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.
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Reflecting on my first year as editor of the Journal, here are some thoughts:

The number of manuscripts received for consideration in the Journal increased significantly compared to the first two years of publication. It is good to have a larger than smaller pool of submissions to choose from. Naturally, the work of reviewing and editing also increased. But, that is better than waiting on and/or canvassing people to write. Keep sending them in!

As with the first two volumes of the Journal, the articles in volume 3 reflect a variety of interesting topics and situations from around the world signifying both the breadth and depth of work in international agricultural and extension education. At some point, it would be informative and useful to include in the Journal an analysis of the content, author characteristics and regions/countries represented in these articles.

The expanded editorial board has been actively involved in the Journal’s work, particularly policy matters and manuscript review. Our dialogue is continually focused on trying to showcase the scholarship of association members and other professionals in a quality publication.

Many colleagues helped with their critical and timely reviews of manuscripts. Please see their names at page 72. Thanks.

Thanks also to my secretary Sandra Sanders, whose enthusiasm, organizing ability and computer skills are invaluable.

As we look toward 1997 and beyond, a couple of notions for readers and authors to consider:

A vision for the Journal by 2005 was crafted at the March 1996 annual meeting of AIAEE and reported in the association’s newsletter “The Informer” (Summer 1996). Maturity, worldwide representation and circulation, universal access, diverse content, and multilingual print/electronic versions are a few images of this vision. It will take our combined critical thinking and hard work to make this journey. I would encourage you to continue to express your thoughts and ideas in the Journal. Commentary and Tools of the Profession articles provide this avenue.

The issue of sustainable food security for the world’s rapidly growing population has been highlighted once again by the World Food Summit which was held in Rome in November 1996. I would like to feature ideas, suggestions and experiences from association members and readers on the world food issue and the summit as a commentary section dialogue article in the Spring 1997 issue. If you wish to contribute, please send to me by February 15, 1997.

Wishing you all a great 1997, and looking forward to seeing you at the 1997 conference in April.
THE POTENTIAL FOR LINKING PRIVATE AND PUBLIC EXTENSION SERVICES IN BANGLADESH

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Outstanding Graduate Research Presentation

This paper is the outstanding graduate research paper from the Twelfth Annual Meeting of the Association for International Agricultural and Extension Education, Arlington, VA, U.S.A., March 28-30, 1996.

Abstract

Recent literature on international agricultural extension shows a renewed interest in examining the potential for linking public and private extension initiatives. This study was designed to examine the long-term effectiveness of Mennonite Central Committee's (MCC) extension work with subsistence farmers in Bangladesh and the limitations and benefits of linking this work with public extension services. One-hundred and two farmers who received extension support from MCC during the period 1983 to 1986 were sampled. The findings indicate that MCC's past involvement with these farmers is continuing to have a positive economic impact. High correlations were found between MCC extended production technologies and their contribution to net income levels. However, income from MCC extended technologies has declined following MCC's withdrawal. Farmers highlighted the need for continued technical assistance and access to good quality seed. It was concluded from the study that extension activities of NGOs can be linked with government extension services. Possible opportunities to realize such linkages are indicated.

Rivera (1991) noted that extension services worldwide reached "a critical turning point" by the 1980s (p. 3). In spite of the large expenditures associated with the implementation of agricultural extension projects, results generally were below expectations (Ameur, 1994). The optimism that accompanied new extension services after World War II has been replaced by concerns regarding (a) the efficiency and financial viability of public sector extension services, (b) the appropriateness of advocating one extension model for what are often markedly dissimilar national and regional situations, and (c) the assumptions
accompanying agricultural extension programs, including the role of and linkage between public and private sector extension initiatives (Rivera, 1991). Increasingly, extension professionals are searching for new and effective ways to link the best of public and private sector extension initiatives (Maalouf, Contado & Adhikarya, 1991).

Bangladesh is one of the countries where the debate regarding possible linkages between private and public extension has been taking place. In 1977, the Training and Visit System (T&V System) of agricultural extension was introduced in the country with the assistance of the World Bank (Kashem, 1992). The Department of Agricultural Extension (DAE) in Bangladesh now employs more than 12,000 block supervisors, or village extension workers, as they are generally known in T&V Systems. Each block supervisor is responsible for providing agricultural extension services to 1,500 farm families (DAE, 1993).

Theoretically, few Bangladeshis are beyond the influence of the extension service. However, by the DAE's own admission, the T&V System "...has not been particularly successful in Bangladesh as a means of widespread dissemination of technology to meet farmer circumstances and problems" (DAE, 1993, p. 1). This lack of success has prompted the DAE to consider establishing linkages with non-governmental organizations (NGOs) that are actively providing agricultural extension support to farmers (DAE, 1993).

In 1983, Mennonite Central Committee (MCC) Bangladesh, a North American based NGO, modified its extension approach from one of crop demonstrations to working with individual subsistence farmers. Subsistence farmers have, more often than not, been overlooked by agricultural extension programs in Bangladesh, including the government extension service (Kashem, 1992). From 1983 to 1990, MCC's primary emphasis was on diversifying agricultural production among farmers by introducing vegetable crops, a highly profitable cropping alternative. Vegetable crops presented subsistence farmers with opportunities for increasing the cropping intensity of their limited personally owned land. In addition, vegetable crop production enabled farmers to utilize small pieces of land, previously left fallow because they were not appropriate for rice production, and to provide their families with a nutritious food source. Cabbage, cauliflower, tomato, cucumber, and yardlong bean were among the vegetables introduced by MCC. Supporting MCC's extension activities was an active field research program addressing the concerns of subsistence farmers.

Although MCC's primary focus was vegetables, limited assistance was provided in regard to non-vegetable crop production. In 1990, MCC's extension program expanded its focus to place additional emphasis on other agricultural production activities including livestock, fisheries, and fruit and timber production.

Farmers were selected to participate in MCC extension activities if they were able to support their families for two to eight months of a year (months of self-sufficiency) with the income from their own farms. Quantifying farmers' socio-economic status in terms of months of self-sufficiency provided MCC with an index on which comparisons among farmers could be made. Comprehensive baseline surveys were used to determine a farmer's beginning socio-economic status. Total months of self-sufficiency was calculated by dividing total income by the number of adults in the family (a child under the age of 12 years is equivalent to 0.5 adult), then divided by an estimate of basic monthly food costs. Estimates of basic food costs were adjusted yearly to account for inflation and to allow for year-to-year comparisons. Basic food costs increased by 180% during the period 1983 to 1993 (Musser, 1993).

In each of the years between 1983 and 1986 additional farmers were added to the program. Following selection, weekly field visits were conducted by MCC extension workers. Selected farmers received assistance for a period of four years after which MCC support was withdrawn. Throughout this time comprehensive records
were kept detailing changes in the socio-economic status of each farm family working with MCC.

The continued availability of detailed extension records from each of the years that a farmer received extension support from MCC made it possible to revisit former MCC farmers and to assess the long-term impact of MCC extension activities on farmers’ current socio-economic status. Furthermore, the ability to assess the long-term impact of a private sector NGO provided opportunities for highlighting possible limitations and benefits of public vs. private extension linkages in Bangladesh.

**Purpose and Objectives**

The purpose of this study was to examine the changes that have occurred among farmers as a result of their involvement in MCC extension activities. The objectives were:

1. Determine the long-term effectiveness of MCC’s extension activities on raising farm income.
2. Identify factors that have contributed to improving the economic status of farmers.
3. Identify the constraints faced by farmers which continue to limit improved economic performance.
4. Determine possible limitations and benefits of private and public sector extension linkages in Bangladesh.

**Methodology**

The population for this study consisted of 177 farmers selected from a total of 663 farmers who began work with MCC during the period 1983 to 1986. The farmers were selected on the following criteria: (a) the farmer's former extension worker was still employed by MCC, (b) the farmer attempted a minimum of two MCC-assisted projects, and (c) a farmer’s extension files were complete. A stratified random sample of 126 farmers was selected from the population. Sample size was determined at the 0.05 error level (Krejcie & Morgan, 1970). Of the 126 farmers in the sample, 102 farmers were farming at the time of the study. Twenty farmers were employed off-farm and four were deceased. Each of the remaining 102 farmers was surveyed. These farmers were located in one of three main land types where MCC previously worked: (a) 34 saline charland farmers on marginally productive land newly deposited in the Bay of Bengal, (b) 59 medium highland farmers (MHL), and (c) 9 medium lowland farmers (MLL).

The interview survey was a 48-question instrument developed by an MCC researcher and reviewed for content and face validity by three additional MCC research and extension staff. The questions covered a comprehensive descriptive inventory of farm resources, production history, farm management processes, sources of technical assistance, and past and present constraints to farm production. Data were collected using continuous scores and categories. Face-to-face interviews were conducted by a team of two individuals in August/September 1992 and June/July 1993, including the former extension worker who had worked with the farmer and an MCC researcher who was unfamiliar with the farmer. Average duration of the interviews was 1-2 hours.

The data were collected in-country, coded, keyed and sent to the researchers in the USA. The data were analyzed at the Pennsylvania State University using the Statistical Package for Social Sciences (SPSS) using descriptive and correlational statistics.

**Findings**

Following MCC's withdrawal, changes have occurred in the variables impacting farmers' socio-economic status. Family size increased by the equivalent of 0.6 adult units over the farmers' baseline year (1983) with MCC. For subsistence farmers, changes in family size can have a large impact on the economic status of the family. At the time of the study, the average family size was 4.1 adults and 3.0 children. Seventy percent of the school-age children were regularly attending school.
Farmers' total land holdings, including owned and sharecropped land, increased 77% over the baseline year (Table 1). The greatest increase in total land holdings was observed among MHL farmers (87%). Sharecropped land increased in all three areas (Table 2). Charland farmers and MHL farmers increased their sharecropped land holdings substantially, by 134% and 346%, respectively. By comparison, MLL farmers increased their sharecropped land holdings by 28%. The increase in land holdings may indicate both an increase in farmer confidence and income, as well as an increase in large landowner confidence in these farmers. Five of the 102 farmers lost all of their own land and are now solely dependent on sharecropped land.

Musser (1993) reported that 79% of farmers had positive increases in months of self-sufficiency as estimated in 1992-93 when compared with their base year with MCC. By contrast, 67% of all farmers in this study indicated they were economically better off (Table 3). In terms of decline in economic status, Musser (1993) indicated that 18% of the farmers were in this category, which was similar to the 19% of farmers in this study who felt they were economically worse off.

Table 1
Mean and Standard Deviation for Total Acres Farmed per Family

<table>
<thead>
<tr>
<th>Year</th>
<th>Charland n=34</th>
<th>MHL n=59</th>
<th>MLL n=9</th>
<th>Overall n=102</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>Base year (1983)</td>
<td>1.52</td>
<td>0.64</td>
<td>0.64</td>
<td>0.64</td>
</tr>
<tr>
<td>1992-93</td>
<td>2.78</td>
<td>1.91</td>
<td>1.20</td>
<td>0.82</td>
</tr>
<tr>
<td></td>
<td>82%</td>
<td></td>
<td>87%</td>
<td></td>
</tr>
<tr>
<td>Percentage change</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 2
Mean and Standard Deviation for Total Acres Sharecropped per Family

<table>
<thead>
<tr>
<th>Year</th>
<th>Charland n=34</th>
<th>MHL n=59</th>
<th>MLL n=9</th>
<th>Overall n=102</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>Base year (1983)</td>
<td>0.61</td>
<td>0.60</td>
<td>0.13</td>
<td>0.20</td>
</tr>
<tr>
<td>1992-93</td>
<td>1.43</td>
<td>1.57</td>
<td>0.58</td>
<td>0.73</td>
</tr>
<tr>
<td></td>
<td>134%</td>
<td></td>
<td>346%</td>
<td></td>
</tr>
<tr>
<td>Percentage change</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 3
Perceptions of Current Economic Status as Compared to MCC Base Year

<table>
<thead>
<tr>
<th>Economic Status</th>
<th>Charland n=34</th>
<th>MHL n=59</th>
<th>MLL n=9</th>
<th>Overall n=102</th>
</tr>
</thead>
<tbody>
<tr>
<td>Better now</td>
<td>85</td>
<td>51</td>
<td>100</td>
<td>67</td>
</tr>
<tr>
<td>Worse now</td>
<td>9</td>
<td>30</td>
<td>0</td>
<td>19</td>
</tr>
<tr>
<td>Same</td>
<td>6</td>
<td>19</td>
<td>0</td>
<td>14</td>
</tr>
</tbody>
</table>

Months of self-sufficiency for MLL farmers are not reported individually due to the low number of farmers represented (n=9) and the presence of several extreme increases. However, MLL farmers are represented in the overall report of changes in months of self-sufficiency shown in Figure 1.

Figure 1
Increase in Months Self-sufficiency from MCC Extended Crops
The increase in months of self-sufficiency for the three groups was 4.0 months. The average number of months of self-sufficiency in 1992-93 was 6.6, as compared to 2.6 months in the farmers' baseline year. Charland farmers' self-sufficiency from farm production increased by 2.9 months and for MHL farmers by 3.2 months. MCC extended crops accounted for 1.6 months of the increase for charland farmers; 1.3 months for MHL farmers; and 1.5 months overall (Figure 1). In comparison, in the fourth year of their involvement with MCC, extended crops accounted for 2.0 months of the total increase in self-sufficiency for charland farmers and 3.6 months of the increase for MHL farmers.

Months of self-sufficiency decreased after the farmers' fourth year, suggesting the decline is the result of MCC's withdrawal. However, decreases have been observed between the fourth and fifth years even when MCC's assistance was maintained for a total of five years (Musser, 1993). The decline in self-sufficiency may indicate that farmers have reevaluated their commitment to vegetable production in the broader context of their land, labor, and risk constraints.

New vegetable crops extended by MCC accounted for 23% of agricultural income, even though they occupied less than 10% of the productive land (Table 4). The majority of land used to grow MCC extended crops was on land that was previously left fallow by farmers.

A very low, positive correlation was found between total land holdings and total months self-sufficiency in both the farmers' baseline year (\( r = 0.20 \)) and in 1992-93 (\( r = 0.23 \)) (Table 5). Therefore, the substantial increases in land holdings noted earlier have not translated into expected increases in self-sufficiency. In contrast, a high correlation was found between land used for MCC extended crops and the contribution of those crops to the farmers' total self-sufficiency (\( r = 0.75 \) in 1983; \( r = 0.83 \) in 1986; \( r = 0.73 \) in 1992-93) (Table 5).

The provision of technical information to farmers by MCC was the major component of MCC's extension activities. Of the farmers who indicated their economic status had improved 67% cited increased technical knowledge as the main reason for this positive change (Table 6). Seventy-eight percent of MLL farmers, 68% of charland farmers, and 62% of MHL farmers indicated increased technical knowledge. The next two reasons given were earning more outside income (18%), and the ability to grow more crops (15%).

### Table 4

Percentages of Income from and Land in MCC Extended Crops

<table>
<thead>
<tr>
<th></th>
<th>Charland n=34</th>
<th>MHL n=59</th>
<th>MLL n=9</th>
<th>Overall n=102</th>
</tr>
</thead>
<tbody>
<tr>
<td>% of income from MCC extended crops</td>
<td>23</td>
<td>21</td>
<td>28</td>
<td>23</td>
</tr>
<tr>
<td>% of land in MCC extended crops</td>
<td>10</td>
<td>9</td>
<td>9</td>
<td>9</td>
</tr>
</tbody>
</table>
Table 5
Product-moment Correlations Between Land Use and Months of Self-sufficiency

<table>
<thead>
<tr>
<th>Land</th>
<th>Year</th>
<th>Total Months Self-sufficiency</th>
<th>Months Self-sufficiency from Projects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total crop land</td>
<td>Baseline (1983)</td>
<td>0.20*</td>
<td>0.23*</td>
</tr>
<tr>
<td></td>
<td>92-93</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MCC project land</td>
<td>1983</td>
<td></td>
<td>0.75**</td>
</tr>
<tr>
<td></td>
<td>1986</td>
<td></td>
<td>0.83**</td>
</tr>
<tr>
<td></td>
<td>1992-93</td>
<td></td>
<td>0.73**</td>
</tr>
</tbody>
</table>

* p ≤ .05     ** p ≤ .001

Table 6
Primary Reasons for Positive Change in Economic Status

<table>
<thead>
<tr>
<th>Reason</th>
<th>% of Farmers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Charland n=29</td>
</tr>
<tr>
<td>More technical knowledge</td>
<td>68</td>
</tr>
<tr>
<td>More outside income</td>
<td>4</td>
</tr>
<tr>
<td>Ability to grow more crops</td>
<td>26</td>
</tr>
<tr>
<td>Health has changed</td>
<td>0</td>
</tr>
</tbody>
</table>

Lack of money was cited by 65% of farmers as a major constraint to agricultural production (Table 7). A number of studies have reported the serious difficulties faced by Bangladeshi farmers in obtaining agricultural credit (Kashem, 1992; DAE, 1993). Forty-six percent of farmers indicated the lack of good quality seed was a major constraint to agricultural production. Only 15% of farmers in the charland indicated that obtaining good quality seed/seedlings was a problem; whereas 64% of medium highland farmers responded similarly. The ability of charland farmers to obtain seed is related to their proximity to an existing MCC extension area. Vegetable seedlings are regularly available in markets in current MCC areas from extension-supported farmers.

Forty-eight percent of farmers responded that the lack of access to quality seed was the major reason for not growing MCC extended vegetable crops (Table 8). Poor markets (5%), weather (3%), irrigation (3%), and pests (3%) were cited much less frequently as reasons for not growing MCC extended crops.

Only 40% of the total new vegetable crop production initiated by farmers while working with MCC was maintained after MCC’s withdrawal. Fifty-nine percent of vegetable production was maintained by farmers in the charland; 29% by MHL farmers; and 33% by MLL farmers.
Table 7
Major Agricultural Production Constraints

<table>
<thead>
<tr>
<th>Problem</th>
<th>Charland n=34</th>
<th>MHL n=59</th>
<th>MLL n=9</th>
<th>Overall n=102</th>
</tr>
</thead>
<tbody>
<tr>
<td>Money</td>
<td>82</td>
<td>59</td>
<td>44</td>
<td>65</td>
</tr>
<tr>
<td>Quality seed</td>
<td>15</td>
<td>64</td>
<td>33</td>
<td>46</td>
</tr>
<tr>
<td>Technical knowledge</td>
<td>15</td>
<td>59</td>
<td>33</td>
<td>43</td>
</tr>
<tr>
<td>Draft animal</td>
<td>21</td>
<td>22</td>
<td>11</td>
<td>21</td>
</tr>
<tr>
<td>Irrigation</td>
<td>21</td>
<td>18</td>
<td>33</td>
<td>21</td>
</tr>
<tr>
<td>Land</td>
<td>27</td>
<td>7</td>
<td>33</td>
<td>16</td>
</tr>
<tr>
<td>Plow</td>
<td>15</td>
<td>10</td>
<td>0</td>
<td>11</td>
</tr>
<tr>
<td>Sprayer/pesticide</td>
<td>30</td>
<td>0</td>
<td>0</td>
<td>10</td>
</tr>
</tbody>
</table>

Table 8
Reasons for Not Growing Major MCC Extended Crops

<table>
<thead>
<tr>
<th>Reason</th>
<th>% of Farmers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality seed</td>
<td>48</td>
</tr>
<tr>
<td>Land</td>
<td>18</td>
</tr>
<tr>
<td>Time</td>
<td>17</td>
</tr>
<tr>
<td>Markets</td>
<td>5</td>
</tr>
<tr>
<td>Weather</td>
<td>3</td>
</tr>
<tr>
<td>Irrigation</td>
<td>3</td>
</tr>
<tr>
<td>Pests</td>
<td>3</td>
</tr>
</tbody>
</table>

In regard to technical knowledge, 43% of farmers indicated that the lack of technical knowledge is a major constraint to agricultural production (Table 7). This is supported by the finding in Table 9 wherein 56% of the farmers indicated that following MCC’s withdrawal they did not have a source of technical assistance. Only 9% cited the government as their source of technical assistance. Studies have indicated that government block supervisors play a limited role as information providers. Islam (cited by Halim, 1991) reported that 55% of contact farmers do not know their block supervisor. Similar findings have been reported in other studies. Kashem (1992) reported that small farmers had the greatest contact with fertilizer dealers and the least contact with block supervisors. Interestingly, 24% of farmers indicated they continued to receive technical assistance from MCC. Again, this finding is related to the proximity of charland farmers to a current MCC extension area. Only 15% of charland farmers indicated the lack of technical knowledge was a problem, as compared with 64% of MHL farmers (Table 7).
Conclusions

MCC's Subsistence Farmer Program is having a continued positive impact on many of the farmers who have been involved in the program. The provision of technical support for vegetable production has provided farmers with an important nutritional and economically profitable cropping alternative. Although former MCC farmers continue to be dependent on non-farm income sources to support their families, the increase of 4.0 months of self-sufficiency, noted in this study, represents an important improvement in socio-economic status for this group of farmers. Additionally, the high correlation between area of land used for vegetable production in MCC projects and contribution to total months of self-sufficiency indicates that MCC was able to effectively extend vegetable production to farmers. Furthermore, it demonstrates the effectiveness of face-to-face extension contact with farmers. Questions regarding the transferability of this extension approach remain unanswered.

Following MCC's withdrawal the contribution of vegetable crop production to total self-sufficiency levels has declined, indicating farmers' continued need for extension support. The important finding of this study that farmers perceived a continued need for technical support and access to high quality seed highlights the need for MCC to further examine its role in addressing post-extension-involvement activities. Possible program modifications could include providing continued, but limited, technical assistance to formerly receiving full MCC extension support farmers and placing more emphasis on establishing private seed dealers in former extension areas.

The low correlation between total land holdings and increases in self-sufficiency levels highlights the potential for extension programs to further assist subsistence farmers find ways to increase productivity from other segments of their farming system. It also points to the difficulties farmers experience when sharecropped land comprises a large percentage of the total land farmed. Farmers in Bangladesh often derive only marginal economic benefit from sharecropped land due to inequitable land tenure arrangements. As indicated in this study, opportunities exist for assisting farmers to find strategies to maximize the economic benefit from personally owned land.

The study also raises questions regarding the ability and/or willingness of NGOs, like MCC, to provide long-term extension services and infrastructure support. Although the provision of long-term extension assistance and

Table 9
Source of Agricultural Technical Assistance

<table>
<thead>
<tr>
<th>Source</th>
<th>Charland n=34</th>
<th>MHL n=59</th>
<th>MLL n=9</th>
<th>Overall n=102</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>14</td>
<td>85</td>
<td>22</td>
<td>56</td>
</tr>
<tr>
<td>MCC</td>
<td>71</td>
<td>0</td>
<td>0</td>
<td>24</td>
</tr>
<tr>
<td>Government</td>
<td>3</td>
<td>5</td>
<td>56</td>
<td>9</td>
</tr>
<tr>
<td>Businessperson</td>
<td>6</td>
<td>5</td>
<td>22</td>
<td>7</td>
</tr>
<tr>
<td>Other</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>
infrastructure development is the mandate of the government, this study indicates that only a small fraction of former MCC farmers are currently being reached. Should, however, the government extension service be restructured, potential opportunities exist for more closely linking the activities of both public and private extension efforts. The provision of extension assistance to farmers previously supported by NGOs and the development of seed supply networks that are accessible and affordable to subsistence farmers represent two tangible areas where linkages between public and private extension activities could provide important benefits. However, in the absence of a reorganized government or NGO extension approach, farmers are likely to continue to experience the production-related constraints highlighted in this paper.

The debate over private versus public extension services is likely to continue in terms of policy and programming. In the context of this debate, the findings of this study indicate the potential for establishing a dynamic linkage between private and public extension services. NGOs, like MCC, have established themselves as being capable of delivering high quality extension programs and of leading the way in suggesting innovative extension solutions. The flexibility of government services to seek innovative solutions, on the other hand, is often limited. Government extension services, however, are often able to provide longer-term assistance to farmers at a level that NGOs often find difficult to maintain. Emphasizing the strengths of both public and private extension initiatives may begin to more fully address the needs of subsistence farmers.

References


AGRICULTURAL EXTENSION AS A DEVELOPMENT STRATEGY FOR WAR-TORN COUNTRIES: THE CASE OF LEBANON

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Abstract

Large scale civil wars, especially since the Second World War, have plagued resource poor countries. Lebanon is one such country that was devastated by a long civil strife. Agricultural extension is perceived as a major policy instrument to stimulate rural development in the reconstruction process. Selected socio-economic data about farmers and farming systems in Lebanon are presented. A district level public/private extension system is proposed, and steps in administering an effective extension system are suggested.

Introduction

A substantial proportion of large scale civil wars since World War II have occurred in Third World countries (Davis, 1975). The civil war in Lebanon was a result of a breakdown in the political system of the country. Soon after Lebanon's independence from France in 1943, religious groups shared responsibility for ruling the country. Political power was divided among the major religious groups according to the 1932 census. Thus, the president was a Meronite Christian, as it formed the single largest religious group; the Prime Minister and the Speaker of the Legislature were from among the Sunni and Shiite Moslems, as these formed the next largest groups; the Greek Orthodox Christians and the Druze were also given government offices.

This political system worked for many years. However, in the face of growing population and economic inequality, the Moslems demanded a greater role in the country's government. As a result, civil war broke out in 1958. A compromise was reached but the basic political system remained unchanged. A civil war broke out again in 1975. Moslem and Christian groups split into factions, each with its own army. The Moslems fought against the Christians and other Moslems as well; Christians fought other Christians.

When the civil war erupted, other countries became involved. Israel, Syria, Iran and the United States became part of Lebanon's conflict. In 1982, Israel invaded Lebanon to drive out the Palestinian Liberation Organization (PLO), and destroyed much of southern Lebanon where the PLO had been based, and then advanced to Beirut. By the mid 1980s, Lebanon was in a state of anarchy. No government, army or police could maintain order. However, in the late 1980s, the Meronite Christians agreed to a
plan that gave more political power to the country's Moslems, and the fighting stopped in the early 1990s.

It was estimated that the war took the lives of over 150,000 people (Baerwald & Fraser, 1995). The war also created about 600,000 handicapped people, and displaced 800,000 with only a few of them returning to their place of origin (Crom, 1995).

In post war environments, the countries experiencing war are likely to have some common economic characteristics. Collier and Gunning (1995) noted that the economies of these countries have been extremely short of private investment for many years, and that the return from investment is likely to be high. They further emphasized the importance of building public infrastructure to attract private investment, where it is estimated that the rate of return of such investments is as high as 39%.

Though Lebanon does not have a Ministry of Agriculture Extension System, agricultural extension is seen as a policy instrument that the national government can use to stimulate development in the post-war era. Because countries use extension to achieve different objectives, there is no one definition for it. However, in all cases, there is a considerable emphasis on the use of extension for the development of human beings to increase their capacity for rational decision making (Roling, 1990). Ban (1986) noted that extension often transfers technology from researchers to farmers, advising and educating them on the decisions they make to stimulate rural development.

Extension service is not new in the Lebanese development program. The extension department was first organized under the Ministry of Agriculture in 1954 to improve citrus and poultry production (USDA, 1965). After a considerable improvement in extension programs, this service was discontinued during the civil war in the early eighties. However, a form of private extension service is run by companies to promote the use of certain agricultural inputs. A 1995 survey to assess socio-economic characteristics of Lebanese farmers indicated a high demand for a much more comprehensive extension service (Betru, 1995).

Objectives

The general objective of this study is to enable decision makers to plan the future of extension in Lebanon given its re-emerging status, and secondarily, to illustrate a process for extension professionals in other settings to consider, given their situations. More specifically, the study (a) presents selected socio-economic data about farmers and farming systems in post-war rural Lebanon, (b) proposes an extension system, and (c) suggests guidelines in administering a strong extension system in Lebanon.

Methodology

A descriptive research method with the use of a survey technique was employed to collect field data. The survey method is an important fact-finding tool to obtain personal and social information about beliefs and attitudes (Kerlinger, 1986). Areas of largest concentrations of farmers were identified from northern, central, and southern Lebanon. A national sample of 240 farmers was identified by using a standard procedure for sample size determination (Casley & Kumar, 1988), and subjects were randomly selected to be interviewed. A procedure was followed to obtain a proportional number of subjects from each region. A questionnaire was developed and pre-tested for the interview.

A second major source of data was the perceptions of 25 officials from the Ministry of Agriculture, mainly regional agricultural directors and extension planners. They were questioned about alternative systems of extension available to decision makers, the process by which extension service should be conducted, and major problems of establishing a responsive extension system in Lebanon. These individuals were interviewed at a workshop sponsored by the World Bank and the Ministry
of Agriculture entitled "Decision Making in Agricultural Extension: Applications and Principles", held at the American University of Beirut in March 1996.

Data were analyzed using simple frequency distributions and percentages. Furthermore, a review of literature as a source of secondary data was incorporated in the analysis.

Results and Discussion

Lebanon encompasses 4,015 square miles. It is located on the eastern shore of the Mediterranean Sea with a population of about 4.5 million. It has a mild climate, an open social environment and Western-style economy.

The Lebanese government considers the "village" (municipality) as the smallest administrative unit with the 'Moukhtar' (mayor) as the administrator elected by the villagers. The "Cassa" is the next largest administrative unit in the Lebanese government structure, similar to the county in the United States. The "Mohafazah" is the largest administrative unit at a regional level. There are 5 administrative regions, 22 Cassas, and 1,982 villages (Mousawi, 1983). The city of Beirut is in the Mount Lebanon administrative region.

According to the Hariri Foundation (1987), 15% of the population lives in rural areas while the remaining are urban dwellers. About one third of the population receives income from agriculture and related activities. Agricultural activities are restricted by the country's predominantly mountainous topography which limits the development of farmland.

One fourth of the farmland is used for crop production; the remainder is mainly rangelands for migratory flocks of sheep and goats. Of the cultivated area, more than one-half is terraced. The population pressure on the land is great with about 1,000 persons per square mile. Land holding is characterized by small farms.

Crop production is either rain-fed (80%) or irrigated (20%). Rain-fed crops are grains and pulses, while vegetables and fruits are grown with supplemental irrigation. Wheat and olives are the major crops in the north taking over 50% of the cultivated land, followed by grapes and other fruits. Vegetables, wheat, grapes, tobacco, sugar beets and pulses like beans are widely grown in eastern and central Lebanon. The production of vegetables under controlled environments such as plastic houses is gaining importance.

Agriculture contributes 20% of the Gross National Product, with 80% accruing from non-agricultural sectors, mainly services. Citrus fruits and apples are the main agricultural exports.

Lebanon is a net importer of agricultural commodities. Grains, meat (or live animals), cotton, wool, hides, and skins are among the major agricultural imports.

There are different forms of agribusinesses in the country. They include agricultural input companies, farm machinery dealers, and modern poultry farms. Sugar beets production and processing is an example of a vertically integrated agribusiness in the country.

Problems of agricultural production in Lebanon are diverse. Agricultural land has been drastically reduced as the result of growing urbanization; zoning of rural and urban regions is inadequate; the cost of land rent has increased drastically in the last ten years; farm lands are small and fragmented; capital investment in agriculture is low; very limited credit is available from commercial banks and individuals, and only at high interest rates. This situation is even worse for small farmers who cannot provide the credit guarantees required by creditors (Achour, 1994).

Farmer Interview Data

The survey results indicated that the average family size in rural Lebanon was seven. Sixty-six percent of these families had only one member working on the farms. Twenty three percent of the interviewed farmers were
illiterate, 40% had an elementary education, and the remaining 37% were above secondary school, including technical and university education. Women constituted 60% of the adult illiterates. A great majority of the farmers (75%) had farmed for over ten years. Only 14% of the interviewed farmers were members of agricultural cooperatives.

The survey indicated that 34% of the farmers engaged in non-agricultural activities for additional income. The non-agricultural component constituted 53% of these households' incomes.

Land tenure patterns indicated that 23% of the farmers had land of their own; 27% were renters, and the remaining 50% practiced mixed ownership. Fifty percent of the interviewed farmers operated on less than five hectares of land. In general, there were more vegetable farmers than either fruit or cereal producers.

Ranking of agricultural production problems by the interviewed farmers showed that marketing was at the top of the list. The specific agricultural marketing problems include: lack of accurate, timely market information, processing, handling, and contracting. Other agricultural problems and their relative importance ranked from high to low include: government support in terms of financial, technical and agricultural policy particularly in foreign trade; plant diseases; and availability of irrigation water and agricultural land.

The aftermath of the civil war was visible everywhere in Lebanon. Farm roads, secondary schools, small scale industries and establishments were reported not adequately available for the villagers' daily living. However, worship sites, elementary schools, shops and tractors were abundantly found.

Practically all the interviewed farmers expressed strong needs for farm information and advice. Ninety-five percent of the farmers agreed to collaborate with scientists from the American University of Beirut for research and extension activities on their farms.

Ministry of Agriculture Officials Interview Data

Extension planners and regional directors of the Ministry of Agriculture (MOA) were interviewed during a workshop held at the American University of Beirut. Responses indicated that extension should be decentralized, and that clientele should share the cost of extension programs with the government. MOA officials also recommended that agricultural faculties in the Lebanese universities, agribusinesses, special project implementation units, and village administrative councils need to be encouraged to provide extension services.

When asked to rank major rural development problems in Lebanon, MOA officials identified agricultural marketing, agricultural policy, the conservation of natural resources, the establishment of credit institutions, strengthening the extension system, and fighting rural out-migration. Lack of technical personnel, a clear extension mandate, budget, and facilities were indicated as problems of the Ministry of Agriculture in establishing an effective extension system.

Analysis of Selected Literature

Analysis of literature about the possible participation of institutions suggested by MOA personnel to provide extension services indicates that agribusinesses were involved most frequently. The major forms of agribusinesses include:

1. **Processors**: Agricultural processors such as sugar, vegetable and fruit conserve factories are operating very well in Lebanon. They are interested in obtaining raw material according to planned schedules. An interesting example of an extension service provided by processors is given by Onyango (1987); in Kenya sugar companies offer sugar cane farmers various incentives.

2. **Input Companies**: These are generally involved in the promotion and sale of
agricultural inputs such as chemicals, fertilizers and farm machinery. The sales and promotion agents of input companies are generally motivated and efficient. However, they are criticized for a lack of objectivity, and a tendency to focus on large farmers, neglecting small farm units that also need extension services (Arnon, 1989).

**Exporters**: Companies that export agricultural commodities frequently provide extension services to producers. For example, Rice (1974) noted that the United Fruit Banana Company in Ecuador provides improved practices and required inputs to the growers. A similar pattern can be used in Lebanon with apple growers that produce this major export.

4. **Commodity Boards**: This form of agribusiness does not exist in Lebanon, but is reported to be potentially useful. The focus of such boards is on the marketing of a single high value commodity, such as apples in the case of Lebanon. Swanson & Claar (1984) indicated that, in such systems, production and marketing is fully organized and vertically integrated.

**A Proposed Extension System**

Lebanon is a net importer of food crops. Thus, expanding the commercial production of such crops as sugar beets need to be encouraged. For example, tax policies can encourage sugar manufacturing companies to help sugar beet farmers increase their production to specified qualities.

Second, special project implementation units can be encouraged to provide extension services in the rural areas. These are usually donor-assisted projects for a particular area that focus on a set of production problems. An example is the United Nations Integrated Development Program in the northern region. This unit is responsible for extension activities in the whole district (Cassa) of Hermel in the Baalbek Administrative Region.

Third, agricultural faculties in Lebanese universities can provide pre-service and in-service training for agents involved in development programs. The universities with agricultural programs in Lebanon are the American University of Beirut, Saint Joseph University and Beirut University College. Universities can also serve as sources of technical subject matter expertise.

Fourth, networks of village administrative councils particularly at district (Cassa) level can provide flexible, decentralized extension services that would attract active participation of local residents. Since farmers' associations and agricultural cooperatives are not well developed in the rural areas, utilizing the initiatives of local administrative councils in rural areas can serve the interests of farmers and the non-farm population dependent upon agriculture.

The Cassa is considered the feasible unit to offer extension services from the standpoint of the administrative unit's economic characteristics, geographic size and number of residents. Each Cassa can be encouraged to establish an Extension Program Planning and Implementation Council (EPPIC) proportionally representative of villages within the Cassa. The EPPIC determines extension programs, the number of staff and budget, and negotiates the proportion of costs to be covered by the government and other cooperators. Institutions such as agribusinesses, faculties of agriculture, development banks and non-governmental organizations can be encouraged to be represented in EPPICs. The number of EPPICs in a Cassa can be adjusted depending on the population to be reached and diversity of extension programs. The extension activities of the Cassas can be coordinated and supervised by the regional offices of the Ministry of Agriculture and the headquarters in Beirut. Therefore, a decentralized Cassa-oriented extension service is perceived to be the most feasible approach that combines private individual and commercial initiatives and government interests.

**Proposed Administrative Guidelines**

Guidelines are suggested to administer a strong
extension system. Extensive literature concerning this issue is available in USDA (1945) and ICA (1952). Specific guidelines to administer an effective extension system include:

1. Make available benefits of extension to all people regardless of class, ethnic background or religious affiliation (Maunder, 1972). In this way, extension as an instrument for development of a country torn by civil strife can further contribute to a nation's social reconstruction.

2. Establish a legal basis and a basic charter for the extension service. A legal charter assures that the parties responsible for extension services can continue to maintain their status and obtain funds for extension activities. Alternatives are available to policy makers to determine the institutional base of the anticipated extension system selected from the Ministry of Agriculture, faculties of agriculture, agribusinesses (processors, input companies, exporters, and commodity boards), cooperatives, farmers' associations, agricultural credit institutions, special project implementation units (non-governmental organizations), village administrative councils, and private consultants. Field data reported earlier encourage national extension planners to guide agribusinesses, faculties of agriculture and special project implementation units in conducting extension services with the Cassa EPPICs forming a network of local extension systems. The legal charter should clearly indicate the degree of involvement of the government in the Cassa-oriented extension system, and foster the development of an organizational plan. An organization plan for extension opens lines of communications among the Cassa extension offices, regional officials and headquarters administrators of the Ministry of Agriculture; and indicates the roles of agribusinesses, faculties of agriculture and non-governmental organizations.

3. The parties involved in the extension service, in this case, the Cassa EPPIC and the regional and national agricultural extension planners, must know the rural peoples' farm situations, living conditions, needs, attitudes toward adopting new ideas and capacities to co-invest in extension from farm and, perhaps, non-farm sources of income. The field data indicate that agriculture contributes only 20% to the Gross National Product. On top of that, 34% of farmers engage in non-farm activities for additional income. This implies that the extension service should focus not only on agriculture, but also on activities such as human nutrition and other agriculturally related income producing goals.

4. Decide whether Cassa EPPICs should concentrate on a few problems in depth, or lightly touch on many problems. Choosing between these alternatives or a combination is not easy. However, selecting a few problems for which results can be released quickly is probably feasible. As experience is gained more resources become available, solutions to other pressing problems can be sought. After the value of extension has been demonstrated, and its acceptance by key leadership assured, extension planners can give more consideration to longer term agricultural problems.

Extension programs should be prioritized by carefully gathering information from both extension personnel and extension clientele. The Cassa EPPIC provides an effective site for data gathering and analysis. For example, interview data from both farmers and personnel of the Ministry of Agriculture indicate that agricultural marketing is the major problem. Therefore, marketing information to assist in decision making related to import substitution and export commodities could be a start in developing Lebanon's renewed extension system.

5. Arrange to obtain and train extension staff in subject matter and in teaching methods. Extension personnel without a high degree of education can contribute. However, the less training an extension worker has, the more technical supervision must be provided. A strategy to attract outstanding men and women is to recognize extension as a profession. This implies offering salary and fringe benefits
commensurate with education level and experience. These employees will see the career opportunities and will improve through self-study and analysis as well as through formal advanced training.

6. Develop integrated extension education programs. An extension program includes educational projects that reflect people's needs and resources and a plan for allocating additional human and other resources. It plans for coordinating disciplines to assure cooperation and smooth exchange of information. It outlines the results expected from the planned extension effort; it estimates the time to implement major actions and outlines dynamic relationships among activities.

Summary and Conclusion

Problems of rural communities in a developing country context are diverse and complex. Problems are even more difficult when the country comes out of a long, devastating civil war. The rural reconstruction process is costly and time consuming. Agricultural extension is proposed as a major development strategy to address such problems. Three extension-system options for the Lebanese rural reconstruction program include: (a) a government sponsored extension system, particularly if increased equity is a primary goal, (b) a private sector extension system if flexible management and direct interaction with farmers is desired, and (c) a mixed, public-private, extension system that is responsive, intensive, flexible and politically influential. Neither the public nor private sector in Lebanon is established to conduct extension services independently. The third option, namely a mixed public and private system, is perceived to be the most feasible option. This can be achieved by adopting a Cassa-oriented extension system that is decentralized and responsive to both private entrepreneurial initiatives and societal goals. Professional principles can guide the administration of a similar system in other countries as well that are recovering from civil strife.

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PHILOSOPHICAL REFLECTIONS ON THE NATURE OF ENDOGENOUS KNOWLEDGE IN RWANDA

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Abstract

Articles related to endogenous knowledge normally deal with particular, mostly technical aspects of this knowledge as if it has no philosophical basis. However, it is imperative to have an understanding of its philosophical basis to understand and validate this knowledge. In this article, a brief introduction of Rwandan philosophy as it relates to knowledge is given, followed by its application in interpreting discussions with farmers on the topics of knowledge, its individuality, and gender specificity, using agroforestry knowledge as a specific example.

"If you have knowledge, you already have food." (Katagiri, 1988, p. 69)

In Kinyarwanda, the language of Rwanda, knowledge, experience and science are all incorporated in the concept contained in the word ubumenyi. Science is understood as the possession of knowledge as contrasted with ignorance or misunderstanding; it is, therefore, different from science as understood in Western epistemology. To have ubumenyi implies having knowledge of (or experience with) a plurality of notions/objects because, according to Kagame (1958), a simple knowledge limited to one object or a limited number of notions cannot be constituted under the term ubumenyi. Intelligence is the instrument of knowledge with which people perform actions in order to obtain and generate knowledge. According to Kagame (1958), these actions include the ability to think (in the sense of remembering), to compare and to invent. Balibutsa (1985) added to these the notions of to think (in the sense of reflecting), to analyze, to explain, to meditate and to understand.

While Kagame's seminal work on Rwandan philosophy helped one to understand what knowledge is (or is not), this information does not explain differences in knowledge (and the content of that knowledge) between people, the ways in which knowledge is obtained, or how people enhance their knowledge over time. Nevertheless, such understanding is imperative to determine and understand the processes of agroforestry knowledge/technology generation (the central goal of the author's research), and was the main strategy recommended at an international seminar on agroforestry at Kigali, Rwanda, to further agroforestry practices in Africa (CTA, 1988).

An important research question for the author (den Biggelaar, 1994) was whether the scientific philosophical understandings of knowledge as described by Kagame (1958), Balibutsa (1985) and Jahn (1990) were similar to what farmers understood by the term. To answer this question, a number of community and focus group interviews were held with farmers in Kibingo district (Karama municipality, Gikongoro) and Maraba and Simbi districts (Maraba municipality, Butare) in southern Rwanda. An initial series of 13 community interviews, open to all persons, was held to discuss preliminary findings on the nature of the agricultural systems in the area, the role of trees in the landscape, and the gender differentiation in knowledge about tree cultivation. A second series of eight focus group interviews was restricted to a group of 44 locally identified tree experts and their spouses, and focused in...
particular on questions regarding the nature of knowledge, particularly agroforestry knowledge, what it means to be knowledgeable about something, and how one can become knowledgeable.

What is Knowledge and How Does one Obtain Knowledge?

Farmers perception of knowledge as having four aspects, namely intelligence, experience, communication and putting information into practice. Some farmers considered knowledge to be "natural" (a gift of God), some stated that it results from experience, while others suggested it is obtained by being well-informed and having gone to school, although older farmers especially considered knowledge learned in school to be "artificial knowledge" as it is not applicable and useful for economic survival and social functioning in society. Whatever the source of knowledge, the information needs to be put into practice for it to be recognized as knowledge. For example, the knowledge of a healer is revealed through her/his actions as a healer. Thus, a person will be recognized as a healer if she/he is capable of curing certain diseases successfully with a number of patients. A farmer having planted and carefully tended many species of trees will be recognized as being very knowledgeable about these trees. Thus, knowledge manifests itself through one's actions.

Being knowledgeable about something means knowing its utility, holding its secrets and showing a sustained interest in it as revealed through one's actions as described above. However, being knowledgeable about something depends not only on what one knows, but equally on how one can explain that knowledge to another person and provide sufficient and reliable information so that the other person can successfully apply that knowledge and attain the same benefits. In short, besides knowing facts, real knowledge is first a willingness to do something with these facts, second to put them into practice, and third to communicate one's knowledge about these facts to others. All four aspects have to be present for a person to be recognized as "knowledgeable."

These findings are both startling and interesting, as they are analogous to what Western societies ascribe to their scientists: knowing basic facts, putting these into practice in experiments, communicating the results and the knowledge gained from these experiments in journals and in scientific meetings, and replicability (in that all else being equal, other scientists obtain the same results). However, the level at which Rwandan tree experts, as one category of indigenous scientists, operate and the methods they use are quite different from the methods of researchers trained in the Western knowledge tradition.

Individual Versus Collective Knowledge

The results of the case studies of individual tree experts and discussions with other farmers revealed the differentiated nature of tree and tree cultivation knowledge, both within and between gender and within and without a specific geographic area. During the focus group interviews, therefore, the topic of the nature of knowledge and its differentiation between individuals was discussed extensively. This differentiation did not occur only in the area of agroforestry, but extended more or less to all knowledge. In the words of one participant, "In general, collective knowledge is obtained in school. However, everyone has their own individual faculties which she/he can use according to her/his preferences."

In rural Rwanda, knowledge is obtained primarily through informal training by parents and grandparents, and from learning by doing or experiencing, both of which are individual-centered. Participants acknowledged that some collective knowledge was imparted through informal learning processes as it was necessary for society to function and for people to make sense of their environment. Exchanges of knowledge and information gained from individual experiences are another way of building a collective knowledge base in a community. According to the farmers, such exchanges do take place on a one-to-one basis, but not in a regular and organized fashion. The
consensus view in one of the focus group interviews was that the virtual absence of a mechanism of information exchange was considered a drawback for the development of endogenous knowledge:

"Our knowledge remains diversified because we lack the time and a framework - for example, meetings - where we can inform ourselves of and exchange our respective knowledges. This would allow us to have a common knowledge."

People themselves offered various reasons why their knowledge differs. The differentiation in knowledge starts at birth, as God does not equip everyone equally. In addition to the intellectual abilities obtained at birth, knowledge varies because of the different knowledge inherited from one's ancestors and passed on to parents to children in each generation. People also differ in character, interests and taste. Whether someone becomes a carpenter, a blacksmith, a healer of cow diseases, or a farmer depends to a large degree on both birth and education and training provided by the parents. In addition, recognition in later life as being highly knowledgeable about a certain area, depends upon what one does with the initial information. For example, in the area of agroforestry, some people are more serious in their tree planting activities than others. Some have a feeling for experimentation and research and are constantly tinkering in search of new knowledge and technologies; others do not have such drive and are satisfied with what they have and know. In addition to these personal characteristics, economic circumstances may facilitate a differentiation in knowledge. Considering tree cultivation practices, interview participants opined that knowledge acquisition and experimentation were greatly aided by having a large farm, animals, manure and possibilities to plant and experiment with trees.

Agroforestry Knowledge and Gender

For the identification of local tree experts, an equal number of men and women were asked to rank their fellow farmers on their colline according to their knowledge of trees and tree cultivation using an adaptation of the wealth ranking game (Grandin, 1988). In wealth ranking, three to four respondents are asked to arrange farm households in a community in a number of groups of similar wealth according to local criteria. Subsequently, respondents explain the criteria they used to divide households and the wealth characteristics of each group. The rank of each household given by the different respondents is converted into a score and averaged, so that one obtains an idea of the relative wealth of each household in the community. A similar procedure was used by the author to rank individual male and female farmers (not households) according to informants’ own criteria of what it means to be knowledgeable about trees and tree cultivation. The analyses were, however, done at the household level by combining the scores obtained for husband and wife from the various informants. The decision to combine scores in this manner was based on the statements of numerous informants that if women are knowledgeable about trees, their husbands must also be knowledgeable. These statements may have been inspired by the traditional belief that women cannot admit that they have more knowledge than their husbands (E. Bucyobukiro, a Kinyarwanda linguist and the author's language teacher, personal communication, May 1992). In addition, since knowledge was defined primarily as having many diverse species on the farm, and as this could only be possible through the efforts of the husband, the latter must also be knowledgeable about trees. From the information obtained from the informants during the ranking game, there were some indications that the nature of the knowledge of trees and agroforestry possessed by men and women was different. To confirm this finding and to determine which of the two genders, in the farmers' opinion, was more knowledgeable about trees, one question in the community interviews dealt with the gender aspect of agroforestry knowledge. The discussions related to this question were the most animated and contentious of all community interviews.
A majority of farmers present at the community meetings supported the view that women are more knowledgeable about trees than men. This conclusion was reached in spite of the fact that the vast majority of persons who attended these meetings were male: 286 men and 156 women. The discussion also revealed that men's and women's knowledge of agroforestry is not the same. Men's knowledge related to "big" trees such as Eucalyptus, Grevillea, and Markhamia, the planting and management of trees, the introduction of new species and/or varieties of trees, and decision-making aspects related to species choice, placing, timing of planting, and harvesting trees for timber, fuelwood or stakes.

Women's knowledge focused on species identification, naming of species, and the utility, use and harvesting of tree products for use as 'yeasts' for brewing beer, seasoning, medicine, fuelwood qualities, love potions, etc. As knowledge of the use and utility of trees, particularly for medicinal purposes, is highly valued, and as women are especially skilled in human healing practices, women are considered more knowledgeable about trees than men. However, while there are men with extensive knowledge of healing plants and practices, there are women who know nothing about them. As indicated earlier, knowledge depends on intelligence obtained at birth, education and training by parents, and one's interest and curiosity in discovering and learning about things, possibly leading to being recognized as a specialist. As all these aspects vary between individuals, regardless of gender, knowledgeable and non-knowledgeable persons are found in each group.

**Summary and Conclusions**

There are parallels in what constitutes "being knowledgeable" in the endogenous and scientific knowledge systems. The characteristics that farmers provided to describe "experts" using emic criteria (intelligence, experience, putting information into practice, and communication) are similar to what westerners use to describe scientists and researchers. In both societies, a differentiation of knowledge exists between individuals according to age, gender, abilities, interests, and motivation. Where indigenous experts and western-trained researchers differ is in the nature and content of their knowledge, namely what facts are important to know and what each of them knows, the methods used to generate new knowledge, and the ways to store and communicate this knowledge. It is especially in the latter two aspects, knowledge storage and communication, that the scientific knowledge system excels and the endogenous knowledge system lags. Farmers did recognize the near absence of a mechanism of knowledge communication as a major handicap for advancing their knowledge. However, in the absence of conferences, workshops, journals, information super-highways and other communication technologies, researchers would feel just as isolated and constrained in increasing their own and their discipline's knowledge. Therefore, to stimulate endogenous knowledge generation and technology development, it would be necessary to create appropriate communication networks among experimenting farmers, and between these farmers and the general farm population. To bring this about, there is a need for persons with both endogenous and scientific knowledge of tree species, tree cultivation and agroforestry systems to find new methods to share detailed information with farmers throughout Rwanda in an informative and not a prescriptive manner that treats the farmer and her/his knowledge with respect. Some ways in which this can be accomplished are study clubs mediated, but not organized, by an extension worker or researcher in which farmers discuss problems and jointly work out solutions; community interviews and focus group discussions as used in this research; farmer study tours and exchanges; and virtual reality tours produced, directed and narrated by farmers for farmers using video or other modern communications technologies depicting and explaining innovative practices, ideas or land use systems (den Biggelaar, 1996). The latter would especially be useful when introducing new ideas, technologies or practices to a large audience, or ideas and practices from other regions, countries, or continents.
From the discussions in the focus group interviews, it became clear that tree production knowledge is less valued than tree use knowledge. As women have extensive knowledge of the use of trees for food, medicine, fuelwood qualities, and other purposes, they were recognized as being the most knowledgeable in the domain of trees. Consulting women will be important in the future as, with continuously decreasing farm sizes leading to an increased competition between trees and crops, a greater percentage of total cultivated land will need to be devoted to food crops, which is the responsibility of women, to attain family food security.

Agroforestry projects should, therefore, initially focus on female farmers to convince them of the benefits and the utility of new trees species and agroforestry practices, and subsequently explain to men how to go about planting new species and putting improved agroforestry technologies into practice.

One of the aims of development programs in general, and extension organizations in particular, is knowledge change, which hopefully will lead to a change in practices (Bennett, 1977). But whose knowledge and what knowledge do we want to change, particularly in the face of the individualistic, dispersed nature and content of endogenous knowledge, especially in the area of agroforestry? It should be kept in mind, that, even without research and extension interventions, endogenous knowledge systems are dynamic systems constantly undergoing change and adaptations brought about by ecological, social, economic, and political changes and uncertainties (reactive changes), and farmers' own experimental activities (proactive changes). Secondly, how do we go about measuring knowledge change, especially as views about what is considered valid knowledge differ in endogenous and exogenous knowledge systems? Studies of endogenous knowledge systems and their philosophical basis can provide some answers to these questions, particularly by increasing our comprehension of the nature and content of endogenous knowledge, and the internal dynamics, organization and functioning of the systems. This would enable us to improve the effectiveness of research, development, and extension activities, and the ways in which we measure any changes brought about as a result of these activities. More importantly, the re-evaluation of endogenous knowledge systems will empower, legitimize and enhance existing local capacities for identifying problems and developing solutions, which will be an important step enabling rural people to work towards their own development.

Acknowledgments

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References


Endnotes

1. As knowledge is not natural, inborn or inherent (the meaning of "indigenous" given by the dictionary), I prefer to use the term "endogenous" (developed locally or from within) to describe local people's knowledge.

2. Rwandans consider both animals and people to be sensitive beings, but philosophically they belong to the different metaphysical categories of ikintu (things, i.e. minerals, plants and animals) and abantu (people) (Kagame, 1958). This distinction is made on the basis of differences in attributing intelligence to animals and people. Both animals and people can "know intelligence" (intelligence is the object of knowledge, indicating smartness, cleverness, perspicaciousness), but only people can "have intelligence" (use intelligence as an instrument of knowledge).

3. Tree experts were identified with the help of an adaption of the wealth ranking game (Grandin, 1998). They were defined by the local population as farmers cultivating and/or knowing the usage of a wide variety of ibiti (trees). The latter were understood as "all plants that are not grasses" according to the Rwandan philosophical meaning of the term ibiti (Kagame, 1958).

4. The word farmers in this article refers to both women and men earning a living primarily from cultivating the land.

5. Colline (or hill in English) is the smallest administrative unit recognized by Rwandans, and was used as a community in the ranking exercise.
INSTITUTIONAL LINKAGES FOR EFFECTIVE COORDINATION AND COOPERATION IN PARTICIPATIVE RURAL DEVELOPMENT

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Abstract

A problem seriously limiting the potential impact of development organizations in participative rural development is the lack of effective coordination and cooperation. The problem is outlined, the conditions for its solution discussed and an organizational model suggested that provides an enduring linkage structure between the local community and various development agents. It offers a functional alternative to well-intended but usually only temporarily successful efforts that rely on fortuitous and unstable personal relationships. The basic assumption of the model is that effective coordination and cooperation is only possible when planned on a long-term basis through and with the community.

The Problem

Major players in rural development are local communities and numerous development organizations or agencies functioning as development agents. Problems limiting the potential impact of most development organizations operating within a community are an uninvolved community and the lack of coordination and cooperation, often resulting in a great deal of duplication and, eventually, a largely reduced development impact.

The notion of participation and involvement of the community has gained widespread support in recent years, to the extent that there are indications of a general paradigm shift (Chambers, 1983; Oakley & Marsden, 1990; Röling, 1994). The reason for the growing acceptance of this new paradigm of development can be attributed to its significant advantages over other approaches such as, for example, the technology-transfer model. Advantages include self-reliance and sustainability, wider coverage, and higher efficiency and effectiveness (Cernea, 1987; Oakley, 1991).

Many traditional communities find themselves confused by unplanned, uncoordinated and duplicated efforts of a multitude of development organizations eager to become involved in development in their regions. Very often the focus of their involvement is the same. In rural areas of South Africa, for example, it is not uncommon for three or four development organizations to promote vegetable gardens within the same community without knowledge of the existence and programs of one another. The result is confusion or, at least, a diluted development impact. In commercial and more accessible situations the problem is similar, often with more role players involved and, consequently, an even bigger potential for uncoordinated and wasteful efforts.

One explanation for this unnecessary waste of resources is that the preconditions and possibilities for proper coordination and cooperation are lacking and/or not appreciated by all role players. Some of these preconditions and possibilities are discussed briefly, followed by the outline of
an organizational structure through which effective coordination and cooperation can be institutionalized and thus placed on a sounder and more formalized basis.

**Preconditions and Possibilities**

**Need for Cooperation and Coordination**

The concepts of cooperation and coordination are not totally exclusive. Cooperation usually refers to collaborating in a joint effort or a specific endeavor, while coordination has to do with the proper relation and delimitation of efforts, in such a way as to minimize duplication and maximize complementarity.

The problem of uncoordinated development inputs can be partly attributed to the fact that the scope of this problem is not sufficiently appreciated. This can be ascribed to a sectoral rather than a holistic approach to development and, consequently, to an incomplete understanding of development needs. In addition, self-centered motives can prevail in the field of rural development. A realization of the shortfall of aid compared to the tremendous need should create more commitment to end waste and ineffectiveness due to a lack of coordination and cooperation (Düvel, 1985).

**Mutual recognition and acceptance of motives**

Different development organizations become involved in development for different reasons. These differences are associated with the type and goals of an organization. The diagram in Figure 1, an adaptation of Albrecht and Züfle’s view (1964), illustrates the basic differences between the primary goals or interests of different types of development organizations, or the degree to which they serve the interests of the client.

![Figure 1](https://via.placeholder.com/150)

**Types of development organizations by primary goals.**

<table>
<thead>
<tr>
<th>Non-Government Organizations (NGOs)</th>
<th>Government Organizations (GOs)</th>
<th>Commercial Organizations (Serious)</th>
<th>Organizations (Fly-by-Night)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interest and well-being of client</td>
<td>Interest and well-being of client</td>
<td>Interest of Organization</td>
<td></td>
</tr>
<tr>
<td>General or public interest</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The above comparison of different types of organizations is based on the criterion as to whether or not and to what extent the interests of the client are served. In the case of non-government organizations, government organizations and serious commercial organizations the interests of the client feature very strongly, but only with NGOs is the client interest likely to be the primary objective. Government organizations will usually promote the interests of the client only if they are not in conflict with public or general interests. As for serious commercial organizations, the client’s interest is obviously of secondary or intermediary importance. Beyond this variation in clients’ interests, organizations may also differ in the degree to which they pursue other interests, and in particular self-interest. Similarly, there are likely to be different reasons or motives for participating in activities of coordination or cooperation.
A common goal

All players involved in a collaborative development effort should share an interest in at least one common goal. Without a common goal, organizations or individuals will not have a reason to become involved in a collaborative effort. For example, mutual interest in development can be a common goal, and the stronger the interest, the greater the chance of successful cooperation and coordination.

Purposeful planning

Agreement to cooperate and to join in coordinated action should ultimately result in a concrete action plan. The development of such a plan demands transparency of goals to be pursued and the role and function of every involved player. The plan should also include detailed actions and activities to be undertaken.

Mutual understanding

For cooperation to be effective, all involved players must have a clear understanding of one another’s goals, functions, and development approaches. While it is important to appreciate the pros and cons of collaborating with specific players, it is equally important to realize that each player is capable of rendering its designated contribution within the framework of the mutually accepted plan. Prescribing to others is likely to hamper the process because of resistance resulting from suspicion and fear of losing independence and identity in the coordination process.

Coordination at operational level

In order to be effective, coordination should be decided upon, planned and implemented at the operational (community) level and not just, as many fruitless attempts have shown, at managerial, regional or national levels (Düvel, 1985). The latter levels are useful to legitimize and create a suitable atmosphere, but by themselves do not ensure proper implementation of coordination and cooperation at the operational level.

It is at the operational level that cooperation and coordination really matters and should take place. In practice, this is usually arranged informally between individuals and is dependent on good personal relationships between them. This kind of arrangement is fortuitous and unstable since change in interpersonal relationships can end a good cooperative and effectively coordinated working relationship. It is therefore important to provide a more stable and permanent institutional arrangement. A model to operationalize this idea is introduced and discussed.
Figure 2. An institutional linkage structure for facilitating coordination and cooperation in participative rural development.
An Organizational Framework for Cooperation and Coordination

The institutional framework proposed to facilitate and formalize the process of coordination and cooperation is shown in Figure 2. This structure is not intended to be an alternative institutional framework for development organizations focused on the implementation of development programs or projects, which, according to Cusworth and Franks (1993) usually consists of top management, middle management, support staff and field or site staff. It is visualized as a linkage structure or system with the purpose of linking development organizations with the community in an effective partnership. The level of involvement, and linkage, of the development organization will largely dictate whether the extension worker or agent will be a member of the organization’s middle management or field staff, and this will also determine the nature of support services that he or she can draw upon.

The linkage system consists of two major parts: (a) an over-arching body representing the target community, serving as its representative body and coordinating all development activities, and (b) a series of action committees (program or development) at the operational level responsible for implementation of various development activities and programs.

The over-arching, central coordinating body -- Central Development Council (CDC) -- has the following characteristics:

1. The CDC is representative of the whole community, particularly various interest groups and local institutions. As a coordinating, controlling and advisory rather than operative body, its size is inconsequential. However, what is important is for the community to view the CDC as representing the community and its interests.

2. The CDC accepts the responsibility for the development of the community as a whole. This can refer to development in general, or, if restricted to agriculture, a link-up with a more over-arching development body.

3. The CDC’s main function is to identify, initiate, negotiate, commission, control and coordinate all development priorities and actions (programs).

The actual design and implementation of development programs and projects takes place at the operational level. Implementation should, in the spirit of participative development, occur in a cooperative manner between development agents and a representative group (nominated or elected) from the community, both of which will need to take responsibility and ownership of the program. Such involvement is commissioned by the CDC, with the program or project committees required to report to the CDC on a regular basis. Ensuring that this happens combined with transparent, documented programs will enable the proper coordination of all development programs.

Various development activities or programs in which different development agents or organizations are willing or prepared to become involved have to be coordinated. The initiative for such programs may come from the CDC or from the development agents, but in all cases the program and its implementation are subject to the council’s guidelines or approval. This is a distinct departure from traditional approaches, where the target community is often the passive receiver of programs or action plans decided and developed unilaterally by the development agency. For the development agency this may appear, and in fact is, a restriction or infringement on its decision making and development activities which can cause delays and make the process more cumbersome.

However, the empowerment of the community to take ownership of the development process which results from participation as provided in the model outweighs these considerations.

The coordination envisaged between development organizations is not so much a result of direct negotiation and liaison with one
another but occurs rather from interaction and cooperation with the local community’s CDC. Coordination takes place through the CDC, which, in a sense, performs a mediating function and could establish guidelines. Coordination is thus achieved through what Mintzberg (1979) refers to as the concept of “standardization” rather than direct supervision. The community, through its representative CDC, assumes a key function and can enforce certain issues, but this is reconcilable with the principles of democracy and empowerment. Through standardization of work practices it can, for example, demand that agents’ involvement be of a collaborative and participative nature such as requiring development actions to become the responsibility of communities consisting of nominated or elected local community members working in collaboration with development agents. Other procedures that can be enforced by the CDC are that activities should be programmed and that the action or program committees report on a regular basis to the CDC. Such coordination that is demanded and enforced by the community is more likely to be successful in the long term.

Although agents’ involvement is essentially arranged with and through the CDC, direct mutual liaison between the various agents operating in a community should be encouraged. This could lead to the formation of a professional liaison or extension committee, as shown in Figure 2, operating under a revolving chairmanship and being represented on the central council by its chair. It could be argued that communities may not be able to undertake such a leading management role in development. While this may be true, guidance and training can build community capacity. In fact, this is congruent with the development or extension philosophy of helping people help themselves and is one of the main purposes of the proposed organizational linkage system (Düvel, 1995). Experience indicates that this kind of institution building is not likely to take place spontaneously, but will have to be stimulated and guided; a process that relies heavily on the idealistic and selfless involvement of one or more development agents.

Practical considerations in applying the suggested organizational structure to specific local circumstances include:

1. The need and degree to which various local institutions should be involved and/or represented on the CDC.

2. The appropriate size and boundaries of the development organization’s service area, and the number of sub-committees that can be effectively consolidated into a cohesive unit that accepts ownership for its own development.

3. Deciding whether to start with different existing operational committees and coordinate them through representation in the CDC or establish a CDC first and then form the required action or program committees.

Conclusion

The proposed organizational linkage structure is intended to promote cooperation and coordination among development organizations through involvement of the community, thereby providing a more structured and permanent basis for interaction between the organizations involved. The same structure allows for an empowerment of the community to ultimately take ownership of the development process. The adoption of this organizational model in developmental programs usually requires adaptations to be made in order to meet the specific local circumstances and institutional structures, but its relevancy is closely related to the importance attached to participative development.
References


Abstract

The purpose of this study was to identify constraints to technology transfer as perceived by three groups of extension personnel in Karnataka state of South India. The study also examined whether type of agriculture influences perceptions. A total of 244 extension personnel responded to a mail survey developed by the researchers. Overall, extension personnel perceived lack of funds to conduct timely research, inadequate transportation, resources of farmers, cost of inputs, and availability of credit as major constraints in technology transfer. Extension personnel working in dryland agriculture perceived several technology transfer statements as constraints more so than extension personnel working in irrigated agriculture.

Introduction

Jaiswal and Arya (1981) defined technology transfer as the process by which practices recommended by research and development agencies are transmitted through extension agents to producers. This process is effective when the maximum number of potential adopters understand, accept and actually put into practice the major part of an item of technology with minimum time lag, deriving maximum possible material and economic benefits (Reddy, 1981).

The subject of technology transfer has been examined by a number of researchers. Much of this research has focused on the impact of technology in specific countries. Despite sustained efforts, agricultural extension in less developed countries has not been able to achieve much success in transferring improved technology to farmers (Rogers, 1983). Research studies have identified a variety of constraints hindering effective technology transfer in general as well as in relation to specific crops such as rice, sugarcane, cotton, and maize (corn). As a result, substantial gains from new farming technologies still remain unrealized.

According to Singh and Singh (1992) there are several constraints which affect agricultural technology transfer in developing countries like India. These include factors related to technologies, socio-psychological traits of farmers, cultural atmosphere, institutional constraints, and past experience with adoption of agricultural technology. They found specifically that age, education, caste, income, socio-economic status, innovation proneness, attitudes of farmers toward scientific cultivation, management orientation, and extension contact were important socio-psychological constraints affecting effective transfer of technology in semi-arid regions of Northern India.

Nataraju, Perumal and Nagaraja (1991) examined technology transfer constraints in the Training & Visit System. They identified several constraints including waste of time in conducting afternoon meetings, no recognition for qualified and experienced workers, strict adherence to meeting schedules of visits, frequent visits of supervisory staff, lack of transport to make timely visits, inadequate
supply of inputs, and inadequate coordination with development departments, banks, cooperatives and other organizations.

A study by Singh and Laharia (1992) identified constraints affecting the transfer and adoption of sugarcane technology. One of the major constraints identified was lack of feedback from farmers to research workers, followed by ineffective liaison with field staff, housing facilities for extension workers, incentives for extension work, availability of necessary inputs, complexity of new technology, and risky nature of new technology. The authors concluded that these constraints are beyond the control of farmers and suggested that government should take appropriate measures to overcome these problems.

Situational, input availability, economic, and technological factors were identified as constraints that inhibit rice farmers in Kashmir valley, India (Tantray & Nanda, 1991). Economic factors were rated as a major constraint in increasing rice production, with high cost of cultivation, lack of a profitable marketing system, and inadequate credit facilities being highly rated. Lack of availability of improved seeds, chemical fertilizers, and labor were significant input constraints.

Ramanathan, Anantharaman and Lakshmi (1987) analyzed constraints in the adoption of cassava varieties by farmers in Kerala and Tamilnadu, India. Technological, economic, and marketing and infrastructure constraints were examined. High cost of cultivation, lack of a proper marketing system, inadequate use of cassava by industries, and less price and less demand for cassava were identified as major economic and marketing constraints. Lack of timely availability of fertilizers and lack of special programs for improvement of cassava were identified as infrastructure constraints.

The foregoing review of studies on technology transfer indicates that there are several constraints limiting effective transfer of technology. These constraints affect farmers, researchers, and extension workers engaged in agricultural production. Several of these constraints relate to the resource base of clients, government priorities for research, funding, the way the extension system works, and the technology itself.

In the tradition of the above-cited research, the study reported in this paper examines the perceptions of selected extension personnel in Karnataka State, South India, regarding the constraints limiting effective transfer of technology. Housed in the government’s Ministry of Agriculture, the extension service is organized in three staffing levels regional, district and taluk or block with a single line of command from top administration to the field level. Three groups of extension personnel were involved in this study. The first group was assistant directors of agriculture (ADA) located in all 175 taluks in the state. ADAs are the middle level extension personnel responsible for planning, supervision and execution of agricultural development programs in the taluk. Normally, 4 assistant agricultural officers and 10 to 15 agricultural assistants work under each ADA. The second group was assistant directors of agriculture - subject matter specialists (ADA-SMS) assigned to each of the 20 districts in the state. There are five ADA-SMSs in crop production, plant protection, information and training, inputs, and soil and water management attached to the Principal Agricultural Officer of the district. They provide subject matter support to agricultural officers and other field extension personnel working in the district, and take care of quality control of inputs such as seeds, fertilizers, chemicals, and implements. Agricultural officers (AO-SMS) were the third group involved in the study. These personnel are attached to a coordination taluk (group of taluks) and serve as subject matter specialists in crop production, plant protection, information and training, and inputs. Each of the 60 coordination taluks into which the 175 taluks in the state are grouped has an assistant director who supervises the SMSs. The latter support agricultural extension officers at the taluk level.
Purpose and Objectives

The primary purpose of this study was to identify constraints in transfer of technology as perceived by extension personnel in Karnataka State of South India. Specifically the study was designed to (a) identify research, client, extension, and technology constraints perceived by three types of extension personnel, and (b) determine whether the type of agriculture (dryland or irrigated) practiced by farmers in the geographic location where extension personnel are assigned was a factor in constraints perceived by extension personnel.

Methods and Procedures

Population

The study population consisted of 175 assistant directors of agriculture (ADA), 100 assistant directors of agriculture with subject matter specialty (ADA-SMS), and 240 agricultural officers with subject matter specialty (AO-SMS) employed by the Department of Agriculture. The frame for the study was obtained from the personnel office of the Department of Agriculture.

Instrumentation

A questionnaire was developed by the researchers. The questionnaire had two sections. Section one contained 46 statements identified in the literature reviewed and/or the experiences of researchers as technology transfer constraints in four major categories - research, extension, technology, and client-related. Responses to these statements were measured on a 4-point, Likert-type scale, ranging from not at all a constraint (1) to a major constraint (4). Section two of the questionnaire covered demographic information, namely age, education level, major for the highest degree obtained, and work experience. The questionnaire was first prepared in English and translated into the local language (Kannada) for ease of understanding the statements. Both versions were made available to respondents to choose the one they felt most comfortable with. Face and content validity of the questionnaire were established using a panel of experts consisting of five faculty members, two graduate students in the Department of Agricultural and Extension Education, and the Associate Dean for International Programs at The Pennsylvania State University.

Data Collection and Analysis

Data were collected through a mailed survey. Respondents received a cover letter, a copy of the questionnaire and a return addressed prepaid envelope. After the initial mailing and two follow-ups, a total of 75 ADAs (44%), 63 ADAs-SMS (63%) and 106 AO-SMS (44%) responded. Early and late respondents were compared (Miller & Smith, 1983) on all the 46 statements and were not found to differ significantly. One-way ANOVA was used to determine perceptions of extension personnel regarding constraints to transfer of technology. Factorial ANOVA was used to determine differences in perceptions of extension personnel regarding constraints in technology transfer and type of agriculture practiced by farmers in the location where extension personnel were assigned. A post-hoc reliability analysis indicated the instrument had internal consistency. Cronbach's alpha coefficients ranged from a low of .78 (extension constraints) to a high of .93 (research constraints).

Findings

Demographic Profile of Respondents

Respondents' ages ranged from 27 to 57 years with a mean of 49 years and a standard deviation of 5.41. Eighty-six percent of the respondents had a bachelor’s degree, 13% masters and 1% a doctoral degree. Respondents reported from 3 to 42 years of work experience with a mean of 24 years and a standard deviation of 5.99.
Objective 1

One-way analysis of variance (ANOVA) and Scheffée procedures were used to examine differences in perceptions of extension personnel related to technology transfer constraints. As shown in Table 1, statistically significant differences at the .01 level were found among the perceptions of the three groups related to two technology transfer constraint statements. Of these two statements, one was in the research constraints category and the other in the extension constraints category.

Results of the Scheffée test revealed that the perceptions of AOs-SMS were significantly different from those of ADAs relative to the technology transfer constraint statement—lack of liaison with field staff (F=5.03; p ≤ .01). AOs-SMS perceived lack of liaison with field staff as a "moderate" constraint while ADAs and ADAs-SMS perceived it as "somewhat" of a constraint. On the other hand ADAs-SMS were significantly different from ADAs and AOs-SMS in perceiving competence of extension workers as a constraint (F=7.43; p ≤ .01). No significant differences were found between the three groups’ perceptions of other technology transfer constraint statements (Table 1).

Table 1

Analysis of Variance for Perception of Technology Transfer Constraints by Extension Personnel

<table>
<thead>
<tr>
<th>Constraint</th>
<th>Mean Perception Score&lt;br&gt;</th>
<th>ADA-SMS</th>
<th>AOs-SMS</th>
<th>F-Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research</td>
<td></td>
<td>Overall</td>
<td>ADA</td>
<td>AOs</td>
</tr>
<tr>
<td>Feedback from farmers to researchers</td>
<td></td>
<td>2.42</td>
<td>2.35</td>
<td>2.24</td>
</tr>
<tr>
<td>Lack of liaison with the field staff</td>
<td></td>
<td>2.29</td>
<td>1.99a</td>
<td>2.36ab</td>
</tr>
<tr>
<td>Knowledge of liaison with field staff</td>
<td></td>
<td>2.05</td>
<td>1.90</td>
<td>1.97</td>
</tr>
<tr>
<td>Feedback from extension workers to researchers</td>
<td></td>
<td>1.85</td>
<td>1.72</td>
<td>1.90</td>
</tr>
<tr>
<td>Feedback from researchers to extension workers</td>
<td></td>
<td>2.30</td>
<td>2.09</td>
<td>2.33</td>
</tr>
<tr>
<td>Incentives to conduct quality research</td>
<td></td>
<td>2.86</td>
<td>2.83</td>
<td>2.87</td>
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### Table 1 (Cont).

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<tr>
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<td>1.87&lt;sup&gt;a&lt;/sup&gt;</td>
<td>2.41&lt;sup&gt;b&lt;/sup&gt;</td>
<td>1.94&lt;sup&gt;a&lt;/sup&gt;</td>
<td>7.43&lt;sup&gt;*&lt;/sup&gt;</td>
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<td>1.84</td>
<td>2.19</td>
<td>2.07</td>
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<td>2.33</td>
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<td>1.72</td>
<td>1.52</td>
<td>1.62</td>
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<td>Recognition of extension workers</td>
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<td>2.58</td>
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<td>2.50</td>
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<td>2.96</td>
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<tr>
<td>Resources of farmers</td>
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<td>3.04</td>
<td>3.06</td>
<td>3.10</td>
<td>0.12</td>
</tr>
<tr>
<td>Overall</td>
<td>2.73</td>
<td>2.68</td>
<td>2.71</td>
<td>2.79</td>
<td>1.29</td>
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<td><strong>Technology</strong></td>
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<td>Complexity of the technology</td>
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<td>2.39</td>
<td>2.20</td>
<td>2.18</td>
<td>1.11</td>
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<td>2.62</td>
<td>2.73</td>
<td>0.89</td>
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<td>Perceived cultural/social risk involved in adopting technology</td>
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<td>1.84</td>
<td>1.76</td>
<td>1.92</td>
<td>0.71</td>
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<td>2.28</td>
<td>2.49</td>
<td>2.29</td>
<td>1.19</td>
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<td>Compatibility of technology with society/cultural norms</td>
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<td>2.06</td>
<td>1.86</td>
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<td>2.14</td>
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<td>Appropriateness of technology</td>
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<td>1.98</td>
<td>1.89</td>
<td>2.04</td>
<td>0.61</td>
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<tr>
<td>Degree to which the technology uses local resources</td>
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<td>2.28</td>
<td>2.32</td>
<td>2.27</td>
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<td>Market for products of new technology</td>
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<td>2.83</td>
<td>2.92</td>
<td>2.97</td>
<td>0.32</td>
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<tr>
<td>Overall</td>
<td>2.28</td>
<td>2.32</td>
<td>2.22</td>
<td>2.26</td>
<td>0.59</td>
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</tbody>
</table>

<sup>a</sup>Range: 1 (not at all a constraint) to 4 (a major constraint).
Means followed by the same letter are not significantly different from each other as computed by Scheffe post hoc analysis.

*<sup>p < .01</sup>  
<sup>b</sup>Range: 1 (not at all a constraint) to 4 (a major constraint).
Means followed by the same letter are not significantly different from each other as computed by the Scheffe (.01) post hoc analysis.

*p < .01
Objective 2

Factorial ANOVA was performed to determine if differences existed in the perceptions of extension personnel regarding technology transfer constraints by type of extension personnel (ADA, ADA-SMS, and AO-SMS) and the type of agriculture (dryland or irrigated) practiced by farmers in the location where extension personnel are assigned. Statistically significant main effects and interactions were revealed for eight technology transfer constraints. The results are shown in Tables 2 and 3.

Table 2 summarizes the F values for the two main effects of extension personnel type and type of agriculture as well as the interaction effect of type of extension personnel by type of agriculture for the eight technology transfer constraints, while Table 3 presents the means and standard deviations.

For two constraints, lack of liaison with field staff (F=5.08; p < .05), and competency of extension workers (F=5.83; p < .05), significant main effects for extension personnel type were found. ADAs-SMS perceived both the statements as a constraint more so than ADAs and AOs-SMS (Table 3). No significant interaction existed (F=1.05; p > .05) nor was there a main effect for type of agriculture.

For two constraints, availability of inputs to conduct trials and lack of adequate number of extension workers, significant main effects were found for both extension personnel type and type of agriculture (Table 2). ADAs-SMS in dryland agriculture perceived that availability of inputs to conduct trials was a constraint more so than ADAs-SMS in irrigated areas (Table 3). Similar results were found for ADAs. No differences existed relative to AOs-SMS perceptions for this constraint. Both ADAs and AOs-SMS in irrigated agriculture perceived lack of adequate number of extension workers as a constraint more so than ADAs and AOs-SMS in dryland agriculture (Table 3). However, no significant differences were found for ADAs-SMS in both dryland and irrigated agriculture.

Significant interaction existed between the variables type of extension personnel and type of agriculture for three technology transfer constraint statements. These included transportation for extension workers (F=4.406; p < .05), availability of credit (F=3.859; p < .05), and complexity of technology (F=3.84; p < .05). ADAs-SMS in dryland agriculture (3.43) perceived transportation for extension workers as a constraint more so than ADAs-SMS in irrigated areas (2.68). On the other hand, AOs-SMS in irrigated agriculture (3.42) considered transportation for extension workers as a constraint more so than AOs-SMS in dryland agriculture (3.13). However, for ADAs, type of agriculture did not influence their perceptions.
Table 2
ANOVA of Technology Transfer Constraints by Type of Extension Personnel and Type of Agriculture.

<table>
<thead>
<tr>
<th>Constraint</th>
<th>Type of Personnel&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Type of Agriculture&lt;sup&gt;b&lt;/sup&gt;</th>
<th>Type of Personnel x Type of Agriculture&lt;sup&gt;c&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of liaison with field staff</td>
<td>5.083**</td>
<td>0.021</td>
<td>1.055</td>
</tr>
<tr>
<td>Competency of extension workers</td>
<td>5.831**</td>
<td>0.288</td>
<td>0.620</td>
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<tr>
<td>Availability of inputs to conduct trials</td>
<td>3.860*</td>
<td>4.132*</td>
<td>1.072</td>
</tr>
<tr>
<td>Transportation for extension workers</td>
<td>0.527</td>
<td>0.291</td>
<td>4.406*</td>
</tr>
<tr>
<td>Lack of adequate number of extension workers</td>
<td>4.464*</td>
<td>7.094**</td>
<td>0.924</td>
</tr>
<tr>
<td>Availability of credit</td>
<td>0.264</td>
<td>0.857</td>
<td>3.859*</td>
</tr>
<tr>
<td>Complexity of technology</td>
<td>1.050</td>
<td>0.740</td>
<td>3.840*</td>
</tr>
<tr>
<td>Technology uses local resources</td>
<td>0.017</td>
<td>10.519**</td>
<td>1.881</td>
</tr>
</tbody>
</table>

<sup>a</sup>: df = 2; <sup>b</sup>: df = 1; <sup>c</sup>: df = 2
<sup>*</sup> p ≤ .05; <sup>**</sup> p ≤ .01

Both ADAs and ADAs-SMS in dryland agriculture (3.44 and 3.60) perceived availability of credit as a constraint more so than ADAs and ADAs-SMS (3.27 and 3.05) in irrigated agriculture. On the other hand, AOs-SMS in irrigated agriculture (3.44) perceived this as a constraint more so than AOs-SMS in dryland agriculture (3.26). ADAs in irrigated agriculture (2.65) perceived complexity of technology as a constraint more so than ADAs in dryland agriculture (2.25). In contrast, both AOs-SMS and ADAs-SMS in dryland agriculture (2.32 and 2.33) perceived complexity of technology as a constraint more so than their counterparts in irrigated agriculture (2.05 and 1.83).

Conclusions and Recommendations

Of the 46 statements examined in this study, 21 constraint statements were perceived by extension personnel as moderate constraints to technology transfer. The mean scores for these 21 statements ranged between 2.51 to 3.50 on a 4-point scale. Most of these constraints were in the research, extension and client constraint categories. Lack of research facilities in terms of funds, material and equipment, and priority for research, resources of farmers, lack of transportation, market for products of new technology, and inadequate number of extension workers, are seen as major constraints. These findings mirror the findings of previous research (Tantray & Nanda, 1991; Ramanathan, Anantharaman, & Lakshmi, 1987; Nataraju, Perumal & Nagaraja, 1991) concerning technology transfer.

There was general agreement among all three categories of extension personnel concerning the impact of the constraints on technology transfer. Differences were observed only in the case of two constraint statements, namely lack of liaison with field staff, and competency of extension workers. Subject matter specialists at the district and taluk levels perceived these as constraints to a greater extent than assistant directors at the regional level. This difference can be explained by the fact that subject matter specialists work closely with and support the field staff (agricultural officers and village level workers) where liaison...
Table 3
Means and Standard Deviations for Technology Transfer Constraints by Type of Extension Personnel and Type of Agriculture.

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<thead>
<tr>
<th>Extension Personnel Type</th>
<th>Irrigated</th>
<th>Dryland</th>
<th>Total</th>
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<td>n  M   SD</td>
<td>n  M   SD</td>
<td>n  M   SD</td>
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<td></td>
</tr>
<tr>
<td>ADA</td>
<td>26  1.77 .81</td>
<td>46  1.98 .88</td>
<td>72  1.90 .86</td>
</tr>
<tr>
<td>AO--SMS</td>
<td>43  2.34 .99</td>
<td>59  2.11 .96</td>
<td>102  2.21 .97</td>
</tr>
<tr>
<td>ADA--SMS</td>
<td>18  1.89 .99</td>
<td>42  2.00 .79</td>
<td>60  1.97 .86</td>
</tr>
<tr>
<td>Total</td>
<td>87  2.09 .98</td>
<td>147 2.05 .89</td>
<td>234 2.05 .92</td>
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<td><strong>Competency of extension workers</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>ADA</td>
<td>24  1.92 .93</td>
<td>43  1.91 .82</td>
<td>67  1.87 .86</td>
</tr>
<tr>
<td>AO--SMS</td>
<td>42  2.00 .90</td>
<td>53  1.96 .89</td>
<td>95  1.94 .89</td>
</tr>
<tr>
<td>ADA--SMS</td>
<td>19  2.21 .71</td>
<td>37  2.50 .97</td>
<td>56  2.41 .90</td>
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<tr>
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<td>85  2.02 .86</td>
<td>133 2.04 .93</td>
<td>218 2.04 .91</td>
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</tr>
<tr>
<td>ADA</td>
<td>26  1.85 .96</td>
<td>48  2.29 .99</td>
<td>74  2.13 .99</td>
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<td>104 2.56 .98</td>
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<td>44  2.45 .97</td>
<td>63  2.30 .99</td>
</tr>
<tr>
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<td>88  2.20 .99</td>
<td>153 2.46 .99</td>
<td>241 2.37 .99</td>
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<td><strong>Transportation for extension workers</strong></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>ADA</td>
<td>26  3.04 .99</td>
<td>48  3.13 .94</td>
<td>74  3.09 .99</td>
</tr>
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<td>19  2.68 .99</td>
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<td>63  3.21 .99</td>
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<tr>
<td>ADA</td>
<td>26  3.50 .81</td>
<td>48  3.00 1.12</td>
<td>74  3.17 1.05</td>
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<td>62  2.48 1.16</td>
<td>105 2.69 1.15</td>
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<td>43  2.86 1.19</td>
<td>62  2.84 1.17</td>
</tr>
<tr>
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<td>153 2.74 1.17</td>
<td>241 2.88 1.14</td>
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<td>26  3.27 .83</td>
<td>48  3.44 .82</td>
<td>74  3.37 .82</td>
</tr>
<tr>
<td>AO--SMS</td>
<td>43  3.44 .79</td>
<td>62  3.26 .83</td>
<td>105 3.33 .82</td>
</tr>
<tr>
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<td>19  3.05 .85</td>
<td>43  3.60 .62</td>
<td>62  3.48 .74</td>
</tr>
<tr>
<td>Total</td>
<td>88  3.30 .81</td>
<td>154 3.41 .78</td>
<td>241 3.37 .79</td>
</tr>
<tr>
<td><strong>Complexity of technology</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ADA</td>
<td>26  2.65 .99</td>
<td>48  2.25 .93</td>
<td>74  2.39 .99</td>
</tr>
<tr>
<td>AO--SMS</td>
<td>41  2.05 .91</td>
<td>60  2.32 .95</td>
<td>101 2.18 .94</td>
</tr>
<tr>
<td>ADA--SMS</td>
<td>18  1.83 .83</td>
<td>42  2.33 .99</td>
<td>60  2.20 .97</td>
</tr>
<tr>
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<td>85  2.19 .99</td>
<td>150 2.30 .95</td>
<td>235 2.26 .97</td>
</tr>
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<td><strong>Technology uses local resources</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ADA</td>
<td>26  2.12 .71</td>
<td>48  2.38 .70</td>
<td>74  2.28 .71</td>
</tr>
<tr>
<td>AO--SMS</td>
<td>41  1.95 .77</td>
<td>60  2.52 .89</td>
<td>101 2.27 .88</td>
</tr>
<tr>
<td>ADA--SMS</td>
<td>18  2.28 .57</td>
<td>42  2.33 .90</td>
<td>60  2.32 .81</td>
</tr>
<tr>
<td>Total</td>
<td>85  2.08 .72</td>
<td>150 2.41 .83</td>
<td>235 2.29 .81</td>
</tr>
</tbody>
</table>
and competency becomes critical. They are also responsible for coordinating field trials and demonstrations and as such have a better understanding of field problems than the assistant directors who are more involved in planning and administering agricultural development programs.

Type of agriculture appears to be associated with extension personnel’s perceptions of technology transfer constraints. Lack of or inadequate transportation continues to be a barrier in effectively reaching farmers. Inadequate transportation is more pronounced in dryland agriculture than irrigated agriculture because of relatively large-sized farm holdings, and the distance between farms resulting in fewer visits to farms in dryland agriculture. Lack of credit is also a factor because of the risks involved in dryland agriculture, including the lack of rain resulting in poor production, which in turn affects repayment of loans, and lack of security-free credit. Another reason for differences in perception is that adoption of technology in dryland agriculture is more difficult because of lack of rain, inadequate resources of farmers and poor infrastructure. In addition, the recommended technology may not be suited to the needs of farmers with limited resources. As indicated by Adams (1984), any technology to be successful should have economic viability, technical feasibility and socio-cultural acceptability.

This study has provided useful information about the perceptions of extension personnel regarding constraints to technology transfer. The Department of Agriculture should use the findings of this study to address major constraints. The findings of this study could serve as a benchmark to assess and determine what should be done to address constraints in the four constraint areas - research, extension, client and technology. Suggested future efforts may include (a) examining current research priorities and modifying them in the light of the findings of this study, (b) emphasizing problem-oriented and location-specific research based on needs of the clientele (c) identifying a systematic plan to provide resources to farmers, (d) developing a program to address issues related to post-harvest technology problems, and (e) improving transportation for extension workers so that they can provide technical assistance when needed.

References


ATTITUDES OF BEGINNING TERTIARY STUDENTS TOWARD SENIOR SECONDARY AGRICULTURAL EDUCATION IN SWAZILAND

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Abstract

A descriptive-correlational study was conducted to find the characteristics associated with the attitudes of first-year tertiary students regarding secondary agricultural education in Swaziland. The reasons for attending the present program of study and institution were also elicited. Positive, and moderate to strong attitudes by respondents toward selected aspects of senior secondary agriculture were associated with better parents' occupational status; increased maturity when the student decided to attend present college; exposure to recruitment to college; practice of agriculture in everyday living; high number of youth organizations joined; and residence in a rural area. Important reasons for pursuing the program of study were professional and financial in nature. The influential reasons for enrolling in the present tertiary institution were mainly senior secondary curriculum and academic achievement related, though professionals in tertiary institutions and guidance counselors had a positive influence on students' choices. Implications of the findings for senior secondary agricultural education and recruitment practices to programs and colleges were suggested.

Introduction

Agriculture is important to the economy of Swaziland, engaging 32% of the population and contributing 8% to the gross domestic product (Economic Planning Office, 1996). Therefore, preparing people for various roles in the agricultural industry -- farming and agriculture-support businesses, teaching, research, extension, and other occupations -- is a vital function of the country's educational system.

Swaziland's educational system is based on seven years of schooling at the primary level, three years at the junior secondary level and two years at the senior secondary level. Education at the tertiary level is provided by the University of Swaziland and several colleges.

Agricultural education in Swaziland is delivered at the secondary and tertiary levels. At the secondary level, the goal of junior agricultural education is to develop in students an appreciation for and a positive attitude toward agriculture, while the goal of the senior agricultural education program is to prepare interested youth to gain entry to the College of Agriculture at the University of Swaziland.
The secondary level agricultural education program provides basic knowledge and skills to students for practical application in the agricultural industry both in production and management phases. Tertiary agricultural education graduates have typically been employed in the public sector as teachers, technicians and extension workers. In the last five years, the manpower needs of the private sector for college graduates have been targeted for development as public sector demand has declined.

Studies of agricultural education graduates revealed negative feelings toward and low appreciation of practical activities in agriculture arising from inadequate weighting of this activity in the grading system (Simelane, 1988), and the aspiration for white-collar jobs attributed to the positive image of white-collar careers in the country's colonial history (Asante & Dlamini, 1989). In this context, Sukati (1991) asserted that negative attitudes toward agriculture and practical and service careers among high school graduates were due to inadequate counselling and guidance in school and needed to be improved to meet manpower demands of the Swazi labor market in these areas.

Building upon previous work, this study focuses on the attitudes toward agriculture of beginning tertiary students and the underlying reasons for their choice of the agricultural program and the institution attended. The study has implications for improving senior secondary agricultural education and for recruitment to tertiary institutions.

Objectives

The specific objectives of the study were to:

1. Identify student characteristics associated with attitudes toward selected aspects of senior secondary agricultural education.

2. Describe the level of importance of reasons for pursuing the present program.

3. Describe the level of influence of reasons for enrolling in the present tertiary institution.

Methodology

Population and Sample

The target population was first year beginning tertiary students (N=696) from six colleges (agriculture, science, humanities and education, commerce, law, and social science) in the University of Swaziland (UNISWA) and three teacher training colleges in the country. One intact class was chosen at random to be included in the sample from each college and was deemed to be representative of that college. The sample size obtained by this procedure was 235.

Instrument

The instrument had two parts. Part one dealt with attitudes toward senior secondary agricultural education. Forty-one items were grouped into seven domains: (a) agriculture teachers, (b) agriculture students, (c) agriculture program, (d) agriculture objectives, (e) agriculture teaching methods, (f) agriculture teaching materials, and (g) the public and media's portrayal of agriculture, students and individuals in agriculture. An 8-point Likert-type scale was used for responses to the attitude items, 1 being very strongly disagree and 8 being very strongly agree. Part two contained reasons for choosing the present program and institution of study, and personal characteristics.

Content and face validity was obtained with a group of local agricultural educators. Reliability of the attitude subscales was established through a pilot test involving second year students at UNISWA's College of Agriculture. Reliability coefficients ranged from .5 to .75.

Data Collection and Analysis

Data were collected by the self-administered questionnaire using lists of students in the chosen intact classes provided by the respective institutions. The SPSS/PC v3.1 Statistical Package (Microsoft Co., 1991) was used to input
and analyze the data.

The stepwise regression procedure was used to identify student characteristics associated with their attitudes toward selected aspects of senior secondary agricultural education. Means and standard deviations were calculated for the data on reasons for choosing the present program and the institution of study.

Findings

Characteristics Associated with Attitudes of Students

Characteristics that were significantly associated with attitudes toward five aspects of senior secondary agricultural education (dependent variables) are included in Table 1. Two dependent variables (agriculture teachers and agriculture program) were found to be not significantly associated with student characteristics.

In Table 1, the partial regression coefficients ($b_k$) indicate magnitude (weak = .00-.34, moderate = .35-.69, strong = .70 and above) and direction (+ or -) of attitudes toward a specific dependent variable associated with a specific category or level of the independent variable.

The data show that attitudes toward secondary agriculture students associated with the lowest grade level at which students decided to attend their present institution were positive and moderate (.61) and that attitudes associated with the lowest father's occupation were positive but weak (.32).

Attitudes toward agriculture objectives associated with the lowest mother's occupation were positive but weak (.27) and attitudes associated with the lowest grade level at which students decided to attend their institution were positive but weak (.31).

Students who were recruited to their present institution had positive and strong (.87) attitudes toward the agriculture teaching methods as compared with those who were not. Attitudes toward teaching methods associated with students' lowest mothers' occupation were positive but weak (.26).

Attitudes toward teaching materials associated with the students' lowest mother’s occupation were positive but weak (.10). However, for students whose hobbies included agriculture, attitudes were positive and strong (.84).

Attitudes toward how the public and media portrayed agriculture, students and individuals in agriculture associated with the smallest number of hectares of land allocated by the chief to the students' families were positive but weak (.23), and positive and moderate (.41) with the smallest number of youth organizations joined by students before tertiary level. However, attitudes associated with students whose residence was urban were negative and moderate (-.56).

Level of Importance of Reasons for Pursuing the Present Program

The data in Table 2 show that all the reasons for pursuing the present program of study were rated by respondents as very important or important (means ranging from 3.5 to 6.00). The first nine reasons were rated very important (means ranging from 4.50 to 5.49) and the remaining three reasons were rated important (means ranging from 3.50 to 4.49).

While most of the reasons cited as very important or important for pursuing the present program of study have a professional and financial orientation, it is interesting to note that personal reasons such as service to humanity, job creativity and prestige, respect for someone in the same career, and the right personality for the job were also important.

Level of Influence of Reasons for Enrolling

The data in Table 3 show that of the reasons for enrolling in the present tertiary institution rated by the respondents in terms of their influence, 11 reasons were influential (means of 3.50 to 5.49) and the remaining three reasons were not influential (means below 3.50).
Table 1
Stepwise Regression of Attitudes Toward Selected Aspects of Agricultural Education with Characteristics of Students (n=235)

<table>
<thead>
<tr>
<th>Significant Independent Variables (Student Characteristics)</th>
<th>R^2</th>
<th>R^2 change</th>
<th>b_k</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. Dependent Variable: Attitudes Toward Secondary Agriculture Students</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Grade level at which students decided to pursue present college¹</td>
<td>.11</td>
<td>.11</td>
<td>.61</td>
<td>2.91*</td>
</tr>
<tr>
<td>- Father's occupation²</td>
<td>.21</td>
<td>.10</td>
<td>.32</td>
<td>2.31*</td>
</tr>
<tr>
<td>Constant=2.76</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adjusted R^2=.17 For model: F=5.84*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>II. Dependent Variable: Attitudes Toward Secondary Agriculture Objectives</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Mother's occupation³</td>
<td>.11</td>
<td>.11</td>
<td>.27</td>
<td>2.65*</td>
</tr>
<tr>
<td>- Grade level at which students decided to pursue present college¹</td>
<td>.18</td>
<td>.07</td>
<td>.31</td>
<td>2.02*</td>
</tr>
<tr>
<td>Constant=3.89</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adjusted R^2=.15 For model: F=5.09*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>III. Dependent Variable: Attitudes Toward Secondary Agriculture Teaching Methods</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Whether specifically recruited by someone in the present college⁴</td>
<td>.15</td>
<td>.15</td>
<td>.87</td>
<td>2.75*</td>
</tr>
<tr>
<td>- Mother's occupation³</td>
<td>.25</td>
<td>.10</td>
<td>.26</td>
<td>2.41*</td>
</tr>
<tr>
<td>Constant=4.52</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adjusted R^2=.15 For model: F=7.39*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IV. Dependent Variable: Attitudes Toward Secondary Agriculture Teaching Materials</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Mother's occupation³</td>
<td>.14</td>
<td>.14</td>
<td>.10</td>
<td>3.45*</td>
</tr>
<tr>
<td>- Hobbies including agriculture⁵</td>
<td>.29</td>
<td>.15</td>
<td>.84</td>
<td>3.10*</td>
</tr>
<tr>
<td>Constant=4.60</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adjusted R^2=.26 For model: F=9.13*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>V. Dependent Variable: Attitudes Toward How the Public and Media Portrayed Agriculture, Students and Individuals in Agriculture</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Hectares of land allocated by the chief of the residential area**</td>
<td>.15</td>
<td>.15</td>
<td>.23</td>
<td>3.03*</td>
</tr>
<tr>
<td>- Number of youth organizations joined***</td>
<td>.32</td>
<td>.16</td>
<td>.41</td>
<td>3.67*</td>
</tr>
<tr>
<td>- Residence⁶</td>
<td>.39</td>
<td>.23</td>
<td>-.56</td>
<td>-2.26*</td>
</tr>
<tr>
<td>Constant=3.99</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adjusted R^2=.35 For model: F=9.43*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* p<.05

Coding:
1 = Primary, 2=Form 1-3, 3=Form 4-5, 4=Just before college
2&3=Unemployed, retired, deceased & any other which imply "no income", 2=self employed, 3="blue-collar", 4="white-collar"
4&5=YES, 1= No
6 = Rural, 1=Urban
** Absolute value (minimum=1, maximum=5)
*** Absolute value (minimum=1, maximum=3)
### Table 2
Level of Importance of Reasons for Pursuing the Present Program of Study

<table>
<thead>
<tr>
<th>Reasons</th>
<th>Mean</th>
<th>S.D.</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Opportunities for further training</td>
<td>5.19</td>
<td>1.03</td>
<td>220</td>
</tr>
<tr>
<td>2. Prospect for employment</td>
<td>4.97</td>
<td>1.05</td>
<td>222</td>
</tr>
<tr>
<td>3. High income</td>
<td>4.88</td>
<td>1.17</td>
<td>221</td>
</tr>
<tr>
<td>4. Working conditions</td>
<td>4.88</td>
<td>1.10</td>
<td>224</td>
</tr>
<tr>
<td>5. Service to humanity</td>
<td>4.87</td>
<td>1.05</td>
<td>224</td>
</tr>
<tr>
<td>6. Creativity involved in the job</td>
<td>4.86</td>
<td>.98</td>
<td>221</td>
</tr>
<tr>
<td>7. Respect for someone in the same career</td>
<td>4.80</td>
<td>1.41</td>
<td>216</td>
</tr>
<tr>
<td>8. Right personality for the job</td>
<td>4.75</td>
<td>1.22</td>
<td>220</td>
</tr>
<tr>
<td>9. Challenge with the job</td>
<td>4.66</td>
<td>1.11</td>
<td>221</td>
</tr>
<tr>
<td>10. Other benefits involved</td>
<td>4.48</td>
<td>1.31</td>
<td>218</td>
</tr>
<tr>
<td>11. Prospect for promotion</td>
<td>4.22</td>
<td>1.55</td>
<td>218</td>
</tr>
<tr>
<td>12. Prestige associated with the job</td>
<td>4.07</td>
<td>1.39</td>
<td>219</td>
</tr>
</tbody>
</table>

Scale: 1=not important at all, 2=very unimportant, 3=unimportant, 4=important, 5=very important, 6=absolutely important

### Table 3
Level of Influence of Reasons for Enrolling in the Present Tertiary Institution

<table>
<thead>
<tr>
<th>Reasons</th>
<th>Mean</th>
<th>S.D.</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Subjects taken in high school</td>
<td>4.53</td>
<td>1.37</td>
<td>222</td>
</tr>
<tr>
<td>2. Grades in high school</td>
<td>4.43</td>
<td>1.53</td>
<td>220</td>
</tr>
<tr>
<td>3. Advice by a professional in the desired field</td>
<td>4.12</td>
<td>1.64</td>
<td>219</td>
</tr>
<tr>
<td>4. Advice by a career guidance counsellor</td>
<td>4.11</td>
<td>1.57</td>
<td>223</td>
</tr>
<tr>
<td>5. Reputation of the target department</td>
<td>3.90</td>
<td>1.45</td>
<td>215</td>
</tr>
<tr>
<td>6. Reading information about the college</td>
<td>3.76</td>
<td>1.51</td>
<td>222</td>
</tr>
<tr>
<td>7. Parent(s) wish or advice</td>
<td>3.71</td>
<td>1.77</td>
<td>221</td>
</tr>
<tr>
<td>8. Reputation of the college</td>
<td>3.70</td>
<td>1.50</td>
<td>210</td>
</tr>
<tr>
<td>9. Advice by students in the program</td>
<td>3.70</td>
<td>1.50</td>
<td>223</td>
</tr>
<tr>
<td>10. Hearing announcement about the college</td>
<td>3.66</td>
<td>1.62</td>
<td>219</td>
</tr>
<tr>
<td>11. Advice by college educator</td>
<td>3.51</td>
<td>1.66</td>
<td>220</td>
</tr>
<tr>
<td>12. Library facilities</td>
<td>3.49</td>
<td>1.80</td>
<td>217</td>
</tr>
<tr>
<td>13. Advice by an agriculture teacher</td>
<td>3.47</td>
<td>1.75</td>
<td>219</td>
</tr>
<tr>
<td>14. Advice by college administrator</td>
<td>3.46</td>
<td>1.65</td>
<td>217</td>
</tr>
<tr>
<td>15. Advice by relative(s)</td>
<td>3.39</td>
<td>1.56</td>
<td>224</td>
</tr>
<tr>
<td>16. Advice by close friends</td>
<td>3.39</td>
<td>1.47</td>
<td>219</td>
</tr>
<tr>
<td>17. Access to religious activities</td>
<td>3.24</td>
<td>1.63</td>
<td>222</td>
</tr>
<tr>
<td>18. Advice by non-agriculture teacher</td>
<td>3.18</td>
<td>1.58</td>
<td>219</td>
</tr>
<tr>
<td>19. Appearance of the campus</td>
<td>2.82</td>
<td>1.69</td>
<td>225</td>
</tr>
<tr>
<td>20. Sports facilities</td>
<td>2.81</td>
<td>1.61</td>
<td>225</td>
</tr>
<tr>
<td>21. Campus is next to town</td>
<td>2.60</td>
<td>1.54</td>
<td>219</td>
</tr>
<tr>
<td>22. Campus is next to home</td>
<td>2.44</td>
<td>1.52</td>
<td>222</td>
</tr>
</tbody>
</table>

Scale: 1=not influential at all; 2=very uninfluential; 3=uninfluential; 4=influential; 5=very influential; 6=absolutely influential
Subjects taken in high school was the most influential reason for enrolling in a tertiary institution. Subjects taken in high school, grades in high school, and advice by a professional in the desired field or a career guidance counselor were the top three reasons categorized as influential. In contrast, advice by friends and relatives other than one's parents, advice by agriculture/non-agriculture teacher or the college administrator were not deemed to be influential. The reputation of the college and the target department were also cited as influential reasons for enrolling. But selected features of the campus, such as appearance, sports and library facilities, and proximity to a town or one's home were not influential.

Conclusions and Implications

Positive and moderate to strong attitudes of respondents toward selected aspects of senior secondary agriculture were associated with better parents' occupations and high number of hectares of family land; increased maturity when the student decided to attend present college; exposure to recruitment to present college; practice of agriculture in everyday living; high number of youth organizations joined; residence in a rural area.

Senior secondary agricultural education does not seem to have positively impressed students of lower economic status. However, this should be interpreted with caution as students residing in rural areas also tended to possess a positive image of how the public and media portrayed agriculture, students and individuals in agriculture. Inconsistent messages might be due to motivation of poorer students not to be tied to the low status accorded to agriculture (Dlamini, 1986).

A career guidance component within the senior agricultural education curriculum can be incorporated at the senior secondary level. This study showed that positive attitudes were associated with exposure to recruitment by colleges. The Department of Agricultural Education and Extension in the College of Agriculture in the University of Swaziland can enhance efforts to recruit potential agricultural education professionals while they are at the senior secondary level. In addition, a youth organization component can be incorporated early within the senior secondary agricultural education curriculum which can serve as a tool to enhance positive attitudes among graduates.

In the present study, the four most important reasons for taking up the program of study were supported by the existing literature. They were opportunities for further training (Sube, 1981); prospect for employment (Reynolds, 1977); higher income (Koch, 1972); and service to humanity (Bentley & Rossmann, 1966). These and other important reasons for students' choices in pursuing a program of study are mainly professional and financial in nature. An opportunity to further one's training is an important motive to pursue a program of study. Employers need to be continually encouraged to provide such opportunities and support to their employees who can directly influence the employers' output. An attractive salary appeared to be one of the most important reasons for pursuing a program of study. If agricultural careers can be made more attractive by offering competitive packages, potential professionals might take agricultural careers as one of the better options.

The five reasons reported by students as most influential in their choice of the tertiary institution in which to enroll were supported by the existing literature. They were subjects taken in high school (Gilmour, 1981); grades in high school (Richards, 1970); advice by a professional in the desired field (Dlamini, 1983); advice by a guidance counselor (Gilmour, 1981); and reputation of the target department (Graham, 1990). These and other reasons influencing enrollment in the tertiary institution are mainly related to the senior secondary curriculum and academic achievement. Professionals in tertiary institutions and career counselors have had a positive influence in students' choice of the tertiary institution. The reputation of departments in institutions was also considered to be important by prospective students. Advice by parents, students in the programs and college educators were also regarded as influential.
Senior secondary students must be tracked in such a way that the combination of subjects taught will be useful to gain entry in the desired institution. These students must be advised of the required academic level for the different institutions as they enter the senior secondary level so that they can set their academic goals in a timely manner.

Tertiary professionals and career counselors are looked up to by beginning college students. The functions of these individuals must be enhanced for better career counseling among prospective college students.

There is nothing that speaks better for a tertiary program than departments that offer the program. The image of the Department of Agricultural Education and Extension in the College of Agriculture in the University of Swaziland must be maintained at a high level to attract prospective students and instill pride among graduates.

Parents, students in tertiary programs and college educators carry with them the trust of prospective students who enroll in a tertiary institution. These are the individuals upon whom the tertiary institutions should create a positive impression if they would like to sell their institutions.

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BUILDING LINKAGES FOR PROTECTION OF THE ENVIRONMENT: THE ROLE OF PARTICIPATORY TECHNOLOGY DEVELOPMENT

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Outstanding Research Presentation

This paper is one of five outstanding research papers from the Twelfth Annual Meeting of the Association for International Agricultural and Extension Education, Arlington, VA, U.S.A., March 28-30, 1996.

Abstract

A ten-year participatory technology development effort was undertaken by World Neighbors to assist Quechua farmers living in the Andean mountains of Bolivia, Ecuador and Peru to improve soil and water conservation practices on hillsides that lose 80 to 120 tons of soil per hectare per year. The results of this action research demonstrate that site-specific adaptations made by farmers improved food security, enhanced profitability, conserved water, and reduced soil erosion. Motivation to test, adopt and disseminate new ideas on a volunteer basis required that all four of these benefits be realized by farmers.

Rationale

Nearly three billion people depend on mountains for hydroelectricity, recreation and mineral resources. Half of humanity lives downstream of a mountain watershed. Until scientists, economists, and development officials recognize the strategic importance and fragility of mountains, thousands of local cultures and a large portion of the world's intact ecosystem will remain at risk (Denniston, 1995).

World Neighbors believes Denniston is wise to point out the importance of these mountainous areas, and the thousands of local cultures that live in them to our ecosystem. As a non-governmental organization dedicated to helping marginalized families develop their capacities to meet their basic needs, World Neighbors has devoted approximately 75% of its resources during the past 43 years to programs that have improved the way of life for indigenous peoples in mountainous terrain in more than 30 nations of Asia, Africa and Latin America.

As high rates of population growth began forcing more and more people to cultivate hillsides with 30 to 70 degree slopes in order to survive in the early 1970s, World Neighbors came to see the vital importance of working with our co-workers, the small rural farmers, to develop and disseminate appropriate practices that would conserve their natural resources. In 1974, World Neighbors-Central America was fortunate to find Marcos Orozco, the recently retired 25-year veteran national director of the Government of Guatemala’s water and soil conservation program to facilitate this effort (Peters, 1976). The success of the participatory technology development program facilitated by Orozco in Guatemala and Honduras eventually attracted visitors from over 350 non-government and government organizations throughout the world to visit the leadership networks involved in these efforts in Guatemala and later...
World Neighbors - Andean Area efforts to replicate these programs among small indigenous peasant farmers living in the Andean Mountains of Bolivia, Ecuador and Peru began six years later. Expectations were high that indigenous leaders from Guatemala could readily teach their southern counterparts appropriate technologies they had helped develop and disseminate in Central America. Subsequent experience taught us that the process was far more complicated than originally anticipated.

**Purpose**

The purpose of this article is to share insights gained from working with small rural Quechua and Aymara farmers to develop and disseminate appropriate technologies to protect natural resources in 140 communities in the Andean mountains of Bolivia, Ecuador and Peru.

**Setting**

The farmers served in these programs own .5 to 2.5 hectares, prefer to speak their native languages of Aymara and Quechua, are generally functional illiterates, and live between 2,300 and 4,000 meters above sea level. Average annual rainfall varies between 600 and 1,200 millimeters.

Government agencies and international organizations such as United Nations Children's Fund (UNICEF) Proandes estimate that rates of soil erosion in these areas range from 80 to 120 tons per hectare per year. Unfortunately, government agricultural extension services provide no services to the indigenous peoples of these areas.

By 1982, World Neighbors - Andean Area was convinced that participatory technology development was the only way to deal with the lack of government extension services for rural Quechua and Aymara people living in the mountainous areas of Bolivia, Ecuador and Peru. The only hope for dissemination of improved practices among the desperately poor was the enthusiasm of the farmers themselves (Bunch, 1982). For example, Quechua farmers eager to be a part of the process of testing and disseminating new ideas among their needy neighbors in Northern Potosí, Bolivia, walked as many as 24 hours round trip to attend monthly training seminars.

**Developing an Effective Participatory Soil and Water Conservation Program**

The first task in developing an effective soil and water conservation program involving farmers appeared simple enough. Just bring the most outstanding Mayan farmer trainer-of-trainers, Anacleto Sajbochols, to give a three-day practical seminar to teach the same simple technologies they were using in Central America to outstanding Quechua and Aymara counterparts. However, to our surprise, three weeks after the seminar was given in Northern Potosí, Bolivia, the ditches dug on the contour at the seminar were covered up by the farmers themselves.

We concluded that sufficient dialogue with small farmers had not preceded the seminar and that more committed farmers needed to be recruited to test these ideas the following year. So, a year later, Pio Camey, another outstanding Mayan farmer trainer-of-trainers, was brought in to do a second series of seminars in Bolivia, Ecuador and Peru.

To our surprise, the contour ditches for preventing erosion and water runoff were covered up once again. This time farmers explained that the water collected in the contour ditch would have a disastrous effect if it broke loose during a heavy rain. It posed the danger of creating one more gully on their own land, that of their neighbor, and perhaps both. Furthermore, the grass Guatemalan leaders had recommended that farmers plant on the top side of the contour ditch to feed animals and filter out the soil moving down the hillside during the rainy season would not survive the lower rainfall of this area.
Five years elapsed before World Neighbors - Andean Area was able to gather sufficient resources to once again arrange an exchange between these leaders. This time we decided to take trainers-of-trainers from Bolivia, Ecuador and Peru to see parcels of land that small farmers in Honduras had protected with soil and water conservation measures. They would also see improved homes and other benefits derived over time.

During the time that elapsed between the earlier seminars and the new initiative, farmer trainers-of-trainers in Central America had worked in diverse new environments. They had begun to realize that the most important thing to teach their neighbors was a problem-solving methodology, not a technology. This was fortunate. As we studied the methodologies they were using at the demonstration farm of Loma Linda we asked the Andean farmers to discuss in Quechua language the pros and cons of each methodology. To our amazement, the 13 farmers who came to Honduras predicted that none of the practices would be adopted by their counterparts. They would have to go back to their respective nations and start from scratch with their neighbors.

This taught us several lessons about participatory technology development. First, trainers will only be effective if they provide follow-up, so that the technology can be adapted as needed over time. Second, participatory technology development is site-specific. No matter how simple the technology, it cannot necessarily be transferred from one place to another, even when it has been developed by the peasants themselves and would appear appropriate. For example, tillage practices for corn and beans in Central America differ from those for potatoes, horse beans and barley in South America. Deep tillage furrows 40 centimeters wide developed on the contour are perfect for planting corn and beans. By protecting them from year to year, farmers can replant their corn or beans by simply driving a stake into the middle of the furrow and drop the new seed into the hole. This soft bed speeds up root growth thereby improving productivity.

Furthermore, the narrow space between each furrow left uncultivated ensures that all moisture and nutrients are kept in the root zone where they are most needed. Therefore, when the trainer from Ecuador returned to his area, he began by pointing out to the small Quechua farmers that the idea of constructing deep tillage furrows on the contour was just an idea to be tested. He suggested that they initiate small experiments to test ideas they believed would be appropriate for their own area. We were surprised to learn in the dialogue which followed that all farmers had attended seminars on water and soil conservation. They took us to see the terraces they had helped build which the owner had never used. They also showed us the beautiful aluminum A-frames another large non-governmental organization had given them after attending their seminar. We noted that they had never used these either. It also became evident that loans for seed and fertilizers for those who constructed terraces were not producing the desired result. Anyone could drive down roads in adjacent provinces and see terraces that had not been kept up after these financial incentives were terminated.

It soon became apparent that small-scale experimentation was necessary (Bunch, 1991). The farmers eventually chose to test two ideas. The first was deep tillage rows on the contour. Annual precipitation was so low in this area that farmers had been unable to plant corn. Perhaps deep rows would conserve enough water in the root zone, so that farmers could finally raise the crop in sandy soils. The second idea tested by farmers was bench terraces two meters wide, which was one-half the width of terraces being promoted by professional agronomists working for the other large non-governmental organizations promoting these activities in Ecuador. Grass was also planted on the edge of these terraces to provide food for their livestock and protect the edges.

Everyone was deeply distressed when a serious drought occurred during the next growing season. Half way through the season it appeared all crops would be lost. We felt fortunate to have encouraged the farmers to experiment on a
small scale. To our amazement, at harvest time, the only people to harvest any crops were those who had implemented these practices. An important lesson was learned. From the environmental perspective, the motivation for initiating these programs is normally soil and water conservation. In contrast, the most immediate economic benefit to areas that are drought prone due to environmental degradation, is likely to be water conservation. This could save the crop, averting serious hunger and the need to migrate to the city to look for work. We therefore agree with Kerr and Sangh (1992) who stated that conservation investments are measured by small farmers like other investments, and will be undertaken only if profitable. Soil conservation measures that produce the most rapid return are the most favored. Opportunities to combine conservation with quick increases in productivity are limited, but they should be explored to the extent possible.

The water and soil conservation programs, in that order, were off to an enthusiastic start in Ecuador. Fortunately, we had given the Quechua trainers-of-trainers who had formed a non-governmental organization called Centro de Desarrollo de Educación Indígena (CEDEIN) a video camera to tape in the native Quechua language testimonies of the men and women involved and share with neighboring villages. When these tapes were shown in adjacent communities, the response was immediate. Hundreds of people crowded around to see them. They were not interested in whether the films had been professionally produced and edited. The important thing was that they, the Quechua participants, were the architects of their own program. The fact that all communication was in their native Quechua language was a unique first. Also, for the first time all women could understand. This was important because women receive only two or three years of primary education and do not learn Spanish. The impact was evident a year later when widows began gathering their neighbors to initiate water and soil conservation trials on their own land.

Eventually CEDEIN was persuaded to include a woman on their staff. The impact was remarkable. When this woman joined her husband in promoting water and soil conservation, the number of families involved increased from 28 to 48 in the next six months. When we inquired how she had accomplished this remarkable feat when it had taken her husband 18 months to involve the first 28 families, her reply was simple, "All the new participants were my relatives!" So, although the implementation of water and soil conservation programs normally requires male labor, the importance of involving women should never be underestimated. One can be sure they will also be the first to help widows.

Another lesson learned during the second and third year of the program was that farmers had so little land due to high population density that they were only willing to test new ideas on small plots that would no longer produce anything. Since recuperation of these parcels of land was going to be labor intensive, they wanted to make sure the crops planted would be able to take maximum advantage of all rainfall. Once again, small bench terraces were preferred. To bring these new terraces into production, the trainers-of-trainers encouraged their neighbors to plant a cover crop of local peas several times during the first three years. Since these plots would produce nothing anyway, the only opportunity cost for doing this was the labor invested in planting and turning under the cover crop.

Although the cost of labor was generally high and the constraining factor in implementation of these practices (Stocking & Abel, 1992) it was inexpensive when compared to the cost of purchasing new land. Since labor was an available resource all farmers possessed, they were pleased to use it in a manner that generated more land. Before we knew it some of the poorest farmers were building terraces up canyon slopes of 70 degrees or more that had never been farmed.

A note of caution should be injected at this point because the texture of the soil in some of the
areas where these terraces were built was a soft sandy loam. Under conditions of normal rainfall this posed no problem. But one day the area suffered a deluge of rain. Tragically, this destroyed the soil and water conservation work done previously in two communities. The advice of soil scientists should always be sought to ensure that technologies being developed by small farmers do not pose hazards when there is an unexpected deluge. In this particular case, the Ministry of Agriculture of the Province of Chimborazo actually recorded 40 tons of soil was eroded per hectare in one day, the highest recorded figure in the history of the area.

Fortunately, this mishap did not dampen the interest of the majority of the leaders in the area. In fact, three years later, one of the first people to test this idea turned out to be an adult literacy teacher who worked part-time for the bilingual inter-cultural program of the Ministry of Education. He was so enthusiastic about the land that he had reclaimed with small bench terraces and cover crops that he motivated the entire population of three communities where he was teaching literacy to do the same. That brought an important social custom into play. "Minka" is an Andean Indian tradition of working together for the common good.

Our experience with cooperative efforts in the water and soil conservation programs is summarized by Stocking and Abel (1992):

Cooperative labor allows better planning, since achievements become more predictable. Output from the strong and weak, and the healthy and ill, for example, cancel out to give a predictable quantity and quality of labour - an important consideration in watershed conservation planning. An individual may be able to dig 10 centimeters of cut-off drain, but only if 20 individuals cooperate digging 10 meters each will the drain perform its design function. Heavy tasks, such as the construction of stone terraces or rooting out the tree stumps, are impossible for individuals working alone.

Each person’s knowledge complements that of others, so that the group is in a stronger position to evaluate outside advice and make better decisions, for example on the alignment of contours or the reallocation of land. Many people working together provide a greater incentive for effort than the lone individual.

These advantages of cooperation in agriculture apply with particular relevance to conservation works, which often require large amounts of labor for construction and continuing cooperation among neighbors for their efficient functioning and maintenance. Potential returns to labor in communal or cooperative ventures can be large, and are probably always greater than in comparable individual enterprises. (p.77).

The social benefits of a cooperative effort reached their maximum expression in the community of San Martin Alto, Ecuador, when after six months of daily communal effort to help each family regenerate a small plot of land through the construction of small bench terraces, Catholics and Evangelicals decided to hold a joint Easter service, an unheard of event in an area strongly divided by religious beliefs.

In locations where initial trials had been conducted forages planted at the edge of bench terraces became well established. One family had increased the number of cows raised from one to three during the first four years of participation in the program. The representative of Heifer Project International was so excited about the possibility of animals promoting water and soil conservation that he agreed to provide animals for communities which would work together to protect a plot of soil for every individual in the community. He realized this would not only provide the necessary forage from the grass planted at the edge of every terrace but would also conserve needed rainfall and soil to improve the food security of the area. This really moved communities into action.
Animals are their prized possessions because they represent their savings account for health emergencies and festive occasions.

Communities also had begun constructing large contour ditches planted with grass at the top of major production areas to catch runoff from other communities or land that was detrimental to their area. It was becoming increasingly clear to them that these measures had to be implemented on a broader scale to economically protect larger production areas from water-induced soil erosion at a lower cost.

As a result of the enthusiastic promotion of this program by the Quechua adult literacy teacher, the office of the Ministry of Education for the Province of Chimborazo asked CEDEIN to train all interested adult literacy teachers in these practices. Two seminars were given: one seminar to 15 supervisors who oversee 520 bilingual adult educators, and the other to 15 Quechua adult literacy teachers specifically interested in replicating these ideas in new communities.

World Neighbors–Andean Area has found that the true test of the effectiveness of a non-governmental program is whether it leads to the participation of rural school teachers. In Bolivia, the Ministry of Education allocated 10 full time rural teachers to replication of the self-help community development programs. This augmented the program's outreach from 40 to 120 communities in the provinces of Charcas and Alonzo IbaZez. In Peru, the program expanded from 50 to 200 communities in the Departments of Ayacucho and Huancavelica. Their active participation proved crucial in maintaining program efforts during the period of violence caused by the Shinning Path. Some of the best rural teachers even informed rural communities that requested their services that a prerequisite for their transfer would be community involvement in the World Neighbors program. They had observed that the standard of living and attitudes about formal education were entirely different. These are critical factors in achieving a sustainable impact.

We are hopeful this will occur once again in the Province of Chimborazo of Ecuador. We believe the participatory technology development process has proven itself once again because it has dealt with all of the limiting factors in production and development. In the case of our efforts in the Province of Chimborazo these included inadequate rainfall, a shortage of cultivable land, the high cost of labor, low income, and lack of involvement of educational institutions.

Fortunately the same participatory technology development process also produced positive results in Bolivia. In this case the limiting factor was land covered with rocks, especially communal land. So, the most popular technology was building a rock wall on the contour. Once again joint efforts were the key to success. A video camera was also invaluable. Farmers would fall asleep watching slides after an hour into an evening training event, but they would stay awake until 1 and 2 A.M. watching videos taken the same day or in other programs. Not only that, they would demand that the videos be shown over and over again.

To draw maximum attention to these impressive communal efforts, provincial field days were organized. In one case four trucks were rented to bring farmers from four projects in neighboring provinces. When we were unable to provide transportation for a fifth project, 120 farmers decided they would make the 12-hour round trip on foot! In order to reach the site on time they left their communities at 3 A.M. in the morning. When they hiked over the top of the adjacent hill with the Bolivian flag flying in the wind, their Andean horns broke into celebration. They were joined immediately afterwards by the 350 participants who had arrived by truck. When the national anthem was sung, the hills facing the 30 hectares of land that had been protected with rock barriers built on the contour, literally broke into song. Radio Pio XII also gave the event national coverage in Quechua!

The whole event provided a tremendous opportunity for edification of major community efforts to promote water and soil conservation.
practices throughout two provinces. A video of the event was also prepared by the local Indian leaders. It was shown repeatedly to the 120 volunteer promoters who attended two-day monthly training seminars at five sites throughout the two provinces.

By 1991, 670 families from 58 communities in Northern Potosi, Bolivia protected 71.5 hectares, four percent more than the goal they had set for themselves. In 1993, the World Bank funded a program to assist 120 volunteer promoters trained by World Neighbors to teach their neighbors appropriate water and soil conservation practices. A total of 1,936 men and 794 women attended these events. By the end of 1994, the total land area protected had grown to 142 hectares. Today, as one winds around the hairpin roads of the Andean mountains in that area, one can observe entire mountainsides that have been improved with water and soil conservation practices.

In summary, farmer participation in research and extension is a necessary condition for adoption to occur. Participation should be built into the whole process from problem definition to technology development and transfer (Fujisaka, 1989). For this reason we must acknowledge and accept farmers as equals and respected partners, especially in the field of natural resource management (Tamang, 1993; Chambers, Pacey, & Thrupp, 1989).

References


PERCEPTIONS AND ACTIVITIES OF AGRICULTURAL EDUCATION PROFESSORS IN U.S. INSTITUTIONS OF HIGHER EDUCATION REGARDING INTERNATIONALIZATION OF THE AGRICULTURAL EDUCATION CURRICULUM

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Abstract

The main purpose of this study was to examine the perceptions and activities of agricultural education professors in agricultural education departments in U.S. institutions of higher education regarding internationalization of the curriculum. The study showed that internationalization is an important issue in agricultural education but will not receive the attention it needs unless more opportunities are provided for faculty and students to travel and participate in international activities. The study also showed that agricultural educators as a group are not doing much beyond discussing international issues or using examples in their course work to add an international perspective to the curriculum.

Introduction

The debate over the introduction of an international perspective into the curriculum in U.S. institutions of higher education has gone on for many decades. Technological, economic, social and political factors have combined to bring many scholars and authors to the conclusion that internationalization of the curriculum is an essential component of education.

Universities are becoming more aware of the need to internationalize their curricula (Schechter, 1990). Colleges of agriculture and natural resources should be no exception to this trend, as the need to understand the global economy and the United States’ place within it touches every farm family.

Martin and Keller (1989) acknowledged:

The need for developing an awareness of the global nature of the agricultural industry has become one of the major issues of our time. It has become increasingly apparent that if a person is to be considered educated in agriculture, he/she must be cognizant of the interrelationships of various agricultural systems and the governments, cultures and societies in which they function. It is no longer sufficient to know how to produce food and fiber and conduct or manage the many tasks in today’s agricultural industry. Development and enhancement of one nation’s agricultural system is unavoidably interwoven with those of other nations. If these developments and interrelationships are to be successful, it is critical that students of agriculture learn as much as possible about systems of agriculture in cultures and societies.
Despite the support in much of the literature for internationalization of the curriculum, Magrath (1992) conceded that the challenge on behalf of international education remains as it has always been, an exceedingly tough one.

He pointed out:

For many faculty leaders, and sadly for too many senior administrators, international education is a “nice thing”, something out there that is marginal, exotic, but hardly vital to the reputation and prestige of the college or university. It is difficult to bring about change, because most colleges and universities are simply not organized to give a high priority to international education. There are international education officers at most colleges and universities, but sadly they are often individuals who do not have line or budgetary authority; they have the same kind of influence that too often has been attached to our affirmative action offices. (p. 4).

Goodwin and Nacht (1991) also documented that the resistance on the part of many mainstream faculty to internationalizing the curriculum and to truly support international involvement as a part of the teaching and research process constitutes a serious problem.

Bruce, Podemski and Anderson (1991) shared the same concern by recognizing the difficulty of developing a global perspective in teacher education. The authors explained that the most difficult problem to overcome is the lack of awareness among education faculty that students need a global perspective, but contend that development of such a perspective in an educational program is feasible. Faculty whose preparation and experience may not have included a global perspective may question the need for such an emphasis in the curriculum and doubt the feasibility of incorporating yet another emphasis in an already crowded curriculum.

In Lamy’s (1983) opinion:

Many teachers and administrators recognize that most international education programs introduce a new and challenging content to their classrooms and schools. However, these educators often do not feel competent to teach or administer programs in international issues, area studies, foreign languages and cross-cultural understanding. Finally, many educators are concerned that this emphasis on global or international programs is contradictory to the fundamental purpose of the school—to prepare young people for careers and for citizenship in the United States. (p. 5).

With the rapid shrinking of the world due to communication technology and the dramatically increased interdependence between nations, American institutions cannot afford not to prepare U.S. citizens for participation in world affairs. What is needed is a broad public awareness of the problem and its numerous national and international implications. If the public can be educated about the alarming state of U.S. ignorance about the rest of the world and implications to national security, as is repeatedly indicated in the literature, it will be easier to gain support for new proposals and efforts to internationalize school curricula. It is our responsibility as educators, journalists, government leaders and citizens to sound the alarm.

As we look to the 21st century, we should not forget the words of the former U.N. Secretary General Kurt Waldheim, “many civilizations in history have collapsed at the very height of their achievement because they were unable to analyze their basic problems, to change directions and to adjust to new situations which faced them” (Lurie, 1982, p. 419).

While there are substantial difficulties in providing a quality international dimension to agricultural education programs, Kellogg (1984)
said “...we must offer this kind of educational experience for agricultural students for the 1990s and the 2000s. To neglect the international dimension in our universities’ educational programs in agriculture would be a failure to responsibly fulfill our mandates as teachers of a new generation” (p. 18).

**Purpose and Objectives**

The main purpose of this study was to examine the perceptions and activities of agricultural education professors in departments of agricultural education in U.S. institutions of higher education regarding internationalization of the agricultural education curriculum.

The specific objectives of the study were to:

1. Identify the demographic characteristics of agricultural education professors.

2. Examine the perceptions of agricultural education professors regarding internationalization of the agricultural education curriculum.

3. Compare selected perception variables to the demographic characteristics of agricultural education professors.

4. Identify activities conducted by agricultural education professors to add an international perspective to the curriculum.

**Methodology**

The research design for this study was a descriptive survey. The population included all professors of agricultural education in 81 U.S. institutions of higher education.

The instrument used for data collection was a questionnaire which consisted of three sections. Section one was designed to collect demographic data such as gender, age group, present rank, years taught in college/university, percentage of present position allocated for teaching, research, administration, extension or other duties, ethnic group, country of citizenship, visit to other countries, length of visit, and number of languages spoken other than English.

The purpose of section two was to examine the perceptions of U.S. agricultural education professors regarding internationalization of the agricultural education curriculum. There were 21 items in this section. Respondents were asked to respond to each item statement using a 5-point Likert-type scale from (1) strongly disagree to (5) strongly agree. A similar scale was used for the third section which focused on identifying activities used to internationalize courses in agricultural education.

The questionnaire was reviewed for content, readability, clarity, and validity by a panel of six professional international education experts. A pre-test of the questionnaire was conducted among ten agricultural education graduate students. Comments and remarks were compiled and used to develop the final draft. A reliability check on the questionnaire revealed a high Cronbach Alpha reliability of .94.

**Data Collection**

A list of the agricultural education professors was established by using both the Directory of Agricultural Education Departments (1993-94) and the Agricultural Education Directory (1992). There were 360 U.S. agricultural education professors listed in both directories. A sample of 260 professors was randomly selected from the population for participation in this study.

A cover letter explaining the purpose and importance of the study and the confidentiality of information provided was prepared and attached to the questionnaire. The questionnaires were sent to and collected from the respondents by mail. A return-addressed, stamped envelope was included for the completed questionnaires. The respondents were asked to return the completed questionnaires within four weeks.

Follow-up letters were sent seven weeks after the first mailing encouraging nonrespondents to...
return their completed or blank questionnaires, if they chose not to participate in the study. Three weeks later, a second follow-up letter was sent to the respondents who had not returned the questionnaire.

Of the 260 respondents in the sample 6 were no longer agricultural education professors. A total of 205 questionnaires were returned (80.1%). Of the returned questionnaires, 12 were blank, and 9 were not properly completed. These were not used in the data analysis.

Analysis of Data

Data were analyzed using frequencies, percentages, means and standard deviations, the t-test, and Pearson-Product-Moment Correlation Coefficient. The alpha level was established at .05.

Results

Demographic Characteristics

One hundred and eighty-four respondents from 81 U.S. institutions of higher education provided usable data for this study. Analysis of the demographic information revealed that 91.3% of the respondents were male, 63.5% were between 40 and 59 years old, 82% were white, and 98.4% were U.S. citizens.

Sixty-eight percent of the respondents were associate or full professors, 78.6% had taught between 1 and 25 years in colleges or universities, and 88.8% allocated between 5 and 100% of their time to teaching. About 70% of the respondents had traveled to a foreign country either for professional or vacation-related reasons. Only 27% of the respondents indicated speaking at least one foreign language.

Perceptions

The data on perceptions of U.S. agricultural education professors regarding internationalization of the agricultural education curriculum are presented in Table 1. Respondents rated the statement “The total college curriculum should reflect a respect for knowledge of the global community” highest with a mean score of 4.33. The lowest-rated item was “There is no need for continued effort in helping students develop a global perspective in agricultural education because they will get this elsewhere in the university” with a mean score of 1.92. Generally, with the exception of the negatively worded statements, all perception statements received mean score ratings above 3.00.

Selected perception variables were compared with demographic characteristics of agricultural education professors. A t-test statistic was computed to determine if the perceptions differed with international travel. The results indicated a significant difference in perceptions regarding internationalization of the agricultural education curriculum between respondents who had traveled to a foreign country and those who had not traveled (p<=.009). Respondents who had visited a foreign country perceived internationalization of the agricultural education curriculum more positively than those who had not.

A Pearson Product-Moment Correlation Coefficient was computed to determine if a significant relationship existed between perceptions of respondents and years of experience, length of visit to a foreign country, and percentage of time allocated for teaching. Results indicated a weak but significant correlation existed between respondents’ perceptions and length of their visit to a foreign country (r = .1778, p<.05). There were no statistically significant relationships between perceptions and years of experience, and perceptions and percentage of time allocated for teaching.
Table 1
Means and standard deviations of agricultural education professors’ perceptions regarding
tonternationalization of the agricultural education curriculum (n=184)

<table>
<thead>
<tr>
<th>Item</th>
<th>Perception Score&lt;sup&gt;a&lt;/sup&gt;</th>
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<tbody>
<tr>
<td>1. The total college curriculum should reflect a respect for a</td>
<td>4.33 0.72</td>
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<td>knowledge of the global community.</td>
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<td>2. The attitudes, values and commitment of the college faculty are</td>
<td>4.29 0.67</td>
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<td>important factors in trying to integrate global perspectives into</td>
<td></td>
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<td>the agricultural education curriculum.</td>
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<td>3. The general university environment in which an individual faculty</td>
<td>4.28 0.73</td>
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<td>member works plays an important role in his/her participation in</td>
<td></td>
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<td>international activities.</td>
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<td>4. International education is good for the U.S. agricultural economy.</td>
<td>4.23 0.72</td>
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<tr>
<td>5. Faculty should encourage their students to develop an attitude of</td>
<td>4.20 0.72</td>
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<td>appreciation and understanding of their role as citizens of the</td>
<td></td>
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<td>world.</td>
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<td>6. United States citizens should increase their knowledge of other</td>
<td>4.19 0.81</td>
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<td>countries’ agricultural systems.</td>
<td></td>
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<td>7. International issues will become more important to U.S. citizens</td>
<td>4.11 0.72</td>
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<td>in the next ten to twenty years.</td>
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<td>8. Opportunities to develop a knowledge base about the dynamics and</td>
<td>4.07 0.73</td>
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<td>interdependencies of nations throughout the world should be provided</td>
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<td>to students not only by the college of agriculture but throughout a</td>
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<td>university-wide program.</td>
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<tr>
<td>9. Internationalization of the curriculum will help U.S. citizens</td>
<td>4.05 0.85</td>
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<td>to gain a greater understanding of the interdependence among nations.</td>
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<tr>
<td>10. Department heads and faculty in U.S. colleges of agriculture</td>
<td>4.05 0.78</td>
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<td>should be genuinely committed to promoting international education.</td>
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<td>11. Agricultural educators have an important responsibility to</td>
<td>4.04 0.78</td>
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<td>enhance students’ understanding of international issues that affect</td>
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<td>their lives and bind them to other people.</td>
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<td>12. There are strong reasons for a university to encourage, establish,</td>
<td>4.00 0.81</td>
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<tr>
<td>maintain or develop a commitment to internationalization of its</td>
<td></td>
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<td>programs, course offerings and activities.</td>
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<td>Item</td>
<td>Perception Scorea</td>
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<td>Mean</td>
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<tr>
<td>13. International education should be actively promoted by students,</td>
<td>3.96</td>
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<td>faculty and administrators.</td>
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<tr>
<td>14. International agricultural education programs should be offered</td>
<td>3.95</td>
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<td>to help U.S. students understand current international market trends.</td>
<td></td>
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<tr>
<td>15. Agricultural educators should try to give examples from other</td>
<td>3.92</td>
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<tr>
<td>countries’ agricultural production systems along with the U.S.</td>
<td></td>
</tr>
<tr>
<td>system.</td>
<td></td>
</tr>
<tr>
<td>16. Internationalization of the general curriculum should be a priority</td>
<td>3.66</td>
</tr>
<tr>
<td>function of all U.S. institutions of higher education.</td>
<td></td>
</tr>
<tr>
<td>17. Agricultural education faculty need a background of international</td>
<td>3.63</td>
</tr>
<tr>
<td>knowledge in order to help students develop attitudes and practices</td>
<td></td>
</tr>
<tr>
<td>that will be more compatible on a global scale.</td>
<td></td>
</tr>
<tr>
<td>18. In the context of United States’ participation in the world</td>
<td>3.42</td>
</tr>
<tr>
<td>community, it is imperative to employ agricultural education faculty</td>
<td></td>
</tr>
<tr>
<td>with an international perspective.</td>
<td></td>
</tr>
<tr>
<td>19. The current emphasis on Western civilization and culture in the</td>
<td>2.69</td>
</tr>
<tr>
<td>curriculum at U.S. universities should not be diluted by adding</td>
<td></td>
</tr>
<tr>
<td>international perspectives.</td>
<td></td>
</tr>
<tr>
<td>20. U.S. institutions of higher education are placing too much emphasis</td>
<td>2.24</td>
</tr>
<tr>
<td>on international education at the expense of local and national</td>
<td></td>
</tr>
<tr>
<td>research priorities.</td>
<td></td>
</tr>
<tr>
<td>21. There is no need for continued effort in helping students develop</td>
<td>1.92</td>
</tr>
<tr>
<td>a global perspective in agricultural education because they will</td>
<td></td>
</tr>
<tr>
<td>get this elsewhere in the university.</td>
<td></td>
</tr>
</tbody>
</table>

aScale: 1 = strongly disagree, 5 = strongly agree.
Several of the items rated above the mean level of 4.00, which was set a priori as the highest level of agreement.
The extent to which agricultural education professors conducted activities to add an international perspective to the curriculum is shown in Table 2. The results indicated that the majority of respondents were only occasionally or rarely using almost all 24 activities designed to internationalize the curriculum.

Table 2
Means and standard deviations of frequency of activities conducted by agricultural education teachers to add international perspectives to the agricultural education curriculum (n=184)

<table>
<thead>
<tr>
<th>Activity</th>
<th>Activities Conducted&lt;sup&gt;a&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
</tr>
<tr>
<td>1. Encouraging class discussions about other people’s points of view.</td>
<td>3.84</td>
</tr>
<tr>
<td>2. Providing examples from diverse cultures.</td>
<td>3.53</td>
</tr>
<tr>
<td>3. Incorporating international students’ perspectives into class activities.</td>
<td>3.47</td>
</tr>
<tr>
<td>4. Using educational materials that reflect an international perspective.</td>
<td>3.25</td>
</tr>
<tr>
<td>5. Incorporating courses that build awareness of trends affecting the future of agriculture worldwide.</td>
<td>3.23</td>
</tr>
<tr>
<td>6. Inviting guest speakers to share perspectives on global issues.</td>
<td>3.20</td>
</tr>
<tr>
<td>7. Participating in international development projects and activities.</td>
<td>3.19</td>
</tr>
<tr>
<td>8. Including international issues and material in agriculture education curriculum.</td>
<td>3.16</td>
</tr>
<tr>
<td>9. Attending seminars, colloquia, meetings, etc.</td>
<td>3.08</td>
</tr>
<tr>
<td>10. Keeping in contact with former students who have returned to their countries.</td>
<td>3.01</td>
</tr>
<tr>
<td>11. Establishing cooperative relationships with institutions in other countries.</td>
<td>3.00</td>
</tr>
<tr>
<td>12. Providing faculty international development opportunities.</td>
<td>3.00</td>
</tr>
<tr>
<td>13. Encouraging research on international topics.</td>
<td>2.98</td>
</tr>
</tbody>
</table>
Table 2 (cont.)

<table>
<thead>
<tr>
<th>Activity</th>
<th>Activities Conducted$^a$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
</tr>
<tr>
<td>14. Incorporating suggestions from former international students</td>
<td>2.78</td>
</tr>
<tr>
<td>into the agricultural education curriculum.</td>
<td></td>
</tr>
<tr>
<td>15. Requiring all agricultural students to take at least one general</td>
<td>2.73</td>
</tr>
<tr>
<td>education course that heightens awareness of issues related to</td>
<td></td>
</tr>
<tr>
<td>international agriculture.</td>
<td></td>
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<tr>
<td>16. Supporting faculty exchanges abroad.</td>
<td>2.71</td>
</tr>
<tr>
<td>17. Offering study or internships abroad opportunities for U.S. students.</td>
<td>2.68</td>
</tr>
<tr>
<td>18. Providing exchange programs for U.S. agricultural education students</td>
<td>2.61</td>
</tr>
<tr>
<td>in foreign countries.</td>
<td></td>
</tr>
<tr>
<td>19. Providing funds for international programs.</td>
<td>2.53</td>
</tr>
<tr>
<td>20. Hiring international educators as faculty and administrators in the</td>
<td>2.49</td>
</tr>
<tr>
<td>college of agriculture.</td>
<td></td>
</tr>
<tr>
<td>21. Bringing distinguished educators from other countries to campus to</td>
<td>2.45</td>
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<tr>
<td>serve as visiting scholars.</td>
<td></td>
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<tr>
<td>22. Providing special services to agricultural education students</td>
<td>2.41</td>
</tr>
<tr>
<td>through workshops.</td>
<td></td>
</tr>
<tr>
<td>23. Awarding financial aid to support the recruitment of international</td>
<td>2.19</td>
</tr>
<tr>
<td>students into agricultural education programs.</td>
<td></td>
</tr>
<tr>
<td>24. Establishing a foreign language requirement.</td>
<td>1.98</td>
</tr>
</tbody>
</table>

$^a$Scale: 1 = never conducted, 5 = conducted often.

Conclusions and Recommendations

Respondents in this study agreed that international issues will become more important to U.S. citizens in the next ten to twenty years and that the total college curriculum should reflect a knowledge of the global community. It is, therefore, important that agricultural education departments provide opportunities for students and faculty members to develop awareness of the cultural, economic, and political events in other parts of the world.

Respondents who had visited a foreign country perceived internationalization of the agricultural education curriculum more positively than those who had not. The length of foreign visits was also positively correlated with the respondents’ perceptions regarding internationalization of the curriculum. It is recommended that more opportunities be provided to students and faculty to gain international experience, both short and long term. It is also recommended that a more practical approach to internationalization should
be encouraged in the agricultural education curriculum. Discussion is a very good starting point, but the use of more active learning procedures is recommended. The results of this study may provide the basis for developing procedures to infuse international perspectives into agricultural education and organize appropriate training for faculty members to accomplish the task.

References


Lurie, J. (1982). America...globally blind, deaf and dumb: A shocking report of our incompetence through ignorance in dealing with other countries. Foreign Language Annals, 15(6), 413-420.


Referees for Spring and Fall 1996 Issues

David Acker, Oregon State University  
Mike Burnett, Louisiana State University  
Mary Lou Carlson, University of Illinois  
James Christiansen, Texas A&M University  
John Crunkilton, Virginia Tech  
Joe Cvancara, Washington State University  
Jim Diamond, Pennsylvania State University  
Arlen Etling, Pennsylvania State University  
Milton Fujii, University of California  
David Giltrow, CCCI  
Steve Jones, University of Minnesota  
Layle Lawrence, West Virginia University  
Jim Long, Washington State University (retired)  
Barbara Ludwig, Ohio State University  
Robert Martin, Iowa State University  
Edna McBreen, University of Wyoming  
Don Meaders, Michigan State University  
Ruben Nieto, Ohio State University  
Curtis Norenberg, University of Minnesota  
Rama Radhakrishna, Pennsylvania State University  
John Richardson, North Carolina State University  
Bill Seiders, Food and Agricultural Organization  
Roger Steele, Cornell University  
Lakshman Velupillai, Louisiana State University  
Walter Wiles, Southern University  
Ismail bin Yahya, University College of Belize  
Moses Zinnah, Winrock International
In his book, "Holistic Resource Management" Allan Savory asserts we can manage natural resources sustainably if we think, observe, plan and act considering the "whole." The whole may be garden, a farm or ranch, holdings of a management agency, a water shed, a bio-region.

He explains: “We may know a lot about hydrogen and a lot about oxygen - but still not understand water.” We need to conceive the whole.

With a view of the "whole under management," Savory suggests we then define a tentative three-part goal, a goal that integrates our personal inner-most values, the means to realize these values, and our image of the landscape we leave for future generations.

With both the whole and the goal in mind, Savory then says, study the ecosystem--things like plant succession, water cycles, mineral cycles, energy flows.

Next, look at resource management "tools." Some tools are apparent - timing, fire, grazing, animal impact on soil, mechanical technologies, money, labor. Other tools may not be so obvious - synergistic intercropping patterns, or beneficial predator insects, for instance. He believes that human creativity reveals and creates other tools.

Aware of a broader range of tools, we filter these alternatives through "testing guidelines" and, following "management guidelines," apply selected tools within the context of the larger whole and the integrative goal.

The Holistic Resource Management model helps us clarify, devise and learn from ever finer cycles of on-the-ground experiments that move us toward the goal of sustainability.

But whose goal? Whole families, organizations and communities are included in the Washington State University - W. K. Kellogg Foundation Holistic Management Project with ranchers and resource agencies. Perceiving a larger whole implies involving a wider circle of people in defining goals.

No easy charge!

So, the Washington State Holistic Management Project supplements the HRM model by adding consensus building and leadership. Project participants are becoming more skilled in using the HRM model and in helping other practitioners in groups think, observe, plan and act more holistically to sustain natural resources, institutions, communities and even one’s personal approach to living.

Also, as a positive, goal-driven decision making model, the supplemented HRM model helps refine curricula that prepare professionals in agriculture and rural development. For example, WSU faculty refer to the model in their curriculum work with Bunda College of Agriculture in Malawi, Africa.


   Also available from the Center is the "HRM Quarterly," a newsletter. CHRM, 1010 Tijeras, NW; Albuquerque, NM 87102; chrn@igc.apc.org.


3. Bob Chadwick of Consensus Associates, PO Box 235, Terrebonne, OR 97760; 541/548-7112; wick5896@aol.com.

4. From the Covey Leadership Center, 3507 North University Ave., Provo, Utah 84605-9008; 801/377-1888.

5. A WSU contact is Prof. Ron Jimmerson, Human Development Dept., Washington State University, Pullman, WA 99164-6236; 509/335-2896.
The history of the anglophone Caribbean is replete with both significant and subtle changes to its agriculture. Recently, one of the more pronounced changes has been a paradigm shift with regard to agricultural training in general, and farmer training in particular. Agricultural training is now characterized by decreasing state involvement, increased cost-sharing by beneficiaries, more location-specific initiatives as opposed to national programs, and the privatization of extension.

This relatively new order has been fueled, and in some cases literally “kickstarted”, by events external to countries. Structural adjustment programs and the declared aims of governments to commercialize agricultural production to compete in an era of globalization and trade liberalization have been cited as key factors. These changes, coupled with decreasing donor agency support, provision of revolving credit to replace grant funding, and greater insistence on measurable training results create new challenges for agricultural trainers.

Private consultants, non-government organizations (NGOs) and the private sector have been attempting to correct some of the imbalances created by these changes. Many foresaw the death knell for regional agriculture in the absence of self-sustaining viable training alternatives.

One self-financing initiative that has been legitimizing training in cost-benefit terms is the Continuing Education Programme in Agricultural Technology (CEPAT). This program was established by the Faculty of Agriculture, University of the West Indies, as a mechanism to rapidly introduce appropriate technologies to the agricultural sector in the Caribbean region. A major vehicle to accomplish this task has been the short-term training course. The faculty employed a full-time consultant curriculum planner as a proactive effort to support regional agriculture and in anticipation of the changing training paradigm.

Short courses are conducted over a period of one to three weeks and are essentially demand-driven and needs-based. CEPAT has successfully delivered over 100 courses at regional and national levels. This level of responsiveness is a direct result of the careful planning, conduct and evaluation of courses.

CEPAT employs various needs-assessment mechanisms to respond to the myriad and often competing needs of the 14 states in the Caribbean community. Official and informal links have been established throughout the region with most of the NGOs, farmers’ groups, international, regional and national research and development institutions, agriculture professionals, ministries of agriculture, trade and environment, and senior policy planners. Each group suggests areas of need to CEPAT individually or through established CEPAT national advisory committees. At the CEPAT secretariat these suggestions and ideas are analyzed to determine whether they lend themselves to a training solution.
Following this initial prioritization, mechanisms for delivering a training response to these legitimate training needs or performance gaps are explored. The scope of the need determines whether the course will be conducted nationally or regionally. The identified need must be converted to actual demand before a course is developed. Once an appropriate mechanism is identified, a course coordinator, who will have overall responsibility for the course content, is appointed. The curriculum planner is responsible for the determination of the participant exit profile, the delivery methodology and course evaluation.

The course coordinator and curriculum planner first articulate what the trainees should be able to do by the end of the course. Based on this exit profile a curriculum is developed, field sites and practical exercises suggested, course faculty recruited, and a course assistant assigned. The course assistant assumes most of the responsibility for the administrative details at the secretariat and course venue. The course will usually be advertised for defined target groups and appropriate participants accepted.

Courses are conducted using participatory, andragogic, learner-based delivery modes. An informal, mid-course oral evaluation gives participants another means of influencing the course outcome and/or highlighting any technical or administrative mistakes. Considering that these services are provided for fees, every effort is made to maintain quality standards and remedy any shortcomings. The participants are given an opportunity, with guaranteed anonymity, to complete an end-of-course evaluation questionnaire on the course objectives, content, delivery, and administration. The analysis of these responses guides the conduct of similar or repeat courses. At the closing ceremony an elected participant reflects on the course and provides another structured mechanism for feedback. However, one of the distinguishing features of CEPAT training is the post-course, work-place evaluations conducted 9 to 14 months after completion. These evaluations reveal the true impact of the training, namely what the participants did to address the initial performance gap identified.

Results of a sample of post-course evaluations have shown mean ratings of 68% for how much of the course material is used; 85% for how confident respondents feel in applying the techniques and skills learnt; and 79% for how relevant the course material is in addressing real-life situations.

Distance teaching techniques are being used to design learners’ guides. These guides are designed and prepared to facilitate learning with reduced facilitator input, significantly limiting inter-island travel by facilitators and trainees. Courses can then be conducted on any island with flexible hours and one or two key facilitators, thereby increasing overall cost-effectiveness.

While there may be no panacea for dealing with similar changes elsewhere, the CEPAT experience underscores the benefit of participatory, as opposed to consultative needs assessment, a learning environment of mutual respect, and the development of clear, achievable objectives. CEPAT continues to reassess its *modus operandi* to maintain the documented high standard of its courses in terms of utility, relevance and the increased ability and confidence of its graduates. After five and a half years, the program has survived and grown, primarily because of the proven benefits accruing to its farmer-and NGO-based clientele.