problems, priorities, and opportunities as well as the psychological, process, semantic, physical, and economic barriers to adoption.

Introduction

To alleviate rural poverty by ensuring food security and sustainable improvement in people's well-being, research-based technologies must reach and be widely adopted by farmers. Change agents may know the solution to problems confronting farmers, yet be unable to communicate these solutions if they lack effective communication skills, and do not apply sound extension education principles. These principles emphasize two-way communication between farmers and change agents, focus on farmers' practices and priorities, consider gender and land tenure issues, and enable agents to better understand how farmers make farm and marketing decisions (Mung'ala, 1996; Rudebjer & Temu, 1996).

Developing countries are particularly susceptible to the problems of low agricultural productivity and environmental degradation. These problems can be alleviated if extension education systems have a sound research and technology base, and understand and apply extension education principles to enable farmers to adopt new and improved technology, so that they can reap the economic benefit flowing from these technologies. For instance, Christensen (1983) and Easter, Leitch and Scott (1987) refer to the adverse consequences of soil erosion such as decreased land resale value, loss of soil fertility, sedimentation of streams and lakes, and contamination of water supplies with pesticides and fertilizers. In contrast, extension education programs have been found to enhance soil and water conservation, improve farming systems, aid in transfer of appropriate technology, and develop rapport with and persuade farmers to adopt improved farm practices (Earle, 1993; Kenya Government, 1985).

It is the purpose of this paper to present extension education principles, and the characteristics of new technologies which facilitate transfer and adoption of technology among farmers. Examples from the experiences of the author in extension work are provided to show what happens when these principles are observed or violated.
**Extension Principles Facilitating Technology Transfer and Adoption**

Seven principles that should facilitate the delivery of technology to farmers by an extension system and its eventual adoption by farmers are suggested in the literature.

*Consultation.* Because rural people mistrust outsiders (MacDonald & Hearle, 1984), they will resent agents who take ready-made plans for them to follow without prior consultation. Failure to consult may negatively affect technology transfer. For example, in the last two years, elders of a local African Inland Church (AIC) initiated an agricultural and community development project to address the area's socioeconomic problems. The pastor was not consulted at this stage. The elders, who sought advice from agricultural professionals, were supported by other community leaders from within and outside the AIC. They requested the church’s pastor to provide opening remarks for field days which were well attended. Though the pastor complied, he later told us in an evaluation interview, that the initiative was doomed to fail because, according to him, the elders were nothing more than a clique of relatively rich, close friends who were working without consulting others. We discovered that the pastor was unwilling to support the initiative because he resented being excluded from key decision making and planning.

*Building mutual trust.* In addition to consulting all relevant stakeholders, any mistrust among individuals and/or groups should be removed. A recent interview with a prominent Bahati farmer and community leader revealed that many farmers in the area were suspicious of any one trying to collect money for a community project. They feared that the money might be diverted to personal use. This fear came from past experience with a water development project in which funds were misappropriated by members of a management committee. Consequently, raising money in this community for whatever cause is likely to fail unless farmers are convinced that the organizers are trustworthy.

For technology transfer to succeed, there must be mutual trust between leaders and their followers. Mutual trust must also exist among the leaders themselves. For example, when the Bahati Divisional Extension Officer could not get public funds to train farmers in crop and livestock husbandry, he convinced farmers to take financial responsibility for their training. They collected money and the extension officer successfully conducted the first training session. However, his supervisors did not support the initiative. Instead of commending him for starting a sustainable way of carrying out extension, they frustrated his efforts and forced him to abandon the idea. As the officer later discovered, his superiors were uncomfortable with his increasing popularity among farmers. Furthermore, they suspected he might gain financially, even though he did not keep any of the farmers' money. For successful technology transfer, extensive consultations to remove mistrust between interested parties are essential.

*Establishing rapport with stakeholders.* Farmers and change agents should operate in mutual interest networks by establishing rapport through friendship, and by avoiding any sense of superiority by either party. While evaluating extension projects in Keiyo Marakwet District a few years ago, a young farmer told us that his extension agent, being a high school graduate like himself, could not teach him anything. In this case, the farmer's superior attitude made him unteachable. Farmers also resent advice from agents who adopt superior attitudes (Boone, 1989).

*Being sensitive to farmers' needs, constraints, and opportunities.* Farmers may differ in education, gender, age, ethnicity, needs, constraints, opportunities, and socioeconomic status. A change agent is only human, and may not have an answer for every question that farmers may have. When unable to answer questions, an agent should be willing to suggest alternative sources of answers instead of guessing or giving incomplete or wrong information. The importance of admitting that change agents cannot know everything about agriculture came out clearly in our December
1997 interview with a very successful Bahati farmer who grows passion fruits. The farmer told the author that change agents in the area knew little about passion fruit production, and therefore had nothing to offer him. He claimed that he was teaching agents how to manage the crop, and lamented that they were offering him nothing in return. Yet they were using his teachings to train other farmers without giving him credit. To further alienate the farmer, the agents, he regretted, had a habit of bringing him frequent visitors who not only wasted his time but also trampled on his crops. Obviously, the agents lacked wisdom and diplomacy in their work. A better way would have been for them to ask the farmer whether and when it would be convenient to bring visitors and the number of visitors he could handle. They should also have monitored and discouraged any behavior that was likely to offend their host. In addition, they should have readily admitted their lack of skill in passion fruit production, and assured the farmer that any knowledge and information gained from him would, with his permission, be used to benefit the community, and that they would give him full credit for it. On realizing the importance of growing passion fruits in the area, they should have requested their supervisors to organize short courses or seminars to improve their technical skills.

Using appropriate terminology to teach farmers. Semantics is the study of meaning in words (Kreitner, 1989). When using unfamiliar terminology to explain recommended agricultural practices, one should ensure that farmers understand. Extension education can facilitate this assurance because it encourages change agents to know farmers’ characteristics and to use simple words that express clearly the ideas being communicated. If, for example, there were 100 animals grazing in a particular field and someone said the majority of those animals had a bacterial infection, it would be difficult to know whether the word majority meant 60, 70, 80 or 90 animals unless the actual number or percentage was also given. Proper translation of English into the local language, simplification and choice of words, use of culturally acceptable gestures, and the general appearance of an agent may determine one’s success in establishing rapport with farmers, and in successfully communicating the intended message.

Having good technical preparation and self-confidence. It is easier for farmers to believe the teachings of a person with the right technical preparation and self-confidence. An agent, in one case, was teaching Nakuru farmers how to lay out a tomato seedbed but was uncertain of the recommended dimensions. Her lack of self-confidence made it harder for farmers to have confidence in her teaching.

Being a good listener. A sincere effort to listen and to avoid sexist language will improve communication effectiveness. Our December 1997 interviews with Bahati farmers revealed that most of them were dissatisfied with their agents’ listening skills. Over 80% of them complained that the agents often did not care to find out what their problems were. Yet without knowing problems it is impossible to solve them.

Technology Characteristics Facilitating Adoption

The literature and personal experience have shown that to be more easily adopted, a new technology must have certain characteristics.

Relative economic advantage is the degree to which the technology is perceived to be better than the idea it supersedes in terms of economic profitability, social prestige, physical convenience, low initial cost, lower perceived risk, decreasing discomfort, psychological satisfaction or saving of time. A cheaper technology will be adopted faster than a more expensive one (Roling, 1990). Because farmers want to make money, we should show them how a new technology will benefit them financially. For example, we convinced several Bahati farmers to start growing passion fruits instead of maize because the average gross margin from an acre of passion fruits and from an acre of maize in the area was $6,000 and $200 dollars per year, respectively. Availability and cost also
influence technology adoption. In Kenya, for example, many farmers adopted tractor land preparation, though costly, because the government made tractors readily available to farmers for hire. As an example of how physical convenience influences technology adoption, many farmers in Kenya preferred planting maize and beans in the same hole, against research recommendations, because it was more convenient. They also refused to plant two rows of beans between two rows of corn, recommended by researchers through the Training and Visit Extension System, because doing so required more labor for planting and weeding which was a major constraint during the weeding period.

Compatibility is the degree to which a technology is perceived to be consistent with the farmer's goals and aspirations; sociocultural values, norms and beliefs, and past experiences; needs; and existing farm practices. Technologies compatible with existing farm practices encourage a positive attitude toward change, improve the agent's credibility, and may be adopted faster. A Bahati farmer grew maize on six acres continuously knowing well that it had a lower gross margin than kale. She reasoned that because the farm was far from home, managing kale would be difficult and less compatible with her other work activities.

Trialability is the degree to which a technology may be tried out on a limited scale to determine its efficacy before adopting it on a large scale. For instance, artificial insemination can be tried with a few cows in the herd and natural service on the majority. This enables the farmer to test suitability and efficiency of the new technology. Technologies that can be tried on a limited scale will be adopted faster due to their lower risk to the adopter (Shields, Rannigar & Goode, 1993). A farmer tried to grow 20 acres of maize in Kitale District recently but lost the crop due to drought. A second farmer sowed 100 acres of wheat in Mau Narok but excessive rain destroyed the wheat. If these farmers had grown the crops first on a smaller scale, they would have avoided crippling losses.

Complexity is the degree to which a technology is perceived to be relatively difficult to understand and use. Technologies that are more complex to understand and use have lower rates of adoption. A young Bahati farmer attempted to keep pigs without knowing what that entailed. He consulted livestock professionals on housing and feeding but later wondered why his weaners were experiencing unusually low growth rates. He had neglected regular control of internal parasites. For him, swine production was a complex technology that required a thorough understanding for effective implementation.

Visibility or Observability is the degree to which the results of a technology are visible or observable. The more viable a new practice is and the easier its results are to observe, describe, and communicate to others, the more rapidly it will be adopted. Material innovations and concrete ideas that are easily observable are adopted faster than less concrete ones. Some young Bahati farmers started farming after seeing their neighbors’ success. Those we talked to were motivated by the success of farmers who had built costly residential houses or bought new vehicles with income from four acre vegetable plots.

Applying Extension Education in Agriculture

Knowledge and application of extension education principles help in determining farmers' needs, constraints, priorities and opportunities; teaching farmers the value of improved agriculture; recommending suitable crops and livestock for different agro-ecological zones; encouraging adoption of appropriate technologies, and evaluating farmers' reactions and attitudes towards development projects. It is also helpful in raising farmers' involvement in project identification, planning, implementation, and evaluation as well as persuading respected community leaders to legitimize and support viable development projects.

Generally, farmers act on the advice and suggestions of a person they know and like, and whose knowledge they respect. This must be an individual of considerable personal integrity who will answer questions only when certain
that the answer is correct. Bahati farmers, for example, had unfavorable opinions regarding most of their area extension agents, but they were full of praise for their divisional extension officer whom they considered knowledgeable, honest, reliable, helpful and deeply committed to his job. Good agents listen thoughtfully to farmers' opinions before suggesting changes. They develop programs that weave technological improvements into the existing culture instead of trying to make radical changes. For example, soyabean production in Bahati was conveniently introduced as a substitute for culturally valued foods in that community: soya milk was presented as a replacement for cow’s milk, soya drink as a replacement for tea and coffee, while the plant’s nitrogen-fixing properties were presented as a partial substitute for fertilizer.

Change agents who know and apply sound extension education principles in their work have a better understanding of farmers' needs as well as the characteristics of a new technology that affect its rate of adoption. When well applied in farmer education, extension principles improve the transfer and adoption of appropriate agricultural technologies. The adoption of these technologies can increase farm productivity and consequently improve farmers' food security and living standards.

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TOOLS OF THE PROFESSION

Book Review


Words such as “participation” and “inclusion” have become commonplace within the rhetoric surrounding theoretical models of change (Argyris & Schon, 1996; Chamala & Keith, 1995; Checkland & Scholes 1990; Marrow, 1969; Stringer, 1996; Vijayaragavan, Singh, Singh, Patil & Khanduri, 1996; Whyte, 1991). Whether we are discussing changes within our organizations, communities or governments, we now rarely contest the once radical idea that input is important from those persons affected by or involved in the changes. Regardless that change theory has embraced a participatory approach, an annoying gap remains between theory and practice. Implementation of participatory approaches is vulnerable to questions of efficacy and application.

The value of a theory independent from its applicability is questionable. A theory exists in the practices and discourses of those who use it to understand and act effectively with respect to some aspect of the world.

Therein lies the power of the Mortiss and Chamala guide. Grounded in theoretical assumptions of adult learning, group dynamics, and participatory action management, the authors provide a step-by-step guide to implementing a model of participative action management. The guide and the learning units were published as a joint project of the University of Queensland and the Queensland Department of Primary Industries for the National Soil Conservation Program of Australia. Although the subject matter is land care management in Australia, the strategy given is not limited to any one discipline or geographic region. The guidelines and strategies provided allow for easy adaptation to many situations and challenges.

The philosophy underlying both the training guide and the set of learning units that accompany the guide is that change can take place through the organized activities of community groups. Chamala and Mortiss posit that community action groups are key to achieving sustainable use of land and water resources at the local level. Community groups have been effective in the battle to save Australia’s eroded farming and grazing land. Witnessing these successes, governments, government agencies, rural interests, and conservationists increasingly see community groups as a focus through which information, services, and funds from government and non-government agencies can be drawn together and directed for community action. This new framework or model for the delivery of services and the implementation of policies at the community level is the Participative Action Model (PAM). PAM is based on the social learning process and the empowerment of people and communities.

PAM is Chamala’s and Mortiss’ basis for the training program. The purpose of the guide is to equip a leader/coordinator to lead a program of training sessions in group management for people involved in land care. Their goal is to help readers develop the skills and the knowledge required to work effectively with others for a common goal.

The focus is on learning. However, Chamala and Mortiss stress “active learning” and participation. They invite the reader not simply...
to read, but to do, think, experiment and then share their knowledge. Although the last step of PAM is appropriate evaluation and documentation of progress, Chamala and Mortiss remind the reader that evaluation of action plans is a continuous process, and accountability to all stakeholders is crucial.

Their emphasis on reflection answers one valid concern of many who are enticed by the promises of a new and successful change model, yet wonder if it “truly works.” If Chamala and Mortiss were to leave out the reflective, critical component of the model, then the training guide for collaborative decision making would soon be translated into practices which would themselves become institutionalized and lose much of their original power. Therefore, practitioners of PAM must continue to question the practices, language, and power relationships implied in the way the institutions of land care management function.

The guide is designed to be used in conjunction with chapter reprints (called learning units) from the authors’ book Working Together for Land Care: Group Management Skills and Strategies. Each of the 15 chapters of the training guide coincides with the reprints. The chapters are arranged in a sequence which is linked to the expected pattern of development of a group. The first two chapters explain the philosophy of participative action and provide a model for establishing a participative land care group. The next three chapters deal with issues that can be expected to arise in the early life of the group—learning to work together, the development of leadership skills, and the defining of rules, roles, and responsibilities. Then follow eight chapters on the “how-to” aspects of group functioning: how to run a good meeting, how to organize activities, how to plan, how to motivate oneself and others, how to communicate effectively on a personal and a public level, and how to find the necessary human and financial resources for land care projects. The last two chapters discuss how to keep the group going after the initial burst of enthusiasm, and how to manage the conflicts that accompany change. Chamala and Mortiss have designed the chapters as independent units, describing objectives of each, with the intention that the novice to the experienced community organizer can pick and choose the most appropriate chapters for specific needs.

Although the training guide and the learning units share the same learning objectives, each one serves a specific purpose to achieve those objectives. The learning units or chapters outline the theories, concepts, and principles. Each chapter is followed by personal and group activities reinforcing diagnostic skills in examining individual styles as well as group process skills. Chamala and Mortiss argue that it is these skills that will enable the individual to manage the various situations one might encounter in planning, implementing, and monitoring and evaluating land care projects.

The training guide provides pragmatic guidelines that can enable even a first-timer to facilitate a meeting. The guide offers notes on adult learning, training, facilitation, and various training techniques. It includes specific advice on how to prepare and conduct the training program and individual sessions. Included in its 15 session plans are master sheets to be copied for everything from motivational sayings to overheads to handouts during the meetings. Outlined in the guide is a specific model that develops the session leader’s role as facilitator for individuals and groups to achieve what it is they wish to achieve, or as the authors put it, provide “leadership to empower others.”

Chamala and Mortiss are transparent in their bias that sufficient power exists at the local level to affect change of global proportions. They assume that those who attempt to use PAM believe in its potential. With their carefully crafted blueprint for participatory action management, they effectively provide the tools to bridge the gap between the promise of theory and the reality of practice.
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