A Case Study of the Diffusion of Agricultural Innovations in Chimaltenango, Guatemala

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Abstract

The adoption of appropriate innovations is an important issue in agricultural development. However many development project officers fail to use strategies to identify and select opinion leaders who can leverage the diffusion and adoption process. This case study used qualitative methods including interviews, focus groups, and observations to gather data to analyze current social networks, identify key participants, understand the roles and characteristics of leaders, and define a strategy to engage leaders within the region of Chimaltenango, Guatemala. The analysis revealed three diverse social networks; one powered by political structures in the urban and rural areas while organized groups of regional farmers powered a second type of social networks. Independent farmers shaped still other unstructured and informal networks that influenced adoption and diffusion of innovations. Data confirmed that opinion leaders have identifiable and predictable roles and characteristics within and among the networks. Therefore, the diffusion of innovation through formal and non-formal leaders represents a promising strategy for development project officers. Local leaders influence adoption decisions largely because of their recognition and respect by community members. The diffusion of innovations through opinion leaders promotes the active participation of local farmers and validates the innovation through time. Therefore, the importance of analyzing social networks and selecting opinion leaders to support the diffusion process of development projects was important in Chimaltenango, Guatemala. The authors recommend future studies to compare results from other regions and cultures in Guatemala.

Keywords: Opinion leaders, social networks, diffusion, agricultural innovations, Guatemala

Introduction

Heemskerk (2005) observed that agricultural innovations are changing to be more demand driven to respond to farmers' needs. Farmers need to be active participants of the development and diffusion of innovations to make adoption happen.

The role of the change agent in the diffusion process is to promote a participatory environment where opinion leaders will lead the diffusion and adoption of innovations. Rogers (2003) emphasized that "the opinion leaders approach magnifies the change agent's effort" (p. 388). Therefore it is important for change agents to recognize the social network and empower opinion leaders to share the responsibility of diffusing innovations to other farmers.

The involvement of opinion leaders increases the credibility of innovations because these opinion leaders convince their peers to adopt appropriate innovations. In addition, innovations that are validated by an opinion leader acquire local sponsorship and sanction (Rogers, 2003). Therefore, to achieve long-term adoption, opinion leaders should lead the diffusion process.

Change agents, as sole entities of the diffusion of innovations, have scarce resources and limited access to peers. Rogers (2003) suggests that communication strategies should target opinion leaders, who then are going to target their peers. The number of individuals reached at the end is higher and adoption is sustained through time. Participatory approaches have shown to be effective as innovations are diffused. Change agents have realized the importance of identifying keys players to collectively implement innovations among social networks.

Theoretical Framework

Heemskerk (2005) found a natural characteristic of farmers that they "innovate to sustain, expand, and improve their production systems" (p. 1). Miller and Mariola (2009) found farmers were willing to adopt conservation farm technologies but many farmers discontinued the use of the technology because of socioeconomic factors. Therefore, it is important to promote the diffusion of agricultural innovations among all farmers through social networks.

The process of diffusion of an innovation occurs when it is "communicated through certain channels over time among members of the social system" (Rogers, 2003, p. 5). This definition identifies three key components: innovation, communication channels, and social system. First, Rogers (2003) defines an innovation as "an idea, practice, or object that is perceived as new by an individual or group of individuals" (p. 12). More specifically an agricultural innovation is defined as the result of a social negotiation between farmers (Heemskerk, 2005). Rogers also described a communication channel as "the means by which messages get from one individual to another" (p. 18). The most influential channels in the diffusion process are interpersonal channels which are face to face interactions between two or more individuals (Rogers, 2003). Finally, a social system is considered as interactions among individuals to solve a joint goal (Rogers, 2003).

Rogers (2003) observed that a common source of information in all stages of the adoption process of an innovation was interpersonal communication between farmers, friends, and neighbors. Starting with the awareness stage, farmers (potential adopters) learn about an innovation from peers. This occurs in a social learning process which lowers uncertainties related to adoption. Later, during the interest stage, farmers gather details about the innovation from other farmers. Then, in the evaluation stage, farmers discuss the positive and negative aspects of adopting the innovation with other farmers and develop a joint

evaluation. Afterward, in the trial stage, farmers often do small-scale trials to observe the benefits of innovation. Finally, during the adoption stage, farmers use the innovation in a large-scale operation as an ongoing practice.

Social Networks

Analysis of a social network recognizes all interactions among individuals of a social system. Monge, Hartwich, and Halguin (2008) noted that the analysis identifies the influence that certain individuals have over others' choices and decisions. The type of links and relationships between human actors within the system shows their social structure (Knoke & Kuklinski, 1982). Monge, Hartwich, and Halgin, (2008) citing the works of Kohler, Behrman and Watkins (2007) and Hogset (2005) concluded that "social networks affect the diffusion of innovations through social learning, joint evaluation, social influence, and collective action processes" (p. 9). Therefore, it is important to study the nature of the different networks, identify the social links, and define participatory strategies to diffuse an innovation among the network.

Horizontal and Vertical Communication

Feder, Just, and Zilberman (1985) found that the diffusion of information in a social system depends on interpersonal communications among individuals. These horizontal communications occur between farmers with similar social and economic characteristics and who are able to persuade each other to adopt innovations and knowledge. Individuals from other communities, who are identified as outsiders of the social structure, are not considered as key players, especially in isolated rural areas.

Horizontal communications promote the observation, monitoring, and discussion of farmers' experiences. These dialogues allow them to evaluate innovations and make decisions about adoption among their peers. However, peers generally have access to the same information. Monge, Hartwich and Halguin (2008) posited that farmers must also have vertical communications to learn about innovations. A common source of new information and innovations in a social structure are opinion leaders.

Opinion leaders and their role in the diffusion of innovations

Opinion leaders are heterophilous individuals who observe and evaluate innovations proven by innovators. They are considered "early adopters of culturally acceptable innovations and generally are opponents of culturally unacceptable ones" (Monge, Hartwich, & Halguin, 2008, p. 12). Once opinion leaders approve and adopt and innovation, it influences others in the group who also adopt the innovation to maintain a social and economic status among the social system. Leaders are important determinants of rapid and sustained change, as diffusion happens faster when it is initiated by them (Valente & Davis, 1999). They are considered the bridge between farmers and sources of innovations.

Opinion leaders have certain characteristics that make them heterophilous to contribute to their social systems with innovations. Rogers (2003) observed that opinion leaders tend to have access to mass media information and external contacts that provide them new ideas from outside. Additionally, Rogers concluded that opinion leaders have "greater contact with change agents, social participation, higher social status, and more innovativeness" (p. 362). Opinion leaders are used as role models in the adoption of innovations. This can be effective at the social and economic levels of the diffusion process. From the economic perspective of projects' implementation when diffusing an innovation, opinion leaders multiply the efforts of the change agent, by carrying the message to more possible adopters. This translates into

effectiveness by achieving more diffusion in less time. At the social level, once opinion leaders have adopted an innovation, that innovation acquires local sponsorship and credibility (Rogers, 2003).

Selection Process of Opinion Leaders

Valente and Davis (1999) identified a set of procedures that allows researchers to analyze a social system to identify opinion leaders or key players and their interactions among the network. Some of the suggested recruitment procedures were: a) individuals select themselves to be leaders; b) external individuals or key informants select leaders; c) community members select participants that then pick other participants (snowball); d) selected community members select opinion leaders; and e) all community members nominate opinion leaders. According to this study, the first two procedures were shown not to be effective because of possible selection bias. The most recommended methods of selecting opinion leaders to support the implementation of development projects are participative procedures like c, d, and e that allow all individuals to be part of the selection process. Frequently, opinion leaders are selected based on two important characteristics, credibility and trustworthiness, and other demographic factors, such as gender, ethnicity, and geography.

Innovations in Latin America

Hartwich, Monge, Ampuero, and Soto (2007) concluded that common problems found in the traditional top-down extension services of countries, such as Bolivia, are obstacles in the communication and diffusion of knowledge (information and skills). This top-down approach creates an inability of the system to reach a greater number of farmers. The limitation to reach more farmers is due to the use of a vertical system where extension agents are responsible for all interpersonal communications that occur. Therefore, there is a need to replicate the diffusion of innovations through the analysis of social networks or systems of small farmers to identify key players who will support the diffusion process to reach a greater numbers of farmers.

Evidence provided by a study conducted in three areas of Bolivia, suggests that farmers from rural areas adopt innovations based on persuasion, social influence, and competition within their social system (Monge, Hartwich, & Halguin, 2008). This study confirms that using the farmers' influence over their peer networks is effective to diffuse the adoption of agricultural innovations.

Another study about diffusion of innovations analyzed the adoption through time of nontraditional export products as main crops by small farmers in the Central Highlands of Guatemala. Carletto, De Janvry, and Sadoulet (1999) observed adoption twenty years ago when nontraditional products were introduced quickly. In the last decade two thirds of small farmers who adopted these crops discontinued the use of the innovation due to external factors such as the changes in price in the global market and low qualities of the soil. This study suggested that for the adoption of agricultural innovations to be sustained through time it needs to be economically and environmentally sound.

It is also important to mention that several studies about the application of social networks analysis have been done in areas such as medical, economics and marketing, but few are applied to the innovation process in agriculture (Monge, Hartwich, & Halguin, 2008). Therefore, this research study will define a methodology to identify key players that will contribute to the diffusion of appropriate agricultural innovations among small farmers in the region of Chimaltenango, Guatemala.

Background on the Study Context

The diffusion of agricultural innovation to farmers of the region of Chimaltenango is conducted though governmental, nongovernmental, and farmers' organizations. These organizations use the political, social, and agricultural networks and their communication channels to transfer information.

Chimaltenango has a recognized political structure. This structure is made up of individuals that have been elected by the population. The authorities guide the economic and social development of the urban and rural areas. The main authority of the region is the governor (called CODEDE-Departmental Counsel for Development) who coordinates projects with the mayors (also called COMUDE-Municipal Counsel for Development) of the different municipalities. Mayors then coordinate activities with the rural villages through the principal authorities of each village, the COCODE (Community Counsel for Development). There is a vertical communication system between the central area and the villages where the units have a meaningful difference in their economical and social characteristics. Under this system farmers are located at the end of the chain.

The Guatemalan farmers though, have their horizontal channels and their own distinct organization. Some are part of organized groups, such as associations and cooperatives, and others are independent. Associations and cooperatives provide farmers the benefits of receiving technical assistance, being able to commercialize larger volumes to the market, and receiving funds from governmental and nongovernmental organizations to improve and increase their productions.

Agriculture is the main economic activity of small farmers in the region of Chimaltenango. Farmers have applied traditional agricultural practices such as intercropping to produce basic grains like corn and beans for family consumption. Productivity levels of grains are low because of the lack of use of agricultural inputs such as fertilizers to improve the quality of the soil. A number of small farmers have diversified their productions by planting nontraditional vegetables that are sold to exporting companies. Diversification is applied as an option to improve their income and the quality of life of their families.

This case study observed and analyzed the social network of these farmers to identify their links and relationships. Farmers were asked about their perceptions about the key participants and how they lead the diffusion process of innovations among them.

Purpose and Objectives

The purpose of this study was to analyze the diffusion process of innovations among a group of small farmers in Chimaltenango, Guatemala. The specific objectives were as follow:

(a) Explore the social networks and identify key participants, their links, and relationships;

(b) Identify the roles of opinion leaders in the diffusion of agricultural innovations; and,

(c) Analyze the applicability and diffusion of techniques learned through training.

Methods

Qualitative research was used in this study to "understand how people make sense of their experiences" (Merriam, 2009, p. 37). Qualitative methods (interviews, observation, and journal entries) were used to gather individuals' perceptions about who they think are the opinion leaders, what their characteristics are, and how these leaders influence the adoption or non-adoption of agricultural innovations. The field work was conducted over a one-month period (July, 2009) to ensure prolonged engagement directly in the community. The data were gathered in the local language, Spanish, and

translated into English by the principal researcher who is native Spanish speaker. Also the principal researcher is Latin-American, which provided greater reliability of the translation.

The study focused on key players of a particular area (Chimaltenango, Guatemala) and more specifically, a group of individuals participating in training activities funded by the United States Department of Agriculture (USDA). Individuals in the sample were identified by the principal researcher through snowball, chain or network sampling. This type of sampling allowed the principal researcher to identify a few key informants who referred others whom they know could provide rich information to learn about the diffusion process of agricultural innovations. Subsequently, a purposive sample consisting of 15 individuals were identified. Ten of these individuals were female and five were male (Table 1). Seven individuals were ethnically indigenous and the other eight were Ladinos. The Spanish Royal Academy Dictionary (2003) defines ladino as a person of mixed European and American Indian ancestry who speaks Spanish as a first language.

Table 1

Demographic Attributes by Cohort

Demographic attribute	**Demographic cohort**
Vertical political networks	1-I, 4-I,6-I, 7-I, 8-I
Horizontal networks	2-I, 3-I, 5-I, 9-I, 10-I, 1-FG, 2-FG
Female	1-I, 2-I, 3-I, 4-I, 5-I, 10-I, 2-FG
Male	6-I, 7-I, 8-I, 9-I
Ethnically indigenous	1-I, 2-I, 3-I, 4-I, 1-FG
Ethnically Ladinos	5-I, 6-I, 7-I, 8-I, 9-I, 10-I, 2-FG
Agriculture as economic activity	2-I, 4-I, 5-I, 6-I, 7-I, 8-I,10-I, 1-FG, 2-FG
Formal leader	1-I, 3-I, 4-I, 5-I, 6-I, 7-I, 8-I
Non-formal leader	2-I, 9-I, 10-I, 1-FG, 2-FG
Age 18-30 years	1-I, 2-I, 9-I, 2-FG
Age 30-65 years	3-I, 4-I, 5-I, 6-I, 7-I, 8-I, 10-I, 1-FG

The 15 selected participants were identified because of their knowledge and experiences about the process of diffusion of agricultural innovations among their networks. Respondents were selected by their peers as formal and informal leaders because of their natural characteristics to lead and the role they play in the groups and communities. The principal researcher acted as an observer who gathered information about the social networks and the diffusion of innovations.

Data were collected through semi-structured interviews with individuals and focus groups. These interviews were guided by a set of 17 questions, with no predetermined order. Questions help the principal researcher to gather information about the participants' experiences, opinions, and perceptions about the diffusion process of innovations. Ten individuals were interviewed on a one-to-one basis, and five individuals were part of two focus groups. One focus group was made up of three individuals from a farmers' association and the other was made up of two individuals from another organized group of farmers. Focus groups among small number of participants were used to

encourage discussions among them (Berg, 2001).

Observation and journal entries were also used to gather information about participants. Observation by the principal researcher provided knowledge of the context of participants and systematically gathered behaviors and reactions to the diffusion of innovations. Journal entries allowed the principal researcher to collect information about events, such as farm visits and training sessions.

Respondents were coded according to the type of method used to gather the information, I-Interview and FG-Focus Group. In addition, a random number was assigned by the principal researcher to ensure confidentiality of the participants.

Validity and reliability of this study were monitored through different methods, including triangulation, member checking, prolonged engagement in data collection, and peer reviews. Triangulation was done by repeated interviews, observation and reviewing documents about the categories by the principal researcher. In addition, all the information and tentative interpretations gathered during interviews were reviewed and checked by participants. Raw data, interpretations, and categories were discussed with colleagues to confirm the validity.

Finally, the principal researcher stayed at the research site for a month where she interviewed participants, spent time in the rural communities, and observed their daily activities.

Findings

Three categories emerged during the study: 1) *social networks* with subcategories about the leadership roles and relationships within the social network, 2) *characteristics of leaders and techniques to influence other*, including a subcategory on successful development projects, and 3) *applicability of training topics in the region*. Representative quotes, using an audit trail of respondent's unique identifiers, provide verification back to the raw data sources. Each category will be discussed in detail by sub-heading.

Social Networks

Participants for this study were asked to identify their positions inside their social network. A groups of participants identified themselves as political leaders, including COCODES (4-I, 6-I, 7-I), mayor's assistants (8-I), and a municipality representative (1-I), others identified themselves as organizational leaders (3-I, 5-I, 9-I) and, finally, others identified themselves as members of a group/organization or rural communities (2-I, 10-I, 1-FG, 2-FG).

The leaders and their networks.

The roles, links, and relationships of participants varied according to their positions. The political leaders interviewed were selected by the members of their communities through democratic elections for a four year period. In the case of the mayor's assistant, his major role was to be the link between the mayor and the community members to satisfy the people's needs and implement development projects at the community level(8-I). The COCODES were counsels that work with the people to try to alleviate their social, economic, and environmental problems through the implementation of local projects (7-I). On the other hand, municipality's workers were elected by the mayor and their role was to implement projects that responded to the mayor's work plan (1-I). Political leaders were part of a vertical system with structured communication channels and recipients. In this case, the mayor and his/her staff were the center of the system. The mayor communicates and coordinates activities with the rural communities through the mayor's assistants and COCODES to implement activities and projects at the local level.

Organizational leaders were individuals that were recognized as leaders

by their peers. They organize their members into specific projects or activities that respond to the organization's goals and objectives. Leaders in this category clearly defined their role and responsibilities among the organization. One respondent stated, "As the president of the group, I make contacts with organizations (governmental and nongovernmental) to seek for funds to support the implementation of projects for the members of the group" (5-I).

Other participants defined themselves as members of an association or community. As members, they were aware of the social structure of their group or community and recognized their leaders, their roles, and responsibilities (10-I, 1-FG, 2-FG).

Participants also identified common roles of leaders. One recognized role was keeping constant communication among peers. Other roles were to seek for external funds to implement projects and to promote unity and organization among members of the communities (5-I, 6-I, 8-I).

Participants recognized formal, as well as informal leaders. Informal leaders that influence the adoption of innovations were recognized based on their success as farmers and their extensive professional and social networks (7-I). In addition, elder villagers in rural communities were also considered leaders because of their knowledge and wisdom (6-I).

The role of a leader in the diffusion of agricultural innovations. The role of a leader is to seek for social, economic, and environmental suitable innovations that suit their peers' needs. In Guatemala as small farmers have scarce economic resources to sustain their plots, farmers look for low cost and effective agricultural techniques that may result in higher productivity (6-I, 7-I, 8-I). As agricultural leaders, they are trying organic fertilizers in small plots to evaluate results. If they observe improvements such as better quality of the soil and high production levels, they want to share the knowledge and skills learned with other farmers to improve their income and quality of life.

Other participants with formal leadership positions mentioned specific roles such as "to provide information about workshops to learn improved agricultural techniques." They were also searching for funds, credits, and productive projects for reforestation, greenhouse production, and irrigation systems to benefit small farmers (1-I, 5-I, 2-FG).

Links and relationships among the social network. As part of the process to get to know the social network, participants were asked about a person whom they may contact in case they have a question about agriculture. The majority responded that they would go to the person with the most agricultural experience in the community. According to a respondent, an experienced farmer was "someone who has had high yields in past productions and has several market contacts to sell the agricultural products at a good and stable price" (6-I).

Participants mentioned that when they asked for technical assistance from peers, they also look for someone they trust and with whom they are familiar. In most of the cases, these people were family members or close friends (4-I, 5-I, 10-I). In other cases, respondents mentioned they may contact the formal leaders of their associations or communities (3-I, 6-I, 8-I, 2-FG).

To learn about the level of organization, participants were asked if they were part of an organized group such as associations or cooperatives. Ten of the 15 respondents were part of different farmers' groups. Groups were formed with different purposes, such as getting micro-credits to apply to agricultural activities (2-I, 3-I) or implement improved agricultural production techniques such as greenhouses (4-I, 5-I, 1-FG). Other farmers get together to sell

agricultural products, such as coffee, in larger quantities (2-FG) or to implement food processing projects.

In order to analyze the social network, participants were asked about their level of exposure to agricultural innovations and interactions with extension agents. Most of them who were farmers indicated that they did not have direct contact with extension agents. Leaders working in governmental and nongovernmental organizations mentioned a higher level of interaction with extension agents and a higher exposure to agricultural innovations. They also wished that these contacts would be available on a daily basis for rural farmers who needed the technical assistance the most (9-I). In terms of the level of innovation that the participants were exposed to in their daily life, members from one rural community showed a higher exposure to improved horticulture production. They all mentioned one individual responsible for the agricultural and marketing innovations happening in that specific community (6-I, 7-I, 8-I). Two participants from the same association mentioned how they have been exposed to new products through other members of the group (2-I, 3-I). On the other hand, other participants presented their concern of not having access to observe and practice agricultural innovations (4-I, 7-I, 10-I, 1-FG, 2-FG).

Characteristics of a Leader and Techniques to Influence Others

In this case, participants were asked about the characteristics they think a leader should have or characteristics that have worked for them as leaders. A leader should work with others, as a team, to accomplish common goals (1-I, 8-I, 2-FG). A participant reinforced this concept by saying, "I don't work alone; I am sure that I would not have accomplished anything by myself. For example, I get a lot of support from authorities of the rural communities who know the leaders and they help us diffuse the information" (1-I).

Another two participants mentioned honesty as the most important characteristic a leader should have. They believed that when a leader is honest, people immediately trust him/her (2-I, 10-I). Others mentioned that a leader should be loyal to his/her peers no matter what. They also considered that a leader should be dynamic and active in order to benefit the group or community (3-I, 5-I).

Other respondents thought that a leader needs to have good communication skills and communicate with all the members without discriminating (1-FG, 2-FG). Finally, other participants thought that a leader should share the information and knowledge they gain with others (2-I, 4-I, 6-I, 7-I, 8-I) in order for people to follow him/her.

Successful development projects. It is important to learn from experiences of individuals, groups, and communities. Therefore, participants shared success practices and projects that have worked for them. Recommendations were focused into types of methodologies, monitoring and evaluation techniques, and importance of sharing the cost of development projects.

A participant mentioned the importance of providing small incentives with short-term results for people to observe accomplishments and motivate them in a long-term project (1-I). Another participant believed that providing constant follow-up to members and maintaining constant communication with them prevent misunderstanding (2-I). Other mentioned the importance of sharing and celebrating the accomplishments of a group to encourage people to continue working hard (3-I). Another respondent thought that beneficiaries should share the cost of a project with the donor in order for them to appreciate and invest the resources properly (9-I).

Other participants reinforced the importance of doing practical training. They thought it was important for the beneficiaries of a project to learn by doing and be able to accomplish their own results. One participant stated, "Nobody learns from others' experiences, therefore; the importance, of accomplishing our own experiments and projects like we do in our demonstration farm" (5-I). Finally, another respondent said, "for a project to last over time and be sustainable it should start small, where we can observe and monitor results, and later reproduce the knowledge or skill to others through opinion leaders " (7-I).

Applicability and Diffusion of Innovations

The sustainability of the training sessions and workshops offered to small farmers were measured through different questions during interviews and observations done at the field level. Participants were asked about how appropriate the topics were for their conditions, if they would be able to reproduce them on their farms, and if they would be able to teach them to other farmers.

Three participants thought the knowledge and skills that they learned through training were appropriate for their conditions (6-I, 7-I, 8-I). Organic techniques used to produce fertilizers were the most appreciated by farmers as they mentioned that they were an effective and low-cost option to grow their crops. This was especially true since the chemical fertilizers they used to buy increased in prices over the last year. Farmers mentioned that it was easier for them to reproduce the practice on their farm if they practiced the techniques during the practical training sessions. Participants also thought it was going to be easier to teach what they have learned to other farmers because they practiced the procedures of applying the fertilizers. They reinforced the importance of making practical training sessions on their sites (6-I, 7-I, 8-I).

All participants mentioned the importance of teaching others what they have learned, but they clarified that not all farmers were open to learning. Therefore, they talked about the importance of identifying those farmers who were interested in learning about the organic production. Some participants thought that they would teach the techniques first to the members of their own families and, later, to others outside the family network (6-I, 7-I, 8-I).

Participants, in general, thought that they could sustain the activities they were carrying at the present. To improve in the future, they mentioned that education is crucial for agricultural development of the region. They mentioned that training should go hand in hand with other components, such as access to credit or funds for investment (2-I) and marketing information about access to national and international markets (3-I).

According to a participant, the sustainability of projects will be reached when "projects respond to local needs" (9-I). One participant also said that for the project to be sustained through time, "techniques and practices should be taught and

monitored from the beginning to the end; in other words, how to do them and how to maintain them" (10-I).

Recommendations

Strategies to Identify Leaders to Diffuse Agricultural Innovations

As a result from this study the following is a recommended strategy to identify opinion leaders among groups of farmers. The steps are not listed in order; they can be completed according to the environment, conditions, and negotiations with the different groups of farmers.

The steps are: a) ask the members of the group to define the criteria to select leaders. At the same time, observe potential opinion leaders who have the desired characteristics described by participants; b) facilitate the process for the group to select leaders among the group; c) identify the leaders, communicate the role they will play in the diffusion of innovations, look for their approval, and start the training process; and d) monitor and evaluate the diffusion process by the leaders and provide required feedback. This strategy has the purpose of providing change agents a guide to identify opinion leaders based on a criterion, not randomly. The strategy proposes the selection of opinion leaders by their peers under a participative procedure where they will select them based on credibility and trustworthiness.

Conclusions and Implications

Opinion leaders were part of distinct social networks in the region of Chimaltenango. Participants in this study recognized the importance of opinion leaders in the diffusion of innovation for the adoption to be sustained. Opinion leaders played key roles, such as to evaluate innovations, keep communication among the networks, facilitate the opportunities for agricultural projects and training, and create and maintain contacts with external organizations.

Opinion leaders were identified as the source of information and innovations for community members. Participants in this study confirmed that the diffusion process in their communities involved the active participation of opinion leaders who evaluate innovations in their sites and observe results. Later if they consider the innovation to be suited for their peers and situations (in terms of social, economic, and environmental conditions), they influence their decision process, as described by Rogers (2003).

Innovations were diffused by individuals who were honest, loyal, and proactive. These characteristics allowed them to be respected by their peers and also influence others in the decision process of adoption. They were heterophilous by trying and evaluating new practices, but cautious by considering if the innovation would be culturally and socially accepted by their peers. According to Rogers (2003) these individuals' characteristics are indicative of opinion leaders.

The most-known, structured, and recognized networks in the rural and urban areas are political networks. These networks are effective to identify the different areas and their leaders and to get a formal approval to start the implementation of agricultural projects. Other types of networks are the ones created around organized groups, such as associations, cooperatives, and federations. They are recognized groups that have an organization of members, centralized diffusion systems, and specific goals and objectives. The advantage of working through these networks is that they have established horizontal methods of communications. Therefore, it can be efficient to use their communication channels to diffuse agricultural innovations. The disadvantage of using this strategy as the only means of reaching participants is that information will not reach farmers outside of these networks who might also need technical assistance

and technology transfer. Finally independent farmers, who do not belong to a structured network, can be reached through meetings called by the local authorities (COCODES) of the rural areas. These farmers who in some cases are considered non formal leaders by their peers can provide support to establish a decentralized diffusion system. A non-formal opinion leader may be as effective as formal leader. Therefore, it is important to include them in the diffusion process.

Diffusion of innovations and information is an essential component of agricultural education and extension. For the diffusion process to be sustained through time, innovations need to be evaluated and validated by opinion leaders. These leaders are identified by their roles and characteristics by the members of their networks. Therefore it is important to review the networks, their participants, the links, and communication channels to transfer information and practices among farmers.

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