
INSTITUTIONAL ARRANGEMENTS FOR INCREASING THE DISSEMINATION ROLE OF FARMER GROUPS IN AGRICULTURAL INNOVATION SYSTEMS

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Abstract

Farmer groups are playing an increasingly important role in pluralistic extension systems and agricultural innovation systems. Based upon data collected from individual farmers (n = 88) and farmer groups (n = 46), this paper shows that farmer groups were disseminating information to other farmers, and that farmers relied upon groups for information. There was a positive correlation between the number of groups that farmers were in and the number of other farmers to whom they disseminated information. Factors for success in group dissemination included type of group (project-supported or not), participation by members, membership in the Meru Goat Breeders' Association, and linkages with outside entities. Linkages through the project and to local and external agencies are thus an important factor in increasing the dissemination role of farmer groups, and should be encouraged. Support from external institutions also seems to play a role. Other suggestions to increase the dissemination role of farmer groups include increasing the capacity of groups, individual farmers in the groups, and local government institutions. Mechanisms to make it easier for groups to form include waiving registration fees in some cases, allowing groups to register through more local entities such as the church or the local government, and waiving requirements for by-laws and a written constitution where appropriate. Finally, the establishment of a clearinghouse or standard operating procedure whereby groups can obtain development assistance and development players can identify established groups to take part in projects is suggested.

Introduction

Government extension in many developing countries today is unable to provide small-scale farmers with pertinent technologies and information to meet their needs and thus help to bring about rural development. Reductions in government services in Kenya and ineffective and inappropriate extension approaches have led to gaps in extension of innovations to small-scale farmers, who play a major role in the Kenyan economy. Therefore improved ways of bringing about the development and dissemination of innovations are being sought. Current extension thinking takes a much more participatory, pluralistic, and farmer-centered approach.

Research and development (R&D) have moved from a linear model to a more complex mode that includes many players such as government, farmers, the private sector, and non-governmental organizations (NGOs). Innovation systems thinking has more recently injected into the R&D framework the idea that change is much more than technological, and that innovations take place within social systems and have important institutional components. The innovation systems framework thus allows users to regard agricultural development in a much

more comprehensive manner, and to analyze such systems through viewing the various players, their relationships, and the outcome of such relationships.

Innovations thinking has evolved from different schools of thought. The following details are based on a conceptual framework by Ekboir et al. (2005). An innovation is anything new introduced into a social or economic process (OECD, 1999). Schumpeter (1934, 1939) provided some of the earliest analyses of innovation processes. However, it was not until the 1960s that innovation studies in the realm of agricultural development were published. Such studies analyzed technology generation, dissemination, and adoption; organization of agricultural systems; and models of induced innovations. Agricultural innovation systems thinking has grown out of various schools of thought surrounding such issues, including national agricultural research systems (NARS).

Because of the public good nature of agricultural research, such studies naturally focused on public research organizations, and eventually recognized the role of other public institutions such as universities. This view was encompassed by the national agricultural research systems approach (Muhammed, 1991). Because the NARS view was somewhat limiting in terms of explaining technology generation, dissemination, and adoption, other perspectives came into play, including farming systems research and extension, participatory rural development, and agricultural knowledge and information systems (AKIS). The AKIS approach broadened the NARS approach to include more actors and the ways that they Following the structural adjustment programs implemented in the 1980s and 1990s, research and extension were further transformed by decentralization, privatization, new funding mechanisms, and the implementation of pluralistic systems. Such systems can be examined more comprehensively by taking an innovation systems approach.

Agricultural innovation systems (AIS) thinking takes a much broader look at players than previous approaches. This includes taking into account the various components of the value chain, including processing, marketing, and consuming. There is a much greater emphasis in AIS on the agents at the local level, such as the farmer and farmer groups.

Farmer groups are important in agricultural innovation systems, and in extension systems as well. Farmer groups are important both for farmers—for accessing information and services, aggregating demand, and empowerment—and for service providers, who use the groups as a focal point for local communities. Groups allow for federalization and lobbying, and give farmers a voice. Groups increase the efficiency, effectiveness, and equity of service provision and also help to empower farmers (Esman & Uphoff, 1984; Geran, 1996).

Groups play an important role in agricultural extension in Kenya today. The current extension program, National Agriculture and Livestock Programme (NALEP), encourages the use of “common interest groups,” as do many other extension players such as NGOs and bilateral aid organizations. Some projects in Africa make group formation a prerequisite for assistance (Stringfellow, Coulter, Lucey, McKone, & Hussain, 1997). Franzel, Wambugu, and Tuwei (2003) found that using groups in Kenya ensured more farmer-to-farmer engagement and extension.

Purpose and Methods

The goal of this paper is examine the role that farmer groups play in disseminating innovations in agricultural innovation systems in Meru, Kenya. The paper will focus on the institutional arrangements necessary to increase their role in agricultural innovation systems as a way to disseminate more innovations and so bring about improved rural development.

A mixed-methods, multiple-stage approach was used to obtain data. The ten-month study consisted of a preliminary phase, survey research, and a follow-up stage that included stakeholder feedback. The approach used obtained both qualitative and quantitative information to answer research questions.

The population of interest to the study was small-scale farmers in Meru Central District in Kenya (those with landholdings generally between 0.25 and 1.5 hectares). The target population was those farmers who were involved in dairy-goat groups through a joint project of the Ministry of Livestock Development and the NGO FARM-Africa, as well as non-member farmers who had benefited in some way from these groups.

From that population of small-scale farmers, a sampling frame of farmers on FARM-Africa or government lists was put together. From the sampling frame, random samples of individual households were drawn from the lists to elicit data for the study. Individual dairy-goat group members (n = 44) were chosen at random from a list of groups where possible. Also of interest to the study were farmers who have benefited from the group (through group dissemination of information or technology). These non-dairy-goat group farmers (n = 44) were sampled by asking the farmer groups for lists of people who had benefited from their group, and then randomly selecting farmers from that list. Units of analysis thus included both farmers (dairy-goat members and non-members) and the dairy-goat groups. The entire population of the current dairy-goat farmer groups in the FARM-Africa project in the district were interviewed (n = 46). Purposive sampling was used for key informant interviews (n = 24).

Topic guides were used for semi-structured interviews with key informants, which included general questions with probes. More formal questionnaires for both individual farmers and farmer groups were then developed based on this information, from other questionnaires used in similar research, and from document analysis. The Institutional Review Board of the University of Florida approved the study design and instruments prior to data collection.

Validity of the formal survey was ensured by having a panel of experts examine the instrument, pilot testing the instrument, assuring respondents of anonymity, training of translators, and using member checks. The researcher used local languages and indigenous categories to ensure understanding among respondents. The findings were presented to participants at the end of the study for further validation.

There were two types of dairy-goat groups in the project. FARM-Africa helped to start 20 dairy-goat groups in Meru Central, based upon participatory poverty measures obtained from the local level. These project-supported groups were known as “FARM” groups. However, many other farmers in the district decided to start their own groups, albeit without formal FARM support. These were known as “extension” groups. They had bought a breeding buck (while FARM groups were given one), and were trained by extension staff or other dairy-goat groups without the typical project support. There were 26 extension groups.

For the group interviews in this study, typically four to six farmers from one dairy-goat group were interviewed as a group over approximately a two-hour period. The group questionnaire consisted of 66 questions and participatory activities (group timelines and Venn diagrams). Following the group interview, randomly-selected individuals were sought to both corroborate the group information and to obtain information at the household level. One group member and a non-member who had benefited in some way from the group were sought at each interview site. The individual questionnaire consisted of 48 questions, and took between 30 to 60 minutes to complete.

Quantitative data from the questionnaires were entered into the Statistical Package for the Social Sciences (SPSS) software and analyzed. Descriptive analyses of the data were a major outcome. Measures of association such as correlation coefficients (Pearson's product moment) and multiple linear regression were used to examine and predict relationships among the study variables.

Qualitative data was analyzed by hand by reducing them to workable categories. The researcher then sought to discover themes, patterns, associations, explanations, and general statements about the relationships among categories of data (Marshall & Rossman, 1999).

Results

There are many types of groups in rural Kenya. They are part of the social fabric of the country. Although groups have been a type of social capital used by farmers for generations in Africa, the *harambee* movement following Kenyan independence greatly increased the number of grassroots-level groups. *Harambee*, meaning "let's all work together," was a government initiative to get self-help groups to form to obtain government assistance. Today, registration of groups with the government is usually required for farmers to receive government or other project assistance. Therefore, many groups have been formed at the community level in Kenya.

Almost every farmer interviewed in Meru was a member of some type of group. In addition to farmers' groups, some of the groups in Meru Central District included women's and men's groups, sports, church, school, cattle dip, political party, water, merry-go-round (revolving funds), clan, funeral, and marketing groups. Groups provided an important venue for obtaining information and technology, as well as moral support. Individual farmers ($n = 88$) were in an average of 2.4 groups. Ninety-seven percent of the dairy-goat group farmers were members of other groups. The main groups that individual farmers in the study belonged to included dairy-goat, church, clan, merry-go-round, water, and women's groups (Table 1).

Table 1. Types of groups to which individual respondents belonged ($n = 88$).

Type of group	<i>f</i>	% of individuals
Dairy goat	44	50
Church	39	44
Clan	23	26
Merry-go-round	18	20
Water	18	20
Women	14	16

Note. Individuals could be in more than one group

The data showed positive, significant linear relationships between the number of groups that farmers were in with the amount of tours/trainings they had received ($r = .225$; $p < .04$; $n = 88$) and the number of other farmers to whom they had disseminated information or technologies ($r = .306$; $p < .01$; $n = 74$). Groups thus were a valuable source of information and technologies for farmers in Meru Central District.

Farmer Group Linkages

Dairy-goat groups in Meru had many linkages to other players in the agricultural innovation system. Using Venn (*chapati* in the local language) diagrams (Figure 1), groups depicted other players with whom they interacted (Table 2). Size of the *chapati* indicated the

importance of the linkage. Other players mentioned include coffee and dairy societies, agro-chemical companies, markets, and other NGOs.



Figure 1. *Chapati* diagram by a dairy-goat group

Table 2. Sizes of chapatis given to various links with the dairy-goat groups (n = 46).

Source	Big	Medium	Small	Total
Government extension	36	9	1	46
FARM-Africa	27	8	0	35
Churches	24	8	8	40
Local government administration	18	15	10	43
Meru Goat Breeders' Association	10	3	7	20
Other farmers	7	23	6	36
Other farmer groups	6	13	8	27
Schools	4	9	6	19
Agricultural shows	2	5	7	14

The *chapati* diagrams revealed a mix of both local and external linkages. The dairy-goat groups were linked with other farmers, groups, churches, and local government administration at the local level. However, they also had outside links with government, NGOs, and sometimes private companies. A higher number of linkages was associated with higher adoption of technologies by neighbors (see Table 3).

Role of Farmer Groups in Dissemination

The dairy-goat groups—and other local groups—were important sources of information for farmers. When asked for their top three sources of information, 26% of the individuals interviewed listed groups. All of the dairy-goat groups interviewed (n = 46) said that they told other farmers about new information and technology. The main methods that dairy-goat groups used to tell other farmers about new technologies were through the chief *baraza*, in other farmer groups, at the buck station, through training others, and by calling meetings.

Baraza was the community meeting held periodically by the chief, traditionally used to impart information to villagers. Much information was passed along to farmers at the community level through this forum. Extension agents often presented information at the *baraza*, as did the dairy-goat groups. Trainings also took place at the *baraza*. Thirty-nine percent of the dairy-goat groups mentioned that they had trained other farmers at the *baraza*.

Members of the dairy-goat groups also informed people of innovations in the other groups that they belonged to, such as clan and women's groups. Through these groups, farmers from the dairy-goat group communicated the new information and technologies they had learned. One woman interviewed said that as they cleaned the church for their women's group, they presented any new knowledge to one another.

Buck stations were another main means that dairy-goat groups used to disseminate information. The buck station was the center for breeding activities for a group. A pure Toggenburg buck was kept at the buck station, and local goats were brought there for breeding. Seventy-four percent of individuals interviewed said that they received information at the buck station when they took their goat there for service. At the buck stations, dairy-goat groups reported having provided an average of four services to members and nine to non-members in the past month.

The fourth way that dairy-goat groups extended information and technology was through formal training of other farmers and groups. The 46 dairy-goat groups had each trained an average of three other groups in the past year, with a range of 0 to 36. Farmers in the FARM-Africa-supported dairy-goat groups were often responsible for training the new dairy-goat groups, which were known as "extension" groups. Seventy percent of the dairy-goat groups said they had trained non-members specifically on fodder tree technology. The average number of non-members trained on fodder by the dairy-goat groups was 33. Dairy-goat groups also gave information to outside visitors such as NGOs, groups from other countries, other farmers outside the catchment area, extension officers, researchers, and government officers.

Lastly, dairy-goat groups informed other farmers of new information and technologies by calling meetings at their group location. For instance, if an extension agent was coming to train the group, they might invite their neighbors. When fodder was being distributed to the dairy-goat groups, they often involved the whole community in both the training and the distribution of fodder seedlings. Groups also held their own training sessions, or invited other farmers to their meetings.

In addition to these five major ways of information dissemination (*baraza*, groups, the buck station, training, and calling meetings), many other means were used disseminate information and technologies to other farmers. These included the breeding stations (where pure Toggenburgs were bred), community animal health workers, fodder tree nurseries, churches, and through neighbors and visitors.

Factors for Success in Dissemination by Groups

The data above show the role of dairy-goat groups in disseminating information and technologies in Meru. The particular variables that contribute toward group success in dissemination are now examined.

To more easily examine the effects of the various factors on success indicators, an index of success in dissemination was created. The "adoption index" is the average of the dairy-goat groups' ratings of the number of neighbors adopting dairy-goat technologies, taken together with

three external raters' scores. These scores could range from 1 to 4, where 1 = none, 2 = some, 3 = many, and 4 = all. Cronbach's alpha for this index was 0.69.

A regression model showing predictors for the adoption index is detailed in Table 3, where the adoption index is the dependent variable. It includes the independent variables "type of group" (FARM or extension), perception of "member participation in groups," "individual membership in the Meru Goat Breeders' Association (MGBA)," and "number of linkages." The model was developed using the backward method of model building, where all of the variables are put in, and then those that do not contribute significantly to the outcome are dropped out. Variables that were dropped from the regression equation included the amount of schooling of individuals within the group, meeting frequency of the group, the number of activities conducted by the group, group capacity level, physical location, group size, age of the group, level of formality, group cohesiveness, and homogeneity of members.

Table 3 shows the most important predictors of dissemination. The r-square value of 0.61 means that the combination of these variables—type of group, member participation, membership in MGBA, and number of linkages—explained 61% of the variation in the adoption index, which was a measure of success of the group in dissemination. Type of group, MGBA membership, and number of linkages were positive, meaning that increases in these variables lead to an increase in success of the group in dissemination. Because type of group was binary, it means that the type of group variables coded as "1" (FARM) were contributing to group success.

Table 3. Linear regression analysis of variables for prediction of success in dissemination (adoption index).

Independent variable	Beta	Std. Error	<i>t</i>	<i>P</i>
Type of group ^a	0.38	0.07	5.36	0.00***
Participation by members	-0.13	0.04	-3.33	0.00**
MGBA membership	0.01	0.00	1.79	0.08*
Linkages	0.04	0.02	2.47	0.02**

^a 0 = extension-facilitated group; 1 = FARM-facilitated group

Note. $R^2 = .61$; * approaches significance; **significant; ***highly significant

Participation by members, however, is negative. This variable was a measure of the groups' perception of how much members participated, ranging on a five-point scale from "strongly disagree" to "strongly agree" to the statement, "Group members regularly participate in most group activities." Because it was negative, it means that as groups tended to disagree that their member participation was high, groups had a higher adoption index. This may be due to the fact that groups with high participation were inwardly focused, and did not reach out to or spend much time with non-members and thus disseminate information.

Conclusions and Recommendations

This study shows that community-level groups are a major way for farmers to obtain information and training and to play a role in dissemination to other farmers. However, certain variables appear to help groups in this role. The groups that had more outside assistance and linkages had more opportunities to disseminate, and indeed were more successful in dissemination.

This study echoes some other findings with regards to the linking of community groups to both local and external institutions. Krishna (2001, p. 938) describes the importance of capable

agencies or institutions, and their role in development: “Capable agents help villagers overcome these obstacles [lack of information, poor communication networks etc.] to effective collective action and social capital is made more productive when such agents are available in the village.” Similarly, De Haan, Valdivia, Njeru, and Sheikh (1996) found that dairy-goat groups in Kenya that had the most face-to-face contact with the project had the most successful rates of dissemination of the goats. The fact that the number of dairy-goat group members who were in the Meru Goat Breeders’ Association (MGBA) was an important contributor to overall group success validates these findings, and shows that linkages with supporting organizations are crucial.

The MGBA was important for groups as a source of information and germplasm and for marketing. Increasing links with the MGBA or similar organizations would likely increase success of groups in dissemination. Similarly, strengthening community-based organizations such as the MGBA may be another way to improve extension in rural communities. By training farmers in organizations such as the MGBA, and then assisting them to train other farmers, dissemination can be more effective and less costly.

In the FARM-Africa project described in this study, strong emphasis was put on linkages between all of the players involved in the project, including the private sector, government extension, and various research players. Perhaps this was one of the reasons why project reviewers viewed the dairy-goat project as quite successful. Involving multiple players allowed FARM-Africa to use the strengths of each one and to cut costs for their project. Based on this and other research studies, it appears that strengthening linkages will increase the success of groups in disseminating information.

For actors to work together at the local level, certain mechanisms must be built in to ensure effective linkages. One study finding was that the dairy-goat groups with higher numbers of linkages had higher rates of dissemination to their neighbors. Groups that are linked with many other entities have many opportunities to share and learn information. Linkages also help to ensure that organizations are sharing knowledge and not duplicating one another’s activities. Projects such as the one in the study can build linkages through study tours, workshops, field visits, and the like.

Group formation also appears to increase the number of linkages in rural areas, which can lead to greater dissemination. Geran found in her 1996 study in Zimbabwe that group formation led to increased links with service providers, as did Rouse in Zambia (1996). Obonyo (2000) also found that one of the benefits from being in a group in western Kenya was access to external agencies. The dairy-goat groups benefited from the project by increased linkages to local government, extension officers, outside researchers, and the like.

Furthermore, capacity must be built at the local level. By the end of the project cycle, the farmers in the dairy-goat groups were training other farmers in the area and even traveling outside of the district to impart their knowledge. This was made possible though capacity building at the group level, especially among key individuals.

The data show that the government was playing a vital role in the project. In spite of the usual lack of resources from the public sector, involving the government is key for several reasons. The state has typically been mandated to provide public goods and services to the rural sector, and to ensure that farmers and other poor people are not being left out by the private sector. Governments also have the necessary human resources and capital equipment—but often not the funds—for operational expenses. By partnering with projects, the government can cut costs and do their job more effectively.

In areas like Meru, where social capital is already high, farmer groups should be targeted as a vehicle for extension and other rural development initiatives. Mechanisms for working with farmer groups need to be improved. For instance, the Ministry of Culture, Gender, and Social Services, which works with groups, must be able to liaise with the government extension staff, with other development providers and with the local administration in the form of the chief's office. Some mechanism needs to be established in order to prevent replication of efforts and alienation of certain groups. The chief's camp would perhaps be a suitable clearinghouse for groups seeking assistance or development organizations seeking groups.

For groups to play an effective role in extension, an enabling environment is necessary. Groups need to be able to approach the government or other development players for assistance. The Kenyan government should make it easier to register groups with the Department of Social Services. Illiteracy, physical distance, and fear of the government may keep farmers from registering groups (groups are required to develop by-laws and to elect officers, processes that some farmers may find difficult). In these cases perhaps the government could allow groups to approach other entities besides the district government offices, such as churches or NGOs, in order to register. Requirements for written by-laws and constitutions could also be dropped in some instances. Where poverty and other factors inhibit individuals from joining groups, perhaps a limited form of providing subsidies for such groups would enable them to be able pay the registration fee.

There should then be a standard operating procedure for groups to follow to obtain development assistance, or for the mechanism to work the opposite way: for development players to seek groups that they can then work with. The local administration and the chief's office need to be strengthened, because they have been shown to be an important player in agricultural extension.

In a pluralistic extension model, all of the actors in extension must work together in such a way that by all means necessary the information and technologies spread. Such a model must take advantage of the strengths of each of the players. For instance, Parkins (1997) found that formal organizations tended to provide information to farmers, while informal organizations usually provided materials. This study found that certain players were useful during the project starting point and others in the midst of the project.

Government extension policy in Kenya today is to work with farmer groups. Policy makers should continue to incorporate an integrated or pluralistic approach to extension, in which grass-roots organizations play a key role. The emphasis today is on extension systems that are demand-driven, participatory, pluralistic/multi-stakeholder, decentralized, and privatized. This means involving *all* players. Groups are one important vehicle for extension; however, they are no "silver bullet." Groups should be used, but not solely focused on as a means of extension. It is unlikely that farmer groups in rural areas will be doing formal-type extension on their own. It is in conjunction with other players such as NGOs, government, and private players that farmer groups will be most effective.

Researchers, policy makers, and practitioners should better understand farmer groups' role in development, and their strengths and weaknesses. Farmers are an important source of information for other farmers. However, they need to be able to access information and technologies to be able to show, tell, and learn. A study on adoption and dissemination of fodder shrubs in central Kenya (Franzel et al., 2003) concluded with the following:

Extension approaches are needed to enable farmers groups, on their own, to access information on new practices. Governments and development partners should not see their role as simply transferring technology and information to farmers. Rather, they should focus on assisting farmers groups to mobilise their own resources and enhance their ability to obtain information on improved practices from outside their villages (p. i).

In summary, some recommendations for institutional arrangements to increase the role of farmers groups in agricultural innovation systems therefore include the following points.

1. Use farmer groups for dissemination purposes, however, not as a sole means of extending information and technologies.
2. Provide trainings, cross-visits, agricultural shows and other mechanisms to build the capacity of farmers and groups. At the same time empower groups to “go it on their own” eventually.
3. Focus on key individuals within groups for training; in the case of the dairy-goat groups, the buck keepers, breeders, and community animal health workers.
4. Increase linkages of groups with outside entities from whom they can learn and to whom they can disseminate information and technologies.
5. Provide an enabling environment for groups to form by working with the Ministry of Gender, Culture, and Social Services; the local chiefs; and churches to facilitate non-threatening ways for farmers to register groups through these institutions.
6. Provide mechanisms for coordination between development players and farmer groups that will prevent duplication of efforts and alienation of marginalized farmers.
7. Establish a clearinghouse and/or standard operating procedure whereby groups can obtain development assistance, and development players can identify established groups to take part in projects.

Educational Importance and Application

Farmer groups can indeed play a vital role in systems of agricultural innovation. The study has shown that there are several institutional arrangements that can be implemented by policy makers and other stakeholders to ensure that smallholders participate in development. When farmers play a part in development, there is a greater chance of ensuring that their needs are being met. The international extension community must recognize the role that each player can have in an innovation system and take steps to capitalize on the strengths of the various players.

One of these institutional arrangements that should be of great interest to education is that of learning and capacity strengthening. This entails new tools, skills, and competencies at both the individual and institutional levels. Extension educators and policy makers must consider the best ways to increase such capacities, and to consider how best to target capacity building for the different stakeholders.

There is much that can be done in the policy arena as well. Group formation should be encouraged, and mechanisms for increasing linkages with groups can be implemented. By working with farmers at the grassroots level of innovation systems and utilizing the capacities

and strengths found there, academicians, practitioners and policy makers can help to bring about more sustainable growth and development.

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