Meeting Educational Needs of San Lázaro Farmers: Indigenous Knowledge Systems

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Abstract
Indigenous knowledge systems (IKS) have been defined as learned ways of knowing and looking at the world. Indigenous knowledge is capable of providing alternative methods of viewing and solving developmental problems, since the success of development efforts often depends on local participation. A descriptive study conducted in San Lázaro, State of Trujillo, Venezuela, explored factors that explain how familiarity with farmers’ traditional knowledge systems can enable extension educators and local people to work as partners in planning and implementing agricultural and sustainable development programs. The study was conducted using qualitative and quantitative research methods. Fifty San Lázaro farmers participated in a study that described their traditional farming practices in coffee production and their level of participation in government-sponsored agricultural programs. Agricultural educators should use the results of this study to direct efforts to recognize IKS and beliefs of San Lázaro farmers in developing extension programs to meet comprehensive adult educational needs.

Introduction
For over a century, the term “Extension” has been used throughout the world in connection with agricultural improvement. Most recently, the role of international extension education has been concerned about extension’s role in agricultural development and in the organization and effectiveness of agricultural extension programs in less industrialized nations (Rivera, 1986). According to FAO (1984a), traditional extension programs assist farm people through educational procedures. These include improving farming methods and techniques, increasing production efficiency and income, improving levels of living, and lifting the social and educational standards of rural life.

In many developing nations great strides have been made through extension efforts to ameliorate agricultural sustainability (FAO, 1996). However in Venezuela, agricultural extension has been implemented inadequately with poorly trained, poorly motivated extensionists that often live far from the communities they serve, and lack the resources to carry out their responsibilities (World Bank, 2000). The service never reached the majority of its intended clientele and had little to offer to those it did reach. Moreover, there has been little effort in Venezuela to involve local farmers in the planning of extension programs. Undeniably, the success of agricultural extension and development projects often depends on local participation. Therefore, working through indigenous knowledge systems (IKS) can enable extension educators and local people to work as partners in planning and implementing agricultural and development programs (World Bank, 1990).

Purpose and Objectives
The purpose of this descriptive study was to explore the needs of small-scale farmers in the village of San Lázaro, State of Trujillo, Venezuela within the context of their traditional knowledge systems. The overall level of participation of San Lázaro farmers in government-sponsored agricultural programs was also examined. The objectives of the study were to:

1. Identify the traditional practices of San Lázaro farmers and its influence in coffee production.
2. Describe the level of participation of San Lázaro farmers in government-sponsored agricultural programs.

Methods and Procedures
Research Design
Qualitative and quantitative methods were used to conduct this study. According to Riechardt and Cook (1979) using qualitative and quantitative methods together helps to correct for the inevitable biases that are presented in each method and contribute to methodological rigor to provide richness to the data. Especially driven by the qualitative paradigm, this study

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included a complementary quantitative component described by Morse (1991) as “qual+quan” methodological triangulation. The simultaneous “qual+quan” method describes that part of the phenomena that cannot be quantified... [and yields]... different but complementary data on the same topic” (Morse, 1991, p. 122).

**Population**

The target population for this study consisted of a group of small-scale farmers located near the village of San Lázaro, State of Trujillo, Venezuela. A purposive sample (Miles & Huberman, 1994) of 50 farmers who participated in the UNIR (Una Nueva Iniciativa Rural, or A New Rural Initiative) project was used in this study. Data collected in this study reflected the views of the participant San Lázaro farmers.

**Instrumentation and Data Collection**

An interview schedule was developed including a quantitative and qualitative questionnaire. The questionnaire was comprised of close and open-ended questions regarding the influence of farmers’ traditional practices on coffee production and farmers’ participation in agricultural government-sponsored programs. To establish content validity and to increase clarity and dependability, the instrument was field and pilot tested in Venezuela to judge the content, length, wording and consistency of the instrument. The panel of experts comprised of university faculty and graduate students in international agriculture established face validity and trustworthiness to the qualitative-quantitative instrument based on the field and pilot tests (Lincoln and Guba, 1985).

A self-report survey, observations, field notes, and face-to-face interviews were used to collect data. The interviews were conducted in Spanish. The interviews then were translated into English and transcribed for analysis purposes.

**Data Analysis**

The qualitative section of the data collected was analyzed using an inductive approach. As Rudestam and Newton (1992) stated, making sense of the data in the naturalistic approach means processing it through a technique of inductive analysis in which the theory is more likely to emerge once data are collected. This approach is known as the “constant comparative method” described by Glaser and Strauss (1967).

The data were organized into computer files using NVivo, a qualitative data analysis program (Richards & Richards, 1994). Methodological triangulation of qualitative and quantitative data sources involved the comparison of field notes, observations, and interviews were then used to compare results obtained from the quantitative section of the data as described by Morse’s (1991) qual+quan method. Descriptive statistics were also used to analyze the quantitative section of the data.

**Results**

Nearly all (94%) of San Lázaro small-scale farmers were male and 86% described their primary occupation as farming. More than half of the participants (60%) stated that their farm holding was less than 10 hectares. Slightly over half (54%) of the respondents had been farming all their lives and 52% had 2-5 children. Less than half (44%) of San Lázaro small-scale farmers interviewed completed six years of government required elementary school.

**Traditional Farming Practices in Coffee Production**

Table 1 shows that nearly all (98%) of San Lázaro farmers planted coffee and 96% reported to plant the Caturra variety. Eighty-six percent of participants preferred the Caturra coffee variety over their traditional coffee variety. As reported in Table 1, 88% percent of the respondents reported that they processed coffee beans (beneficiation) on the farm. Referring to this process, 88% reported that they dried coffee beans on concrete patios and then transported the processed coffee to the market. Over three-quarters (78%) of participant farmers indicated that they removed the coffee pulp by self-made machines and then allowed the coffee beans to ferment. The majority (64%) of interviewees reported that they used electric equipment for coffee processing, and over half (56%) classified coffee on the farm before selling in the market.
Table 1

Frequencies and Percentages of Participants for Planting, Preference, Processing, and Use of Equipment in Coffee Production

<table>
<thead>
<tr>
<th>Coffee Production</th>
<th>f</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planted coffee</td>
<td>49</td>
<td>98</td>
</tr>
<tr>
<td>Coffee varieties planted*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Local</td>
<td>14</td>
<td>28</td>
</tr>
<tr>
<td>Caturra</td>
<td>48</td>
<td>96</td>
</tr>
<tr>
<td>Bourbon</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>Conducted coffee processing*</td>
<td>44</td>
<td>88</td>
</tr>
<tr>
<td>Steps in coffee processing*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wash coffee beans</td>
<td>18</td>
<td>36</td>
</tr>
<tr>
<td>Remove pulp by self-made machine</td>
<td>39</td>
<td>78</td>
</tr>
<tr>
<td>Dry coffee beans on dryer</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Dry coffee beans on concrete patio</td>
<td>44</td>
<td>88</td>
</tr>
<tr>
<td>Remove parchment from beans</td>
<td>9</td>
<td>18</td>
</tr>
<tr>
<td>Allow coffee beans for fermentation</td>
<td>39</td>
<td>78</td>
</tr>
<tr>
<td>Classify coffee for selling</td>
<td>28</td>
<td>56</td>
</tr>
<tr>
<td>Transport processed coffee to market</td>
<td>44</td>
<td>88</td>
</tr>
<tr>
<td>Coffee varieties preferred*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Local</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Caturra</td>
<td>43</td>
<td>86</td>
</tr>
<tr>
<td>Bourbon</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>Coffee processing equipment used*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electric</td>
<td>32</td>
<td>64</td>
</tr>
<tr>
<td>Manual</td>
<td>7</td>
<td>12</td>
</tr>
</tbody>
</table>

Note. *Findings were based on Yes/No questions. Total percentage can equal less than 100 because only the affirmative responses are presented.

When the participant coffee farmers were asked about the reasons why they preferred Caturra, they declared that Caturra produces more. Concerning that assertion, a participant stated, “the Caturra variety produces more and bears more coffee beans.” Another farmer stated that he got more coffee beans with the Caturra variety. One farmer indicated that he once harvested more than 125 quintals (1 quintal = 100 lbs.) from 12,000 coffee trees. Another respondent stated, “Caturra coffee beans weigh more.” Respondents also preferred the Caturra variety because they believed that it was easier to pick and handle. The coffee farmers interviewed indicated that Caturra was easier to pick because of its small tree size. As one farmer said, “Caturra trees don’t grow tall making the coffee picking labor easier.”

San Lázaro participant farmers also indicated that they preferred Caturra because it was more resistant to many diseases. As one coffee farmer stated, “Caturra has more resistance to the red spot.” Another farmer indicated that Caturra was more resistant to plagues than other varieties. One participant stated, “The Caturra variety is more resistant because my plantation is 18 years old and still looks very healthy.”

In addition, participants noted that Caturra has adapted well to their climate. One participant farmer declared that Caturra was resistant to the weather. Another farmer pointed out, “Once Caturra was introduced it began to produce good yields under our soil and climate conditions.”

Table 2

Means and Standard Deviations Regarding the Influence of Farming Practices on Productivity in Coffee Production

<table>
<thead>
<tr>
<th>Farming practices</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Picking coffee beans by hand only</td>
<td>1.0</td>
<td>.00</td>
</tr>
<tr>
<td>Picking coffee beans only when ripe</td>
<td>1.0</td>
<td>.14</td>
</tr>
<tr>
<td>Controlling for weeds</td>
<td>1.2</td>
<td>.50</td>
</tr>
<tr>
<td>Propagating coffee on seedbeds</td>
<td>1.3</td>
<td>.74</td>
</tr>
<tr>
<td>Using coffee pulp as organic fertilizer</td>
<td>1.3</td>
<td>.85</td>
</tr>
<tr>
<td>Correcting soil acidity</td>
<td>1.5</td>
<td>.96</td>
</tr>
<tr>
<td>Applying organic fertilizer</td>
<td>1.6</td>
<td>.98</td>
</tr>
<tr>
<td>Controlling for pests with own method</td>
<td>1.8</td>
<td>.96</td>
</tr>
<tr>
<td>Using shade in coffee plantation</td>
<td>2.3</td>
<td>.93</td>
</tr>
<tr>
<td>Planting only the local coffee variety</td>
<td>2.6</td>
<td>.90</td>
</tr>
</tbody>
</table>

Note. Values from computing mean range from 1=to a great extent, 2= somewhat, 3=very little, and 4=not at all. Other= pruning and replanting.

Influence of farming practices on productivity specifically in coffee production was measured using a Likert-type scale with values from 1(to a great extent) to 4 (not at all). San Lázaro small-scale farmers were asked to indicate the influence of traditional farming practices on productivity. Table 2 reports that picking coffee beans only when ripe and picking...
coffee beans by hand only ($M=1.0$) were the practices that influenced productivity to a great extent. Farming practices (Other$^1$) such as pruning and replanting ($M=1.2$), and controlling weeds ($M=1.2$) were believed to influence productivity to a great extent. However, participants indicated that planting only the local variety ($M=2.6$) tended to have very little influence on productivity.

*Participation in Government-Sponsored Agricultural Programs*

The level of participation of San Lázaro small-scale farmers in government-sponsored agricultural programs was measured using a Likert-type scale with values ranging from 1 (Always) to 5 (Never) for ten items. Table 3 reports the means and standard deviations for the government-sponsored programs or activities in which the respondents participated. Participants indicated that about half of the time ($M=3.0$) they helped determine technical assistance for other farmers. They also stated that about half of the time ($M=3.4$) they received benefits for their participation in government-sponsored agricultural activities. Additionally, respondents indicated that they seldom visited the extension office ($M=4.0$). However, the participants indicated that they nearly never visited a research station ($M=4.6$), received assistance on animal production practices ($M=4.7$), or received farm credit ($M=4.8$).

**Table 3**

*Means and Standard Deviations Regarding Farmers’ Participation in Government-Sponsored Agricultural Program and Activities*

<table>
<thead>
<tr>
<th>Programs and activities</th>
<th>$M$</th>
<th>$SD$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Helped determine technical assistance for other farmers</td>
<td>3.0</td>
<td>1.1</td>
</tr>
<tr>
<td>Received benefits from my participation</td>
<td>3.4</td>
<td>1.0</td>
</tr>
<tr>
<td>Attended workshops, courses, field days</td>
<td>3.7</td>
<td>.94</td>
</tr>
<tr>
<td>Received assistance on crop production</td>
<td>3.8</td>
<td>1.3</td>
</tr>
<tr>
<td>Agricultural officer visited me</td>
<td>3.9</td>
<td>.86</td>
</tr>
<tr>
<td>Agricultural officer gave me technical assistance</td>
<td>3.9</td>
<td>.88</td>
</tr>
<tr>
<td>Visited Extension office</td>
<td>4.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Visited Research station</td>
<td>4.6</td>
<td>.79</td>
</tr>
<tr>
<td>Received assistance on animal production</td>
<td>4.7</td>
<td>.70</td>
</tr>
<tr>
<td>Received farm credit</td>
<td>4.8</td>
<td>.40</td>
</tr>
</tbody>
</table>

*Note.* Values from computing mean range from 1=always, 2=usually, 3=about half the time, 4=seldom, 5=never.

San Lázaro small-scale farmers were asked about how family members benefited from their participation in government-sponsored agricultural programs. Respondents stated that they acquired new knowledge and leadership skills from participating. Referring to this, one respondent declared, "*My family has participated and obtained lots of knowledge about agricultural practices.*” According to another participant, “*My son has participated in agricultural programs sponsored by the government. He took a course with the INCE [Instituto Nacional de Capacitación Educativa—National Institute of Educational Training], a government program that provides training on various disciplines including courses for farmers.*”

In addition, respondents declared that family participation provided support to other farmers. Referring to this, one respondent stated, "*By participating, we have helped other farmers that did not participate in such programs.*” According to one participant, “*My son learned many skills that have helped us all on the farm.*”

Moreover, participants stated that their family participation in government-sponsored agricultural programs helped increase farm
production. According to one participant, “I have seen more production on my relatives’ farm since they have participated in a government-sponsored agricultural program. They have learned greatly to manage the farm from those experiences.” As one respondent stated, “Participating in government-sponsored agricultural programs, my family, including my brother and my son have learned new practices and knowledge about agriculture. The INCE offered training around here in which my brother participated and he obtained great results on his farm. His farm has improved greatly.”

**Discussion and Conclusions**

San Lázaro farmers interviewed appeared to be a representative slice of traditional farm families found in the Venezuelan Andean region. These farmers lack both formal and non-formal educational opportunities and have very little access to information outside their communities. According to López-Cordovez (1982) by 1980 more than three-fourths of the agricultural production units in Latin America were family farms that are the most disadvantaged portion of the agricultural sector. Lack of resources and poverty are pervasive problems among the rural population in Venezuela, including San Lázaro’s farming community. Venezuela was among the top eight Latin American countries in rural poverty incidence during the 1990s (Berry, 1998).

Coffee is the main crop among small-scale farmers in this study, but the farm holdings are small and produce low yields (Quiroz, 1999). The farmers interviewed overwhelmingly preferred the Caturra variety to others including the local variety, and most farmers processed coffee on the farm. A comment from farmers indicate that they preferred the Caturra variety because it produces more, is easier to pick and handle, is more resistant, and adapts well to their climate. Caturra is an introduced variety that local farmers adapted to unique local conditions. At the same time, Caturra is more likely to demand use of external inputs. Farmers need to increase knowledge about conducting coffee practices under these circumstances to avoid unsustainable practices. San Lázaro farmers need technical assistance especially in coffee production. Since they possess the knowledge of their own farming systems, before recommending any other coffee variety to San Lázaro farmers, researchers and extensionists should consider the reasons for the preference of the Caturra variety. Essentially, an educational program that targets strategies for improving coffee production could reduce poverty and enhance profitability. On the other hand, agricultural educators in the farm-school of Pampanito, that is the closest public school of that sort to San Lázaro community, could design curricula that include farmers’ knowledge and the latest technical package in coffee production.

Farmers in this study used a mix of traditional coffee processing practices (fermentation) and also modern technology-driven innovations such as electric coffee processing equipment. Farmers first need to evaluate appropriateness of a technology on the basis of their own criteria. Especially in coffee processing, extensionists should develop programs that facilitate the use of new technology to optimize this process and encourage farmers to use new technologies along with existing ones. But the decision to choose a particular technology from the set of technological options should be left to the farmers and let them use their own practices because these decisions are more likely based on their traditional knowledge systems. Perhaps this is the key is to help local farmers develop a management system that will optimize their efficiency.

San Lázaro small-scale farmers agreed that conducting traditional practices in coffee production influenced productivity to a great extent. However, participants also reported that planting only the local variety had a negative influence on productivity. A technology package oriented to the coffee production calls for one consistent with resource availability, labor, markets, and socioeconomic conditions of San Lázaro farmers and the biophysical conditions of the farm.

The study findings suggest that agricultural extension educators in San Lázaro are not actively involved in delivering programs to this community. This finding is consistent with the lack of extension support offered by the national extension system in Venezuela. However, farmers’ family members received benefits from participating in government-sponsored programs. While it appears that the farmers did not obtain extension education from the government, they did benefit a great deal
from the UNIR project. Perhaps projects such as
UNIR could help agricultural educators adopt a
role of conveners, catalysts, and consultants who
set up discussions and maintain dialogue with
farmers to understand their problems, enhance
opportunities, and create solutions from farmers’
points of view. There is a need for agricultural
education programs aimed at incorporating
indigenous knowledge through participatory
approaches to bridge the communication gap
between outsiders and insiders.

**Educational Implications**

As shown in figure 1, this study
uncovered factors that have important
educational implications for extension educators
as they plan programs for San Lázaro farmers.
Farmers’ knowledge systems are embedded in
the local culture, socio-economic context, and
biophysical environment. Extension educators
could create linkages with other agencies using
strategies and methodologies such as workshops,
farm visits, and training that would involve
farmers as partners in providing solutions for
their problems.

![Figure 1. Meeting educational needs of San Lázaro farmers.](image)

Agricultural educators should
incorporate farmers’ knowledge systems in
collaboration with public and vocational
schools, social service agencies, farmer
associations, NGOs, and the ULA-NURR
faculty. This collaboration will help lift the
social and educational standards of San Lázaro
farmers to meet their comprehensive adult
educational needs. For instance, agricultural
researchers from the National Agricultural
Research Institute—*Instituto Nacional de
Investigaciones Agrarias* (INIA) could use
farmers’ knowledge and experience to validate
farmers’ on-farm experiments and to create
opportunities for further technology generation
and diffusion. In addition, extension educators,
NGOs, especially the UNIR project, farmer
leaders, *INIA* researchers and the ULA-NURR
faculty should join efforts to conduct a
Participatory Rapid Appraisal (PRA) among San
Lázaro farmers to identify and prioritize their
educational needs. Furthermore, the ULA-
NURR faculty and farm-schools should develop
and modify curricula that use appropriate
communication strategies, methods, and media
to reach farmers and share information with
them. Ultimately, these require a mix of local
knowledge systems and outside educational
knowledge if the educational needs of farmers in
San Lázaro are going to be met.

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