NEW OVERSEAS MODEL

Farming Systems Research and Development an Alternative to Conventional Ag Extension

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Agricultural extension has a long heritage. The most familiar, formalized system of agricultural extension, at least to American audiences, is embodied by the Cooperative Extension Service (CES). This organization's formal beginning can be traced back to the Morrill Act of 1862 which established the land-grant system of higher education in the United States. One of the purposes outlined in this legislation was "to teach such branches of learning as are related to agriculture and the mechanic arts... to promote the liberal and practical education of the industrial classes." These institutions of higher education were strengthened by the passage of the Hatch Act in 1887. This legislation provided for a system of federally funded agricultural research stations so as to provide the land-grant colleges with a strong research base. The final piece of this triumvirate of legislation in the evolution of agricultural extension in the United States was the Smith-Level Act of 1914. It established the system of government subsidized agricultural extension in association with the land-grant colleges. A stated purpose of the Act was to facilitate the diffusion of information generated at the land-grant colleges and federal research stations, "among the people of the United States."

The formal foundations of the CES were 52 years in the making, and it has been almost 72 years since the passage of the Smith-Lever Act. Central to our CES have been its strong linkages to research and its flexibility in addressing local concerns. This, then, is a brief synopsis of the institution of agricultural extension in the United States. It has served as a model for agricultural extension in many nations throughout the world, and for the purposes of this discussion it will serve as a reference point for conventional extension.

In the headlong rush to promote national development in many of the poorer nations of the world, whose modern history began in the late 1940's, many efforts were made to replicate overseas the successes that were being attributed to the American institution of agricultural extension. Perhaps in retrospect, the methods employed and the institutions established to promote rural development in the poorer nations were inappropriate, for these efforts often attempted to graft foreign institutions onto these nations. In the United States, the demands of small-scale farmers have been cited as being crucial to the development of the CES, while in many other nations, agricultural extension services generally lacked a consistency — the wealthy land owners had little interest in it and the small scale farmers had little if any representation (Rice, 1974). Currently, some form of formal agricultural extension exists in most nations (Asian Productivity Organization (APO), 1975; Blanckenburg, 1984). Unfortunately, many of these efforts at agricultural extension have not yielded the hoped for benefits, and the often desperate conditions of a significant number of the world's small-scale farmers remain underaddressed.

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Reviewer Comments

1. I think that it is very important for the readers of your Journal to have some idea about Farming Systems Research (FSR) as very few U.S. based agriculturalist are aware of this significant work that has been done overseas.
2. FSR work was originally started by CIMMYT and other International Agricultural Research Centers (IARCs) in an effort to encourage agricultural researchers in developing countries to have some contact with farmers. The IARCs were focusing on basic research and they wanted national researchers to concentrate on adaptive research and on-farm trials. Therefore, unlike what may be implied in this article, FSR was approached as a new research technique and not from the extension perspective.
3. FSR work has been going approximately 10 years with USAID promoting it throughout the world. Having worked for almost 11 years with the U.N. system, I found it interesting that FAO and the World Bank did not get involved in the FSR trend. Nevertheless, I noted that in the bibliography three of the citations were U.N. related (FAO and World Bank).
4. A number of American universities became involved in FSR projects, and in recent years the University of Florida had a USAID centrally funded FSR support project to build a network. As part of this network, Kansas State University had an annual conference where a very large number of papers were presented.
5. As with any research trend, USAID as the principle donor has begun to look for new approaches to promote. The University of Florida and part of its network then added the word "extension" to make it FSR/E. However, this does not appear to have been accepted by researchers, extensionists, nor donors. The centrally funded FSR project with Florida is being terminated.

Again, this can be a very important article to alert our domestic teachers of agriculture about a considerable amount of work that has been done overseas which may have some application in the U.S.

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Possibly, an overly simplistic question arises — why have so many of these efforts at agricultural extension yielded such poor results? Despite persuasive evidence that agricultural extension services are not economical in a cost benefit analysis, the commitment to them continues to run high (Leonard, 1977). It is not possible in such a short discussion to comprehensively analyze as complex and diverse an issue as agricultural extension. Instead, we will attempt to highlight and review a few of the more significant problems, as we see them, that have been identified by extension experts and practioners.

An often cited strength of the CES has been its efforts to be responsive to locally perceived needs (Axinn & Thoral, 1972; Government Accounting Office, 1981). In the popular vernacular this has often been referred to as "bottom-up" programming. In this model, the target population is, theoretically, provided with opportunities to contribute to the programming process. Generally, this is not the pattern in most nations of the world. Typically, programming is centrally originated, planned, and then channelled down through a hierachial bureaucracy to its lowest levels for enactment (APO, 1975; Axinn & Thorat, 1972; Rice, 1974; Rivera, 1985: Strengthening Public Extension, 1985). This does not imply that all such programming is inappropriate, but experience has demonstrated that the further it originates from its intended audience the lesser its probability of success. A possible explanation of this phenomena lies with the intended audience. If this audience perceives that programming does not address its needs or that it is even contrary to its interests, such an audience will have little motivation to accept the programming (Knapp, 1907; Pickering, 1984; Sukaryo, 1984).

In addition to the local input is the linking function that CES fulfills between research and the intended audience (Rivera, 1985). In many nations such linkages are weak or nonexistant, and this serves to frustrate the efforts at rural development which are being promoted by extension. In some instances there are no domestic institutions engaged in research activities directly related to the needs of the rural population (Blanckenburg, 1984; Rice, 1974). When domestic research institutions do exist and one of their proclaimed missions is to address the needs of the rural population, it is not uncommon for there to be poor institutional linkages between research and extension (APO, 1975; Annin & Thorat, 1972; Blanckenburg, 1984; Rice, 1974; Rivera, 1985; Strengthening Public Extension, 1985).

There exist many underlying reasons for the observed absence of linkages between research and extension. In some cases, extension and research services are organizationally separated because they are housed in different government ministries (Axinn & Thorat, 1972; Rivera, 1985). The interaction between the two services, which is essential for extension to transmit research results to the appropriate audiences, can be frustrated by this organizational separation. Even when the two services are organizationally located within the same ministry, coordination and communication between them can be poor. In some cases these difficulties can be traced to socio-psychological factors related to the training for, and to the perceived mission of each service (Blanckenburg, 1984). Individuals who are involved in research pursuits, generally are highly trained and socialized to value academic and scientific standards. Extension staff, especially at the rural contact level, are frequently inadequately trained (Blanckenburg, 1984; Rivera, 1985) and not socialized to appreciate the same standards which researchers do. In this framework it is not uncommon for researchers to look upon the extension staff as ignorant and intellectually inferior and for the extension staff to look upon researchers as elitest and not interested in practical solutions. Such rivalries can negatively impact a nation's rural population.

A not uncommon perspective concerning the mission and the junctions of agricultural extension was outlined in the published proceedings of a conference sponsored by the Asian Productivity Organization in Japan in 1975 — "the raising of agricultural output, particularly in the area of small-pheasant farming depends largely upon the means and methods of disseminating technical information on improved farming practices," (p. 1). This perspective of agricultural development directly implies that development can largely be achieved through technological means. This implication can have profound affects upon agricultural development policies in general and very specific affects on agricultural extension policies. When agricultural extension is based upon this belief, its major task is to convince its various audiences to accept and adopt new technology (Axinn & Thorat, 1972; Blanckenburg, 1984; Sukaryo, 1984). Such a perspective views the audience as passive consumers who must be sold a product.

Acceptance and adoption of new technology in its many forms may be a necessary condition for rural development to occur, but these factors alone are not sufficient conditions for this acceptance. A multitude of other crucial inputs along with new technology — infrastructures, credit, fair agricultural commodity prices, markets — may be necessary for real rural development to occur. Experience suggests that for agricultural extension to be successful it needs to be part of a coordinated effort which includes the crucial inputs mentioned above (Rice, 1974, Rivera, 1985), that the technology advocated be compatible with the audience's level of knowledge, and that adoption of the technology be in the audience's interest (Knapp, 1907; Sukaryo, 1984). Some evidence suggests that formal agricultural extension services may not be necessary for new technology to be adopted if all or most of the

other factors are met (Rice, 1974; Strengthening Public Extension, 1985).

Only a few of the more pertinent issues confronting agricultural extension were analyzed in detail in the previous discussion. These issues were chosen to highlight some of the critical factors that may have hindered agricultural extension services from achieving the often hoped for results of greater agricultural productivity and greater social equity. Some other frequently identified problems facing agricultural extension services in many nations include deficiencies in:

— qualified personnel
— organizational funding
— agricultural markets
— fair agricultural prices
— staff transportation/travel funds
— organizational communication, both internal and external
— availability of credit for small-scale farmers
— agricultural input distribution systems (Blanckenburg, 1984)
— personnel morale (Leonard, 1977)

An alternative concept that attempts to avoid some of the pitfalls to which conventional agricultural extension has succumbed is embodied by **Farming Systems Research and Development (FSRD).** FSRD attempts to address some of the issues which are a major concern to rural populations, especially the small-scale farmer, where research and extension are merged on the farmers' own fields (Philipp, Schmehl & Shaner, 1981; Strengthening Public Extension, 1985.)

A New Approach: Farming Systems Research and Development

An alternative to conventional agricultural extension must be studied, implemented, and evaluated to bring a more appropriate and likelier to be adopted type of agricultural assistance to small-scale farmers in lesser developed countries (LDC) of the world. The target groups in this important alteration of research and development processes are the millions of small-scale farmers who have remained in poverty because they have not participated in the previously attempted agricultural modernization process.

The FSRD model has the potential to contribute much to the advancement of agricultural production of small-scale farmers around the world.

This approach to agricultural research and development calls for abandoning the top down approach of telling the passive peasant how to improve production and advocates considering the small-scale farmer as an active and integral part of the rural development process. Experience and research studies have indicated that small-scale farmers seek to balance their gains and losses so as to minimize risk with respect to their socio-economic environment. Through generations of transmission as well as personal experience, small-scale farmers have developed an intimate understanding of agricultural and social conditions within their immediate environments. Despite this, it cannot be assumed that they will always make the optimal choices in response to the multitude of issues and situations which they confront. It is crucial, then, that the development planner gain an understanding and appreciation of the rationale of the small-scale farmer as well as of the environment. From such an understanding, the development professional in conjunction with the small-scale farmer can then work to form a solid foundation for rural development.

Viewing the small-scale farmer as an active and rational decision maker is a fundamental component of FSRD. This view makes a coordinated strategy an appropriate choice since that strategy reflects their needs. There are basically five stages to FSRD. The five main stages are identification of a homogenous target group or region, problem identification, design of appropriate on-farm research and new technologies, on-farm research and application of technologies, and the extension of the results (Franzel, 1983; Philipp, Shamen & Schmoechl, 1981).

1. Identification of homogenous target groups: Using the host countries national and regional development objectives, key decision makers, and FSRD personnel, selection of a broad target area is made. This target region is then subdivided into smaller units comprised of farmers of similar socio-economic status who are engaged in similar agricultural production patterns and farming systems in relation to cropping and/or livestock patterns. An initial survey and classification of target areas aids in identifying problems and opportunities to justify a research effort.

2. Problem Identification: In this stage, the FSRD team needs to collect data relevant to the problems of the small-scale farmers in the study area. Data needs to be collected concerning the farmers' families, their levels of formal education, local customs and traditions, economic conditions and other variables. A survey of the entire community should be conducted that includes not only small-scale farmers but local government officials, merchants, religious leaders, youth, and women. It then is the responsibility of the FSRD team to interperate the information and diagnose the situation. From this diagnosis of the farmer's situation, the FSRD team can focus research efforts on problems and issues that will benefit and enhance the farmers' existing agricultural systems. It is also important during this stage to develop a close working relationship with the farmers. This will help to alleviate any skepticism that the farmers may have toward the FSRD team.

3. Design of Appropriate On-Farm Research and the Technologies: Once the FSRD team and farmer have identified problems and opportunities, gathered preliminary data, and set out hypotheses, planning for the on-farm research activities begins. The extent of social and environmental impacts likely to result from

the adoption of the advocated changes should be considered at this time along with any compensational provisions that would give restitution to the farmers who agree to participate in the on-farm research activities.

The design of the on-farm research needs to investigate alternative cropping, livestock, and management practices, as well as modifications of farm household activities. Researchers will learn how the farm household divides its activities. This is done through informal surveys, meetings, and observations to draw information on who tends the crops and livestock, who is responsible for different family decisions, and how they market surplus farm products.

The interdisciplinary FSRD team draws on the specialized skills of its members who are typically agronomists, animal scientists, economists, and sociologists to increase the success of this stage. Local extension personnel and government officials are further involved at this stage of the project to coordinate it with national development policy which also increases the project's success.

The FSRD team periodically meets with local farmers to determine if the development strategy drafted thus far is applicable to local conditions. It is especially important for the FSRD team members to be a resource at this time in the development process. Any frustrations or skepticism expressed by the farmer should be addressed through the research procedures or by modifying a research method.

4. On-Farm Test of Research and Technologies: Applied research is a common term used when referring to tests and research conducted on farmers' fields (Stamen, et al, 1981). This on-farm research is the process where the planned strategy is implemented and the results of these trials are evaluated. Successful implementation of this stage of FSRD program may be one of the most important in relation to the determination of the overall program's success. The FSRD team members study the acceptability of the experiments, trials and introduced technologies by observations of farmer actions, in verbal communications with farmers, and in numerous other ways depending on the unique field conditions. Data is collected and analyzed, procedures are tested and evaluated for economic feasibility, biological performance, resource requirements and expenditures, and socio-cultural accetability. Estimates are made of the overall impacts on both the farmers and their immediate social and natural environments. Finally, the FSRD team must examine the opportunities for improving support services and government policies which contribute to rural development. The success of this last point is increased if extension personnel and government officials are included in the on-farm processes of research and evaluation.

5. Extension of Results: Although the extension of information is critical in all stages of FSRD, the term is used in this last stage to emphasize its importance.

The extension of the research results is the joint responsibility of the FSRD team members as well as the national extension staff. The extension staff must be trained in the concepts of FSRD to facilitate the diffusion of the information obtained in the field. This is why it is a crucial factor to incorporate extension personnel in all the stages of the FSRD program.

The concept underlying FSRD is to improve agricultural production methods suited to a select group of farmers with similar production problems. This will initially restrict the applicability of new methods to only limited areas, but with proper extension techniques the results from the study may be adaptable to similar situations within the nation.

These five stages represent a brief synopsis of FSRD. Integrated into each of these stages are many factors which are important to consider in total rural development program.

Conclusion

FSRD is an exciting alternative approach to agricultural and rural development. It strives to provide new alternatives for the world's small-scale farmers as well as new alternatives for development professionals by avoiding some of the weaknesses often attributed to conventional extension, merging research and extension on the farmer's field. It is based on enlisting the small-scale farmer as an active participant in the development process rather than as a passive consumer. Finally, FSRD holds out the hope to small-scale farmers that they can achieve more secure and prosperous lives through locally appropriatee programming.

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Agricultural Education in Paraguay

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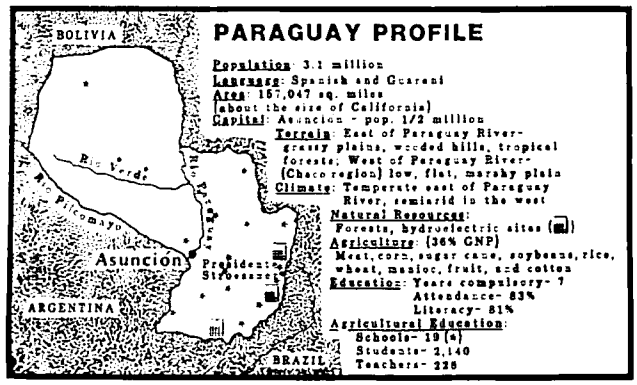
Paraguay is a South American paradox in some ways. It is a landlocked country which will soon become the largest exporter of hydro-electric power in the world. A close examination of the geography of Paraguay reveals that it has two distinct topographical regions which are divided by the Paraguay River. The origin of the river is in the northern part of Brazil and flows into the Atlantic Ocean with the La Plata River near Buenos Aires. Ninety percent of the population of Paraguay lives in the eastern part of the country. Tropical forests, gently rolling wooded hills, and fertile grassy plains abound in this region. The climate is sub-tropical with an average rainfall of 1200 to 1800 millimeters (48-72 inches). The western part of Paraguay, known as the Chaco Boreal, is covered with dense scrub forests and marshes. Only five percent of the country's population live in this region. Here the rainfall averages about 600 to 700 millimeters (24-36 inches) yearly. Temperatures in the Chaco are much hotter than in the eastern part of the country.

The economy of Paraguay depends basically on agriculture; however, with the expected completion of the Itaipu Dam in 1988, the exportation of hydroelectric power will contribute an increasing share of the economy. For now, approximately 36 percent of the gross national product, 85 percent of the value of exports, and 51 percent of the nation's employment are provided by the agricultural sector.

Nearly nine million hectares (22.5 million acres) of land have been appropriated for farming. Only one million hectares (2.5 million acres) are under production by private ownership. Since there are virtually no limitations on the expansion of farm land, expansion in production agriculture is currently underway and will continue through colonization programs. These programs are developed on the basis of small family farms. Large numbers of this type of farmer are needed if colonization efforts are to be successful. Thus the training of farmers is one of the highest priority programs of agricultural education in Paraguay.

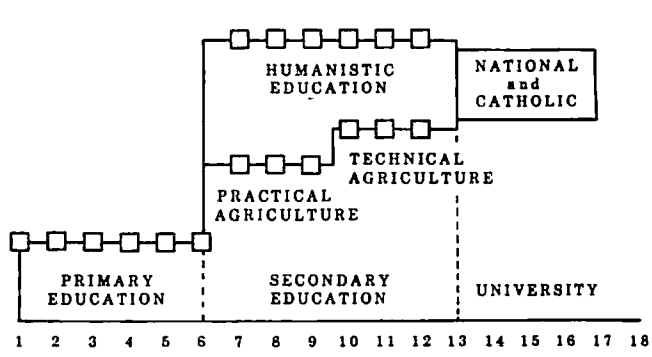


During the 1970's, the Ministry of Agriculture and Livestock, through the Directorate of Agricultural Education, initiated an ambitious plan to build a network of agricultural high schools throughout the country. This effort was supported by a loan from the International Development Bank. The Bank sponsored two projects to expand and strengthen agricultural education. Through the first project, three of the four national schools and one private school were modernized. Part of this project also provided for personnel training and curriculum revision. Under the second project, three new national schools were built, and one of the old national schools as well as a private school were remodeled. In addition, three national and two private schools were re-equipped. Training of personnel from these agricultural schools took place in Paraguay and other countries.

At the present time, there are 19 agricultural high schools located throughout Paraguay. All schools are designed to board students. They also have facilities needed for instruction in technical education in agriculture. Each school also has its own farm. Crops from and livestock produced on these farms are representative of conditions of the local community. School farm products provide a source of revenue for the school as well as part of the food for the cafeteria.

Diagram 1

National Education Systems and Level of Agricultural Education in Paraguay



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