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TARGETING FARMING SYSTEMS ACTIVITIES: HOMOGENIZING VARIABILITY?

Inherent in the farming systems approach is the recognition of the variability of the complex circumstances farmers face while managing farms that are comprised of inter-related crop, animal, household, and off-farm enterprises. Diversity in farming systems must be recognized in developing appropriate technologies for the farmers that manage those systems. However, it is not practical to conduct research tailored specifically to a few individual farmers. Targeting entails the grouping together of similar clientele so efforts can be sufficiently focused. Although the concept of targeting might seem contrary to the recognition of heterogeneity among farms, it is an essential component of the farming systems approach. When Farming Systems Research and Extension (FSR/E) practitioners target a group of farming systems as relatively homogeneous based on a few simple factors, the existing variability among farms is often not sufficiently considered. How can FSR/E teams define and target homogeneous groups of farming systems without losing sight of the heterogeneity among them? Farming systems practitioners take different positions on this issue (Cornick and Alberti 1985).

One perspective stresses the early definition of homogeneous groups of farmers using the recommendation domain concept to guide subsequent research activities. Collinson (1979, 1980), Gilbert et al. (1980), and Franzel (1985) advocate ex ante delineation of recommendation domains based on secondary data and preliminary surveys, followed by a formal survey to refine the domain boundaries. Both Collinson and Franzel describe a technique of defining recommendation domains through interviews with extension agents and local authorities before actually initiating activities with farmers. Early definition of recommendation domains is usually based upon a few relatively easily identifiable factors such as soil type, agroecological zones, crop type, and management (Harrington and Tripp 1985). These authors note the importance of continuing the refinement of domain boundaries throughout the sequence of on-farm adaptive research, but the subsequent reassessment of recommendation domains is often not vigorously pursued.

A more recent view states that grouping farming systems should not take place until the researchers have an adequate understanding of the variability inherent in local farming systems, usually not accomplished early in the work in an area. Cornick and Alberti argue that recommendation domains established early are frequently poorly conceived and lead to a premature assumption of homogeneity. The failure to consider potential variability from factors such as long-term climate induced trends in cropping patterns, household decision-making and labor allocation, or relationships between on- and off-farm activities, may bias subsequent technology development. For example, Cornick and Alberti (1985:1) note:

> ...the roles of women and children that can be critical factors in the development and subsequent adoption of technologies are often explicitly excluded from consideration in recommendation domains. This occurs because the usual time frame for development of recommendation domains is inadequate to the task of understanding intrahousehold dynamics and the importance they hold in the system.

In particular, socioeconomic factors are often not fully integrated into domains defined early, either because of the longer period of time necessary to gather this information, or because of the absence of trained social scientists as part of farming systems teams. One area often poorly covered in early definitions of domains is the different agricultural roles of men and women. Proceeding with on-farm research and other activities on the basis of a hastily achieved assumption of homogeneity could result in inefficient subsequent research and the promotion of solutions that are not appropriate to farmers (Cornick and Alberti 1985:25) or technologies that may favor some farmers (male) while causing disadvantages for others (female).

In this paper the issue of variability versus homogeneity in the targeting of farming systems research and extension activities is explored. After a brief review of targeting in FSR/E using recommendation domains, problems in the conventional use domains in FSR/E are described in an attempt to bring together the two differing viewpoints and to begin to resolve the question. The refined concept of targeting allows for better inclusion of gender variables in the definition of domains.

OVERVIEW OF TARGETING AND RECOMMENDATION DOMAINS

Targeting for Efficiency and Social Equity

FSR/E must differentiate between various potential farmer-client groups and determine the particular needs of each, if technologies are to be developed that clearly meet those needs (Byerlee and Hesse de Polanco 1982). Most literature on the subject of targeting in farming systems has stressed the increase in efficiency of FSR/E activities made possible through focusing upon specific, relatively homogeneous farmer groups.

Efficiency in allocation of research resources is essential if a program is to reach and benefit a maximum number of farmers. By focusing scarce resources upon roughly similar groups of farmers, research programs are able to carry out investigations on a selected number of representative farms and later can transfer the findings to the comparable situations faced by other farmers.

Targeting is also important in justifying the farming systems approach to institutional policy makers who are concerned about social equity in the distribution of resulting benefits. Farming systems practitioners use targeting concepts to assist them in making decisions which increase the likelihood of an optimal distribution of research results among the members of a community.

Conventional Concept of Recommendation Domains

The concept of "recommendation domains" has been widely used in targeting farming systems research since Perrin et al. (1976) first introduced the idea. It is described and defined by Byerlee et al. (1980:899) in the following manner:

> … a recommendation domain (RD) is a group of farmers with roughly similar practices and circumstances for whom a given recommendation will be broadly appropriate. It is a stratification of farmers, not area: farmers, not fields, make decisions on technology. Socioeconomic criteria may be just as important as agroclimatic variables in delineating domains. Thus resulting domains are often not amenable to geographical mapping because farmers of different domains may be interspersed in a given area.

Using this definition, neighboring farm households might be placed in different recommendation domains because of differences in availability of family labor. In societies where women cultivate different crops than those of the men, female

farmers could comprise a recommendation domain separate from male farmers even if they are from the same household.

Expanding Upon the Definition of Recommendation Domain

Perrin et al. (1976) originally conceived of the notion of recommendation domains as an aid to researchers for targeting the development of technologies to specific audiences. The concept has been expanded since then to include a number of additional situations and purposes. Some of the most common applications of recommendation domains include the following gleaned from current literature on the topic:

(1) making policy decisions;
(2) identifying priority issues for research;
(3) specifying clientele for developing recommendations;
(4) selecting representative sites and farmer-cooperators;
(5) focusing analysis of surveys and on-farm trials;
(6) orienting extensionists to groups of similar farmers;
(7) transferring adapted technology to appropriate farmers; and,
(8) enhancing equitable distribution of FSR/E benefits.

As Harrington and Tripp (1985) point out, the domain concept is vital to every stage of the on-farm research process. However, it is apparent from reviewing the literature on the subject that the definition of "recommendation domain" not only changes at each stage, but also varies according to the individual who applies it as well as to the end result. The wide variability among farmers and farms, and the dynamic nature of the farming systems development sequence, contribute to the confusion that exists among FSR/E practitioners as to the general meaning and use of the term recommendation domain.

On-Farm Variability and Conventional Recommendation Domains

The emphasis by Byerlee et al. (1980) upon "farmers, not fields" as the sole basis for the delineation of recommendation domains is not always warranted because of the variability found in some field situations. Cornick and Alberti (1985) cite the case of farmers in the community of Quimiaq in the mountains of Ecuador who manage different cropping patterns in different agro-ecological zones, a product of altitude, temperature, and rainfall variation on the mountain slopes. Not only does each farm cross agroecological zones, but the cropping patterns found in each field vary greatly from year to year. For example, depending upon a farmer's perception of trends and yearly changes in climatic

conditions, bean or fava bean intercrops will be assigned to maize fields located at varying elevations along the slope.

Gender and intra-household variables are often neglected in the process of defining a recommendation domain because of the relatively more difficult and time consuming task of collecting and analyzing data on these variables. Existing information on gender and household variables often offers few useful insights for defining recommendation domains when compared to the secondary data available on agroecological characteristics. In addition, the gender and household data that may exist may be unobtainable locally. Nevertheless, superficial understanding of these variables or the transfer of erroneous assumptions without continued investigation can hamper design and delivery of appropriate technology.

Refining the Concept of Domains

The argument here is that the issue of targeting in FSR/E has become confusing because the definition of the term "recommendation domain" has been stretched to cover too many situations and too many different purposes. Farming systems practitioners must develop a common understanding of how the use and definition of "domains" change as the farming systems sequence progresses from initial characterization through problem diagnosis, testing, adaptation, evaluation, and finally, to the delivery of the new technology to farmers.

It is essential to account for the heterogeneity in farming systems, even while delineating relatively homogeneous groups. Refinement and expansion of the use of domains in targeting will enable researchers to distinguish applications of the domain concept, while still recognizing the diversity among farm households and farming systems.

This can be accomplished by recognizing a problem focus in the definition of the domains, by tying the changing concept of domain more closely to the farming systems sequence, and by stressing a greater inclusion of socioeconomic considerations into the targeting process. The refinements outlined below are a sharpening of focus not a changing of terminology, that will lead to increased utility of this method of targeting in the field.

Any of the three types of domains described below may be defined within specific geographic boundaries for ease in conceptualization, but it is imperative to realize that domains do not necessarily include all the area within the boundaries prescribed. Because domains are based upon a specified problem

focus and upon socioeconomic considerations in addition to the more geographically mappable factors of climate, altitude, and soil, they are actually interspersed intermittently in a discontinuous pattern throughout a geographic area.

The examples here will emphasize gender as a key factor in delineating domains; other factors, such as class, education,-language use, or food preferences, could also be used.

Research Domains: Targeting for variability

A "research domain" is a problem-focused environmental (agro-ecological and socioeconomic) range throughout which it is expected that hypothesized solutions to a defined problem could have potential applicability and therefore should be tested. Research domains are determined during the initiation of research activities, largely by consideration of biophysical (agro-ecological) factors, with some attention to socioeconomic and gender issues.

Recommendation Domains: Targeting for Homogeneity

Research domains are comprised of one or more agrosocioeconomic "recommendation domains", that are tentatively defined based upon the response of a specific technology to the actual agro-socioeconomic conditions found on farms. A "recommendation domain" is a group of farmers (or farmers and their fields) with a common problem for whom a tested solution meets their biophysical and socioeconomic requirements for adoption.

In the Ecuadorian case cited by Cornick and Alberti, recommendation domains would be based not only upon farm households, but also upon their separate fields that are not contiguous but widely dispersed in location and altitude. Each household might fall into several recommendation domains depending upon: (1) where their fields are located along the agroecological gradient of the mountainside; (2) the climate-related crop management decisions made for each of those fields; and, (3) the particular problem solutions to be tested.

Other examples from West Africa demonstrate how gender can be used to differentiate recommendation domains. In many areas, men and women have separate fields, often inherited from their same sex parent, that are not managed communally by the household. Women traditionally grow rice on their lands while men produce upland crops such as groundnuts or sorghum on their own

fields. In this system, fields managed by a household pertain to different recommendation domains depending upon both the cropping system and the gender of the farmer manager. In one area of the Ivory Coast, men plant yams in a cleared field. Women will often care for the yam plants by weeding them while they plant their vegetable crops in the space between the yam plants. In this system, fields are neither men's nor women's, nor would entire fields fall into a single problem-focused recommendation domain. Rather, domains would be determined by crops and their managers, male or female, and contain pieces of many fields.

Recommendation domains are seen as tentative in nature throughout the on-farm adaptive research process. Recommendation domains are initially hypothesized by the FSR/E team on the basis of on-farm exploratory and refinement trials, information collected through directed surveys, and subsequent on-farm verification trials. Over time, as more information is gathered, the recommendation domains are refined and redefined to closer approach reality.

Diffusion Domains: Targeting for Communication

"Diffusion domains" are interpersonal communication networks through which newly acquired knowledge of agricultural technologies naturally flows (Hildebrand 1985). Informal flow of information through a community grapevine is substantial (Rogers 1983). From farmer to farmer, neighbor to neighbor, store operator to patron, information about new ideas moves through a farming community. Awareness of a new technology being verified in on-farm trials takes place among farmers and their families who are not directly involved in the on-farm research.

A farming systems team can enhance the informational effect of on-farm research activities in a community. By understanding the local communication networks in an area, the FSR/E team can strategically locate on-farm verification trials in each diffusion domain to enhance the diffusion of information about a new technology among potential users. This ensures a broader, more equitable distribution of information because it has the potential of reaching farmers who are difficult to reach through conventional extension methods and who rely greatly upon localized interpersonal communication to acquire information.

Frequently, information about new technologies developed in agricultural programs tends to be communicated only through male information networks. In some societies information about technologies is diffused only slowly, if at all, from men to women even within a household. Female farmers are clearly

disadvantaged in learning about new technologies if they cannot participate in male-oriented dissemination programs. Definition and use of diffusion domains in the FSR/E testing process allows practitioners to recognize and plan for the fact that men and women often have different communication networks. For example, if men gather and exchange information about agricultural technology at certain locales (cooperatives, local seed and feed stores, bars) where women are usually not permitted by custom to enter, women may effectively be excluded from the process of dissemination.

FIELD USE OF THE DOMAIN CONCEPT

In practice, farming systems teams work in a project area located on the basis of geographical and political considerations rather than with biological conditions or socioeconomic concerns. Within a project area, project focus can be based on a specific priority commodity commonly produced by farmers in the area or may be based on socioeconomic considerations such as an emphasis upon small farmers or women farmers. The farming systems team working in the area may have responsibility for determining project focus. Seldom will the team have input into defining the project area. Even though it is of great importance in targeting farming systems efforts, the process of selecting the project area and project focus lies beyond the scope of this paper. This discussion will commence with subsequent stages of the targeting process. For the sake of brevity and clarity, a relatively simple example will be used.

A Case of Targeting in the Farming Systems Approach

The following example is drawn from farming systems activities in Central America (Ruano 1977; Hildebrand and Cardona 1977; Reiche Caal et al. 1976). Although based on actual experiences and cases, some liberty has been taken with its portrayal here to show how this refined concept of domains might have been advantageously applied.

A farming systems team from the national research institute composed of three agricultural technicians, one economist, and one anthropologist (all men) was assigned to a certain hilly section of the country. In accordance with national agricultural production objectives, the team's mandate was to work on improving the production of basic grains among small, resource-limited farmers in the project area (a commodity and socioeconomic based project focus).

Initial informal reconnaissance of the area and a review of secondary information revealed that the area was comprised of relatively flat, fertile lands in the valley bottoms and poorer, rocky soils on the slopes. The larger, fertile farms in the valley bottoms were owned by wealthier farmers who were able to employ mechanization in their cultivation systems. Tractors were used in their monocultural stands of maize and short, improved sorghum varieties. In contrast, the hillsides were largely devoted to small farmer cultivation, with farms averaging about 3.5 hectares. Sorghum and maize were interplanted using mostly traditional, taller sorghum varieties. A few farmers employed bullocks and plows on their farms, but most cultivated their crops by hand.

Unfortunately, little secondary information existed concerning the socioeconomic conditions of the area. However, generally for this region, people say that men plant and tend the crops while women manage the household, food processing and preparation, and the marketing. Little was known about the role of women in production. The team assumed that this was generally true for the project area. The team did not at this point have any female members.

In keeping with their project focus, the team decided their attention should be targeted on the smaller hillside farmers and farms. A sondeo (Hildebrand 1982), or diagnostic survey, conducted in the hillside region revealed that farmers in the hillside areas used similar systems of intercropping maize and sorghum. They complained that the scarcity and irregularity of rainfall had made maize cultivation an increasingly risky endeavor. Farmers were unable to grow enough maize to meet their consumption needs. Only the male heads of households were targeted for the sondeo.

Since irregular rainfall frequently caused the failure of the maize crop, the more drought-tolerant sorghum was being grown to supplement it. However, farmers expressed a dislike for eating sorghum and indicated they only grew it to sell for animal feed, using the proceeds to purchase maize. In this sense, substituting cultivation of sorghum for maize reduced the risk of crop failure yet provided for the household subsistence needs.

Sorghum production in the area was higher per unit planted than maize, but still below production levels achieved elsewhere in similar environments with improved varieties. As one facet of their farming systems program, the team hypothesized that selected improved sorghum varieties within the traditional cropping system could lead to a partial solution to the identified production problem.

Based on these findings, the team considered the hillside maize and sorghum farmers and their fields, with declining maize yields as a single "research domain" (problem-focused, agroecological range). A series of exploratory trials were designed for placement throughout the research domain.

At harvest, the team collected production data as well as information on farmer opinions about the new varieties. Even though the new, earlier varieties performed well on all test sites, there were sharp differences among farmers as to their acceptability. Some farmers were planning to keep seed and plant the new varieties again the following season. Others were quite disinterested in the varieties, but their reasons were unclear to the team. Based on farmer evaluations, the team partitioned the "research domain" into two groups of farmers; those interested in planting the sorghums again and those not interested. The former group became a tentative "recommendation domain" and more precisely refined trials were designed to continue testing the varieties under farm conditions, while further determining the reasons for the farmers' acceptance of the new sorghums. For the other group, more information was needed by the team to determine why the new sorghums were unacceptable. Thus, this group continued to constitute a "research domain."

Information had been collected to characterize the farming systems of the area while monitoring the exploratory trials. Continuous contact of the team members with farmers during this period had yielded much additional socioeconomic information not apparent from the initial sondeo activity. All hillside farmers and their farming systems no longer appeared alike.

Some farmers at slightly lower elevations had soils with better water retention characteristics than other farmers on higher slopes. These farmers could plant maize with a greater assurance of obtaining a harvest than those at higher locations with poorer soils. Through additional directed interviews, it was found that lower elevation farmers tended to row sorghum primarily as a cash crop. Because of their favored soil conditions, they possessed enough cash from crop sales to ensure a continuous supply of maize in the household. These farmers did not consume sorghum.

Over time the team came to realize that even though most people claimed they did not eat sorghum, many were actually using it as a substitute for maize. The team hypothesized that sorghum consumption increased among less well-off households farming the poorer, higher elevation fields. It was apparent that farmers of this group also were not interested in the new higher yielding sorghums. As one aspect of their attempt to resolve this seeming contradiction,

the team initiated informal surveys with women of the households within this group. Unfortunately, owing to socio-cultural and linguistic barriers, the male team members were unable to obtain adequate information.

This was corrected by temporarily adding a female social scientist from the institute headquarters to the team to conduct the interviews. She found that these families did consume sorghum, although they had not always done so. Decreasing maize harvests and lack of resources for the purchase of maize had forced them to consume sorghum. Women interviewed indicated that consumption of sorghum implied a certain social degradation, a "shame" in the eyes of neighbors. In many cases, a farmer whose family consumed sorghum was considered a poor provider. To the casual observer, sorghum consumption was not apparent among the farmers; but as the team moved deeper into the community, they found that sorghum was an important part of the diet among families lacking maize.

Further study of sorghum preparation, cooking and taste preferences revealed that sorghum, like maize, is primarily eaten in the form of tortillas, either prepared with maize or alone. Women said some of the new varieties tasted bitter and were not fit for consumption. One of the new varieties was not bitter-tasting, but due to purple glumes, it left telltale dark spots when made into tortillas. Although the purple glumes could be removed after many washings, this was an unacceptable alternative for most families because of a scarcity of readily available water in the higher elevation areas of the research domain.

Using this information, the team partitioned the original research domain into two "recommendation domains." For the earlier tentatively defined recommendation domain, consisting of farmers who produced sorghum destined for the animal feed market, on-farm testing of the previously introduced new sorghum varieties was continued. For the second recommendation domain, composed of relatively poorer farmers producing sorghum for home consumption under less favored soil conditions, the team recommended that the research institute acquire or develop varieties with less coloring and no bitter taste that could then be tested on-farm with the farmers in this group.

Through this experience the FSR/E team and the research institute began to realize that while women were not directly involved in sorghum production, they did have considerable influence in making cropping decisions that affect household concerns such as consumption. Newly cognizant of the need for an augmented social perspective in their development activities, the team began -a

second phase of on-farm experimentation targeted towards the two separate recommendation domains.

At the same time, they began to work with local extension personnel to study the flow of agricultural information among the farmers and households in the region. Recognizing the role that household consumption preferences play in the adoption or rejection of sorghum technologies, female team members and interviewers were added to the farming systems program to ensure a balanced gender perspective.

Among the many local information pathways, it was found that women exchanged much information about sorghum and other agricultural crops with other women at the weekly markets. Among men, interpersonal communication concerning farming and crops took place on Sundays when farmers from the surrounding countryside congregated in the town plaza to converse and visit. By the close of the second season of farming systems activities, the team had tentatively defined several local "diffusion domains" based on gender, religious affiliation, locality groups, and other factors. On-farm trials and extension efforts were managed to ensure information flow to each diffusion domain.

CONCLUSION

This greatly simplified case provides an example of how the refined domain concept allows grouping of roughly homogeneous farmers while not losing sight of the heterogeneity inherent among them. This conception of domains is not a static one, but one that recognizes the changing nature of the targeting process as a result of on-going information gathering through surveys, participant observation, and on-farm experimentation. Maintaining a flexible determination of domains allows for a greater understanding of the diversity of local farming systems, of the rationale behind the behavior of farmers, and of the effect of gender and social factors upon the local practice of agriculture.

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