PN-ABB-864

KNOWLEDGE TRANSFER IN DEVELOPING COUNTRIES

Status, Constraints, Outlook

Proceedings of a Conference
on International Extension at
Steamboat Springs, Colorado—July, 1983

J.B. Claar and L.H. Watts, editors

INTERPAKS (International Program for Agricultural Knowledge Systems)
Office of International Agriculture
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Foreword

It is a pleasure to transmit this copy of *Knowledge Transfer in Developing Countries: Status, Constraints, and Outlook*, the proceedings of a conference that took place in Steamboat Springs, Colorado, between selected faculty members of the University of Illinois and Colorado State University. The July, 1983, conference developed more or less spontaneously from contacts between faculty of the two institutions. Since members of both universities are involved in international work relating to extension and knowledge transfer, the decision was made that much could be gained by an exchange of ideas. The conference focused on the "state of the art," the constraints to more effective extension work, and the needs of the future.

Conference goals also included delineating researchable problems that should be studied, and the implications to extension services of the growing use of the farming systems research method.

Since the conference was held, the INTERPAKS program of the Office of International Agriculture at the University of Illinois at Urbana-Champaign, has received funding from the United States Agency for International Development to undertake a five-year study entitled "Technology Development, Transfer, and Feedback Systems in Agriculture: An Operational Systems Analysis." This conference pointed to specific constraints and problems that will need special attention as the study develops.

The Conference participants can be assured that the information published here will continue to be used, and that through this specific study, and other avenues as well, it will have an impact on the future of knowledge transfer with special relevance to developing countries. We are pleased to share the papers that were presented, and hope that they contain information and insights that readers will find helpful.

J.B. Claar, University of Illinois
L.H. Watts, Colorado State University

Knowledge Transfer for Agricultural Development History—Limitations—Importance

LOWELL H. WATTS AND JOHN B. CLAAR

Agricultural productivity made its first quantum leap forward as a result of machines invented and manufactured in the last half of the 19th century. The gradual development of a "science" of agriculture in the United States followed creation of the United States Department of Agriculture (USDA) and land grant colleges.

In 1914 inspired legislators completed the development of a research and educational concept that was a key ingredient in the rapid development of agricultural productivity in the United States. The land grant system with its teaching, its research, and finally, its extension programs became recognized as one of America's unique mechanisms, permitting agricultural productivity at a level never before dreamed of. This research-and-education concept attracted people from throughout the world to the doors of the Department of Agriculture and the land grant universities of America, all of them seeking techniques by which other nations might use this strange new system to enhance their own agricultural productivity.

Any examination of the extraordinary increases in U.S. agricultural production from 1945 to 1970 must acknowledge a variety of significant influences. New research, growing out of scientific stimulation during the war, uncovered new techniques and new concepts. Plant growth regulating compounds, lethal insecticides, stimulants for feedlot livestock, new vaccines, and new crop varieties all focused on production and gave the knowledge base needed for effective extension work in agricultural production. At the same time, industry was turning out the machines, chemicals, and hybrids that our improving knowledge called for. Transportation systems, farm-to-market roads, and farmyard electrical power were all developed throughout the nation. In addition to playing an educational role, extension agents were frequently in the thick of developing new cooperatives or other organizations to help meet local problems.

Following World War II, and particularly during the 1950's, the land grant system as a concept was recognized and supported as one of the world's most effective means to increase food and fiber production. Research was accepted as an obvious requirement for progress. The extension component for transfer of technology was viewed as a partner in this system to encourage actual application of research.

TWO EUROPEAN EXTENSION MODELS

However, America was not the only developed nation with ideas and techniques that targeted efforts on agricultural production. In Europe, two extension models evolved--one in England and another in France--that were to have profound impact in Africa and parts of Asia. "Increasing food production is not a priority objective of French agricultural policy for the very good reason that French agriculture tends to produce surpluses . . . producers must be able to find markets for agricultural commodities, and to maintain prices at a level where they can enjoy living standards comparable to those of other French citizens" (Stevens 1981, p. 25).

As a result, France has a variety of diverse activities operating under the technical supervision of the Ministry of Agriculture. The administrative structures resulting from this focus have never established a distinct extension function in the Ministry. "Rural extension services have developed in certain ministries, only to be passed on to another ministry without ever having found their fixed place: in

L.H. Watts is Director of International Extension Training Programs, Colorado State University, Fort Collins.

J.B. Claar is Director of International Programs for Agricultural Knowledge Systems (INTERPAKS), Office of International Agriculture, University of Illinois at Urbana-Champaign.

ministries of human promotion, of youth and sports, of planning, etc. . . . These rural extension activities developed also in the private or semiprivate section" (Stevens 1981, p. 27). French influence in other nations has carried their domestic priorities and biases along with emphasis on cash (exportable) crops.

The British, an importing, food-conscious people, have a different outlook. The primary mission of their Ministry of Agriculture, Fisheries and Food (MAFF) is to encourage food production. The task of extension also is oriented toward food production. Extension is a specific function within the MAFF and has reasonably close links to research and teaching.

The system used by the British in the less developed countries (LCDs) was somewhat different from that employed by France or the U.S. Their major goals were to increase the production of certain crops needed by the British but within a framework that required, at the same time, maintaining political control of the population. Hence, not only infrastructure had to be provided, but also information and extension with a major manipulative focus--defined as including whatever was needed to get products developed and exported. Therefore, the British system in the LDCs had a colonial emphasis on cash crops for export.

The French system may create peasant awareness, but it lacks the technical expertise to respond to farmer needs or desires to modernize production techniques. This can create more frustration than progress. Global priorities now demand greater attention to food crops.

KNOWLEDGE TRANSFER IN CHINA

The knowledge transfer systems of China are still different. The cultural revolution in the People's Republic of China practically stopped agricultural research and dried up sources of new knowledge. Chinese visitors to the U.S. have sought assistance in training and research and have expressed keen interest in the U.S. Extension Service. The primary transfer of research at present appears to take place through mass media or in conjuction with regional research transferred directly to communes without a formal extension system. The commune functions as a decentralized system of local leadership that mobilizes and motivates the rural population. Development policy in China is credited with leaving the rural surplus in the rural areas rather than diverting it to help create a modern sector. This favorable environment for development in the rural area is in sharp contrast to the poor developmental environment for agriculture that has been created in many countries that transfer rural surpluses to the industrial sector.

THE U.S. LAND GRANT MODEL AND THE "TROUBLE" WITH EXTENSION

And what of the U.S. land grant model? We have been almost arrogant in extolling the benefits of a system that combines research, extension, and teaching; that has federal influence and financial support, but not federal domination. We have pointed with pride to the explosive increases in American agriculture and with typical American exuberance have expressed impatience with other nations that found that model confusing or unacceptable.

The tremendous progress made by American farmers and the accepted value of research and extension led to significant international involvement of U.S. universities during the 1950's. By the mid-1960's, some of the glitter began turning to gloom. The achievements of extension programs sponsored by the United States Agency for International Development (AID) did not meet expectations. Hard evaluations of the programs failed to show significant national increases as a result of these efforts in many countries. It is interesting to note that the land grant model was never fully applied in the LDCs. Many countries felt that the field extension system was too large to assign to a university without serious distortion of its mission. In many others the government was not willing to shift the administration of the extension service from its ministries to a university. Thus, the land grant model was only partially applied and extension remained a direct function of government.

Critics of extension began to conclude that something was wrong with the extension system, and that perhaps priorities should be centered on research and various types of community development enterprises.

There is today a strong carryover of this viewpoint permeating some donor offices, espcially AID. In contrast, the World Bank has refined extension techniques with its train and visit system (TVS) and major investments in field systems.

With experience we have learned that one of the reasons for the "trouble" with extension is that other nations have organized their universities under ministries of education and their research and extension with ministries of agriculture. In some nations research and extension have almost no contact, even when both are in the same ministry. Even more complicated are

arrangements that have created different extension units for crops and livestock, for agriculture and irrigation, or for specific programs or needs. In many countries, extension carries governmental policy, enforcing regulatory or input-delivering responsibilities. Salaries are low, status is lacking, and supporting activities are often missing.

With these differing influences, one can logically ask "what purpose does extension serve in various countries?" *Perhaps extension has not been effective in knowledge transfer in these situations because in many developing countries it has been designed primarily for other purposes.* For example, "self-destructing" elements were built into many of the extension systems. Extension staff frequently are assigned to handle all sorts of agriculturally related administrative problems such as selling hunting licenses, settling local disputes between farmers, and in general serving as the agricultural representative of local government. In some countries, the extension system is used as a channel for political activity. In Britain, as we have described, the major purpose is to increase food production; in France extension has diverse jobs oriented more toward maintaining income and quality of life than toward food production. In the U.S. we have shifted to some degree from production efficiency as a means to increase income to a complex that considers marketing and management, environmental constraints, natural resource preservation, public policy, and rural development.

In less developed countries, enhancing food production and the balance of payments are frequently high priorities, but donor influences sometimes dominate and skew priorities. And, LDC government interests may not serve needs or primary interests of the farmers. For example, rather than being oriented to enhancing farm income and the welfare of rural families, extension may be oriented to manipulating farmers to produce crops for export. Such orientations result in almost no attention to human development as an extension goal. In our ardor to increase cash income have we forgotten the means through which change must be introduced?

On a global basis, it is impressive to note the heavy investment already made in the LDCs for staffing extension programs. Many nations have recognized the need for extension and have employed a large number of extension personnel. Unfortunately, the training, the financial support, the career incentives, and the linkage to research, as well as the organizational structure itself, have either been ignored or minimally handled. The extension systems frequently contain features that make achieving the conditions that Rogers describes as favorable for knowledge transfer most difficult (Rogers 1983, pp. 317-29). In addition, the constraints of poverty have meant that although many nations hire extension personnel they have failed to provide them with adequate transportation. Obviously, personnel cannot be effective in extension if they are not mobile and adequately trained.

One reason that extension has been held in somewhat low repute may well be the willingness of AID-funded, U.S. university projects to take on a perceived extension function without requiring that the host country be able and ready to assimilate it. The developing world is replete with examples of donor-funded projects that were very effective in increasing food production but that disappeared when assimilated into the general extension system, where the on-going conditions for effective knowledge transfer did not exist. This willingness has led some very good people from the U.S. into the trap of working in situations that have very little possibility of success, and, therefore, to some discrediting of the extension effort itself. In short, we have addressed pieces of the problem rather than the total system of technology transfer and adoption. If we expect our investments in extension systems to result in permanently improved knowledge transfer then we must insist upon certain conditions before aid is extended.

IS EXTENSION NECESSARY IN DEVELOPING NATIONS?

Now in the 1980's we find research continuing to develop new and more advanced technology. In many quarters, however, we also find proponents of the idea that research alone is sufficient to catch the farmer's interest and stimulate his response. The purpose of our conference in Colorado this week is to examine some of the reasons extension systems are not working well in many developing countries and to examine some of the promising directions for improvement. And we want to describe why simply piling on more and more information is an insufficient guarantee of success if a related organization and an effort designed specifically to disseminate and encourage adoption are not also present.

Why all these concerns? We meet because of a recognition that important and vital as research must be, the adoption of technology requires something beyond the acquisition of knowledge, itself. At this particular juncture, the Joint Committee on Agricultural Development of the Board for

International Food and Agricultural Development (BIFAD) has no extension representative. The Office of International Cooperative and Development (OICD) in the Department of Agriculture has expressed dissatisfaction with the lack of leadership in international programming by the Extension Service of the Department of Agriculture. The Cooperative State Research Service has no formal focal point for international programs. Many are convinced that the extension services at the state level are basically uninterested in international activity and that technology adoption may not be achieved by calling upon that uninterested extension leadership for assistance.

Two opposite forces seem to be at work. One calls for rapid expansion of extension or technology dissemination functions. At the same time, the other questions whether extension is necessary in international programs.

Dr. Clifford Wharton, for many years Chairman of BIFAD, made the following statement:

> If there is one area where we have been most unsuccessful, it has been the development of cost-effective and program-efficient models for the delivery of new scientific and technical knowledge to the millions upon millions of farm producers of the Third World. We know how to harness the creative and inventive forces of science and technology in the war on hunger, but I submit that we still have not been fully successful in technology diffusion ... I believe that attention in this area is one of AID's and BIFAD's most critical items on their future agendas (1983, p. 11).

Peter McPherson, Administrator of AID, writing in the May 1983 issue of *Horizons* states:

> Decisions on methods to distribute new techology should be made only after technology is thoroughly tested and proven. A formal extension system such as that in the United States may make sense, but formal extension systems can be very expensive in terms of recurrent salary costs and their demand on scarce administrative talent. Other nonformal approaches need to pursued. These can include radio and private enterprise suppliers--approaches that have been effectively employed in some areas of Asia and Latin America. Also, if new technology promises a sufficiently large gain, as the new wheat varities in the Punjab region of India and Pakistan did, it is likely to spread spontaneously with little or no boost from an extension service.

There can be no question that building an extension system where there is one extension worker for every 1,000 or so farmers is expensive, that it takes a considerable back-up training function and that it soaks up a lot of the trained manpower in developing countries. Therefore, one cannot do other than agree with the assessment of Wharton and with the challenge of McPherson to find the most cost-efficient method of knowledge transfer. That is, we must continue to try to find ways that reduce the need for field agents, especially where countries are large and mobility is poor. If we can do the job through radio or television and group training in villages, or through people who are contacting farmers for another purpose, then we should not continue slavish adherence to a field agent system--especially when we have not been very successful in getting it to work. And anyone who has been knocked about on a jeep trip in a developing country would be very thrilled indeed if the travel were not necessary, and instead he could just get "on the air" and talk to people.

Agricultural development and education is not this simple, however. A major problem that faces all of us is illustrated in a letter written by Alden Hickman, Executive Director of Heifer Project International (1983). Hickman had just returned from Latin America and wrote the following:

> Again and again in Bolivia, Peru, and Ecuador, I saw the projects with "little people" working. When it is "my cow" or "my pig," the care is great, the results are good. When it is a big project at a university, no one seems to care. I watched the faces of almost 100 campesino farmers in Bolivia as they organized *their* own association, elected *their* officers, debated *their* by-laws and employed *their* director. They represented 980 others. Their pride was obvious.

Some years ago in Russia, one could not help but observe the difference in the incentive of the Russian peasant to produce food in his own half hectare plot and the indifference with which he farmed the collective to which he was assigned by government. Throughout the world, human initiative is critical in getting response. Farmers have developed a great wealth of experiences over the centuries. Those who live on the fringes of starvation and poverty have no freedom for experimentation or risk. Therefore, they view new techniques with great suspicion until they can observe firsthand that *they* personally benefit from the changes to be made. *Our job in extension, then, is not only to disseminate*

research, but also to make it appealing, attractive, and above all, beneficial to the individual families working the farms of Africa, Asia, Latin American, and the Middle East. We need to have a human development goal but with a sensitivity for priorities such as increasing food production.

EXPANSION IN FARM PRODUCTION: THREE VIEWS

The question posed by McPherson does merit exploration, namely, how to secure significant expansion in farm output at reasonable or optimal cost? We wish to examine this from three viewpoints:

How People Make Changes

What does diffusion research tell us about how people learn and make changes? The authors are indebted to Dr. Fritz Fliegel, Professor of Rural Sociology at the University of Illinois, who is a recognized authority on diffusion, for the following analysis of this question.

> Perhaps the best way to speak to the issues raised by Wharton and McPherson is to look at the empirical research on what it takes to persuade farmers, especially small farmers, to change their production methods. Probably the most thorough comparative study of the diffusion of innovations among small farmers was conducted in the late 1960's in Brazil, Nigeria, and India. The three-part study was supported by AID.
>
> Drawing on that study, Rogers (1983, pp. 317-19) reports that "The most important predictor of the success of village programs of agricultural change was the extent of change agent effort." Active outreach, in other words, is critical. Second, Rogers reports that differential success among change agents hinges on their degree of orientation to clients' needs. National production targets, for example, may or may not be relevant to small farmers' needs and goals. And third, Rogers notes that another major determinant of change agent success is farmers' perceptions of the credibility of information presented. What determines credibility? According to the India phase of the same three-nation study mentioned above, there is no question at all but that farmers attach highest credibility to result demonstrations (Roy, et. al.).
>
> Persuasion of the small farmer is determined by first-hand contact with what improved technology can do. Some innovations are so dramatically better than they will "sell themselves." Most will not. The mass media and other channels of communication play a useful role in the diffusion process, but not at the point of persuasion.
>
> Change agents who take the initiative to reach farmers, who are sensitive to farmers' needs, and who can demonstrate improved technology that fits farmers' needs, will be successful in persuading farmers to change. The bottom line is not *either* the improved technology *or* the well-organized extension-teaching effort, but *both* (Fliegel 1983).

What Mass Media Can Contribute

What has experience with mass media approaches taught us about their capability? The authors asked Dr. James Evans, Professor of Agricultural Communications at the University of Illinois, a recognized communications authority, to summarize current thinking on the role of mass media in knowledge transfer.

> The views about the role of mass communication in change have been modified considerably during recent decades. During the 1950s and early 1960s mass communication was considered a powerful direct force for development, in part because exposure to mass media was found to be highly correlated to specific modernization variables under study. The late 1960s, however, introduced a period of questioning. Researchers and others noted that the effects of mass communication are limited by social structures and other constraints. Furthermore, they found evidence that mass media often carry very little agricultural information and even less content that is useful for development. One Latin American researcher contended in 1965, for example, that "in Latin America a large portion of mass media content is frivolous, irrelevant, and even negative for rural development."
>
> The 1970s also brought a growing uneasiness about top-down models of development, with a parallel uneasiness about relying heavily upon use of mass media from centralized sources. Mass communication was criticized as being a crutch for inept approaches to development and a tool for cultural imperialism.
>
> Unique capabilities of mass communication are suggested by research that has

shown that mass methods of communicating perform special functions in the human decision-making process. Among them: creating awareness and interest, raising levels of knowledge and understanding, making certain topics more prominent in the minds of audience members, stimulating interpersonal communication, stimulating information-seeking, and reinforcing existing attitudes and behaviors. Diffusion research has suggested that mass media are relatively more important in creating awareness and increasing knowledge, while interpersonal channels are relatively more important at the persuasion function of the innovation-decision process. Also, mass media are relatively more important than interpersonal channels for early adopters than for later adopters.

Research has identified some conditions under which a person may decide or act on the basis of mass communication alone: (a) when the person is not previously inclined one way or another on the matter under consideration, (b) when the matter is not important to groups that might influence the person, (c) when mass communication reaches opinion leaders, (d) when the audience member is, by nature, highly persuasible, (e) when the audience member is under heavy cross-pressure concerning a decision, and (f) when the audience member's selectivity processes are not operating normally.

Recent trends in approaches to development will influence the future role of mass communication. For example, emphasis on self-development and participation at grassroots levels suggest new functions for mass communication, functions that are quite different from the traditional top-down concept of reaching "the masses." In a participatory approach to development, the mass media can alert local groups to issues and alternatives, provide technical information, and help local groups exchange news and ideas. Given new communications technologies (such as communication satellites) that have interactive potentials, some mass media may become important mechanisms for interaction and feedback among participants in development.

Mass media also may make special contributions to development programs that emphasize equitable access to information and equitable sharing of the benefits of development. For instance, recent studies show that television seems to have potential to equalize the distribution of agricultural information among producers.

Under a participatory, horizontal-networking-approach to development, such as that used in the People's Republic of China, the mass media help orchestrate the entire diffusion process by informing the public about needs and problems, about the existence of innovations that have been developed by a local model to meet such problems, and the results of on-the-spot conferences.

In summary, the role of mass communication development is changing with our understanding of the social change process and with changes in communication technologies. Debates of the past about which channels--mass or interpersonal--are "best over-all" become increasingly empty as media develop, as changes occur in audiences and their access to media, as research reveals more about the complexity and richness of human communication, and as planners of education and communication programs became more adept (Evans 1983).

What We Can Learn From Experience

What do our field experiences with different approaches tell us about increasing output?

It is easy to see why a world traveler who is unsophisticated about knowledge transfer could return home very confused about how to go about the task. Such a traveler would encounter many different systems, all apparently aimed at the same problem. One finds single commodity integrated systems, comprehensive educational systems dealing with a broad scope of subject matter, comprehensive systems limited to agriculture but with many other noneducational functions to perform, research-oriented systems, field-oriented systems, isolated subject-matter thrusts (forestry, animal husbandry, etc.), media centered programs, top-down authoritarian systems, and systems that stress organizational involvement.

Given the history of nations, this diversity is not surprising. Also, the situations differ; there are significant differences in culture, social and economic philosophy, governmental systems, and the literacy of farmers. These differences are so great that it is highly unlikely that a model that one can blindly transfer from country to country will be found. For example, the train and visit system is running into problems because the train and visit technique developed in one country

frequently does not fit the cycle of need for information in another where different crops are involved. Often not enough experienced people can be found for these "minor" jobs, and the source of problem-solving research is frequently found to be inadequate.

In Malaysia, farmers are pleading for more flexible visit schedules and for more problem-solving assistance in the field. The program was being called "train and vanish," pointing out that the top-down subject-matter lectures were not adequate assistance.

The purposes for which extension services are set up differ. The British had certain needs and they set up a system to achieve them. As already pointed out, their system was generally oriented to producing exports and maintaining control--not to developing human resources.

The common purposes that have emerged are to increase the production of food crops and to develop the agricultural sector. This shifts the focus to small farmers and to knowledge transfer in education. In this setting the farmer is the one who must change and technology must be related to the specific family's decision-making framework --to the family's values and goals. This is one of the reasons why contact with a field agent is usually necessary to develop change. Experience in the U.S. has resulted in a large and comprehensive mass media program. Almost without exception, however, its role has been to alert the clientele, get their attention, inform them, and encourage them to "see their county agent" for more information.

Although it is not surprising that different approaches exist, one should not conclude that they are all equally effective in terms of the current priorites of the countries involved. Many LDCs have a system that is geared to rendering administrative services although increasing food production through knowledge transfer is now the major goal. The match between current expectations or needs and the existing system is frequently poor. Internal management of the systems also needs attention.

The first publication of the International Program for Agricultural Knowledge Systems (INTERPAKS No. 1, Claar, Dahl and Watts, undated) outlines some of the criteria against which knowledge systems may be assessed. These same criteria also offer some predictive capacity to relate likely success to a given purpose.

CURRENT TRENDS IN RESEARCH AND EXTENSION SYSTEMS

It is encouraging to note that the United Nations Food and Agriculture Organization (FAO) is now interested in revising a 1972 extension handbook. A 1980 FAO publication entitled "Training for Agriculture in Rural Development" focuses almost entirely upon the extension function. The administrator of AID has recently requested a paper on the Extension Service for BIFAD review (unfortunately, to the best of our knowledge, no extension experienced personnel are involved in the development of this paper). In 1981 extension initiatives resulted in inclusion of research and extension directors in the National Association of State Universities and Land Grant Colleges Council on International Agriculture Programs. Presently, the Federal Extension Office is giving specific attention to the problem of basic policy and operating relationships in international program.

The World Bank has been installing the train and visit system that is currently in use in a great many LDCs. This involves a large field force so that there is about one village level worker for 800 people. The recognition, however, seems to be growing as indicated earlier that TVS is not complete in itself, and that it frequently suffers from content problems--from a lack of something to say. Recently at a regional conference in Malaysia the World Bank representative suggested that farming research systems also be set up in the same countries alongside TVS.

The work of many our researchers, in both farming systems and in on-farm water management, has developed a recognition of the need for the extension function. These efforts have something constructive to say to the U.S. extension worker in our domestic programs as well, since they do stress a thoughtful, analytical approach to the extension job. We are no longer in a position to simply "fly by the seat of the pants" in doing extension work. We need thoughtful, professional, well-organized approaches that utilize the best of our knowledge not only in technical agriculture but also in the social sciences if we expect to be effective.

Perhaps one of extension's greatest difficulties has emerged because of unrealistic expectations. As noted earlier in this paper, most extension services in the Third World are badly organized, and frequently have only weak linkages to research. The personnel are poorly trained and suffer from low status. In many countries the training for extension field personnel is being done by the Ministry of Agriculture. Often university training, if provided at all, is at a level which is not very useful for extension needs.

Although the administrator of AID has identified institution-building as one of AID's current priorities, many of our

projects still are not focused on institution-building as much as upon specific technical activity with a heavy orientation toward research. Failure to recognize that the entire extension system must be a focus for development assistance invariably leads to unsatisfactory results.

Each project is unique and requires its own particular approach. To generalize, however, it is probably safe to say that too many of our projects have simply added an extension specialist or two to a research team and then wondered why, when the project was completed, there was little, if any, follow-up. It takes not just training, but training within an on-going organizational framework, to leave a legacy after a project's conclusion.

In looking into the future, it is our belief that in order to succeed projects must contain both site-specific and subject-specific activity, and include assistance in developing the extension organization and its linkages to research and training. We are convinced also that certain basic requirements for success must be in place, or provided for, and if not, the expectations of program activities should be lowered.

Another issue worthy of consideration is the priority accorded the entire knowledge system in agricultural development. Research has been generally recognized as an important requirement, but all too often, the problem of transferring that new information to farmers within the context of the farming system and the constraints on the individual farmer has been ignored. The farming systems research and extension system being supported by USAID is a very encouraging development that addresses a basic weakness in many projects, even though the meaning of extension in these programs is yet to be determined and demonstrated.

Development of an extension system with sufficient priority to have its own transportation, its own offices, its own expertise must be recognized as being just as important as research, if a fully effective development program is to emerge from our efforts in international agricultural development.

ELEMENTS OF EFFECTIVE EXTENSION PROGRAMS

The elements of an effective extension program have been well demonstrated by the U.S. Cooperative Extension Service. It may be useful to identify the elements or conditions that make it effective so that they can be separated from organizational form and thus applied universally. These conditions are based on an assumption that the clients of extension, such as farmers, have substantial freedom to make choices about what they do and how they do it. In this situation extensionists must educate and persuade, not give orders, if they are to be effective and bring about change.

Some of the major conditions for effective extension work follow:

Realistic agricultural policy. Prices and markets that allow some profit to be made from increasing agricultural production.

The means of production. Supply of needed inputs in a timely manner and at a cost that allows profit.

Attract people who can perform. A competitive pay structure to attract trained or trainable people.

Performance-oriented environment and incentives. A personnel system that provides incentives for performances and input from the clients.

Clientele-oriented approach. Projects must begin at clientele levels of sophistication, need, organization, economic viability, and staff expertise.

A continual source of farmer-ready problem-oriented technology. A farming systems approach that considers the system within which farming operations are conducted is mandatory both to guide research toward relevance and assist extension in effectiveness.

Competent, backstopped personnel. Adequate training programs must be established to develop and maintain at least minimal technical competency on the part of field extension personnel.

Research linkage. Some method, usually by subject-matter specialists, must be built into the extension system in order to provide linkage with research regardless of organizational structure.

An educational "friend of the farmer" approach. United States assistance should be focused upon the education, information transfer, and utilization roles, not upon distribution of agricultural inputs or enforcement of government policy; conflicts in assignments that will destroy the "friend of the farmer" image of the field agent must be avoided.

Availability and mobility. Access to and by farmers requires that personnel have mobility and live in the area to be served.

An effective mix of methods. Use of a spectrum of methods including mass media, demonstrations, wholesaling information through suppliers of inputs and services.

Supervision and management. Clear job descriptions, effective supervision, reasonable workloads, field reports, equipment with which to work, and a host of management-related factors are essential for any system to work.

A significant organizational challenge for U.S. land grant personnel working in overseas projects has been to adapt certain principles of information dissemination rather than to enforce the land grant organizational model in nations where it simply does not fit. Just as we are now recognizing the critical importance of farmer attitudes and cultural constraints, we also acknowledge the need to adapt organizational structure to fit within existing patterns in a country.

In INTERPAKS' first publication (Claar, Dahl, and Watts, undated), we attempted to identify certain principles of doing extension work that were important in any kind of situation. To illustate the difficulty in a simplistic transfer of principles, let us dwell for just a moment on a couple of specific examples.

One principle that has been important, in our judgment, is to remove from the extension service in any country as much of the service orientation or providing of direct agricultural inputs as possible. Another concern has been assigning regulatory or policing functions to extension.

Recently, we were pleased to note that in Pakistan the Extension Service is no longer required to distribute seeds, fertilizers, and pesticides. We strongly applaud this response to one of the important principles of doing extension work. It is of interest, however, to note that the lack of training and the lack of communication with an effective research base makes this particular transition somewhat negative in the Pakistani experience. For example, field assistants who do not have new ideas, new techniques, or new research to discuss with farmers now find that their contact is one that simply restates a somewhat simplistic message from previous contacts. Obviously farmer response to this sort of input is very negative and leads to the comment, "Now all you want to do is talk and you don't even provide me with good seeds or fertilizer. Until you can give me something useful, there is very little reason for you to come to see me."

Drawing another illustration from Pakistan, we can examine a development that has taken place through the World Bank sponsored train and visit system. In both Sind and Punjab the World Bank appropriately recognized a serious constraint to extension work imposed by the fact that field assistants in extension had neither adequate housing nor any office from which to conduct their work. In an effort to correct this situation, the Bank has constructed combination home-and-office buildings for field assistants in the project areas. Seeking to insure that there was governmental involvement and local support, the Bank insisted that the land for the buildings be provided by the provincial or local governments. Some of the field assistants are now provided excellent home-and-office buildings which may be located on a large farm owned by an important khan or located in some out-of-the-way area where the land was available at minimum or no cost to the local government.

As a result of the cultural constraints in which the field assistant operates--constraints which require that he be a part of his local village and his family live in that village--the field assistants are simply not occupying many of their offices and, in most cases, have refused to move their families into the homes provided even though they are much superior to the facilities in which they live. In many cases, even the offices are not being used. In this illustration a principle of local support has gone haywire because of sociological conditions.

THE EXTENSION COMPONENT OF FARMING SYSTEMS RESEARCH AND EXTENSION

Farming systems research has recently been expanded somewhat to include the term farming systems research and extension (FSR/E). This latter addition in terminology recognizes that transfer of technology to farmers is a part of the FSR complex and represents the bottom line in adoption of technology.

The current acceptance by AID of farming systems research as the "thing to do" represents a significant step forward, but must not be viewed as the development of a complete system in technology acquisition, dissemination, and utilization.

A current trend in FSR methodology, however, seems to accept a philosophy that if research priorities are established through the FSR system, site-specific, relevant technology will be developed and will be brought to the attention of individual farmers in a specific location. This geographic specificity leads to a conclusion that the dissemination of the new technology will take place through the FSR program, by demonstration and by word of mouth, and that it can perhaps replace extension services that have utilized considerable pools of manpower at significant costs, particularly in less developed countries. This attitude grows out of what seems to be increasing recognition of the need for extension at the same time extension services as organizations for diffusing technology are being considered inept and efficient.

It is critically important for the agricultural development establishment to

understand fully what is at stake. Farming systems research, as mentioned above, is a useful, viable technique by which to develop research priorities. It can also be effective in providing feedback to researchers and in developing demonstrations that may be easily understood by local farmers.

The assumption that this technique might replace the need for extension services is, or at least can be viewed as, a researcher's simplistic response to an effective technique. Such a response is simplistic because it does not consider the full cycle of knowledge acquisition, knowledge dissemination, and knowledge adoption.

We found in the United States and it is the position of this document that simply having the knowledge available is not sufficient to generate the widespread utilization that is needed from a national policy basis.

Therefore, without sacrificing the basic philosophy of farming systems research, the extension component must be built in to insure that the extension services are adequately influenced by farming systems research, trained to take advantage of it, and charged with utilizing the new knowledge as a part of regular extension program efforts.

If extension is not made an effective part of farming systems research, the long-term results will be disappointment with the impact received from farming systems research and a denial of its relevance in terms of technology application at the farm level.

Instead, a farming systems research and extension unit that involves both demonstrations on farms and an organized formal extension delivery system is a more viable concept to guide the future.

There is some evidence that developing countries and international donors may be recognizing this fact. However, the effort to link farm systems research and extension projects with country-wide extension systems may replace attempts to link extension with research as the major problem where these projects exist. The AID-sponsored FSR/E effort under leadership of the University of Florida is now organizing an extension task force.

We may also be on the verge of recognizing that adaptive research--as embodied in farming systems research and extension--and a formal field extension system are not substitutes for each other but parts of a total system.

It is the position of this paper that effective extension services do not cost--they pay handsome dividends.

In summary, there is no shortcut to agricultural development. We rarely have the privilege of having a new variety that will double yields. Instead, we have a hard, lugging job of putting many things together to make a little progress at the margin.

Less developed countries must conclude that they must set up a knowledge base and invest money in a system tied closely to it and protected from some of the political influences and other tasks of government that cause it to lose credibility. This latter point is the hardest lesson of all to learn; namely, that knowledge transfer is basically an educational job, and an educational relationship is fragile. It must be built upon a hard-earned reputation of being a reliable source of information, and this can be destroyed easily.

SUMMARY AND SOME THOUGHTS FOR THE FUTURE

The experience to date in international work suggests some guidelines for the future and some work for professionals in the field.

- The project approach, while useful in showing what is possible, frequently weakens the existing structure on which the country must ultimately depend and creates serious morale and conflict problems.
- Increasing food production in a significant amount involves development of the whole agricultural sector. Although more complicated and expensive, a systems approach through the country's institutions may offer the greatest long-run improvement potential.
- Research and field experience indicates strongly that a well-linked research and extension system, that also includes a field agent component, is essential to reaching small farmers and motivating change.
- The match between needs and expectations of extension systems and the organization and management of existing systems is generally poor. Many LDCs have systems oriented to serving governmental needs. They stress things, not people. They are not client-centered and not well set up to reach small farmers, to create credibility, or to transfer knowledge.

The train and visit system, where it is used, has helped a great deal in correcting many of these problems. By setting the extension component apart from other functions and establishing a disciplined field delivery that emphasizes training and scheduled contacts, it greatly enhances the opportunity to achieve credibility. But these very factors stress top-down, rather inflexible schedules--with which greater compromise must be found--and the content is frequently weak. However, TVS has made so

much improvement that the task is to make it better, not to back away from it.

While TVS focuses on field delivery and is generally weak in technical knowledge adaptation, the farming systems research and extension system is not a complete answer to the widespread utilization of research, either. These two parts of an organic whole--a well-rounded extension service, well linked to adaptive research--will probably emerge as a new direction for the future.

- In order to make headway in improving knowledge systems, more time must be spent with the leadership of LDCs, helping them to understand the conditions that must be achieved if they are to attain their goals. Unless the conditions for effective knowledge transfer are obtained, the expectations from a given investment should be modified. Many constraints on the adoption of technology and improved output lie outside of the extension service. How often do we blame extension for failure to increase production when the constraint, such as lack of credit, lies beyond extension control? As we look to the future perhaps we need to become more sophisticated in how to evaluate an extension system when many external constraints exist.

- One can conclude from experience that the requirements for developing effective knowledge transfer over a broad base in LDCs are being greatly underestimated. For example, a technical support cadre is frequentely missing or very inadequate. Because of widely differing attitudes, values, and conditions, the most promising approach for assistance would seem to be to develop and document not only the conditions that need to be achieved, but also the necessary support tasks and environment.

Such a framework could then provide a tool for analysis of existing structures and an improved predictive capacity. With this checklist, donors could more realistically gauge expected returns from an investment as they weight the inevitable political and economic forces that come to play on such decisions. Such an approach should forestall the inevitable disappointment when miracles are expected but only a small fragmentary investment is made in a unit that does not meet the conditions for success.

INTERPAKS No. 1 makes an undocumented beginning in this direction. What seems needed now is a systematic, resarch approach to develop either universal conditions for success or conditions that fit different goals and situations.

- The scope of the extension goal in international assistance needs further thought. Today one hears a lot about diffusion and technology transfer as the functions of extension. This implies a bit-by-bit approach. This is a very limited concept for extension. The case could be made that an essential role for extension should be to help farmers integrate and manage technology as a total production and marketing process, and to help find and remove the constraints to progress.

- Perhaps most critical of all is the need for developing nations and donor agencies to recognize that extension, even though it is dealing with largely illiterate people, is a sophisticated function that must be very carefully designed and operated. Personal contact, credibility, access, the use of demonstration method, and a clientele-oriented approach are all conditions noted by Rogers to explain success differentials in extension approaches. Favorable circumstances can be set up by careful organization and management, but they are fragile and can be easily destroyed by ignoring the principles that underlie such relationships.

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The Role and Contribution of Agricultural Extension in Agricultural Development

BURTON E. SWANSON

Agricultural development implies the shift from traditional methods of production to new, science-based methods of production that include new technological components, new crops and even new farming systems. For farmers to adopt these new production technologies successfully, they must first learn about them and then learn how to use them correctly in their farming systems.

Simple changes, such as the adoption of a new variety, may involve a minimal extension input. However, if such a change involves a new time of planting, a higher plant population, more fertilizer, the use of pesticides, and so forth, farmers may have much to learn before successfully adopting the new technology. Furthermore, once the shift to new science-based technology begins, the expectation would be that this is the first step toward more intensive and productive cropping or farming systems. This process is the essence of agricultural development, and each step in this process will require either an educational or a communications input, or both.

"Agricultural extension," as used in this paper, is the ongoing process of getting useful agricultural information to farmers (the communication dimension) and then in assisting them in acquiring the necessary knowledge, skills, and attitudes to effectively utilize this information or technology to achieve their own respective goals (the educational dimension). Furthermore, these functions of agricultural extension, regardless of how they are provided, are viewed as an essential component in the agricultural development process.

Some people tend to equate agricultural extension with the term "technology transfer." Such use is incorrect because technology transfer includes the additional functions of input supply and agriservices, which extension does not. However, extension includes teaching farmers management and decision-making skills, as new technology inevitably places more demand on these abilities. Agricultural extension should also help rural people develop leadership and organizational skills so that they can not only organize, operate, and participate in cooperatives, credit societies, and other support organizations, but also participate more fully in the development of their local communities. While many of these activities contribute to technology transfer, not all of them are subsumed under this particular function. Therefore, while agricultural extension is viewed as an essential and major part of technology transfer (i.e., teaching farmers about improved agricultural technology and how to use it), the terms are not synonymous.

AGRICULTURAL DEVELOPMENT GOALS AND EXTENSION

Government policymakers who establish agricultural and food policy for a country can have a major impact on the agricultural development process. If a nation wants to develop a productive agricultural sector, it is very important that agricultural policy be supportive of and consistent with agricultural development goals. Furthermore, there should be congruency and continuity between these agricultural development goals and agricultural extension objectives. Finally, these policies, goals, and objectives should reflect the resources and realities of the agricultural sector in general, and the majority of agricultural producers in particular. If agricultural policy is not consistent with agricultural development goals and vice versa, then it will be very difficult for agricultural extension to operate effectively.

For example, many governments pursue a policy of providing cheap food for urban consumers (Todaro and Stilking 1981). This policy reflects the relative political power of urban consumers, as contrasted with that of a dispersed rural population. In this case, farm prices are frequently held at

B.E. Swanson is Associate Professor of International Agricultural Education and Associate Director of International Program for Agricultural Knowledge Systems, University of Illinois at Urbana-Champaign.

artificially low levels. Under these conditions it will be difficult, if not impossible, to increase agricultural production and to achieve broad-based agricultural development. In some cases, the agricultural sector stagnates, and production actually decreases. No matter how effective extension may be, it will be very difficult to disseminate new agricultural technology, because there is no incentive for farmers to adopt more productive practices.

A second policy alternative is one in which a government wants rapidly increased national agricultural production, but has little concern with equity issues, such as broad-based agricultural development. In this case, government may formulate policies and direct new resources to large production units, such as government-operated farms or large farmers, to increase national food production. Under these conditions, extension workers may focus their activities toward the medium- and large-scale farmers who can have a more rapid impact on total national production. This alternative, however, may soon result in a dual-structured agricultural economy, where a relatively small number of large-scale commercial (or government) farms would produce most of the food for the urban population, while the large number of small farmers would remain at the subsistence level and not be brought into the development process.

Another alternative is a government committed to increasing agricultural production and to broad-based agricultural development. In this case the goal would be to improve the livelihoods of the bulk of the rural population by increasing farm productivity and incomes. This policy implies that there should be increased investment in the agricultural sector, both in terms of the institutions that serve farmers and in terms of getting appropriate technology and new resources (especially credit and inputs) to the majority of farmers who wish to increase their productivity and incomes. In this case, extension would need sufficient numbers of trained personnel to work with the large number of small farmers found in most developing countries.

RECONSIDERING EXTENSION'S OBJECTIVES AND STRATEGY

The prevailing extension objectives and strategy in most countries tend to be built on the goal of production efficiency and an approach based on diffusion theory. In operational terms, this means that extension workers concentrate their attention on the early adopter category of farmers, and new technology is expected to trickle down through the early majority, late majority, and finally to the laggards. (See Figure 1.) This basic extension objective and strategy is based to a large extent, on the experience of extension work in the United States.

As these concepts were translated into extension practice in the U.S., agents were trained to identify the progressive farmers (early adopters) who would serve as the contact point for the introduction of new technology into the community. Extension's view toward the laggards and the late majority was that they tended to be largely traditional farmers--those farmers who were less willing to change. There may well have been an implicit attitude that "if they can't keep up with the times, then it's their problem if they go out of business." To a large extent, these were the individuals and families that made up much of the rural-urban migration, particularly during the fifties and sixties, in the United States.

But the situation in the U.S. during the post-war period was quite different than it is in many developing nations today. The push-pull phenomenon was relatively balanced because as small farmers were caught in the cost-price squeeze and effectively pushed off farms, they were at the same time pulled into the urban areas and industrial jobs.

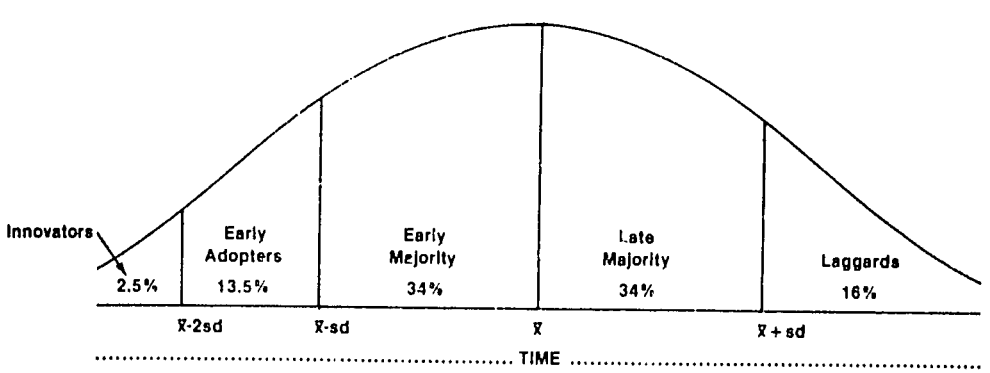

Figure 1: Categories of farmers by rate of adoption.
Source: Maunders, A.H. (1973) FAO Agricultural Extension Manual.

While the transition was difficult, in the long run most people made a new life for themselves, generally at a higher standard of living than before.

The situation in most developing countries today is quite different and appears to call for a very different set of extension objectives and strategy. Research and extension that is focused only on increasing agricultural production, particularly by increasing the output of large-scale farmers or units, is likely to contribute directly to more acute rural poverty, hunger, and the forced rural-urban migration of small farmers. Such a focus can have a very serious and negative impact on the small farm families and households affected. In fact, the magnitude of rural poverty in many nations suggests that rural areas may have to act as "holding grounds" for millions of small-farm households for decades to come. A policy oriented only to overall national production and efficiency, which favors labor-saving technology, might make this latter alternative impossible.

Roling (1982) points out that a central issue in establishing agricultural development and extension objectives is whether a nation focuses on total food and export crop production, or the alternative of increasing the incomes of most farmers, especially small farmers, and thereby increasing total agricultural production. From his perspective, it is the target group and the unit of analysis used in measuring progress that becomes the determining factor in how research and extension are organized and what objectives are pursued. If the objective is to increase total food production to provide relatively cheap food for an urban population, then the focus will continue to be on the larger, more progressive farmers where more rapid progress can be made.

According to Roling (1982) the real alternative extension objectives would include:

- creating income-generating opportunities, appropriate for the mass of small-scale agricultural producers, through improving the productivity of their resources by providing better access to information, goods, services, and markets;
- contributing to a more equitable distribution of the increments in agricultural incomes through affecting the distribution of resources available to small-scale producers;
- contributing to the agricultural development aspect of broad-based, integrated rural development efforts; and
- helping small-scale agricultural producers to organize themselves, so as to allow them to participate as informed, vocal, and countervailing partners in the development effort.

If extension pursues this broader set of goals and objectives, then it can contribute directly to broad-based agricultural and rural development.

EXTENSION AND THE NEED FOR BROAD-BASED AGRICULTURAL DEVELOPMENT

Major attention is now being given to the question of how to achieve broad-based agricultural development and what extension's role should be in this process. For example, the Food and Agriculture Organization's World Conference on Agrarian Reform and Rural Development (WCARRD) in 1979 called for "growth with equity." To achieve broad-based agricultural development, extension must focus on the technology needs of all categories of farmers, not just a single category of larger, progressive farmers, who are frequently viewed as the so called innovators or early adopters. Rather, the goal of extension should be to serve the needs of all farmers. To do so will result in broad-based technology utilization that will be much more efficient, and in effective use of the vast human resources found in the rural areas of most developing countries.

The need for broad-based agricultural development has resulted in more careful consideration of the types of extension strategies and methods that are most "appropriate" for small farmers--including women, young people, and other disdvantaged or miniority ethnic categories in a community. This awareness explicitly recognizes that there are different socio-economic categories in rural communities, and that their circumstances are sufficiently different so that appropriate technology must be developed and adapted by agricultural research and then targeted, through appropriate extension programs, to reach these major categories. Therefore, instead of working with selected progressive farmers in a community, and assuming that technology will trickle down, it is important that each extension worker understand both the agricultural conditions in his or her area of assignment, as well as the major socio-economic categories of farmers. Only by taking both of these factors into consideration can new technology be effectively developed and targeted to these different categories and, thereby, reduce some of the more negative and disruptive social consequences of technological change.

Some government officials may be concerned that by including small farmers as a priority target for extension, the adoption of new technology by farmers will be slowed. According to findings presented by Ruttan and Binswanger neither farm size nor land tenure conditions appear to be important constraining factors with respect to the adoption or the productivity of the high yielding crop varieties (Ruttan and Binswanger 1978, and Luning 1981). Therefore, given appropriate technology that is economically and technically superior for their farming systems, small farmers will adopt about as rapidly as the larger, so-called progressive farmers.

What this premise suggests is that given appropriate types of improved technology and supportive agricultural policies, agricultural extension can simultaneously pursue the goal of increasing national agricultural production and that of broad-based agricultural development. However, to do so, both research and extension must be strongly committed to pursuing a balanced approach that focuses on both increased production and equity considerations. Next, it is useful to consider the different socio-economic categories of farmers located in each community so that these equity considerations can be realized.

Identifying Socio-Economic Categories of Farmers

It is now recognized that a variety of different socio-economic factors, in addition to the socio-psychological factors, affect the adoption behavior of farmers. Therefore, rather than grouping farmers as being progressive or traditional (on the basis of socio-psychological criteria), Roling (1982) suggests that a more accurate categorization would be high access and low access farmers. These terms explicitly recognize that farmers have different access to land, water, labor, inputs, markets, capital, and information.

According to Roling, "It has been a persistent error of extension workers across the globe to explain differences caused by differential access as if they were caused by psychological differences. This error allows extension workers to use diffusion strategies in situations where they are totally unwarranted. In rural communities which are very differentiated in terms of access, as indeed most rural communities are nowadays, it is nonsensical to expect innovations to diffuse from high access farmers to low access ones. In general, innovations will only diffuse within groups of people who are homogeneous in access." (Roling 1982, pp. 95-96).

Collinson in East Africa has developed the concept of "recommendation domains" for targeting adaptive research efforts. The idea is to develop a low-cost, low expertise method of segmenting small rural administrative units into homogeneous categories for which appropriate technology packages can be developed. Segmentation is done on the basis of cropping patterns, the availability of animal traction, the nature of off-farm employment, and such on the one hand, and categories of farmers (e.g. "commercial," "emergent", and "traditional" farmers) on the other (CIMMYT 1979). Kulp's book, *Designing and Managing Basic Agricultural Production Programs*, uses a systems approach as a methodology for developing appropriate technology for the typical or average farm in each agro-ecological zone.

Furthermore, it is now widely recognized that women play an important role in both agricultural production and marketing, as well as in food processing and preparation. The role of women in food production varies considerably between countries, ethnic groups, and even agro-ecological zones.

Generally, women tend to concentrate on food crops rather than cash crops. They may specialize in certain farm practices, such as planting, weeding, and harvesting, rather than land clearing, preparation, and bunding. Women are often responsible for the post-harvest processing and storage of agricultural products, as well as feeding and caring for livestock. They generally use hand tools, and seldom have access to mechanized equipment, such as small tillers, tractors, and so forth. It is unlikely that women will have direct access to inputs and credit. Most farm income, especially from cash crops, is controlled by the male head of the household, and institutional factors often deny women access to inputs and credit. Furthermore, women have little or no access to extension services because most countries have mainly male extension workers, and women's contribution to agricultural production is not fully appreciated. Also in some countries, social customs limit or prohibit the contacts of women with nonfamily males.

Inasmuch as women tend to grow specific crops (especially food or subsistence crops), have specific cropping patterns or farming systems, and are frequently limited in terms of access to resources, including extension, it is essential that the technology and related needs of this important group of food producers be addressed by those institutions serving the agricultural

sector (especially research and extension). Women farmers must not be (further) disenfranchised from the development process. Therefore, women farmers as well as the other significant categories of small farmers and young farmers should be targeted for extension services.

ORGANIZING AGRICULTURAL EXTENSION FOR TECHNOLOGY TRANSFER

The respective functions of technology transfer are organized differently from country to country. In some countries, such as the U.S. and most Western European countries, the supply and service functions are largely performed by the private sector, with agricultural extension (or knowledge transfer) being largely a public sector function. In many third world countries, all elements of technology transfer are performed in the public sector, either through government institutions, parastatal agencies (semi-autonomous public sector firms), or cooperatives. The different ways technology transfer is organized directly influences the objectives of agricultural extension. Therefore, it is useful to examine some of these different approaches and their implications for agricultural extension.

Conventional Agricultural Extension Approach

The conventional agricultural extension approach is a broad categorization that covers many general agricultural extension organizations in the third world. It is somewhat difficult to generalize accurately about these organizations because of the wide range of national extension systems included in this category. Also, there are the additional disparities between theory and practice.

Generally, the main objectives center around increasing national agricultural production, including food crops, export crops, and animal production. Additional objectives that are frequently stated or implied are an increase in farm incomes and quality of life of the rural population. In analyzing these different goals and objectives, it is very important to consider the policy context in which extension operates to determine which objectives are, in fact, given priority. As mentioned earlier, farmer and national objectives can be in conflict. For example, if a government is interested in increasing national food production, particularly for an urban population, while pursuing a cheap food policy, these objectives can be in direct conflict with the objectives of increasing farm income. Policymakers must recognize, however, that farmers will not adopt new technological inputs to increase production unless they can recover the cost of these inputs and make a sufficient profit. Therefore, it is essential that national agricultural development goals be consistent with an supportive of extension's objective to increase farm production *and* incomes, as well as to generally improve the quality of life of rural people.

In some countries, extension is organized by different ministries representing subsectors of the agricultural economy. Therefore, there may be separate extension organizations for forestry, livestock production, crop production, youth, and so forth. This results in agents having a more limited programmatic focus and contributes to a major duplication of organization and services. In other words, rather than one extension worker serving the needs of the farm population in a particular area, there may be two or more workers traveling and working in the same area serving the same clientele.

In addition to the educational responsibilities in these general agricultural extension organizations, extension personnel may be responsible for carrying out most ministry programs and activities at the local level. Therefore, they may sell and distribute inputs, perform regulatory functions, arbitrate disputes, collect agricultural data, handle subsidy programs, and so forth. They, in fact, become the local agricultural representatives of government, rather than full time agricultural extension workers. This type of assignment directly affects the extension worker's ability and capacity to perform his or her extension assignment, generally in a negative manner.

Train and Visit Extension as a Reform of Conventional Extension

One major effort that is trying to transform agricultural extension back into an educational organization is the so-called train and visit system of agricultural extension being promoted by the World Bank. In the past decade the Bank has invested more than one billion dollars in strengthening national extension systems using this approach. Since this approach is well described elsewhere (see Benor and Harrison 1977), the specific features are not described here. However, some general observations appear warranted.

The train and visit approach attempts to reform a conventional extension organization that may be carrying out many nonextention activities; therefore the process of organizational change may not be smooth or

readily accepted. The World Bank, in introducing this particular extension approach into a country, generally tries to improve the policy environment toward the agricultural sector in general (so farmers have some incentive to adopt new technology), and toward the extension organization in particular (recognizing that extension is an essential function in the agricultural development process). Then it makes resources available to address some of the major problems faced by extension, including: mobility, housing, well-defined job descriptions, training, technical backstopping, and the supervision of extension workers, as well as monitoring and evaluation of extension programs. Most of these investments are made at the field level or have direct implications for field-level extension personnel.

In general, the train and visit system is designed to give each extension worker a well-defined extension job plus timely training, technical backstopping, and adequate supervision. In addition, the extension worker is expected to live within his or her area of responsibility and is provided with adequate transportation and teaching resources to conduct his or her work in an effective manner.

Commodity Approach to Extension

High value cash crops, particularly those for export, generally have a separately organized agricultural extension system. The extension function within these commodity development and production systems is generally well-integrated with the other aspects of technology transfer (i.e., input supply and other agriservices), as well as having good upstream linkages with researchers and downstream linkages with farmers. Because these systems have a very narrow focus (an individual commodity) and fully organize each phase of the technology development and transfer process and, generally, the marketing phase, they can be characterized as vertically integrated production systems.

The objective of the commodity development and production systems is to produce and market relatively high value commodities efficiently and effectively. These commodities are generally produced for export (such as tea, oil palm, cashews, rubber, or sugar), but can also be grown for domestic consumption (e.g., milk). Commodities grown primarily for export are very important to a country because they generate scarce foreign exchange. Successful systems also encourage farmer participation by profit sharing that increases farm income. Continuing to reinvest in technology development and transfer ensures the continued improvement of these production systems.

Commodity development and production systems are frequently defined by particular ecological features in a country--for example, beverage crops such as coffee and tea are generally grown at a particular altitude in the tropics--which affect product quality. Cocoa, rubber, and other crops also have a particular ecological niche in the humid tropics where they are most productive. Within these particular ecological zones, such production systems usually involve most farmers in a contiguous area.

Commodity development and production systems are generally limited to a single commodity; therefore, technology development and transfer, as well as the marketing function, are frequently handled by a single parastatal. By controlling the marketing of the commodity (because it is an export crop or a highly perishable product such as milk), it is possible for the parastatal to provide research, extension, input supply, credit, and marketing services to farmers, and then to recover the cost of these services out of the gross profits.

The technology of production is usually well-established for these commodities; therefore, farmers must follow the advice of the extension worker or technician to participate in this program and to sell their crop or production to the parastatal. This approach is sometimes called "contract extension". The farmer has a contract to produce the crop using the recommended practices, and the parastatal has a contract to buy the crop at the specificed price. Failure to follow the technical recommendations may result in a product that will not be purchased by the parastatal. However, in countries where these commodity systems are well-organized, net farm income from cash or export crops generally far exceeds returns on traditional crops, therefore, it is very much in the farmer's economic interest to participate.

Integrated Approaches to Extension and Technology Transfer

In the early seventies it was recognized that for agricultural development to occur, all of the institutional components that affect this process must be coordinated and applied to achieve increased agricultural output. Usually these efforts revolved around donor-assisted projects in a particular geographical area and focused on a common set of production problems. When all of these functions are handled by a public sector agency, such as in an integrated agricultural development project, this approach

can be characterized as a horizontal integrated system.

At each level in the organization and especially at the farm level, there is supposed to be close coordination between extension or knowledge transfer, input supply, credit, and other services. Frequently, all of these functions are handled out of a farm service center, where, in theory, farmers can come to obtain technical information, credit, and the inputs needed to grow crops successfully.

These projects frequently do not introduce any significantly improved technological components or farming systems. To a great degree these projects assume that the existing technology of production is adequate and that the major limiting factors are institutional (i.e., lack of coordination) or resource (i.e., lack of inputs) in nature. Therefore, special input supply, credit, extension, marketing, and other agriservices are made available in a well-coordinated approach.

In integrated agricultural development programs, extension workers can play different roles. In theory they are expected to work with farmers to help them learn about new technological alternatives and then to help them learn how to gain access to inputs, credit, and marketing services, so they can increase farm output and incomes. In situations where there is a shortage of trained agricultural personnel, extension personnel frequently become directly involved in supplying inputs and services. It appears that dispensing inputs, credit, and other services is a more clear-cut, rewarding job than conducting extension programs. Therefore, the latter may be neglected in integrated agricultural development programs, unless more priority and more direction is given to the extension function.

CONCLUDING OBSERVATIONS

The expectations placed on extension are complex and diverse. Different groups in a country may have different goals for extension. Sometimes these goals are in conflict. Farmers may hope to improve farm income and family welfare, while urban people may want an adequate amount of quality food at affordable prices. Government may hope for both of these, and an improvement in the balance of payments, through increased agricultural exports or reduced food imports (import substitution). In spite of these diverse expectations, there are some common elements that merit attention.

First and foremost, extension must be guided by client needs and objectives. Generally, the farm family or farm household is considered to be the primary clientele to be served. However, given the many cultures and ethnic groups being served by extension across many developing countries, these terms may need to be further defined. Also, the gap that exists in some countries between a small number of large-farm operators and the vast majority of small, subsistence farmers requires careful consideration in identifying both the primary client groups for extension and the appropriate goals and objectives for each group.

Agricultural extension, then, is an organized, nonformal educational activity, usually supported or operated by government, to improve the productivity and welfare of rural people who engage in all types of agricultural production, including livestock husbandry, fisheries, and forestry. This educational effort is generally tied to the problems of farmers and involves the use of problem-solving skills and information. The overall objective of these educational programs is to develop people as better decision makers and as better managers of their own resources, so that they can set and achieve their own goals.

Extension, then, is developmental in concept. Extension workers must start with what farmers know and with what farm practices they are currently using. Finally, extension workers must relate change to the particular concerns and values of farmers to be effective at achieving agricultural development goals.

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Organizational Constraints to Greater Extension Involvement in Agency for International Development-funded Agricultural Programs in Less Developed Countries

KENNETH C. NOBE

It is a well known fact that the Agency for International Development (AID) and its predecessor agencies have utilized faculty from U.S. land grant universities in their agricultural programs in less developed countries (LDCs) in varying degrees of involvement since the end of World War II. In recent years, as the agency's manpower ceilings have steadily dropped, AID has aggressively sought broader-based and longer-term involvement of university faculty. Conversely, over at least the past two decades, AID-funded opportunities for extension oriented faculty have declined, for reasons well documented elsewhere (Benor & Harrison 1977). Until recently, this paradox of increasing demand for university based researchers and development experts in the face of declining demand for extension oriented faculty has frustrated university administrators seeking to support AID-funded agricultural development programs. The problem has been particularly acute at those universities where the extension function has been fully integrated with teaching and research at the academic, discipline-oriented department level.

A not so well known fact is that the U.S.-originated extension approach to informing farmers of new agricultural inputs and practices preceded the AID-funded opportunities for faculty researchers and development experts by at least two decades. For example, during the years between World Wars I and II, most European countries with colonies in Southeast Asia, Africa, and Latin America introduced the extension concept in these areas. As these former colonies gained independence with increasing frequency during the 1950s and '60s, an Extension Service in one form or another was retained in their new government organizational frameworks. But, as these new nations have increasingly attracted large scale technical assistance and financing for agricultural development programs from donor agencies--including the Food and Agriculture Organization of the United Nations (FAO), World Bank, former colonial governments and, for our purposes, AID and its predecessor agencies--the level of U.S. Extension personnel involvement has steadily declined.

As noted earlier, there have been many reasons for this decline but one of the major causitive factors was the donor agency, "quick fix" approach to development, as characterized by limited-target-area, short-term (three-to-five year) crash projects. In most cases such projects were superimposed on the existing bureaucratic framework of LDCs without any serious attempts at institutional integration of such efforts. (See Nobe & Seckler 1979, for example.) In particular, such project development terms, usually carried out their own "extension" functions, the effects of which quickly disappeared after such projects terminated and the expatriate advisors and development experts returned to their respective countries. As a result, the extension function in the LDCs has often been discredited. In retrospect, it is becoming increasingly clear that the short-term approach to development that was practiced until quite recently by the donor agencies, including AID, ignored existing Extension Services in these countries, and should bear the primary blame for project-related extension failures.

More recently, the major donor agencies such as FAO, World Bank and AID, strongly supported by independent development oriented agencies such as Ford Foundation and Rockefeller Foundation, have called for a new systems oriented approach to economic development in the LDCs. Such agencies have realized that development is a major change phenomenon and requires both long-term economic investment and greater emphasis on investment in human capital. This changed approach would appear to provide extension-oriented university-based personnel at land grant universities a comparative advantage for greater involvement in future donor-agency funded agricultural programs in the target LDCs.

K.C. Nobe is Director, International School for Economic Development Studies; and Chairman, Department of Agricultural and Natural Resource Economics, Colorado State University, Fort Collins.

Whether this perceived new opportunity becomes a long-term reality or degenerates into the proverbial short-term "honeymoon" will depend largely on two factors. They are: (1) the degree to which Extension can expand its traditional role of delivering farm inputs and related technical knowledge to farmers to include delivering an accurate assessment of farmer output response to policy-makers in LDC government agricultural agencies, such as agriculture and irrigation ministries; and (2) the ability of U.S. university based Extension personnel and central university administrators to select new opportunities for successful performance in the LDC arena. In regard to the latter point, success will be largely dependent upon the bureaucratic organizational framework of the LDCs in which the U.S. university teams elect to work. It is the primary purpose of this paper to outline the characteristics of such organizational constraints to effective U.S. Extension involvement in the LDCs, but in the process the need for a major change in the extension function will also be highlighted.

THE CRITICAL ROLE OF MANAGEMENT IN SUCCESSFUL DEVELOPMENT PROGRAMS

Along with the belated but now rapidly accelerating adoption of the systems approach to agricultural development by AID and other donor agencies comes a growing recognition that the more complex a system is, the more critical is the management factor as well. In the business world, it has long been known that sophisticated management systems are especially necessary to operate the large-scale, integrated processes of a modern economy (Drucker 1974, Arndt 1981). In the opinion of a growing number of development oriented economists, it has been the failure to master effective management functions that has been the principal cause of low economic performance of most LDCs since World War II--and is thus, in itself, a definition of continued "underdevelopment" (Seckler & Nobe 1984). Nowhere is this deficiency more apparent than in the agricultural sectors of most LDCs.

Successful modernization of traditional agricultural systems in LDCs will be critically dependent upon reliable feedback to the government agency planners and policy-makers responsible for delivering farm inputs, (e.g. fertilizer, pesticides, irrigation water, and the like). True enough, research and development experts other than extension personnel can provide this critical feedback. But, if removing the information bottleneck in the agricultural development process is so critical, why shouldn't extension personnel serve that function? Indeed extension personnel should have a comparative advantage in this newly-perceived, critical role, given their traditional direct contact with their farmer clientele groups.

Recognizing an expanded role for extension in the development process is a necessary but insufficient condition for more effective extension involvement in agricultural programs in LDCs. Equally important will be the willingness of LDC governments to accept modernization efforts in general and changes in their agriculturally oriented agencies in particular. Given this reality, it behooves U.S. university administrators to consider competing options for involvement of extension personnel in LDC-based technical assistance team efforts so as to select those efforts that are most likely to succeed. The degree to which the organizational structure of agricultural agencies in LDC governments is likely to constrain such efforts is useful information in that regard. Therefore, the following section will outline three major kinds of organizational structures that may be encountered when selecting target LDCs in which to work.

ALTERNATIVE ORGANIZATIONAL STRUCTURES FOR AGRICULTURAL AGENCIES IN LESS DEVELOPED COUNTRIES

The key difference to be found among alternative organizational structures is the degree to which any particular organization knows the results of its behavior. At the most limiting extreme is a patronistic organization (PO) which operates totally from the top down. Such a governmental PO delivers the products and services that it considers "best" for the country's population but neither asks nor cares whether its constituents are indeed made better off, as viewed from the recipient's perspective.

The vast middle ground in the range of organizational options available is what has been called the administrative organization (AO). It, too, is directed from the top down but does at least measure its performance in terms of the amounts of input delivered--e.g. acre feet of water gauged at the canal outlet, tons of fertilizer provided, number of trees planted, or number of farmers contacted by the extension agents.

At the ideal end of the organizational contium is the management organization (MO) which adjusts the mixture and rate of its product delivery on the basis of feedback about the impact given programs are having on output--e.g. increased yields, higher net farmer incomes, and desirable shifts in agricultural structure or income distribution.

Such an organization operates by the principle of "management by results" which is viewed by Seckler and others as an improved version of Peter Drucker's principle of "Management by Objectives" (Seckler & Nobe 1984, Seckler 1984).

When developing economies are categorized in terms of their historical evolution, one generally finds that they tend to arise out of a patronistic order. (In some cases, LDCs that had made initial development gains have reverted to this organizational form as well.) Initial attempts to modernize such self-serving organizations result in administrative organizations, but these still operate from a patronistic legacy, and are characterized by intense inter-agency rivalry and empire building. Less developed countries have not truly modernized, in terms of becoming both efficient and effective, until they become management-oriented by responding to the principle of "management by results." Given the latter set of conditions, not all U.S. agriculture oriented agencies, let alone counterpart agencies in the LDCs, can fully meet the test of being classified as a management organization. Among those that have not yet fully qualified is the Cooperative Extension Service--but, hopefully, it is now moving in the right direction.

One example of the relative difference between an administrative organization and a management organization is highlighted by the proposed new farming systems approach to agricultural research and development for LDCs as compared to a more traditional approach still embodied in most experiment station complexes of the U.S. land grant university network (Shaner, Phillip & Schmehl 1982). The farming systems approach for LDCs specifies a "results" feedback mechanism, and one can envision this as one of extension's roles. Far too often, however, extension and research faculty are still physically separated on U.S. land grant university campuses. It is somewhat of a paradox, then, that the farming systems approach, which can be viewed as a prototype management organization framework, is now being advocated for LDCs although it has not been fully adopted by the U.S. land grant university network--but that matter is best left for another paper.

The fundamental characteristics of patronistic, administrative, and managerial type organizations are discussed in turn. (The following material previously appeared in an expanded form in Seckler and Nobe 1983.)

Patronistic Organizations

In a patronistic organization (PO), the *who* controls what and how. The PO an extension of the personality of the individual "boss" or "patrone." In organizations under patronistic control, both objectives and operating procedures pertain only insofar as they correspond to the more or less "hidden agenda" of the patrone--the only firm rule is "ask the boss." To borrow an apt phrase from Manibhai Desai, patronistic organizations are operated in terms of "management by subjective."

As government organizations in the West have become more rationalized, (read: modernized), the role of the patrone has receded to the point where it is now difficult for most Westerners to understand patronism in full flower. The reference here is less to the mildly benign English "patron" and more to the vigorous Italian "*patrone*" --a figure made widely familiar in the film, *The Godfather*. The mafia, or *cosa nostra*, ("our thing") is indeed the archtypical form of patronism--quite apart from its association with criminal activities. As in the origin of the mafia itself, patronistic organizations may be and most often are sincerely dedicated to the most noble causes, such as protection of weak and oppressed people.

The point of interest here, however, is not in the objectives of various patronistic organizations but in their *modus operandi*. It is the essentially familial relationship, the relationship of father to son, between the patrone and what may be called, in the curious absence of a reciprocal term, the "patronist," that is the essential feature of patronism. The patrone provides security and protection *to* the patronist and demands in turn unquestioning loyalty, respect and honor *from* the patronist.

It is the culture of subservience created in patronistic organizations that provides its power in politics and war, and is the ultimate source of its weakness in the management of economic affairs in other areas, such as in agricultural modernization programs. Herein lies one of the greatest dilemmas of the developing countries: in periods of social transition, of political turmoil and general insecurity, the most successful *political* form of organization. patronism, is also the weakest form of *economic* organization. Thus, there is an inevitable conflict between the interests of political stability served by the patrone (or a coalition of patrones) and the management of economic development.

The structure of a patronistic organization is totally a top-down arrangement, as shown in Figure 1. As such, it exhibits several characteristics that make it difficult for U.S. expatriate university teams to work effectively in agricultural development

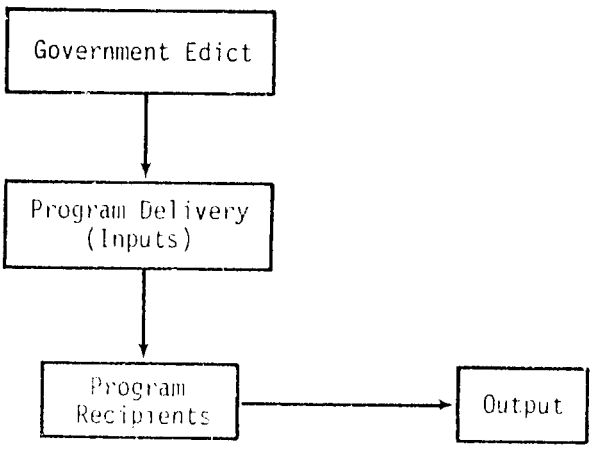

Figure 1. Structure of the patronistic organization.

projects in countries whose governmental structure is still organized along these lines. Among these are:

1. A patronistic system simply will not permit its agency personnel, or its expatriate advisers, to engage in the critical analysis required in science and in scientific management. To allow otherwise would imply equal standing between employees and the "boss" at all succeeding downward organizational levels. Such a relationship, of course, cannot be permitted in a system in which the hierarchy of status relationship assures that criticism runs only downstream, from superior to subordinate, rather than from the man on the spot up to the policy maker. Any attempt to challenge the system, regardless of good intent--such as a field level employee making constructive suggestions for improving the delivery system for, say, irrigation water, fertilizer, or technological knowledge for farmers--is usually viewed as a form of insubordination.

2. The information base in patronistic organizations is deliberately weak or incomplete. Since patronistic societies are constantly in a state of war among competing patronistic groups within the system, any data, however desirable, is suppressed if it could conceivably be used against the agency that could develop or collect it. Obviously data about the present level of effectiveness of such an agency is most dangerous so such information is kept to a bare minimum and access to it tightly controlled.

3. In patronistic organizations, information systems and program control focus on inputs rather than on outputs for the simple reason that lost opportunities are more difficult for competitor agencies to demonstrate than direct mistakes or program failures. In other words, the exercise of power to do something untried but potentially useful is extremely risky because if it fails to meet a stated objective such as to "increase agricultural output by 10 percent" the agency will be severely criticized by its competing patronistic groups. It is much safer to state a "do-able" target such as "to increase the delivery of tons of fertilizer by 10 percent." In such cases, proposals for new programs or even modest program changes are discouraged; permission must be granted for every program change. Plans for new development programs are endlessly reviewed by higher authority, modified, reviewed again, over and over, but are seldom implemented.

4. Decentralization of authority within a patronistic organization is regarded as a loss of control. Therefore, decision making is seldom delegated and almost never delegated down to the lowest echelon where return output information could be most effectively obtained. Clearly, extension field agents are in this lower echelon. Regardless of how much a boss may desire such information, the gap between patrone and the patronist (the farmer with whom this lower government employee echelon is in contact) must be preserved at all costs--even at the expense of opportunities foregone for improving the agency's delivery system.

5. Once a balance among competing patronistic agencies has been established, internal change is avoided at all costs. These competing agencies will take risks to expand "territory" or influence but they will not take the risk of a change in procedure merely to improve performance or cost effectiveness.

It is useful to categorize at least three groups of LDC patronistic organizations. First, some LDC governments are still truly operating in this framework--for example dictatorial type regimes in some older countries such as in some of the "banana republics" and in some countries in the Middle East and Africa. The second group consists of some former colonies that have obtained their independence since World War II accompanied by violent internal political turmoil, e.g. Angola. Third, some former European nation colonies that had well established administrative organizational frameworks prior to independence--e.g. Zimbabwe. The latter countries, nonetheless, have regressed to the point where they now evidence some of the more undesirable patronistic characteristics, particularly in the rival agricultural agencies of agriculture and irrigation. Opportunities for U.S. university extension in countries that fit in groups one and two above should be avoided. Opportunities in countries in the third group warrant careful evaluation prior to establishing the terms of reference for any

contractual agreement to be entered into with AID or a similar donor agency to work in these countries.

Administrative Organizations

The basic operational principle of an administrative organization (AO) is that if a "perfect" program or plan is perfectly implemented, the expected results of the program will surely follow. Therefore, since expected outputs *must* follow delivered inputs, per logical necessity, it would be a waste of scarce capital and professional time to monitor outputs. All that is deemed necessary is to specify the required levels of inputs and then monitor carefully to ensure that these amounts are delivered.

A typical AO operates within the organizational framework shown in Figure 2. As in the PO, programs consist of "top down" transformation of policy values, implemented via administrative action. Programs are formulated by policy makers, then administered "by the book." Specified inspection procedures assure that inputs are monitored but outputs are assumed or simply ignored. Like a wound-up clock, via periodic infusion of budget, an AO blindly "ticks away," with no means of knowing whether its inputs are on track of national planning objectives or not--having no knowledge of the results of its actions.

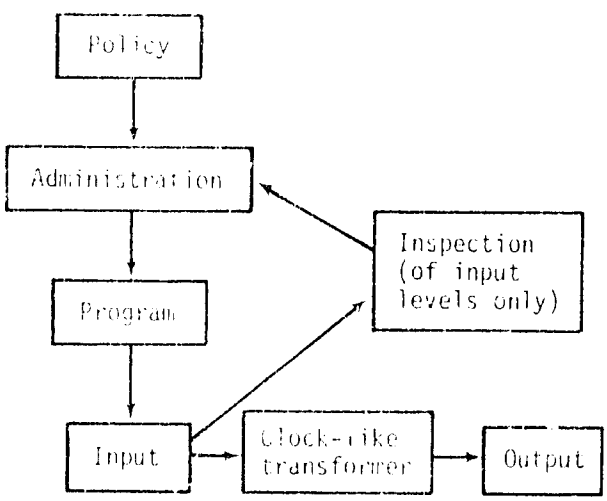

Figure 2. Structure of an administrative organization.

In some situations AOs perform very well. In most situations they do not, with agricultural programs included primarily in the latter group. The difference between these situations may be seen by contrasting a public road construction program with an irrigation development program. In the case of road construction: (a) the program is perfectly known and has been tested over decades, with very little technological change causing a need to experiment with new approaches, (b) all the inputs to the construction effort, including the land, are under total control of the AO, (c) the results of the program are easy to see and evaluate by policy makers and high administrative officials. Lastly, (d), a road automatically interfaces with the private, nonpublic, sector. Once the transformation of labor and materials into a road is complete, individual users can utilize the road by themselves, without the need for further public organization (with the exception, of course, of maintenance and traffic control).

In the case of irrigation programs, conditions (a), (b) and (c) above are reasonably well satisfied in the main storage and canal distribution system. But all of these conditions break down, in whole or in part, below the canal outlet. Most importantly, the desired interface between the public and the private sectors breaks down at the point of the canal outlet because opportunity for feedback of useful information about the results of the program (product output) is lost at this point.

If, for example, there were only one farmer below the outlet, then an irrigation project could work like a road project--it would basically satisfy the above four conditions. As in the case of a road, it could reasonably be assumed that management problems would take care of themselves over the public-private sector interface. But with many dependent farmers below the outlet as occurs in the real world situation, the public good problem of joint-use remains in the system. In such cases, either the farmers have to form themselves into a separate organization to jointly manage irrigation water after it is delivered at the outlet, or the public-private interface must be pushed further downstream to the farmgate of the individual farmer.

Whatever the management problems of the main water delivery system may be, and they are many, they can be solved by better management procedures *within* the span of control of the organization. The problems below the outlet, however, require *reorganization of the system*--involving either a new farmer organization below the outlet, or considerable revision of the interface of the existing public organization with the dependent farmers (end users).

The problem of the canal outlet in irrigation systems is a species of the general problem of defining the organizational interface in management theory. No organization can control everything, yet everything is ultimately related to everything

else--the dilemma of socialism, if you will. How far upstream--through the inputs--and how far downstream--toward ultimate outputs--should the organization attempt to extend its span of control?

In capitalistic oriented private sector systems, this problem of integration of independent but interrelated activities is partially solved by the marketplace. The purchase-sales mechanism provides a feedback at the interface, or environmental terminals, of the organization. However in the public sector AO, this feedback mechanism does not naturally occur and targets may be defined short of the objectives (as in the problem of delivering water just to the outlet, or just planting trees). Thus, without useful feedback at the interface, an agency objective or more accurately its "targets," may be met while objectives related thereto as specified in national planning documents, such as increasing food production by "X" amount, are not realized.

The only solution to this kind of problem is a rigorous performance monitoring function operating from the policy-making level to provide feedback from events to values, from program targets to policy objectives, as envisioned in a modern, management oriented organization. In its absence, the AO becomes a rather simple-minded machine, a "clock," that blindly grinds on with specified but ambigous objectives (or targets), to dubious results. In such a process, the AO creates its own distinctive culture. It is the culture of the cog in the wheel or the automaton who cannot know if error occurs or not, and thus cannot learn and improve. In this regard, Martin Landau (1973) has noted that:

> Bureaucracies are chastized today as sluggish, unresponsive, rigid, closed, and thus resistant to change--which means that they do not learn. Some say they cannot learn: Crozier has suggested that a bureaucratic organization is one that cannot correct its behavior by learning from its errors. I believe he offers this as a definition.

Clearly, administrative organizations must be shifted into a "management by results" mode as a precondition to successful efforts to transfer large-scale technology and capital resources for public resource development projects, such as irrigation delivery systems in developing countries. This does not mean that all AID-funded projects offering U.S. university extension involvement in host countries whose agricultural projects operate in an AO mode should be automatically rejected by university administrators. It does mean, however, that the relevant host country agencies are not yet showing signs of shifting (or at least a willingness to shift) toward a managerial organization framework, it would be prudent to look elsewhere for an international involvement opportunity. For example, projects in India, Pakistan, Thailand, Egypt, and the Gambia appear to be acceptable risks while the same kind of projects in countries such as Tanzania, Sudan, and in many Central and Latin American countries would face a considerably higher risk level.

The Managerial Organization

A managerial organization (MO) is an evolved form of an AO in which feedback from the output cell is being used to modify (and hopefully improve) successive rounds of program implementation. Figure 3 specifies some of the more important structural and

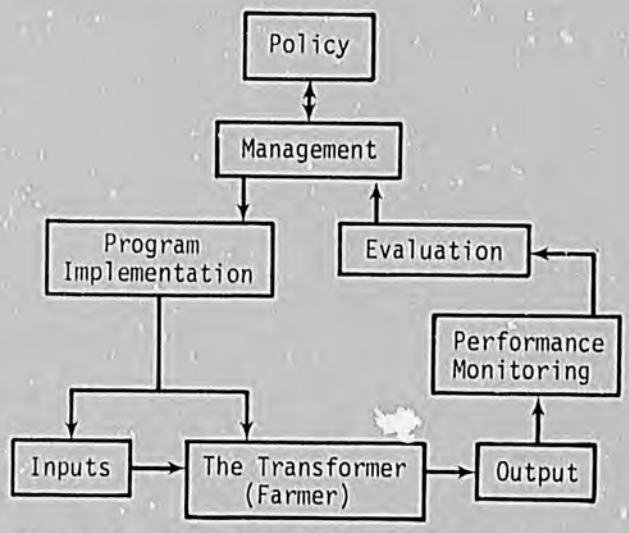

Figure 3. Structure of the managerial organization.

functional properties of a MO that operates according to the "management by results" (MBR) principle. It is important to keep in mind that the basic transformers of this MO "machine" are people and that people are the ultimate "black boxes" of cybernetic theory. (For an explanation of the cybernetic and scientific foundations of management theory and the case for a "management by results" approach, see Seckler and Nobe 1983.) Therefore, the problem is how to design organizational programs to maximize individual initiative and creativity, yet stay on track of the objectives. That, specifically, is the design criterion for the MO. This organizational mode differs most significantly from the AO mode in that it *can know* what it is accomplishing. While the AO blindly ticks away, like a clock, the MO operates much like a furnace connected to a thermostat that sends signals from time to time to bring the organization "back on track"

with its performance objective. This desirable kind of adjustment signal is obtained, of course, by monitoring output performance rather than just measuring inputs.

The MO has a specified operational sequence for six essential functions, as follows:

1. The *policy function* is to set the broad parameters of the organization. These parameters are of two forms: (a) the ends, values, or *goals* of the organization; and (b) the basic operating *procedures* by which the action of the organization is channelized. Martin Landau (1973) has referred to this formulation as the "theory of parametric management systems." The parameters are set at the policy level while the variables are left to the managers. In military terms, this theory is reflected by the distinction between "strategy" and "tactics".

2. The *management function* of the management by results approach is, first to transform general policy *goals* into specific *objectives*, defined in terms of desired outputs at specific times, places, of quantities, and qualities. The transformation of policy goals into management objectives is one of the most difficult operations of the MO system because it requires very close interaction between the policy and management functions. The second major management function is to design *programs* for the organization that, it is hoped, will produce the outputs specified in the objectives. These programs are necessarily in the form of conditional propositions to the effect that, given the initial conditions, *if* inputs are applied according to the program, *then* specific outputs will likely emerge from the transformation.

3. The *program implementation* function is merely putting policy into practice. In agricultural programs it means delivering inputs to end users, be they fertilizer, water, improved seeds, or merely extension-supplied technical information.

4. The *transformer*, in the case of agricultural programs is, in most cases, the farmer. One of his most limiting characteristics is that he accepts new inputs only to the degree that he views potential gains that will outweigh the risks and uncertainty that changes in his operating procedures will entail.

5. The *performance monitoring function* is to estimate the results of the organization's programs and convey this information to managers and policy makers. In other words, this function is to report the status of actual output relative to planned output. It is in this function that extension appears to have a comparative advantage, given its traditional close contact with farmers who serve as the "transformers" in LDC agricultural improvement projects.

6. The *evaluation function* is shared between managers and policy makers. While evaluation is a continuous operation, its intensity fluctuates over time to a degree that it is best considered as a stepwise process periodically "triggered" by two kinds of events. When the results are favorable and if the objectives remain constant, the system is simply reiterated according to the established program. This stationary situation changes, however, when: (1) due to some external perturbation in the environment, unfavorable results appear; or (b) internally, someone "gets an idea" that causes a shift in the values, objectives or program. In either case, the organization as a whole is intensively re-evaluated either to rectify the error or to exploit the new opportunity. In this way the MO moves through time in a step-wise process of controlled change.

It is worth highlighting here a reality that has only been hinted at earlier--ideal, fully operational MOs do not yet exist in the agricultural agencies of most LDC governments. There are, however, a number of LDCs now actively evolving into the MO mode. Countries like Taiwan, South Korea, and Indonesia appear to be reasonably far advanced in this evolution and others such as Pakistan, India, Sri Lanka, and Egypt are definitely showing a willingness to make the transformation. It is in promoting new program options in such situations that donor-funding agencies like AID can help the process along by making a funding precondition of key program output monitoring elements, such as MBR. Likewise, U.S. land grant university administrators can insist on MBR conditions, along with a specified extension role that has been expanded to include an output performance monitoring function, as a contract specification when negotiating for future participation in AID-funded projects in LDCs.

CONCLUSIONS AND RECOMMENDATIONS

Recent shifts in emphasis within AID and other donor agencies to longer term programs, greater emphasis on investment in human capital, and a focus on a systems approach to LDC agricultural development projects all suggest that there will be increased opportunities for involvement by faculty from U.S. land grant universities. Faculty primarily working in an extension function can fully share in these options, particularly if such personnel are willing

to work as members of interdisciplinary teams and if they are willing to contribute effectively to such team efforts in a role considerably different than the traditional extension function.

The new extension function will be significantly different in two ways. First, the delivery of technical knowledge to LDC farmers must now expand beyond a "single product" approach--e.g. one agent working on new crop varieties, another on fertilizer, and a third on pesticides--or a single agent delivering many products one at a time. Instead the "product" should encompass a farmer's total "system" needs and, due to the increasing complexity of his farm input package, must include viable information on farm management and credit. Second, if university teams are to implement fully a farming systems approach in the LDCs, then the existing information void on system output performance at the farm level must be removed. Extension personnel should have a comparative advantage for taking on this new role.

Another emerging area that can involve considerable extension input is in-service training programs for LDC agricultural agency personnel. A proposed AID-funded large scale irrigation management training program in India, for example, envisions that more than half of the personnel to be trained in a systems approach to on-farm irrigation water management will be in the extension cadre of the various state level departments of agriculture (Nobe 1982). A related education oriented option will be AID-funded programs to strengthen agricultural universities in the LDCs such as the new Agricultural University Project in Peshawar, Pakistan.

Recommendations are few in number but, hopefully, will be conducive to success in achieving a future viable extension role in AID-funded agricultural programs in target LDCs. These are:

1. Gear up for involvement in university faculty interdisciplinary team efforts; avoid any options offered that are in the old traditional mold of "extension only" teams and particularly avoid efforts that call for delivery of single products or single product information such as fertilizer, seeds, or pesticides advice.

2. Before taking on an AID-funded project, carefully analyze the organizational framework of the agricultural agencies in the proposed host country. Agencies still operating in the patronistic mode offer no prospects for long-term success, but so-called administrative organizations are potentially viable, provided they are in the process of evolving into managerial organizations. As a minimum, administrative oriented agencies should be willing to move in the MO direction, and procedures for doing so should be incorporated in the project documents and agreed to in advance by both AID and the host country government.

3. In the immediate future, concentrate on three types of AID-funded projects that offer the best opportunities for extension involvement: (1) research and development oriented farming systems projects; (2) in-service agency training programs with an interdisciplinary focus, for example, on-farm water management training projects in countries such as India, Pakistan, and Egypt; and (3) upgrading of agricultural universities in the LDCs such as the new Agricultural University effort in Peshawar, Pakistan.

In conclusion, it now appears that there are emerging opportunities for extension involvement in AID-funded U.S. university team efforts that are greater than they have been for over two decades. We would be ill-advised to move too quickly to accept any and all opportunities that AID may offer, however, because it is critical that our initial university team efforts with greater extension involvement be successful. The level of organizational modernization of proposed counter-part agricultural agencies in the targeted LDCs will be a major determinant of success or failure of such AID-funded efforts. With a solid understanding of an LDC's organizational structure, we can at least choose our options so as to maximize our possibilities for success.

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Constraints to Developing Effective Extension Programs in Agricultural Assistance Programs: Some Brief Observations

EARL D. KELLOGG

The current policy guidance for U.S. agricultural assistance programs emphasizes institutional development, policy reform, research and technology transfer, and private sector involvement--informally referred to within the United States Agency for International Development (AID) as the four horsemen. The effectiveness of extension efforts will influence the degree to which each of these "thrusts" is productive in stimulating agricultural development. The identification of major constraints facing extension in making productive contributions to agricultural development and what might be done about them is important, given this current thinking on agricultural assistance. Integration of extension efforts into agricultural assistance programs has been neglected too long in policy and implementation strategy discussions. However, given the current emphases on technology development and farming systems research programs, it will be difficult to place agricultural extension concerns high on the agendas of most major development institutions. As we approach this subject, we must also remember that our colleagues in the less developed countries (LDCs) have major contributions to make to these efforts and we need to consider how their input might be consistently elicited.

My comments are going to be organized into two parts: a contextual statement about the current state of international agricultural assistance and how extension concerns might fit in, and a classification and listing of the constraints to effective contributions by extension that I have observed.

CONTEXTUAL STATEMENT

The content and process of international agricultural and rural development assistance have been steadily changing over the approximately 40 years that we have been involved in assistance in a major way. The priority given to extension activities throughout this time has varied:

- from low priority in the early years when industrial development was stressed;
- to higher priority in the 1960s and early 1970s when community and agricultural university development were emphasized;
- to lower priority in the mid-to-late 1970s as agricultural research activities were empahasized.

The degree of agreement regarding extension's role in agricultural development has also changed from widely accepted concepts of how extension activities can contribute to an almost confused set of notions about extension's role.

Currently, a number of areas are being emphasized in international agricultural assistance efforts.

(1) Commodity production research and farming systems research are being given higher priority. There are some indications that basic research will receive more emphasis during the 1980s.

(2) Increasing priority is being given to developing a number of important agricultural and developmental institutions.

(3) Somewhat more attention is being directed to human resource development but usually within a research or institutional development project.

(4) Large in-country projects involving a number of disciplines and functions are becoming more important.

(5) There is increased emphasis on developing major subject-matter expertise in collaborative or cooperative arrangements among institutions. Some examples are:
(a) water management;
(b) farming systems research (FSR); and
(c) agricultural policy analysis and planning.

(6) Africa is receiving more attention and this will continue, but Asia will also continue to be of major importance.

How do extension concerns fit into this context? One major question of strategy seems to arise. Should extension be added

E.D. Kellogg is Associate Director, International Agriculture, University of Illinois at Urbana-Champaign.

to the list of major subject-matter areas such as FSR, water management, and agricultural policy for which increased expertise is desired? Or, would it more productive to integrate extension dimensions into the international agricultural research centers, collaborative research support programs, institution and human resource development programs, and the major subject-matter areas mentioned previously?

Funding will be a major problem if it is determined that extension should take its rightful place among the high priority areas of research, institutional and human resource development, FSR, agricultural policy, and water management. If it is decided to integrate the extension dimension into these other areas, there will be no center or focused effort to improve extension conceptualization and expertise, per se. I feel both of these directions are needed. It seems important that extension be integrated into the subject-matter areas mentioned above. However, to improve the state of knowledge regarding extension, some centrally focused effort is needed as well.

CONSTRAINTS

In terms of contraints, I feel a need to speak at different levels than many. I am not an experienced extension person nor have I ever administered an extension program. I will leave to others the task of identifying many of the problems. However, I have had several experiences in LDCs which have left me with strong impressions about extension problems. My discussion will draw more from these experiences than from a review of the literature or the ideas of experienced extension persons.

Problems constraining extension program effectiveness are numerous and vary by nature, origin, severity, and degree to which alleviation is possible. Therefore, it seems important to classify constraints into three dimensions. This classification should assist in the development of a strategy for alleviating extension problems.

(1) Is the constraint internal or external to the extension system? Determining the origin of the problem would assist in deciding where corrective efforts might best be placed.

(2) How important is the constraint in hindering effective performance? Not all problems can be addressed at the same time. This classification dimension should assist in developing priorities.

(3) To what extent can the constraint be alleviated? It is almost impossible or relatively easy to change? Answers to these questions should influence the priority ranking of problems to be addressed, as well.

Obviously, classification of these constraints would depend on the particular situation. Therefore, my subsequent classification is illustrative and involves the first dimension only.

Constraints External to the Extension System

National policy constraints. Traditional agricultural policies related to prices, marketing, transportation, taxing, and trade all have major impacts on whether extension efforts, particularly in production agriculture, can be successful. "Is there appropriate technology that farmers will adopt," is as much a question of effective policy as of effective extension efforts.

Less recognized national policy issues or characteristics are just as important. What is the doctrine, philosophy and commitment in the society and government to public service, technological transfer and educational efforts, eliciting rural peoples' participation, and working from a basis of their expressed needs? I do not mean to imply that extension programming should be based on clients' expressed needs. It is not only unrealistic to expect extension programming to be based solely on client participation and felt needs, it is unwise.

There are sound reasons to include material in extension programs that comes from "the top." Especially in societies like those of many LDCs where information channels are not working well, certain important topics unfamiliar to farmers should be included in extension programs. Also, we know that there are certain issues that need to be addressed by farmers and other rural people that may not be requested by individuals. Important issues for extension programming related to externalities, market imperfections, and public goods may not be identified by individuals as "expressed needs." That these issues are not so identified does not diminish their importance, however.

What is the national policy on civil service in general? How are civil servants instructed to perform? What are their incentives? How are they promoted? Sometimes this is considered to be internal to extension systems but many of these concerns in extension organizations are related to the broader civil service.

Factors influencing technology development, diffusion, and information feedback in the agricultural sector may be important

constraints to effective extension. Some of these factors are the:

- emphasis on applied, farm-tested research;
- extent to which technology is borrowed from outside; and
- major organizational characteristics that influence the degree of linkage between research, education and extension.

Technical content linkage constraints. The inability of field extension agents to obtain appropriate technical expertise efficiently is an important constraint. My observations have been that extension-research linkages are very weak in most developing countries. In many developed countries, the extension system partially internalizes this linkage by employing extension subject-matter specialists. This approach may also be important to developing countries that are striving to provide more effective technical linkages for field extension staff.

Human capital level constraints. The level of education and training is relatively low for agricultural personnel, especially those in extension. In addition, students studying agriculture are relatively low academic achievers.

Constraints Internal to the Extension System

Goals and objectives for extension efforts are often not well developed. This causes unfocused efforts and an inability to evaluate the performance of extension services. Increases in farmers' incomes or in food production are not specific enough measures for evaluating extension activities. Agricultural development that "isn't working" is not a necessary or sufficient condition for being critical of extension's performance. We have to develop more appropriate goals, objectives, and expected outputs to allow genuine evaluation of extension performance. Since extension is often only a part of a broader system of technology development and transfer, this will be difficult to do, however.

Strategies for operation are not clear. Few, if any, experiences I have had indicate extension programs have developed strategies for operation. Priorities for emphasis in terms of subject matter, client groups, and methods are often not clear.

Extension efforts are not integrated with, or do not effectively use, local social and organizational structure. While little social organization exists in some local areas, with already scarce resources extension ought to take advantage of local organizations.

Extension personnel may have limited understanding, empathy, and ability to communicate with local people. This problem involves not only skill in speaking local dialects but also the attitude and background of extension personnel.

Rural people may have inappropriate expectations of extension. A related problem involves the presentation of inappropriate images by extension personnel to rural people. In my experience, the notion that farmers are simply to be given answers and information with almost no regard to learning from them in return is too prevalent. This leads farmers to expect extension personnel just to answer difficult questions immediately, rather than to act as a channel carrying farmer questions to extension subject-matter specialists or researchers and returning subsequent information to the farmer.

Extension services do not seem to have well-developed feedback mechanisms to research institutions, policy-makers, and planners relating to farmer problems and conditions. Without this capacity, the contribution of extension to agricultural development is severely limited.

Lack of mobility and materials for field personnel are problems common to many extension organizations that I have observed.

Policies related to awards and other internal incentives often are not oriented toward excellence in achieving desired tasks. I have observed few extension programs in LDCs where client satisfaction was considered as a criterion for recognition of extension excellence.

There are often major deficiencies in in-service and periodic out-of-service training for professional development of extension personnel.

Little provision is made for effective extension methodology or technical subject-matter backup of field personnel.

As indicated previously, this is not meant to be an exhaustive list of problems facing extension efforts in developing countries. However, I do want to indicate that many important constraints to extension efforts originate outside the extension organization. In addition, the "success" of extension efforts depends heavily on activities also carried on outside the extension organization. Therefore, efforts to improve the effectiveness of extension programs in

developing countries must analyze the broader technology development, transfer, and feedback system, and its important internal and external linkages. This kind of analysis is badly needed to guide future major investments by donor agencies and national institutions in agricultural research, education, and extension.

Human Resources Management: A Constraint to Successful Extension Services in International Development Work

VIOLET M. MALONE

Extension services are in the business of education, a process of "planned change." Such change is designed, purposefully, to alter a current situation in such a manner as to affect "the structure, technology, and human resources of the total organization, or group" (Lippitt 1973). The extension services that are most successful are the ones that apply the model(s) of change in a flexible manner. Consequently, extension services that espouse a philosophy of maintaining the status quo should not exist.

The development and maintenance of successful extension services require the involvement of people (human resources) who have the following characteristics:

- An appreciation of a philosophy that the "generators" and "users" of knowledge are responsible, equally, for the implementation of those knowledge systems that improve the quality of life for the people in the society being served.
- An understanding of the intricate and integral relationships that exist between technical subject matter, systems for technological transfer, and human resource development.
- The competencies needed to utilize strategies within the structure of the knowledge systems that spring from both the stated and ascribed needs of all people involved in a given social system.
- The ability to communicate to a variety of publics the process, the outcomes, and the impact of "change" (knowledge transfer and utilization).

In general, successful extension services are ones that include plans and strategies for managing the people in the system in such a way that the technical subject matter and the delivery modes are linked in an efficient, effective, and dynamic organizational structure.

A MAJOR CONSTRAINT: HUMAN RESOURCES TO MANAGE EXTENSION SERVICES

The human resources in an extension system include researchers, administrators, technicians, field staff, and significant others in the community. These individuals are so important that social scientists are identifying them as "human capital" to which an economic value can be calculated in terms of inputs (Malone 1980).

The constraint posed by such resources to successful extension services is one that exists because the focus on intervention is usually on the end result of increased production or similar goals. These ends have their technical subject-matter strengths in the agricultural sciences, not the behavioral sciences. But the desired transfer of knowledge does not happen unless attention has also been paid to the "agents of planned change."

Leaders of extension services appear to operate on the premise that mere introduction of quality research and relevant practices will create an environment that leads automatically to successful adoption and maintenance of an innovation or transfer of knowledge. But the agents of change, the human resources, are affected by many social system factors: habitat, demographics, economics and community institutions, social structure, the communication and socialization process, and their own belief systems. Ignoring this is to ensure that there will be little or no transfer of the intended practice.

Even though most extension leaders recognize the human resource as an important part of extension services, they find it difficult to plan and implement programs for

V.M. Malone is Professor and State Leader, Extension Education, Cooperative Extension Services, College of Agriculture, University of Illinois at Urbana-Champaign.

coping with this constraint within the framework of technology transfer.

Reasons for the Constraint

Several reasons may be presented why this constraint continues to exist. However, only two are listed here, particularly as they relate to international development work and management of human resources. They are:

1. Inadequate attention paid to clearly defining the problem for which a solution or series of solutions must be found.
2. The use of inappropriate strategies to bring about the planned change.

Both stem from the inability of interveners to identify the human resources needed to bring together the elements of a social system so as to ensure the adoption of any resulting innovation.

Problem Identification. An agriculture system problem in a developing country is a social problem also. We tend to address it as an agriculture science problem first and then, maybe, a social problem. However, it should be obvious to all that the extension of knowledge is a social activity. Therefore, agricultural scientists and researchers need to incorporate social science problem solving methodology into their plans of action.

Let us look at the following case example:

> A developing country vital to the interest of our nation has requested assistance to increase food production for economic reasons. A visit to that country assists extension service leaders to identify several constraints, including size of farms, quality of land, market outlets, credit, etc. Working with all the significant others, the extension leaders work cooperatively to identify a plan of action.

That plan includes a detailed analysis of needs resources related to the technical subject matter. Many pages are used to describe the cropping system, the marketing problems, and credit concerns, along with an expressed concern for people who will "work the system." However, the section actually related to the effect of change on the social interaction of the people is the weakest section, if it exists at all, and its components will the first to be cut from a proposed budget.

Dr. Jose' Emilio Araujo, Director General, Inter-American Institute of Agriculture Science, a specialized agency for the agriculture sector of the Organization of American States, in a 1979 conference held at the Kellogg Foundation at Battle Creek, Michigan, addressed an audience on problems facing the Latin American and Caribbean region. He began by stating that food production was not the basic problem for the region nor was technology a constraint. He felt that a major problem was the need to "address the causes of underdevelopment and low production." The three major concerns he identified were the need:

- to equip national institutions with skills to plan and manage rural and agricultural development policies.
- to introduce entrepreneurial farming along with traditional farming.
- to develop educational and training efforts (informal, out of school, and nontraditional) to serve the interests of development and equity.

He suggested that a major role of educators (extension or others) "is to mobilize people to define what development means to them and to organize themselves in order to accelerate the process." However, it is my view that extension services tend to avoid participating in a discussion of planned interventions that have education for "mobilization of people" as a method of agriculture development. In this context, Dr. Araujo has addressed the problem of agriculture production and rural development as a social problem.

If problem identification is an issue, how might we handle it? One way should be to include the application of social science experiences to the scientific method of problem solving. We might begin to ask questions and seek answers to the following:

- Is this a recurrent, recognized, current, refashioned, or unrecognized problem?
- Is this a problem related to policy, organization, people, production, channel, product, or communication?

Zaltman (1973) has put forth a grid that might be useful in assisting planners to analyze the research problem in a development situation where the human element is an issue (Fig. 1).
Such an exercise should provide a visual image of the scope of the problem to be addressed.

Another aspect of this problem relates to the need to spend more time identifying barriers to change. These include cultural, social, organizational, and psychological barriers. Insufficient attention to any one of these barriers may well be the cause of a delayed response to the adoption of an innovation.

Such a view is supported, in part, in a document prepared as a follow-up to the 1979 World Conference on Agrarian Reform and Rural Development (WCARRD) held in Rome and

	Basic Types of Problems						
Categories	Policy	Organization	Person	Production	Channel	Product	Communication
Recurrent							
Rerecognized							
Current							
Refashioned							
Unrecognized							

Figure 1. Grid for analysis of research problems.

sponsored by the Food and Agriculture Organization of the United Nations (FAO 1981). The writers of the document stated that the "prime constraint on agriculture development is not technology, or even financial, but is essentially organizational and administrative." They too, agree that development work requires investing of small farmers with competencies that will allow them to work towards self sufficiency based on the concept of equity of resources and participation in decision making. The plan to include a recognition of these barriers would be of value to program planning.

Inappropriate Intervention Strategies. Extension services are most successful when they are invited to intervene in a system in which the client group:

1. recognizes the problem(s),
2. agrees that some action to change is needed,
3. is open to assistance outside the client system, and
4. is willing to engage in a process of self-directed activities.

Thus, the Cooperative Extension Service is a successful model for intervention when these elements exist in a host system. However, the application of the model has tended to be the same for each development situation, and herein lies the problem. Strategies that are appropriate for one situation, may not always be appropriate for another situation even though the model is still valid. Therefore, another constraint to successful services is the use of inappropriate strategies in attempts to bring about change.

Researchers and practitioners have identified several useful strategies for intervention (Moulton 1977), including the following three along with a combination of all three (Zaltman 1977). They are:

- persuasive strategies
- power strategies
- reeducative strategies
- multiple strategies

Successful extension services should employ the reeducative strategy in most instances. However, it is my feeling that we often utilize this strategy as our mode of intervention at a time when another mode is needed or required. Thus, our intervention is less effective and we have difficulty determining why our model did not work. It is not the model; it is the inappropriate use of the model.

In general, the extension model is most effective when it is employed along with other strategies. Community problems tend to be multidimensional; therefore, multiple strategies work best. Consequently, successful extension services are those that work with a variety of groups to identify the appropriate role of extension in the change process. As long as we have, as our underlying mission, the education of people for self-sufficiency, we will need to employ those strategies that have education as the medium for change.

The Extension Service as an education-for-change model is a successful one and little should be done to modify the model. However, the application of the model under various conditions needs to be examined. That examination should be conducted within the context of the social sciences. Questions we might ask in this process include:

- Do we not have an educational responsibility for assisting donors and host countries to understand an extension model that has a focus on human resources and problem solving for technology change?
- To what extent is human resource management a knowledge constraint that is too costly to include in our transfer plan?

Such an examination should bring the need to focus on human resources to a higher level of priority for successful extension services.

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Knowledge Transfer in Less Developed Countries

EVERETT V. RICHARDSON

The transfer of knowledge on improved agricultural methods in the lesser developed countries (LDCs) has a history of being ineffective. There have been many reasons given by extension specialists on why the extension services in the lesser developed countries have not been successful. These include: use of the extension service to make sure the farmers follow the rules and regulations of the government (police action), lack of transportation, poor quality of the extension personnel working with farmers, and inadequate other resources (either of knowledge base or finances).

These are very valid problems with the transfer of knowledge through the extension services in lesser developed countries. However, another major reason could be the modeling of the extension services in the LDCs on the Cooperative Extension Service in the United States. The source of agronomic inputs in most LDCs is not a free market; they are controlled by the government and the farmers have very little freedom of choice in their farming practices. Farmers have basically adjusted their practices to the system as it exists. To change farmer practices takes a more active program than the passive type of U.S. Extension Service in which staff are available to help farmers if the farmers come to them.

In most of the less developed countries the delivery of inputs (seeds, fertilizer, water, pesticides, and knowledge) is from governmental agencies. In general, there is a Ministry of Irrigation that controls, manages, and operates the water delivery system down to the farm outlet. This farm outlet generally doesn't serve an individual farmer as in the United States but serves many farmers (5 to 100). These farmers have the responsibility for the water in the watercourse downstream from the outlet. In theory, the farmers should operate, schedule and maintain the watercourse. In fact, it is laissez-faire, with each farmer taking the water when and if it is available. The Ministry of Irrigation (MOI) intrudes only if the system becomes so intolerable that a large number of farmers on a watercourse complain to MOI officials.

The MOI operates the delivery system as a "water disposal system" as efficiently and as effectively as it can. The system generally operates either on a rotation basis or continuous flow basis. On a rotation basis, canal gates to a system of watercourses are open for a period of days--4 to 6, called the "on" period; and then closed for a period of days--4 to 16, called the "off" period. The size of the opening of a watercourse is established by the amount of land it serves. On a continuous flow basis, water (when available), is delivered continuously in a set amount depending on the area served by a watercourse.

Farmers on a watercourse are supposed to take turns and schedule the water among themselves. There is severe maldistribution of water among the farmers on a watercourse with the tailenders suffering the most. The system typifies the statement made many years ago by a Nebraska farmer, "I'd rather be at the head of a ditch with a shovel than the tail with the best water right." The MOI, unless asked--and farmers in the LDCs have learned it doesn't pay to ask--takes no interest in the water beyond the farm outlet (scheduling, maintenance, irrigation methods, and so on).

The Ministry of Irrigation wants the system to operate with precision, like an army, with water at the farm outlet at the proper time in the proper amount. Unfortunately, because of the lack of resources, even this ideal is not realized. Canals, headgates, moqas, and mesqas need repair. Often officials take pay to alter the schedule or amounts (Wade 1982); thus, the statement that Ministries of Irrigation are not operating an irrigation system, but a water disposal system. The most important reason for delivering water--the irrigation of crops to maintain the correct water regime in the soil for optimal economic production --is not considered.

E.V. Richardson is Professor of Civil and Irrigation Engineering, and Campus Director of the Egypt Water Use and Management Project, Colorado State University, Fort Collins.

The Ministry of Agriculture (MOA) has the responsibility for delivery of all the other inputs for growing crops (including credit, fertilizers, and farm machinery). For many crops, they are also the market. They set prices for the inputs and for the output. Thus, the MOA in many countries is a tax collector because it sets a low price, purchases the major crops, and sells high on the world market or low to in-country consumers.

Like the Ministry of Irrigation, the Ministry of Agriculture is a disposal system not a farming system. The Ministry wants to dispose of seeds, fertilizers and pesticides. It tries to contribute knowledge, new practices, and new methods of pest control. It does contribute new seeds and fertilizer because it is the major source of supply, often the only source. But the transfer of knowledge about advances in such areas as seedbed preparation, application of pesticides (when, where and how), or use of fertilizers is ineffective. The MoA's extension service, if it exists, usually operates very poorly. I suspect this is because such systems are modeled on the U.S. system. That is, on a *passive* transfer of knowledge--through field days, demonstration farms, subject matter specialists in major rural centers, demonstration farmers, pamphlets, or radio and TV commercials.

What is needed in an LDC is an *active* extension service--transfer agents and subject-matter specialists out working on the farms with the farmers, in daily or weekly contact with the farmers, showing and helping. Extension workers should actively work with the farmer to 1) identify his problems, 2) search out solutions, and 3) help him implement solutions. What is needed in the typical MOA are field teams, each serving 5,000 to 10,000 acres and made up of general purpose agronomists, sociologists, economists, and agriculture (irrigation and farm machinery) engineers. The teams should have access to subject-matter specialists--such as entomologists and soil scientists--who serve a larger land area. These people already exist in the MOA in most LDCs, but most are in the large cities, in experiment stations, or traveling abroad getting more education.

In most LDCs, neither ministry helps the farmer to improve his irrigation practices. No one takes the responsibility to contribute knowledge on how and when to irrigate, how to level the land, how to determine when to use furrows or when to use basins; or to explain how deep to maintain water on paddy rice, how to manage irrigation systems, how to organize and maintain the watercourse and to schedule irrigation turns among neighbors. In irrigated agriculture the application of the water on the farm falls through the cracks in the responsibilities of the two Ministries. In actual fact, the MOA, even if it took the responsibility to transfer knowledge about on-farm irrigation depends on the MOI's operation of the delivery system.

To improve farm water management takes the resources of both Ministries. The MOIs must assume responsibility for what happens to the water on the farm. They must be willing to modify the delivery schedule of water if it will improve irrigation. That is, the system should be operated for the benefit of optimal economic crop production. The MOI must establish a formal linkage to the farmers to help them schedule water, level land, change their irrigation practices, maintain watercourses, and manage their on-farm systems. This will require that the MOIs establish an irrigation advisory service and provide help in forming an irrigator's association on the watercourses and branch canals that serve several watercourses. The advisory service should link the engineer operating the canals with the farmer users, and provide active professional help to the farmers to improve on-farm water mangement.

At the farm level, the MOI advisory service would cooperate with the MOA extension service to provide an active program to improve farm water managemnet. The MOA would provide those services that involve the proper application of the other agronomic inputs. Both agencies would be charged with providing land leveling services and farm layout changes that are needed to improve irrigation.

For the Ministry of Irrigation to carry out the task of improving irrigated agriculture, interdisciplinary teams must be formed. The teams should have professionals in agriculture and irrigation engineering, agronomy (irrigation), sociology or anthropology, and economics. These teams, together with the extension service teams in the MOA, would work an area of 5,000 to 10,000 acres. They would work with farmers on a watercourse to improve the on-farm water system and its management.

The agriculture and irrigation engineers would develop farm irrigation plans, and specifications for watercourse and branch canal improvements; supervise land leveling (a joint activity with the extension service of the MOA); supervise construction; establish irrigation frequency and amount; develop drainage plans; and monitor the scheduling of water deliveries.

The irrigation agronomist would develop irrigation frequency and quantity schedules

to maintain proper soil moisture for optimal economic crop production. Together with extension he would work with farmers to improve the use of farm machinery, agronomic practices, farm layout, and on-farm research.

The sociology or anthropology professionals would help establish the irrigators' association, settle conflicts, and expedite the work of the others on the team. Their objective would be to establish cooperation between and among peer groups: farmers to farmers, farmers to professionals, professionals to farmers, and professionals to professionals. They would establish an understanding of the positions between and among groups.

The economics professional would help farmers quantify their economic decision-making practices by helping them keep farm enterprise records. They would continually evaluate the cost and benefits of any recommended changes.

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Constraints in Effective Extension Program Development in Third World Countries: The Manpower Development and Deployment Issue

WILLIAM M. BROWN, JR.

In many developing countries international development organizations, government missions, and well meaning persons have believed that the keys to agricultural independence were technology and technology transfer (extension). But three major problems generally prevent realization of such independence: (1) promotion of inappropriate technology, (2) inadequate training of field staff, and (3) unrealistic deployment of field staff.

I wish to address each of these items briefly from my perspective as an extension plant pathologist who developed, for nearly 20 years, extension programs abroad.

PROMOTION OF INAPPROPRIATE TECHNOLOGY

Time limitations placed on development projects often force the development team to go for an "immediate impact." Subsequently this philosophy pursues a path of "do it the way we do at home" the "Texas Syndrome" of bringing in big machines, big fields, big co-ops and working with our technology and resources rather than those of the local farmer. For the most part, we have failed in our efforts to help the subsistence farmer or as the United States Agency for International Development (AID) calls him, the "small farmer."

Fortunately, some programs sensitive to technology and resources of the small farmer have worked with small farm groups. An animal traction experiment station and demonstration school in Santa Cruz, Bolivia, operated by the Central Mennonite Mission was immensely successful. It specifically developed programs for animal traction in small farms. A Canadian Presbyterian Church pig farm and adult school in South Korea used appropriate technology with considerable success; the program leaders addressed needs and used technology and resources of the local farmers.

Time does not permit me to develop this theme. I will leave it for others so that I may discuss the manpower development and deployment issue.

INADEQUATE TRAINING OF FIELD STAFF

This is the area in which I wish to concentrate my discussion. With few exceptions training of extension field staff in foreign countries has been woefully neglected or, when carried out, invariably of too general a nature to be relevant or useful.

Extensionists on development teams have generally been community development, 4-H, or communication media specialists. Infrequently, they have been food technologists, engineers, agronomists; and seldom plant protection specialists such as plant pathologists (a little bias here!). Let me expand on this thesis by focusing on a specific discipline, plant pathology.

Table 1. Distribution of Korean Pest Forecasting Staff by Training Subject Matter Areas[a]

Agronomy	89	Plant Protection	9
Livestock	15	Horticulture	6
Non-Agric.	13	Agric. Chemistry	3
Forestry	10	Sericulture	2
Total			147

[a]Compiled from personal history records, Office of Rural Development, Suweon, May 1974.

In my first assignment, Eastern Nigeria 1965-67, I encountered a host-country system that had no plant pathologist in the whole country much less an extension plant pathologist. In Thailand from 1968 through 1972, I found only one local person in extension with plant pathology training and he was an administrator. Korea until 1976, and presently, had no trained plant pathology staff in extension (Table 1). And my most recent experience up to 1981, in Bolivia, showed none! Don't plants have diseases in these countries?

W.M. Brown, Jr. is Associate Extension Professor, Department of Botany and Plant Pathology, Colorado State University, Fort Collins.

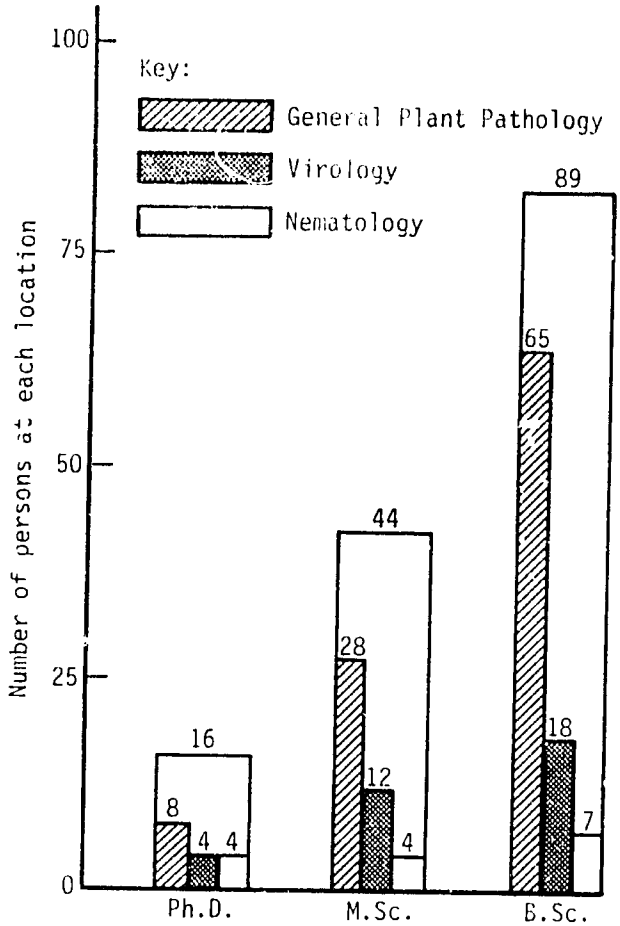

Figure 1. Number, level of training and area of speciality of Thai plant pathologists.

We must accept that in foreign countries students do not go into agriculture by choice. When they do, they certainly do not want to end up in extension! Granted there are exceptions. I have been privileged to work with a few such people but they were very few. It is necessary to acknowledge this fact before beginning to train or even contemplate training Third World extension people. This has been effectively accomplished, to my knowledge, in only two countries, India and Korea.

The first, India, established the Central Plant Protection Training Institute in Hyderabad in the mid-70's. The institute has developed a training curriculum for preparing newly hired extension and government staff to work in the field of plant protection. It is outstanding in its approach to applied training in a specific field that ranges from identification of pest and disease problems to repairing a back pack sprayer.

The second success I will discuss in more detail. By 1975, South Korea had developed the most effective extension plant protection program I have seen in a Third World country. We were able to train a diverse and poorly educated group of people and to develop relevant training programs for them to use. The programs consisted of small workshops and individual field "hands-on" efforts during the crop year. These programs were backed up by winter training sessions that concentrated on more sophisticated aspects of plant protection. This program evolved from a United Nations Development Pilot Training Project and extension effort called Selected Improved Forecasting Unit (SIFU). The basis, needs, and specifics of effective plant protection training were developed and piloted in this program.

In three years we developed a group of highly motivated and adequately- to well-trained field staff through intensive specific training programs and activities. Specialized training, such as ours, can take place and must take place, and should be given priority over other "immediate impact," high visibility activities generally promoted by AID and Third World administrators.

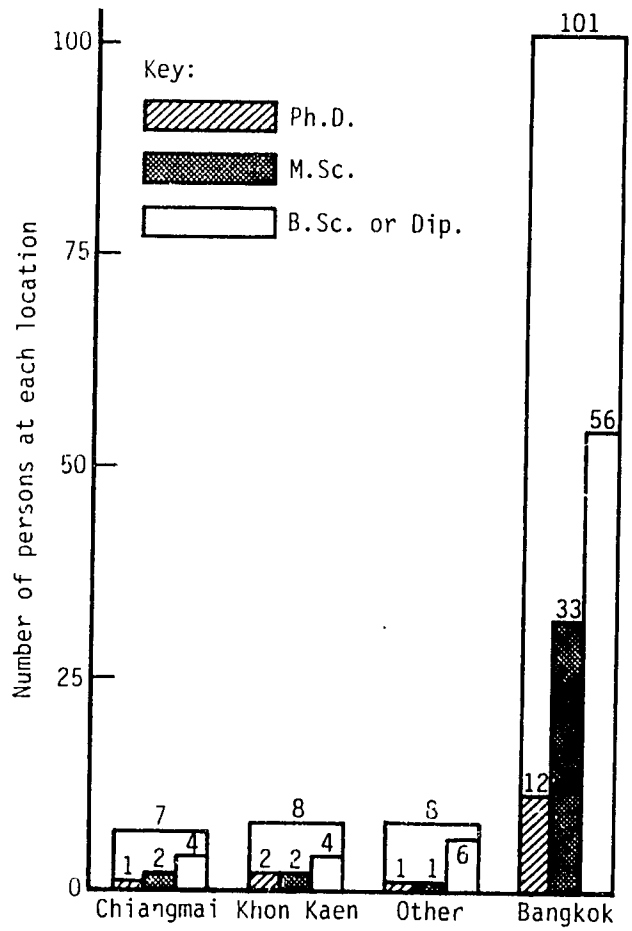

Figure 2. Location of plant pathologists in Thailand. (Does not include those plant pathologists presently overseas on graduate programs.)

Table 2. Background and Rank of Permanently Appointed Pest and Disease Korean Forecasting Staff[a]

	Si & Gun Units	P.O.R.D.[b] Guidance Bureau	P.O.R.D.[b] Research Bureau
Academic background			
College	10	9	9
H.S.	28	0	0
Government rank			
4-A	0	9	5
4-B	25	0	4
5-A	12	0	0
5-B	1	0	0

[a]Compiled from personal history records, Office of Rural Development, Suweon, October 1975.
[b]Provincial Office of Rural Development.

MANPOWER DEPLOYMENT

Inadequate manpower deployment is a universal problem. Frequently the person with subject-matter training wants to teach or do research. These people most often do not want to be posted to areas away from their country's cities or other desirable regions. My Thailand observations made me painfully aware of this (Fig. 2). I have found similar situations in every country I have worked in or visited. Yet Third World countries have a critical need for extension subject-matter specialists who are located in the field and accessible to support community extension agents. And these countries need people capable of communicating with both local agents and research staff at regional or national centers.

Table 3. Korean Forecasting Staff Background[a]

Academic level attained	Number
College graduates	34
College experience (not graduates)	5
Special 2 year training	7
High School	101
Total	147

[a]Compiled from personal history records, Office of Rural Development, Suweon, May 1974.

SUMMARY

There is a critical need for appropriate technology in international development projects. Too much emphasis has been placed on the "institution building" concept and not enough on implementation. Appropriate technology must be implemented at the farm level. The backstopping that the local extension agent receives from subject-matter specialists is often the weakest link in the system.

The highest priority for development activities should be subject-matter specialist training and deployment. This is not limited to plant pathology and plant protection, but to all fields of a specific nature upon which progressive appropriate agricultural technology depends.

We need to stop just dumping John Deere tractors, video projectors, and movie cameras, and begin to emphasize the human factor. Only when the staff capability is developed and deployed can appropriate technology transfer take place.

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Linking Extension with Farming Systems Research

WILLIS W. SHANER

THE PROBLEM

Those analyzing the plight of small farmers (i.e., farmers with limited resources) in the less developed countries (LCDs) often cite the ineffectiveness of the extension service. This ineffectiveness has been attributed to poorly equipped and motivated extension staff and to research unsuitable for small farmer's needs. Both reasons could be due in part to inadequate government coordination and support for extension and research aimed at such farmers.

In the desire to help correct extension's ineffectiveness, several groups--including those attending this conference--are seeking better ways to understand small farmers' conditions and to learn the causes of extension's ineffectiveness. Papers on this topic (e.g., Claar et al., undated; Swanson and Claar, undated) suggest the need to bring farmers, extension staff, and researchers closer together.

During the past decade an approach for helping small farmers in the LDCs, called farming systems research (FSR), began to attract considerable interest. Farming systems research focuses attention on specific groups of farmers whose homogeneity favors their adoption of similar technologies. This approach for generating and diffusing improved technologies offers new opportunities for integrating research and extension.

The following two sections draw heavily on a Consortium for International Development study of FSR (Shaner et al. 1982) funded by the United States Agency for International Development (AID). The first section describes our synthesis of FSR approaches; the second section contains some of my thoughts about the opportunities for further work in extension.

A SYNTHESIS OF FARMING SYSTEMS RESEARCH APPROACHES

While some such as Johnson (1982) argue that FSR is little more than farm management resurrected, others such as Dillion (1976), Norman (1982), and Hart (1983) counter that the approach *is* new. Dillion attributes FSR's uniqueness to its emphasis on a formal holistic approach involving systems analysis concepts and techniques, and the effective integration of social scientists with biological and physical scientists. Norman says that the application of the FSR approach is new for the conditions encountered in the LDCs. Hart points out that FSR pays particular attention to the study of how the various components of the farming system interrelate. Whereas the reductionist approach breaks the whole into parts as a means for concentrated study, the FSR approach helps bring these parts back together again.

More important than the debate over FSR's newness is its applicability for helping solve small farmers' problems in the LDCs and, within the context of this paper, its usefulness for improving extension's effectiveness. Below, I present a definition of FSR, some of its characteristics, five basic FSR activities, and some aspects of its implementation.

Definition of Farming Systems Research

Farming systems research is "an approach to agricultural research and development [of technology] that views the whole farm as a system and focuses on (1) the interdependencies between the components under the control of members of the farm household, and (2) how these components interact with the physical, biological, and socioeconomic factors not under the household's control.

W.W. Shaner is Associate Managing Project Director for the Water Management Synthesis Project and Associate Professor in the College of Engineering, Colorado State University, Fort Collins, Colorado.

Farming systems are defined by their physical, biological, and socioeconomic setting and by the farm families' goals and other attributes, access to resources, choices of productive activities (enterprises), and managment practices" (Shaner et al. 1982).

To date the "systems" aspect of FSR largely concerns identification of alternative types of farming and the attempt to encompass a broad, interdisciplinary approach; FSR has made little use of analytical tools of systems analysis such as mathematical modeling. Consequently, applied or on-farm research might be a better term for the approach than farming systems research.

Characteristics of Farming Systems Research

In the *Guidelines* (Shaner et al. 1982) we describe FSR as being farmer-based, problem-solving, comprehensive, interdisciplinary, complementary, iterative and dynamic, and responsible to society.

The farmer-orientation of FSR shows up in a concerted effort to learn about small farmers' conditions. This is accomplished through direct observations, discussions with farmers, questionnaires, farm records, experiments conducted on farmers' fields, and noting the farmers' reactions to proposed and actual changes. Through this process farmers become closely associated with the research.

The approach is problem-solving in that research teams categorize farmers and farmers' conditions so that responses to problems and opportunities apply to specific types of farmers. Generally, although not exclusively, emphasis is placed on improvements that the farmers will readily accept. These improvements at first tend to be one or two changes in technology that do not require major changes to the farmers' systems. Once the farmers become accustomed to the researchers' presence, more substantial changes can be proposed.

Farming systems research is comprehensive in that the farmers' whole setting is taken into consideration (but not necessarily researched). Thus, component technology or a cropping change, for example, is not proposed without knowing how that change fits the farmers' system. Researchers observe farmers' reactions to a change and listen to what farmers have to say about it. Farmers' acceptance or rejection of a technology and their reasons are the "acid test" of the researchers' work.

Because the farmer performs many functions, the research team must also be knowledgeable about these functions if it is to understand adequately the farmers' situation and be able to offer meaningful improvements. Not only must the research team comprise the requisite disciplines, it must also function in an interdisciplinary manner. By interdisciplinary, I mean operating so that the results of the team's efforts are greater than they would have been if the members worked independently.

Farming systems research is complementary in that it builds on the research, extension, and production work of others. Rather than trying to displace others' work, the approach trys to integrate it. Integration results because of FSR's comprehensive view and its reliance on interdisciplinary teamwork.

Farming systems research is iterative by initiating activities and proposing changes quickly and then by using these results to adjust its approach. Practitioners generally feel that on-farm research should be undertaken quickly--that research results are more effective in learning about farmers' conditions than are more carefully planned and drawn out studies. Farming systems research is dynamic in its phased approach for improving farmers' conditions--lessons learned from earlier research feed back into ideas for subsequent research. The approach is not a single, well-planned, carefully thought-out master scheme for improving farmers' conditions, but a gradual process that continually reevaluates research results and farmers' conditions.

The farming systems reserch approach considers not only farmers' immediate interests, but the broader interests of society, as well. While the targeted farmers may have short-term goals in mind, the researchers are obliged to consider the farmers' longer range interests, as well as the interests of others.

Farming Systems Research Activities

Figure 1 presents the five basic activities of farming systems research, which are: (1) target and research area selection, (2) problem identification and development of a research base, (3) planning on-farm research, (4) on-farm research and analysis, and (5) extension of results. Together, these activities interact with the extension service and the experiment station. The arrows in Figure 1 show the linkages among the activities, including the feedback from research results to previously completed activities. Below, the salient points for each of these five activities are described and related to extension's involvement.

Target and Research Area Selection: Farming systems research teams initiate this activity by aiding key decision-makers in choosing which areas and farmers are to receive the primary focus of the farming

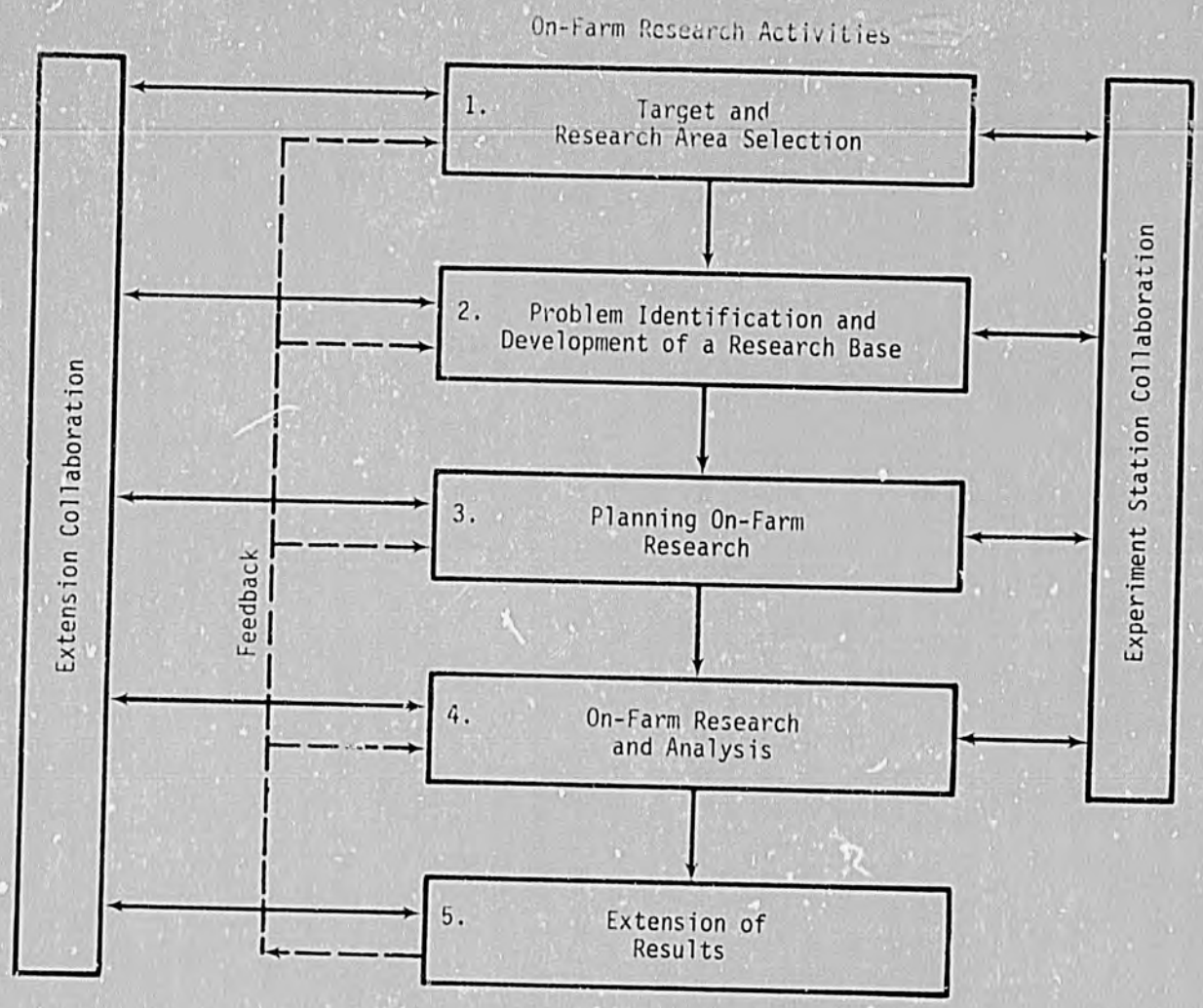

Figure 1. The five basic activities of farming systems research (Shaner et al. 1982).

systems research effort. Once a target area is selected, it is stratified into subareas according to critical physical, biological, and socioeconomic factors. The purpose is to obtain a reasonable degree of homogeneity in conditions so that introduced technologies will have general applicability for those farmers operating under similar conditions. (Note: while this intent is simply stated, its implementation still calls for substantial improvement in methods.) Researchers then choose the research sites, keeping in mind both the effectiveness of the sites for conducting the research and the importance of the subareas.

Extension staff should have an input to national objectives as concerns selection of target areas and farmer groups. The extension agents possess knowledge of local conditions that can be useful in the stratification process and in choosing the research sites.

Problem Identification and Development of a Research Base: Interdisciplinary research teams scout new areas, review secondary sources of data, conduct quick reconnaissance surveys, initiate formal surveys, carry out on-farm experiments, use the results from previous farming systems research activities, and by other means identify problems and opportunities for improving farmers' conditions. In the process, these teams build up their knowledge of the research areas. Problem identification that leads to opportunities for improving farmers' conditions through on-farm research and by other means is a continuing process whereby solutions to one or more problems lead to new opportunities for research.

Farming systems research teams engaged in problem identification and in pulling together information on an area would be made up of individuals from the relevant and

available disciplines. As a minimum, technical (physical and biological) scientists would be combined with social scientists. Agronomists are typically combined with agricultural economists (when the latter are available). Depending on the situation and their availability, the team may also include those with expertise in areas such as livestock, particular crops, pest management, irrigation, and sociology or anthropology.

One or more of these team members should come from the extension service. When the extension service has been active in an area, its staff will be able to guide the research team to identifying both the outstanding problems and opportunities for improvements. This staff will be able to introduce team members to the area's farmers and to representatives of relevant organizations. An advantage of involving extension at this early stage--besides the help it can offer directly--is the insight extension will gain by being present when farmers' problems and the opportunities for research are being identified.

Planning On-Farm Research: This activity sets the stage for the on-farm research program. Research teams review the problems and opportunities identified from the earlier activity, appraise their organization's capabilities, consider the applicability of available technologies, make assumptions about near-term conditions, set research priorities from others.

Here, too, the extension staff's knowledge of the local environment, farmers' preferences, availability of farm inputs, markets for crops and livestock, farmer organizations, local customs, and individual farmer characteristics all help in planning the research. While some of this information may be available to researchers--especially if they have worked in the area before--the extension staff will often provide a point of view and possess knowledge not necessarily available to a team made up only of researchers. For this and other reasons, extension staff should be brought into the planning process. Moreover, knowledge of extension's capabilities should be a factor in the type of research being planned.

On-Farm Research and Analysis: This activity centers on three types of on-farm research: research-managed trials, superimposed trials, and farmer-managed tests. The first is similar to research conducted on experiment stations, except that it is conducted on farmers' fields with the intent of learning how technologies are suited to farmers' conditions. The second occurs when researchers identify conditions in farmers' fields that are ripe for improvement. The third is an experiment managed by farmers in a way that allows the farming systems research team to learn how farmers react to proposed changes. For this type, farmers' modifications to the experiment are as important as the experiment's results.

An essential element of on-farm research is the monitoring of farmers' activities. The purpose is not only to keep track of the biological results, but also to learn more about the farmers' productive activities. Such monitoring is complemented by farm records--usually kept by farmers only for specific crops, livestock, or household activities, rather than for all. Farmers continue to keep these records after completing the experiments; and some farmers who do not participate in the experiments also keep records. These records provide long-run information on the area's farming practices--especially regarding changes resulting from farming systems research activities.

In addition, other research supports these on-farm experiments. Examples include follow-up surveys of household and farmers' production practices and experiment station research where especially controlled conditions are necessary, or where research on farmers' fields might jeopardize farmers' livelihood.

Extension staff frequently assist the farming services research team in monitoring farmer-managed tests--for several reasons. For one, the extension staff may be available for such work and know the participating farmers. These experiments are managed by the farmers and therefore do not call for the researchers' special knowledge, but when the extension staff is involved, more on-farm experiments can be undertaken. For another, by engaging the extension service at this stage, the government will be laying the groundwork for broad diffusion of technologies found acceptable.

Extension of Results: Extension of results refers to researchers' further investigation of technologies before transferal to the extension service. Before transferal, researchers will need to know how technologies found successful in the research area stand up both on broader and on more intensive scales.

Multi-locational testing provides researchers with additional information about technologies developed in the research area by testing them more broadly throughout the target area. This is a transitional step whereby minor variations in conditions under which farmers operate are coupled with the extension service's capabilities for implementing the technology. Even though the farming systems research team considered the services, general capabilities during the

planning stage, the team can be more precise at this stage because it knows the specific requirements of the proposed changes in technology.

Pilot production programs test changes in farmers' systems at a more concentrated level. These localized programs allow the proposed changes to be introduced to all interested farmers. Those farming in an area of 400 hectares, for example, make a desirable pilot group. The intent is to learn how the local environment reacts to introduction of a specific technology. Data are gathered on availability of material inputs and services, how production is marketed, and other changes occurring in the local area. Because extension and other organizations are actively involved at this stage, the transfer of technology is already underway. However, the farming systems research team remains active, as with multi-locational testing, to interpret the results, modify the technologies as needed, or even call off the technology's introduction should that be advisable.

Extension's involvement in this and the other four farming systems research activities is compared with research and other (e.g., production) activities in Figure 2 and described in Table 1.

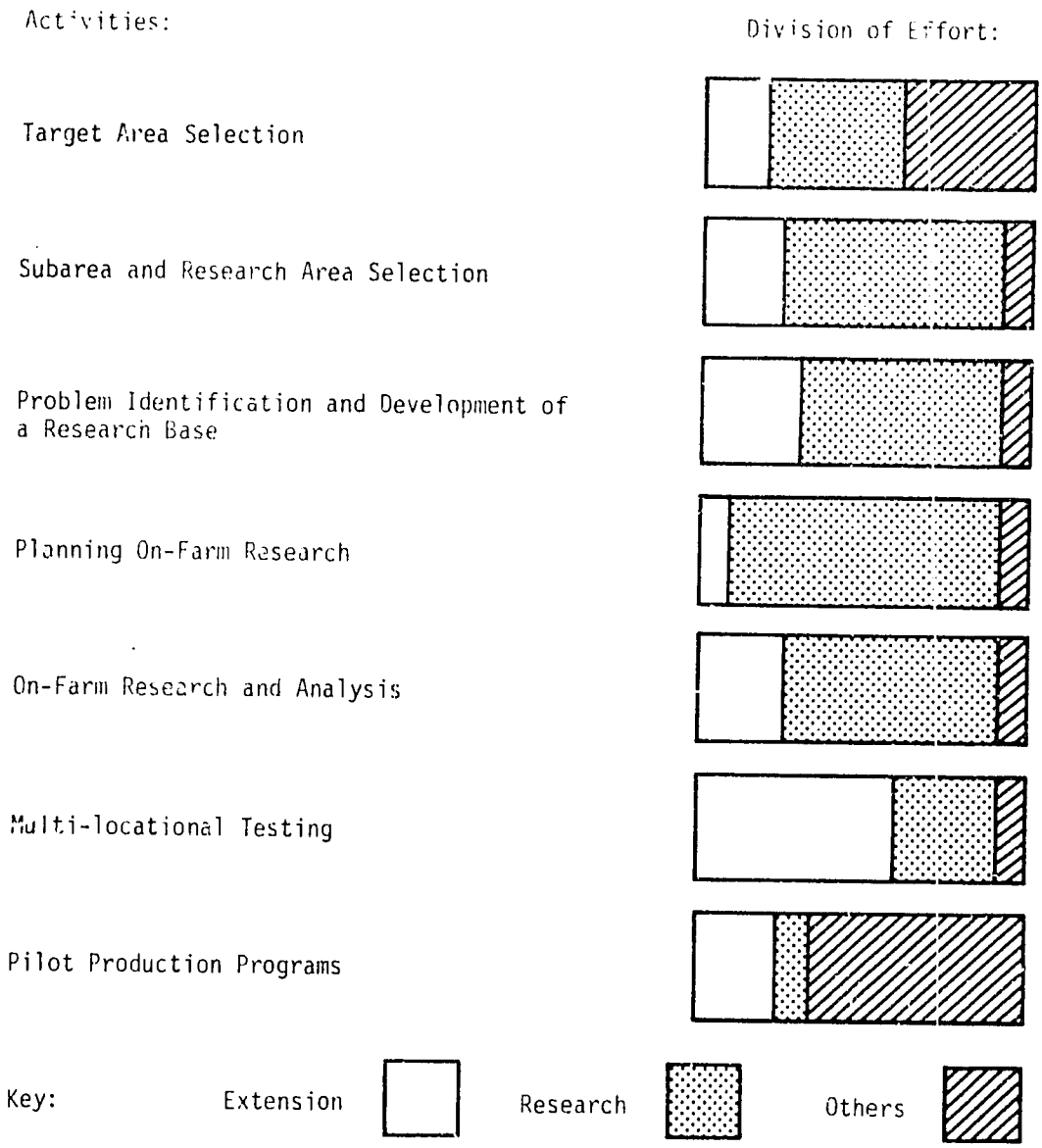

Figure 2. The division of effort between extension, research, and "others" for each activity in the farming systems research process. These are theoretically useful divisions of effort; the actual divisions of effort depend on the specific conditions in each country. "Others" include those such as national decision makers, production program personnel, farmers, and representatives of farmer organizations (Shaner et al. 1982).

Table 1. Extension's participation in each of the farming systems research activities (Shaner et al. 1982).

ACTIVITY	EXTENSION'S PARTICIPATION
Target Area Selection	• Suggest relevant criteria for target area selection. • Cooperate in assembling and analyzing secondary and primary data for target area selection.
Subarea and Research Area Selection	• Cooperate in choosing the relevant criteria for subarea and research area selection. • Cooperate in assembling and analyzing secondary data and in making preliminary surveys, especially in selecting and locating farmers and other interviewees.
Problem Identification and Development of a Research Base	• Help researchers become familiar with local conditions and establish contacts with farmers and others. • Cooperate in assembling secondary data and in making the reconnaissance survey. • Participate in problem identification. • Provide comprehensive outlook of farming and community systems.
Planning On-Farm Research	• Contribute knowledge of current farmer practices and farmer's environment. • Help in making farmer surveys. • Provide feedback from farmers to researchers and vice versa.
On-Farm Research and Analysis	• Help researchers select farmers for trials and tests. • Assist in supervision of farmer-managed tests. • Check on farmer acceptance of new technology. • Provide feedback from farmers to researchers and vice versa. • Help in making surveys and special studies, supervising farm record keeping and climatic monitoring. • Organize field days on trials and tests in farmers' fields.
Extension of Results	• Assist in selection of farms. • Help in supervising tests.
Multi-Locational Testing	• Cooperate in adapting new technologies to different conditions. • Provide feedback from farmers to researchers and vice versa. • Help in preliminary packaging of the new technology for diffusion, and in developing preliminary transfer methods.
Pilot Production Programs	• Help determine feasibility of new technology on intensive scale. • Assist in defining and coordinating tasks of cooperating institutions. • Help finalize packaging of new technology and transfer methods of widespread diffusion.

Implementation of Farming Systems Research

In its simpler form, farming systems research is interdisciplinary, on-farm research aimed at improving conditions for targeted groups of farmers. Implementing such a program calls for care (1) in identifying enough farmers so that the approach is cost effective, (2) in assuring that the government provides the field teams with the requisite resources to carry out their tasks and with incentives sufficient to maintain their interests, (3) and in allowing the teams enough time to develop an interdisciplinary approach. Within this general framework, FSR can be introduced in a variety of situations. This variety applies to the types of programs, organizations, and staffing (Shaner et al. 1982).

Within this flexibility for introducing farming systems research activities, FSR leaders should concentrate their early efforts in providing an effective training program for those being introduced to the approach. Because of the importance of training in FSR--both to researchers and to extension staff--I have chosen to expand on this aspect of FSR's implementation. My comments draw heavily on information obtained from the FSR programs in Guatemala (Ortiz D. 1983) and Honduras (PNIA 1980).

Paramount in training both the researchers and extension staff is assuring that they become willing to respect and thereby learn from the farmers. The Guatemalan and Honduran training programs help bring this about by having the trainees perform each of the farming activities of an experiment. For example, if the farmers plant with a stick, so do the trainees. In other instances, the trainees meet with farmers in their fields to learn what the farmers have to say about identified problems. Later, the trainees will discuss the same problems with staff from the experiment station and from FSR's regional and national headquarters. In this way, the trainees learn about the complementarity of the "streetwise" farmers' knowledge and that of the scientifically trained researchers (Winkelmann and Moscardi 1982). They also learn the importance of having farmers take part in the research process.

After the Agricultural Science and Technology Institute (ICTA) in Guatemala had begun training its own staff in the farming systems research approach, it signed an agreement to train portions of extension's staff, also. Besides field and classroom instruction, each trainee was given a plot of land on which to conduct his or her own experiment. By being responsible for all phases of the experiment, including marketing the experiment's output, the trainees better appreciated the farmers' full range of circumstances.

Details of the Guatemalan and Honduran training programs, which last about nine months, are contained in the *Guidelines* (Shaner et al. 1982). The on-farm training programs of other institutions, including the International Agricultural Research Centers, are also described in this publication.

Researchers trained and experienced in farming systems research procedures can progress up the research ladder--from being field team leaders to occupying positions at the regional or national headquarters. Extension staff so trained will more likely be noted for their understanding of the FSR approach. In the *Guidelines* we designated one who acts as a liaison between research and extension as an extension specialists in farming systems (ESFS). Those in extension who wish to maintain their involvement with FSR can continue as members of FSR field teams, become ESFS on regional or national FSR teams, or return to the extension service to help that organization effect the broad-scale diffusion of technology.

OPPORTUNITIES FOR FURTHER WORK IN EXTENSION

The foregoing effort in farming systems research concentrates on applied, on-farm research; it stops short of extension's role in conveying research results to broad segments of farmers. Of course those in farming systems research realize the demonstration effect of conducting on-farm experiments--whether for good or for bad. The bad can occur when farmers attempt to imitate practices still subject to modification or rejection by the research team.

While not considering FSR's full range of implications for extension, farming systems research practitioners generally recognize extension's importance. For example, Harwood (1980) commenting on the area specificity of FSR says that the "primary end goal . . . is agricultural development of a particular geographical region or district." He goes on to say that while "the program may be called a research program, it has a responsibility for extension linkages, outreach testing and verification, and successful implementation of the recommended technology. The primary goal includes an element

of successful extension." And "the research-extension linkages can be maximized in on-farm research. Extension specialists should participate in the on-farm research. Verification trials are often used for extension demonstration purposes, with the research and extension functions being intermingled."

Concerning verification testing (farmer-managed tests in FSR parlance), he continues: "Following two or more years of successful research testing of new technologies (with participation of extension staff in the research), the trials are then carried to similar farms in representative areas of the agroproduction complex. The role of extension becomes progressively more dominant as this phase is entered, since these trials usually will serve as demonstrations prior to an all-out extension effort. A regional extension person will usually have been assigned as a member of the farming systems research team. He will have trained other extension workers in the technology and its testing in the research villages. The extended verification testing may be done either under extension or research direction. There will almost always be research participation by members of the FSR team, whose role has begun to change. In the verification stage, the options are limited in number and the trials simple but in many locations." (Note: this extended verification testing is the multi-locational testing described above, which conforms with the description by Zandstra et al. 1981.)

Hart describes the relationship between FSR and extension in the following way: "farming systems research is a process that moves from general to particular (area selection, identification of target farmers, specific constraints, etc.), while extension moves from the specific to the general--the goal is to transfer technology to all farmers where the technology is appropriate" (Hart, 1983). Seen as a continuous process, extension activities flow out of the FSR effort. Extension's goals provide early inputs to FSR, and extension staff maintain sufficient involvement in the research process so that the transition from research to extension is gradual and uninterrupted. And, since "the information that moves from the farmer to the researcher usually includes a detailed description of the farmers' present system, and of the farmers' perceived problems, constraints, goals, and objectives, the technology that is generated is highly likely to be adopted" (Hart 1983). Although Harwood describes integration of FSR with extension, Hart notes more realistically that most "institutions with farming systems research programs usually add on a 'technology transfer' step after on-farm validation. But his [Harwood's] last step in the methodology often exists on paper only" (Hart 1983).

In the light of the frequently stated need for improved approaches to extension in the LDCs and the conceptual yet inchoactive linkages between farming systems research and extension, the International Program for Agricultural Knowledge Systems (INTERPAKS) proposal for further work in extension (Swanson and Claar undated) seems timely. Below are some of my thoughts in this regard.

First, I concur with an objective of this meeting that states that we "should focus on an indepth look at various extension methods currently utilized in international development and examine them in the light of actual impact upon the farmer and upon the role that must be played by extension in linking farmer problems back into the research establishment" (Watts 1983). Compton (1982) points to extension's role as helping "bridge the social, cognitive, and geographic distance between a small group of scientists and a large farming community by selecting or designing methods most appropriate for particular message content and the farmers' state of readiness." The farming systems research focus on understanding farmers and their settings, identifying farmers' problems, and designing and implementing on-farm experiments in cooperation with farmers provides the framework for the extension inputs that Compton suggests.

Second, the proposed research in extension might consider looking at FSR experience to learn the extent to which Harwood's description of extension's integration with research is in place or whether, as Hart suggests, the integration is mainly on paper. Our *Guidelines'* presentation of extension's role in FSR rests more on the practitioners view of what extension's role ought to be than with accomplished fact. However, ICTA did indeed give training to Guatemala's extension service (DIGESA) and otherwise enter into agreements with that organization to help integrate the country's research and extension efforts. Also, collaboration of sorts between research and extension was mentioned by those we contacted in Brazil, Honduras, El Salvador, and Senegal--to name those I remember. The nature and extent of this collaboration deserve further study.

Third, the INTERPAKS proposal to AID undoubtedly is correct in pointing to the potentially important role of the private sector, especially in input supply, output marketing, processing, and transferring new technology components. But the social, economic, and political environment within which the private sector operates varies from country to country. Instances arise

whereby the private sector has not served the farmers' interests well--whether from its own shortcomings or from inadequate government policies. As is well known, the private sector in the United States evolved out of conditions often drastically different from those encountered in the LDCs; and over the years the United States government has bridled our free enterprise spirit through antitrust regulations, unfair trade legislation, and the like. In short, I would prefer to see an approach that (1) explores the opportunities for involving the private sector in agricultural development, (2) documents instances where the private sector has been particularly successful, and (3) relates these successes to the relevant social, economic, and political conditions that prevail.

Finally, the synthesis of farming systems research methodology recently completed by the Consortium for International Development might be of some use in implementing INTERPAKS' proposal. To begin, AID intentionally limited the scope of the FSR study to the point at which research results are transferred to the implementing organizations. While research results are transferred, at least in part, through the involvement of extension staff in each of FSR's activities, our work stopped short of identifying the methods of diffusion suitable for extension or other implementing organizations. Nor did we give more than cursory attention to the types of extension organizations. Thus, the study of extension methodologies appropriate for LDC conditions remains to be done. In fact, Ken McDermott (AID/Washington's project monitor) justified the limited scope of the FSR project by saying that a similar study of extension is justified in its own right.

Due to the apparent similarities between the two studies, those who will manage the proposed extension study might want to consider some of the approaches followed by the farming systems research study team. For instance, we began with a worldwide reconnaissance of research aimed at improving conditions of the LDCs' small farmers. Little had been published in this area, progress in FSR was occuring rapidly, and research efforts were largely dispersed and uncoordinated. Such a worldwide investigation to gather source documents and to talk with FSR researchers and administrators was, in our opinion, essential. An important adjunct to this approach was our convening of strategic meetings of FSR practitioners to review our findings and offer suggestions. The focus of this effort was to produce a set of guidelines on FSR methodology suitable for the varying conditions encountered in the LDCs. The result was a logical framework of general principles and procedures backed up with examples of specific situations.

A similar approach for the extension study might be to pick up from our study (at the interface between research and extension) and carry into extension methods and organizational issues. Extension approaches that deserve further study are, for example, Benor and Harrison's training and visit system currently being applied in India with support from the World Bank, the Chilean experience in extension as implemented with the help of the University of Minnesota, Roskelley's Farmer Scholar Program applied to the Philippines, and the experience of Brazil's own department of agriculture. Undoubtedly, many other examples could be identified.

Contacts might be made initially with organizations such as the International Service for National Agricultural Research (ISNAR). This organization was recently initiated by the Consultative Group on International Agricultural Research to help research organizations in the LDCs. While ISNAR's focus is on national research, its contacts in the LDCs could provide information on extension's needs.

The output of this extension study might be a set of guidelines on extension methods suitable for national LDC organizations whose responsibilities center on helping small farmers. To paraphrase from our farming systems research study (Contract No. AID/DSAN-C0054, September 1981), the objective could be to

> synthesize a set of integrated, multidisciplinary extension methodologies adapted to the personnel and financial constraints of the LDCs, packaged for easy delivery in the form of a comprehensive handbook or handbooks to LDC institutions.

Such a study could probably be completed in about 2.5 years for approximately $1.5 million.

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Summary and Comment

ELDON L. JOHNSON

This summary, with some gratuitous comments, is an attempt to string together the myriad pieces of presentation on the thread of problems identified as needing attention, clarification, research, or resolution. Other threads could have been chosen with different results. Written pieces speak for themselves and are not separately summarized. Likewise, no personal attribution is given. Finally, I offer apologies in advance for the monumental omissions that are inescapable.

First a word should be said about some sources of confusion. Language itself, particularly when employed in labeling can be a vehicle for analysis and clarification, but also one for obfuscation, even if unintended. So we discussed whether "extension" is different from "agricultural knowledge systems" and how; whether "farming systems research" is a new label for something old; and whether management systems can best be classified into these three categories, or those four, or the five of Niels Roling and his Dutch colleagues. Confusion sometimes arose when discussion of a particular piece and then of the total, or of the general and then the particular, were indiscriminately mixed; from pursuit of widely varying but unstated assumptions about objectives; and from easy extrapolation from domestic experience to overseas application. Many of these problems of clarification will undoubtedly persist in this summary.

It should also be noted that the perspectives brought by the discussants come from backgrounds of extension and nonextension, of scientific and behavioral disciplines, and of domestic and overseas experience. They reflect the views of administrators, field workers, researchers, teachers, and subject-matter specialists. The common focus is an interest in understanding and improving agricultural extension processes and systems--particularly in the developing countries--using "extension" in the broadest possible sense.

The proceedings, except for "constraints" separately covered, are hereafter summarized under ten headings.

IDENTIFICATION AND AGREEMENT ON OBJECTIVE(S)

Someone said, "The model of extension is appropriate *whatever you call it*." Nevertheless, there was ample disagreement about focus, goals, roles, targets, outputs--or whatever else defines the *mission* to be undertaken in extension or technology transfer systems. Sharp mission statements are common in these systems at home, which makes the ambiguity abroad more puzzling. Whether we are too general, too ambitious, too open to doing good for all, or something else, we seem to need better closure on what we want to have happen, what extension is for, and to whom it is addressed. Or do we simply need a mechanism or method for perpetually setting and resetting our goals?

Evidence of this ambiguity is present in much discussion about polarities: growth (production) and equity (income enhancement); rich and poor; mere dissemination and actual adoption; high access and low access farmers; homogeneous and heterogenous farm populations; motivation to respect human rights and to avoid revolution; commercial farmers and subsistence farmers; closed and open societies; and the public and private sectors. Other evidence comes from unstated assumptions about who says so--who is the source of the objectives: the government, the extension agency, the foreign donors, or the farmers? *Whose* agenda? It makes a difference, with different missions emerging.

The discussion implied need for clarification of objectives, or agreement before action is undertaken in any given context, which in turn implies recognition and definition of roles of all the actors (from policy level to farm level) through some established and ongoing mechanism.

DELIMITATION OF THE MISSION

This is the reverse of the above. If is is important to know what to undertake, it

E. L. Johnson is Vice President Emeritus, University of Illinois.

is also important to know what *not* to undertake. One comment appropriately indicated, "Extension is not for all problems." It should consciously and planfully opt out of some situations. One provocative line of reasoning was that extension programs under U.S. auspices simply should not be undertaken in countries where certain minimal managerial standards and democratic processes do not preexist. Many comments pointed to the need for sharp focus on educational processes, and exclusion of such noneducational roles as regulation, supply of inputs, or enforcement of government policy. More uncertain extension roles, such as possible aid to farmers displaced by agricultural development, were also discussed.

CONCEPTUALIZING AND MODELING THE SYSTEM FOR A "SYSTEMS APPROACH"

In order to discuss a systems approach, we must begin by understanding the necessary ingredients, factors, components, linkages, and phasing or sequencing. All of our discussion here assumed the systems approach. That was both stated and implied by emphasizing that extension cannot either be blamed for all ills, because of the interlocking total pattern, or be fairly judged outside this multifaceted system of which it is an integral part. That being so, what are we talking about anyhow? Another buzz-word? Possibly so until we delimit, get a handle on it, and set some boundaries. Talking of a "system" is like taking an oath to tell the truth, the whole truth, and nothing but the truth--taken literally this would cover the whole universe because of its inherent interconnectedness. So what *are* the other factors? What *is* the package we keep implying or seeking? Beyond necessary centrality, what else has to be added; and what is enough but not too much? There is danger of including too much but also danger of shunning the troublesome--like the political component--despite its determinative capacities.

What kind of a system model is feasible? Can it be universal in view of all the differences by country, by problem, by commodity, by economic level, and so on? Must it be country-specific or culture-specific or problem-specific? Or can the model have central minima of universal applicability with a mix of appendages added for particular situations?

That the systems approach has many valid configurations and subsets was shown by the special attention given to farming systems research and extension. This household-level approach is a micro system in comparison with the macro system conceived above. Yet this type of research is suggestive for other levels, and what is learned at this micro level can be used also at the macro level--in fitting disciplines together, in organizing manpower (including specialist and generalist), in ordering the relations between research and extension, in charting strategy, and in fitting methodology to problem.

ISOLATING MINIMAL CONDITIONS FOR SUCCESS

The above problems cry out for what has to be the first step: determination of what is central and indispensable for successful results. Some of the presented papers attempted to compile useful lists of the minimal conditions, producing one list of general minima and one of management minima. Such analytical efforts and outcomes are useful for all working parties overseas--the extension consultants, the donor agencies, and the host governments. They may be used even to determine whether an overseas project should be undertaken at all. Also, they clearly show how elusive agreement on a final list is going to be, as they graphically show the nature of "the real world" out there--the world of more than one ideology, more than one place for the individual, more than one way to organize mankind for problem-solving. So there are questions of what and whose standards should determine the minima for success, and what to conclude about their validity if "they" and "we" (countries, governments, officials) do not agree.

More research might show the extent to which a single list can attain universal applicability and, short of that, suitable alternatives for different economic and political contexts. Usefulness might be enhanced also by explicit statement of the underlying assumptions.

STRUCTURAL OR ORGANIZATIONAL PROBLEMS

Given whatever organization exists for agricultural development, where does the extension or knowledge and technology

transfer function fit in and relate to all else? There are many options to be considered and many decisions to be made if optimal possibilities are to be realized.

In the world as a whole, U.S. domestic experience is atypical. The more common pattern of extension organization relies on the regular civil service structure (i.e., on the ministries of agriculture and of related natural-resource functions). The U.S. relies on a variety of mechanisms to produce relative autonomy, intergovernmental checks and relations, and primary responsibility through the land-grant universities, with integrated research, instruction, and extension.

Organization is a way of ordering necessary relationships among the components of the agricultural knowledge and technology transfer process--the officers and their clients, the headquarters and the field, the knowledge sources and their application, the producers and consumers of information, the subject-matter specialists and farm agents, the handed-down policy and the fed-back response.

There are, therefore, both big and little organizational decisions to be made. First is the overall type, about which one paper explained the merits of three general forms: the conventional agricultural extension model as in the U.S.; the commodity-targeted approach (e.g., targeted on rice or maize); and the integrated, holistic, or systems approach.

Then there are external questions of linkage with the research organizations and internal questions of how much to centralize and how much to delegate downward. If extension has to be a working part of a larger whole, what is to be the balance among the parts? That balance cannot always be the same.

Should extension be dominant "in its own right," with much autonomy and flexibility, like the U.S. model? If so, in what situations? If not, how can it best relate in a less-dominant or a supporting role, as conveyed by the symbol FSR/E (farming systems research/extension)? In fact, considerable discussion centered on the meaning and perhaps propriety of the slash mark when the case is made for extension to be *in charge* of FSR. "Who is in charge?" and "Who is accountable to whom?" are pervasive questions calling for clear answers. Concern was expressed that we have not yet worked out the extension role and the organization that the international research centers (or for that matter, the national and regional research centers) need for dissemination, adoption, and feedback.

The world presents a wealth of organizational experience in knowledge and technology transfer. The European colonizing countries left their heritage, with the British and French being different. United States evolution of continental proportions has spawned a unique complex of structural relations. External donors and technical assistance agencies have promoted one or another scheme, as the World Bank has promoted the train and visit system. The developing countries themselves, rather than being mindless importers, have shaped eclectic systems to their special needs. Out of this, what have we learned? What do we now choose?

MANAGEMENT PROBLEMS

While many management problems were mentioned and could be classified in various ways, there was no great qualitative emphasis on this area as a constraint to success. Both the human and nonhuman sides of management were discussed. Strong emphasis was placed on "humanizing" whatever system is used--not neglecting the human resources and factors. All the other components, if they are internal, are brought into play by the human actors. People make the difference, since they make the decisions. Therefore, more attention is needed on what has been called the "human capital" in economic and agricultural growth. This includes education, staff recruitment, in-service training, career development systems, personnel incentives and rewards, and a people-related environment. On the nonhuman side, discussion touched upon the whole gamut of common managerial needs, from budgets to equipment and reports.

Two subsets of issues were treated, but with less feeling and concern than might have been expected. They were client participation and the instructional dimension to staff development. Harnessing the resources of women and youth as critical parts of the rural clientele was a kind of taken-for-granted implication for much of the conference and rose to explicit attention only late in the proceedings. A more dominant refrain dealt with "client participation" that identified "farmers" and "small farmers particularly," usually without stated awareness of sex and age. The reiterated emphasis on communication, on feedback, on local organizations, on indigenous resources, and on farmer participation shows no neglect of this crucial management factor, but perhaps lack of explicit attention to the human components making it up. Therefore, getting more *explicit* awareness may be the problem and the solution as seen by some.

In the original conference planning, the instructional dimension of staff development was to have equal billing with the research dimension--the education of extension personnel in the colleges and universities (the curriculum and degrees) and the ongoing training-on-the-job (short courses, seminars, and workshops). The importance of formal and nonformal instruction was probably muffled here because the conference focus was later deliberately restricted, as reflected in the opening papers.

EVALUATION AND MONITORING

This is another management tool, but it received enough attention to deserve mention on its own. The circle of progression from goal-setting to output at the targeted point is not closed until a means of feedback is built in--a means of interpreting and assessing what worked and what did not work. It needs to be built in and continuous. It also needs a discrete, periodic, armslength, long-term dimension. Without such mechanisms, institutions or systems suffer from lack of base lines and institutional memory, as is often illustrated in donor agencies (like USAID) that finance extension programs abroad.

Among the many critical questions are *who* does the evaluating, by what standards--internal or external, and by criteria set independently or with substantial staff participation (with the risk, as someone put it, of setting the fox among the chickens)? Confirming the devotion to the systems concept, agreement was readily reached on the need to evaluate extension and research together, since they are a continuum, and to see extension in a balanced role with the other components of the system.

POLICY INTERACTION AND RECONCILIATION

Extension in every country, and extension advisers going into any country, must operate in a policy context (i.e., within the governmental policies of the host country). Discussion showed that this is a pervasive problem, sometimes troublesome, always risky, and usually approached with caution if not trepidation. Attention may well be directed to an area that is more value-landen and controversial than the usual more objective "scientific" and "economic" considerations--that is, to political considerations.

We do talk about "policy and extension's relation to it, but we easily forget that policy is another name for politics--that it is what politicians decide to do in a country. We recognize government policy as part of the context in which extension people--theirs and ours--have to work; but there we encounter several dilemmas. First, we have learned at home that extension must "stay out of politics" and not be the instrument of government programs and policy; but in another country we do not hesitate to say that certain policies must change for extension success, thus putting extension workers at odds with the government they serve and we at odds with our own home standard. Second, we have learned abroad that food policy--the bottom line, life and death--is too important to escape politics. It may, in fact, be the essence of politics. It is an axiom of human social behavior that what is important enough will "get into politics."

Assuming we know the absolutely minimal conditions for an effective extension system, we surely ought to press hard for them; but if that is a justifiable end, do we know enough about the effective means? Some clusters of questions arise: (1) When we go into a country, what do we accept? Anything? How much? How much would we insist on changing if asked to help improve the knowledge transfer system in the Chinese communes? How much would we decentralize in a nation that lives by its tight unity at the top? (2) When do we say,"Do this or we won't play ball?" And when do we work with what we have and can tactfully get? In other words, is there a place for incremental change instead of upheaval? (3) In a controlled society, what processes *do* we need if we cannot use our own, unchanged? Is there no alternative in alternative situations? (4) How do we make the bottom-up approach work where everything else is top-down, without being seen as destabilizers?

Another dimension of the policy problem overseas is introduced for external advisers or technical assistance staff who are under the auspices of a foreign government. They enter the developing country under the policies of the sponsoring government or donor agency. Beholden to such external policies of national self-interest, defensible though they may be, the expatriate staff may not only be affected in *how* to help the host country but even *whether* to help at all.

Given the nature of most of the world, it would seem that the wisdom of Solomon is needed. Short of that, can more pragmatic techniques be used in environments often

hostile to both our economics and our politics? At least, that is a question that has to be resolved in particualr overseas situations.

STRATEGY FOR OPERATION

Much that has been said--about conceptualizing, setting goals, fixing organization--calls for conversion into operations in concrete contexts with concrete problems. The most vivid impression left by the conference is of the complexity and the array of choices to be made and priorities to be set. Understanding this complexity leads to generalizations. But operational stategy calls for particularities, for the right fit, for what is appropriate--in this problem, at this level, with this organization, for this country. There are plenty of pieces--nations, actors, targets, agencies, methods, values. There is plenty of experience worldwide. There is plenty of need recognized. The challenge is to make the choices, and to put it all together in manageable form for the problem addressed or goal sought.

Such capacity for decision-making and planning amid complexity is the human component--as that component, in another form, is the object of all our efforts. A large matrix of all the variables might be devised for better illumination of the choices as influenced by conditions; but taking choices off the matrix to apply to problems on the land will still depend upon human ingenuity.

The task of knowledge and technology transfer is not impossible. It takes place all the time in all countries, however ineffectively. Doing it *better* is the challenge.

NEED FOR CASE STUDIES

Light would be thrown on many of these problems if case studies were to be made around the world for comparison and identification of common ground and of successes and failures. The present need for capitalizing on, and learning from, this rich experience is recognized by the World Bank, USAID, the foundations, university scholars, and the potential users around the world. The research possibilities are enormous. Such studies would enrich the literature; enlighten governments, extensionists, and donors; and ultimately help the rural household.

CONSTRAINTS

The conference plan also called for special attention to the constraints standing in the way of successful knowledge and technology transfer in agricultural development. The original idea was to have several participants from varied disciplines and with overseas experience identify what they had seen as the major obstacles. Then the commonalities could be derived. While that format did not prevail, plenty of constraints were identified, and all are grouped together below. I present them without elaboration, without ordering by importance, and often without clarity as to who is addressed.

- Limitations in national policy on agricultural development.
- Inadequate human capital development--in recruitment, training, deployment, incentives, and career protection.
- Lack of cultural understanding.
- Inappropriate technology.
- Absence of locally credible means of communication.
- Poor problem identification.
- Use of inappropriate strategies for change.
- Neglect of the ultimate target, the farmer, who may be at the end of the canal or pipeline, getting water but not information or help.
- Government disposal of materials or inputs not of knowledge and application.
- Too little agent contact and presence in the field.
- Interagency friction and non-cooperation.
- Poor use of available resources, like the private sector.
- Misuse and misdirection of extension methods (e.g., power vs. persuasion, where each has legitimate uses).
- Inadequate roles in international, national, and regional research centers.
- Too many diversionary intermediaries before the farmer or user is reached.
- Hampering effect of slow validation of research results.
- Too little use of local organizations and social structures.
- Lack of empathy with local people.
- Lack of effective subject-matter backup.
- Inappropriate expectations.
- Insufficient feedback mechanisms.
- Inadequate strategy for operation.

As you can see, some are external and some internal, a classification of obvious usefulness, but that is left for the user to judge in the particular context.