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Socio-cultural Effects on the Farming Systems Research and Development Approach

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SUMMARY

Improving the lot of small-scale farmers in developing countries is receiving considerable attention from national and international agencies world wide. Approaches to research and development that have the small-scale farm in mind have been improved over the last decade, to the extent that it is now possible to review the major lessons for the advancement of methodologies in what is known as farming systems research and development (FSR&D).

This paper describes FSR&D as a concept and a process, the presumptions underlying the FSR&D approach and a basis for seeing FSR&D as a form of technology with its own cultural attributes, i.e. values, beliefs, expectations and rules of behavior. Key areas are

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identified where FSR&D differs from more traditional research and development (R&D) work in agriculture. Then key points are explored where the inherent cultural attributes of FSR&D may be in conflict with the culture of the host country where an FSR&D team intends to operate. In conclusion, suggestions are made as to what a team might do to adjust FSR&D methodologies to be compatible with the host culture.

INTRODUCTION

The major purpose of FSR&D is to help small-scale farmers with limited resources, who have gained less than larger farmers from agricultural research. Lack of appropriate technologies, combined with a tendency by the public sector to direct its research, development and extension services towards large-scale farms, have contributed to a bleak picture for small-scale farms in most countries.

More suitable approaches to research and development with the small-scale farm in mind have been in progress for over a decade, so that it is now possible to review the major lessons and insights to date for methodologies in what is known as farming systems research and development (FSR&D).

The approach suggested in this paper, however, may be somewhat different in that an attempt will be made to describe how FSR&D as a methodological approach has a set of cultural attributes, i.e. values, beliefs, expectations and rules of behavior. It is the authors' thesis that all methodologies have cultural attributes. In helping to deal with 'transfer of technology' issues relating to agricultural development, it may be useful to examine what kind of culture is inherent in the process technologies that may be transferred.

First, definitions of a few key concepts will be offered.

DISCUSSION OF CONCEPTS

Culture

Although hundreds of definitions of culture exist, there are two broad orientations. In the first, culture is defined as including all those ideas, values and behavior patterns that are socially transmittable (Binford

1968; Harris 1968; Meyer 1971). In the second, more restrictive sense, culture is the ideational domain of a social group (e.g. Parsons & Shils 1951; Goodenough 1971) — the sense in which the more recent literature generally uses the term. Hofstede's (1980) definition will be used in this paper: Culture is the '*collective programming of the mind, which distinguishes the members of one human group from another*'.

The mind of a people is 'programmed', through group socialization, in three specific mental emotional processes: the values, beliefs and expectation systems of the group.

Values help a group strive for some future state (health, spiritual fulfilment, better food supply, wisdom, peace, etc.), or specify attributes of relationships among people judged as worthy, right or wrong. A group's value system is considered by some to be the most basic aspect of the notion 'culture' (see Parsons & Shils, 1951; Hofstede, 1980) and that part of culture from which other parts are derived.

Belief systems are what a group accepts as true and existing. Beliefs include a group's trust and faith that certain types of people, spirits, thoughts, animate and inanimate objects and processes such as change, learning, development, death and growth exist and are true principles which do, or should, guide behavior. Beliefs also suggest relationships, some of which are cause/effect relationships among people, things and processes.

Because people become familiar with behavior patterns and learn to construct rules for effective interaction they build expectations about how certain individuals should act in specific situations. For example, there are differences in what is expected from religious leaders and government officials.

Expectation systems are a group's anticipation of the behavior most likely actually to occur, if certain circumstances are brought about (Finn, 1972). As Hofstede (1980) so aptly puts it, 'social systems can only exist because human behavior is not random, but to some extent predictable'. A group's culture provides expectation systems that make prediction of patterns of human interaction possible.

Culture has its own systemic pattern (i.e. a patterned arrangement of perspectives by which people make judgments about what is appropriate and inappropriate relative to life situations). Each group communicates its culture, using symbols and signs to make its meaning of reality understood by others in the group, to include telling when events start and stop, how events and objects are to be classified, what significance an object, event or behavior has, and how to distinguish between states such as safety/harm, wisdom/foolishness and wellness/illness. Cultural systems constantly change and adapt, yet also find ways to conserve and preserve their core of meaning (Wilson, 1980).

Society

'Culture' and 'society' are not the same constructs. By a society is meant the observable patterns of the organized life of a group. Factors present in organized social interaction include: (1) fairly specific functions or purposes, (2) associational norms, (3) associational states, (4) authority relationships, (5) tests of membership, (6) property and (7) a name and other identifying symbols (Bierstedt, 1970). At the nation-state level, the basic functions include: governance; supply, marketing and protection of goods and services; problem solving; development of new information; personal maintenance; spiritual care; education and health care (Axinn, 1975).

Within a society there may be different cultural groups. However, in this paper, the definition of society will be restricted to a geo-political implication of a nation's patterned, observable, describable human relationships and social organizations/structures; Hofstede has found that nations tend to have a distinctive prevailing system of values, beliefs and expectations, which he refers to as 'national culture'.

This paper will explore the effects of culture on the use of FSR&D methodologies, identify the ways in which the FSR&D approach is a culture of its own, and, finally, examine the effects of FSR&D on host cultures and societies.

FSR&D

FSR&D can be outlined by listing its major characteristics. It is:

A farmer-based approach: FSR&D practitioners pay attention to farmers' conditions and integrate farmers into the research and development process.

A unique problem-solving process: FSR&D teams seek opportunities to develop and guide research and identify ways to make local services and national policies more attuned to the needs of small-scale farmers.

A comprehensive R&D approach: All farm activity (consumption as well as production) is considered to learn how to improve the farm family's output and welfare, to identify flexibility for change and to evaluate the results of study in terms of the interests of both farm family and society.

Multidisciplinary: Researchers and extension staff who work with the farm families come from a variety of disciplinary backgrounds.

Complementary: The FSR&D approach is able to use the outputs of other R&D organizations and give direction to others' work.

Iterative: Previous research results are used to understand the system better and to design improved research and implementation approaches.

Dynamic: Modest changes are first introduced in the farm families' routine; if they are successful and accepted by the family, more significant changes are encouraged.

Responsible to society: The long-term interests of the general public are

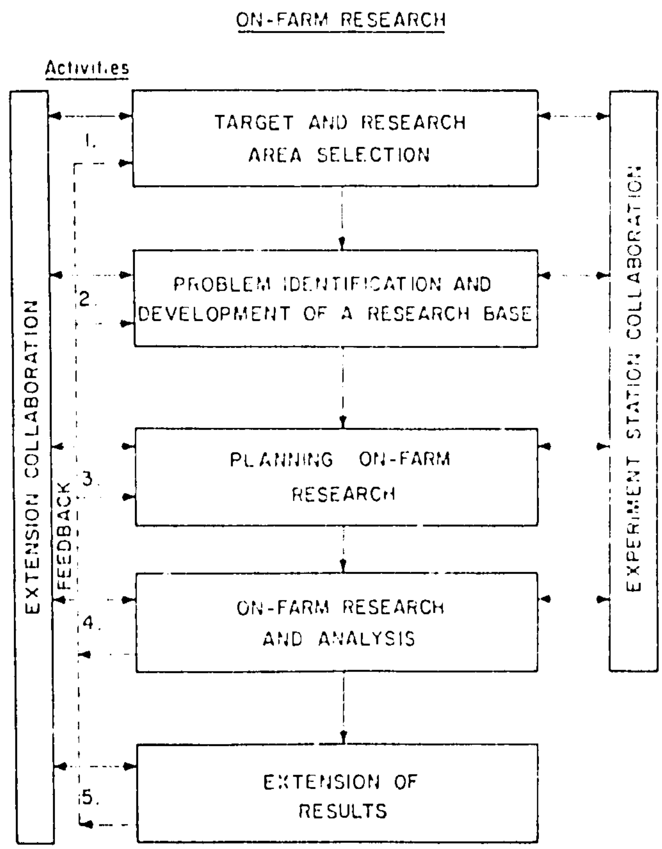

Fig. 1. The five basic activities of FSR&D (Shaner *et al.*, 1982).

kept in mind, in addition to the concerns of farmers immediately affected (Shaner *et al.*, 1982).

The FSR&D process

FSR&D is a process involving a set of interrelated activities. A natural sequence for the process (see Fig. 1) includes (Shaner *et al.*, 1982):

- Target and research area selection.
- Problem identification and development of a research base.
- Planning on-farm research.
- On-farm research and analysis.
- Extension of results.

In Fig. 1, experiment station collaboration, which interacts primarily with the first four activities, is set off to the side to emphasize its supporting rôle in on-farm research. Also, the extension system is shown to collaborate with all five main FSR&D activities. Results from the last two activities — if they should require further improvement — feed back to the earlier activities.

FSR&D AS A CULTURE

Each technology created by man carries with it a culture. Technologies presume certain patterns of interaction to be present and stable enough to count on, so that, if certain changes and additions in methods, procedures and instruments are introduced, the result will be an improved situation.

The FSR&D approach has a set of cultural assumptions within which it operates and which assists a different pattern of social organization to emerge. To facilitate an understanding of the organization of R&D work using the FSR&D approach, the major cultural attributes underlying it are outlined below.

The FSR&D team and the FSR&D process

FSR&D procedures were introduced mainly from North America and Europe; thus, they largely reflect Western values, beliefs and expectations.

FSR&D proponents presume that greater productivity and a higher level of living are attainable for small farmers in developing countries, assuming that these farmers are economically motivated and willing to accept technological change if it is worth their while and fits into their farming system. For example, Winkelmann, an FSR&D proponent at CIMMYT, believes that a larger percentage of farmers' decisions are based on technological and economic factors than on socio-cultural factors (D. L. Winkelmann, 1980: pers. comm.).

The authors have observed firsthand how quickly change can be accepted. For example, many small farmers began using new cereal varieties and production methods during the Green Revolution in countries as different as Pakistan, India, the Philippines and South Korea. Similarly, many small-scale farmers shifted to the production of profitable export crops such as maize and cassava in Thailand, and coffee and tea in Papua New Guinea — although not all continued with the new ways.

FSR&D proponents also assume that small farmers are efficient in the use of resources they control (Schultz, 1964).

FSR&D presumes that small-scale farmers are willing to participate in experiments on their farms so long as their basic household food supply is seen not to be in danger. Farmers are accustomed to uncertainty in farm returns due to such factors as weather, pests and markets, and they may co-operate in on-farm trials that have a good chance of decreasing these uncertainties and increasing their income, if risk is minimal.

A farming system in a developing country can be defined as a unique and reasonably stable arrangement of farming enterprises that the farm household manages according to well-defined practices in response to its physical, biological, economic and socio-cultural environments and in accordance with the household's goals, preferences and resources (Shaner *et al.*, 1982).

FSR&D proponents stress that a good understanding of the farming system, of its complex household production–consumption–quality of life interactions — including the role of women and children — is essential to the development of appropriate and acceptable technologies.

Proponents note that the farm household knows its environmental conditions and inherent cause–effect relationships; outside researchers and extension workers must pay attention to this knowledge so that technologies can reflect environmental realities and improve the system. Proponents believe in quicker on-farm research and development, using initial results to improve methodology, rather than slower off-farm experimentation under controlled conditions. The R&D problem must be the farmers' and not the researcher's or extension worker's.

FSR&D presumptions regarding government, research and extension services

FSR&D proponents believe that improvement in the lot of small-scale farmers requires that a real interest in them be taken by government officials in general and research and extension personnel in particular. Good co-ordination and, preferably, integration of research and extension are considered as prerequisites for small-scale farmer progress. Researchers, extension workers and farmers must learn to trust and respect each other.

Farmers may not have accurate technical explanations of their problems nor know the range of opportunities for improving their conditions. FSR&D proponents believe, nevertheless, that learning about farmers helps to produce better technologies and to promote results more effectively; researchers and extension workers could learn much by literally 'walking in the farmers' footsteps' (Shaner *et al.* 1982).

CONFLICTS BETWEEN CULTURES

People can learn new ways of doing things and also redefine their values, beliefs, expectations and rules for behavior regarding farming. Where the respective cultural attributes of the FSR&D approach and the host farming system are relatively compatible, both adjust and adapt more quickly, particularly in areas that are not central to a farm household's sense of reality, existence, meaning, order or survival. There are examples where some FSR&D technologies have been adopted relatively quickly because they asked for little or no significant departure from the culture of the farm household. In such cases there is compatibility to the extent that people within the farming system are able to adopt new farming practices because they do not cause unresolvable value conflicts. In other cases, however, FSR&D technologies may touch on some of the central belief, value and expectation cords, with cultural conflict as a result.

To explore some of the potential conflict areas, we shall use Geert Hofstede's four dimensions of 'national culture': Power Distance, Uncertainty Avoidance, Individualism Collectivity and Masculinity Femininity. Hofstede's work provides a significant review of theoretical and research literature from several nations. It rests on a rigorous, large-scale research data base. His four dimensions of national culture describe four key domains of values, beliefs and expectations all societies have, but which differ dramatically across societies. These domains are useful in assessing and observing the potential cultural differences which have occurred, or could occur, when FSR&D methodologies are used in a particular cultural setting. Hofstede's dimensions of culture are compatible with the descriptions of indicators of culture used by many other social scientists concentrating on cross-cultural R&D problems and issues (for example, see Brislin & Pedersen, 1976; Triandis, 1980). Hofstede has done important integrative work within the field; his factor analysis handles nicely and parsimoniously the hundreds of variables often described as indicators of culture.

While Hofstede's population was business managers in multinational corporations, his work can perhaps provide a basis for considering how cultural factors affect the FSR&D approach (i.e. how culture affects the process and content of the approach). Further empirical work needs to be done to see if indeed Hofstede's findings hold true for our population (studies by Wilson will be directed toward that end). However, his dimensions of culture are not new concepts; what he has done is to provide a parsimonious framework for describing and predicting where the host culture is apt to be in conflict with the cultural attributes inherent in the FSR&D approach. In addition, Hofstede's framework provides a way of predicting which areas of FSR&D technology transfer might be most difficult to handle. So, using Hofstede's framework as a basis, this paper will now explore potentials for cross-cultural conflict in various FSR&D projects around the world.

Cultural dimension no. 1: Power Distance

The basic concern here is over how societies resolve human inequality or issues of dominance. Every society deals with inequality in prestige and status, ability, wealth, power and laws, and every society finds its own sense of equilibrium.

A basic hypothesis is that the powerful will try to maintain or increase Power Distance and the less powerful will try to reduce it. When the powerful and the less powerful accept, and the social environment supports, the existing power distance, then there is an indication of the culture of a given society.

High power distance cultures tend to be found in more traditional agricultural settings (Hofstede, 1980). While many government officials and politicians pay lip service to the importance of poor farmers, the former are fully aware that the latter have little power or status and pose little or no threat to them.

Groups in developing countries wield power because they control productive factors such as land and capital, and they often end up with the benefits intended for small-scale farmers. When such power groups see FSR&D encroaching on their economic and political position, they sometimes act to undermine FSR&D activities.

On the other hand, small-scale farmers tend to distrust government officials and city people due to a strong belief that these 'outsiders' are different and do not have the farmers' best interests in mind. This distrust must be dealt with, especially during initial contacts.

The remoteness of many small-scale farming systems from centers of agricultural business or R&D activity also promotes this sense of difference and mistrust. A common reality is that research and extension workers infrequently visit remote farming systems, and the reason given for lack of contact often hints at the cultural difference that exists between the two groups. Most researchers and extension workers are taught to value increased production, rather than increased distributive equity per unit of service provided, and, if this is their major criterion, they may prefer the larger farmers, who are believed to be more responsive because they have more resources available. Thus, research and extension staff may be less inclined to support an FSR&D team that concentrates more on small-scale farmers. They may legitimize their choice by pointing out that small-scale farmers tend to live in less accessible places and may be hard to communicate with because of lack of common language, lack of education and mistrust of government officials.

Power Distance is also evident when it comes to the FSR&D team's attempts to generate new technologies to meet the needs of the small-scale farm system. Many a story has been told by FSR&D team members regarding the transformation that must occur in their own conceptual scheme of scientific knowledge when entering a farming system which has a different culture. Researchers who do not make conceptual accommodations to the new cultural realities usually introduce an inappropriate technology. For example, monocropping was introduced to farmers who had more productive and economically viable multicropping systems. Our cultural perspective makes it difficult to see the obvious, as illustrated in the above example. (See Whyte (1982) for an example of a FSR&D team's experience on this point in Puebla, Mexico).

Traditional R&D personnel are used to conducting experiments under controlled situations. The FSR&D approach to farmer participation and on-site experimentation, however, makes for a situation that is more ambiguous and less controlled. First, FSR&D is done in a team environment, so that the R&D process is less controlled by one individual. Secondly, FSR&D teams are usually comprised of people from varying disciplines, each discipline providing a person with a sense of what is technically right behavior. Disciplinary cultural differences often become evident: how each person handles work that is 'below' his sense of status or 'unprofessional' or not 'professionally sound'. Examples abound of FSR&D and other interdisciplinary teams that did not survive such cultural conflicts (Shaner *et al.* 1982; Wilson, 1982). Most unfortunate is the effect on farmers who are a part of the team. Their distrust is once again confirmed: outsiders cause trouble and offer little to improve their quality of life. Stories of dilemmas with outsiders travel quickly through farmers' networks, helping to perpetuate the existing cultural differences.

Another type of dilemma is related to professional cultural bias. Some scientists will identify more with the values of their own profession regarding grass roots equity, political action, worker freedom, etc. As a result, it becomes very difficult for some to contribute to an R&D effort that appears not to redistribute power to the extent that they feel is appropriate. Other scientists, because of past experience, have formed a bias against scientists in certain disciplines. Contending with team members who will not do work related to a FSR&D problem focus originally agreed upon becomes too costly.

Still another power-distance factor in most high power distance cultures is the low status of farmers. Little professional reward accrues to the researcher or extension agent who associates more with farmers than with professional peers or with the network of prestigious agencies. Field research is rewarded less than work that leads to recognition among peers, to journal publications, or to government post appointment.

For the success of their methodology, FSR&D proponents count on an efficient extension service that closely co-operates with research. They believe that extension's main job is twofold: first, to introduce farmers to the improved technology developed by researchers on a few farms by having extension agents spread its use throughout a specific region and, secondly, the agents provide researchers with scientific information based on farmers' use of the technology so that it can be improved further.

However, in many countries, FSR&D expectations are not fulfilled because of the lack of adequate communication and co-ordination between research and extension services.

Extension agents often are taught to tell farmers what to do, not to listen to farmers or to inform researchers about farmers' needs. Agents are often oriented toward a single commodity such as rice, wheat or livestock and are not trained to see a farm as the integrated system conceived by FSR&D. A new form of training is needed to teach agents and researchers a new cultural view of their work.

Extension agents often receive inadequate training, in the form of pre-service classroom instruction, with little opportunity for practical fieldwork or attending refresher courses. Too many times they are simply told what to do; decisions are made at the top of the centralized extension organization. All this leads, in many countries, to low field staff morale and productivity, and to low credibility with both farmers and researchers.

Cultural dimension no. 2: Uncertainty Avoidance

Hofstede's second major dimension of national culture is Uncertainty Avoidance. 'Uncertainty about the future is a basic fact of human life with which we try to cope through the domains of technology, law and religion. In organizations these take the form of technology, rules and rituals' (Hofstede, 1980).

Key factors associated with the uncertainty-avoidance index include: belief in generalists and common sense versus societies that value more the experts and their knowledge; understanding achievement in terms of recognition versus in terms of security; a strong need for consensus versus acceptance of dissent; a belief that written rules and regulations are necessary versus that there should be as few as possible and acceptance of risk versus concern for security.

Below are some illustrations of uncertainty avoidance in the FSR&D setting. FSR&D proponents believe that man has the right, based on scientific research, to control nature to the best of his ability. They feel that wise management based on research enables farmers to improve and control their environment.

In contrast, some farmers may feel they have no right to control nature, that it is far better to live in harmony with it. If God or the supernatural forces decide to destroy what the farmers want to produce, so be it. Farmers may be suspicious of scientific research that tends to interfere with the will of the supernatural.

Other farmers, while they may desire to control nature, believe that they really have little ability to do so, perhaps because of their awareness of the shortness of life or because of past experience of vulnerability to outside forces. So they rely more on customary technologies that seem to work than on technologies that are completely new and uncertain in results.

Unlike the interdisciplinary problem-oriented approach of FSR&D, agricultural research in many developing countries takes a reductionist approach that breaks the whole into more or less independent parts for study: this reduces ambiguity, but a view of the working system is lost. Research designs seldom consider the relationship between suggested changes in narrow areas of research specialization and the farm as a whole or the effect of change on the farm environment.

Related to the tendency toward specialization is the reality that many researchers and extension agents make a career of telling others how to farm without actually engaging in the practice themselves, and real problems can occur where these people do a lot of telling but little actual farming. For example, one of the authors accompanied an American advisor and his national counterpart, a high extension officer, on a farm visit in a South Asian country. The advisor and the author worked with hoes with the farmers, showing them how to place fertilizer correctly in the plant row. Then the author handed his hoe to the well-dressed, high-caste extension official. What a dilemma this caused for the man, who had either never worked with a hoe in his life or thought it highly inappropriate to engage in such work in the presence of the farmer. Should he do such degrading work and lose face with the farmers or decline the hoe and lose the respect of the Western visitors? Power distance and uncertainty avoidance are at work to reduce the risks involved in such situations. Such cultural differences hamper effective collaboration among experiment station specialists, field research teams and farmers.

Another construct related to Hofstede's uncertainty-avoidance index is difference in the use and perception of time and space among cultures. In fact, there may be several different cultural mandates for what should be done during a certain time interval. The farming system often runs on a different time cycle from the social system of the FSR&D team, which, in turn, will often run on a different time cycle than the national or international funding agency. Often, each systemic layer does not understand the other's use of time in relation to an R&D project.

Difference in the use of time is further compounded by individual responses to stress due to time pressure. Some give up, some dominate, some carve out a project meaningful to them but different from the FSR&D project focus, and some try to correct the team's interactive malfunction. Central to time use differences and the handling of pressure is what the farm household decides to do – for it is the farm family's well-being that is at stake. Crafters of FSR&D projects must work hard to design a flow of communication and resources that is responsive to the farming system's sense of timing.

Time pressure can create conflict at several points during a typical FSR&D project: between funding agencies' contract schedules and the FSR&D team's need for time to create appropriate technology in difficult circumstances; over the farmers' need to do more than farm and the team's need to engage in long, intensive workdays to discover a more appropriate technology; or from people's definition of 'full-time'. In Indonesia, for example, some agents say they work full-time but, by the standards of other cultures, only work part time and then go to another job. Schedules are created by FSR&D teams who think that all share a common definition of what 'full-time' means. Much to the consternation of FSR&D members and the amazement of funding agencies, a project may take much longer than contracted. Thus one major area of discussion among FSR&D teams must be a common definition of time and a commitment to put in the same time as other team members.

When a FSR&D team comprises some members from other countries or is hired by a donor agency, difficulties will arise in the cultural judgments of how fast things should be moving along. Project originators need to assess the amount of time they think they may have and make necessary adjustments in job definitions or salary, to free some indigenous team members so that they can 'keep up' with the outsiders. Renegotiating with funding agencies may be necessary for a project that the team knows will take longer than the original deadline.

Researchers and extension agents need to fight the tendency to do excessive experimentation, testing and drawn-out baseline surveys etc., which cause delays. This is partly a fight against a professional culture that values thoroughness, big change and innovation. For example, in Senegal, researchers experimented on the stations with sorghum varieties for so many years that the funding agency decided to substantially reduce its support. On the other hand, FSR&D teams tend to learn as they go, striving for better rather than best.

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FSR&D teams prefer quick systemic surveys and a more rapid communication of information, rather than delaying until they find the 'very best' method, even though this may be difficult in countries where the team members' education has taught them the more traditional approaches to agricultural R&D work.

Cultural dimension no. 3: Individualism–Collectivity

Hofstede's third dimension of national culture, Individualism, describes the 'relationships between the individual and the collectivity which prevail in a given society' (Hofstede, 1980).

Key factors associated with the Individualism Collectivity index include: self versus collectivity orientation; identity sourced in the individual versus the social system; emotional dependence on organizations and institutions versus independence from them; orientation towards group versus individual decisions and applying value standards to all within a culture versus having different value standards for in-groups and out-groups.

One of the central elements in this dimension is self-concept. There are some cultures which do not foster a self-concept in individualistic terms. The Chinese, for example, use the word *jen* for 'man' to include the person plus the intimate societal and cultural environment that makes his existence meaningful. The concepts of farm household or family will also differ across cultures. A family may include just the immediate offspring or extended family or a clan or even an entire tribal unit. FSR&D teams will need to know, from the farmers' perspective, who are included in their household.

Technologies based on individualism tend to be linked with what we now call 'modern' (Stinchcombe, 1965; Triandis, 1973). The collectivist value system sets limits on what kinds of technologies can be taught without radical change in practice. For example, technologies of crop production may increase the yield, but at the same time decrease the sense of group identity, if the 'improvements' involve fewer people.

Cultural dimension no. 4: Masculinity–Femininity

In Hofstede's fourth dimension of national culture, the basic issue is if, and how much, the biological differences between the sexes should have implications for sex rôles in social activities (Hofstede, 1980).

The sex rôle system perpetuated by a society influences that society's beliefs about, among other things, work assignments, distribution of valuable resources, locus of control of income, attributions of appropriate behavior, and issues of equality between sexes.

Key factors associated with the Masculinity/Femininity index include: a tendency to value intuition versus decisiveness; a giving of priority to people versus possessions; a giving of priority to being the best versus trying not to be better than others; a tendency to differentiate sex rôles versus fluidity in definition of rôle relationships; a tendency to value small and slow versus big and fast and, finally, a tendency to live to work versus working to live.

Messages used to communicate the benefits of participating in a FSR&D project will have to be different from culture to culture. Increased money and crops as ends in, and of, themselves may have greater appeal in high masculinity (MAS) societies, while appeals to more effective human interaction are stronger in low MAS societies. Teaching strategies which emphasize decisiveness in decision-making may have little appeal in low MAS cultures where people value intuition, but high appeal in high MAS cultures. Bigger and better farms may be a motivation to increase yields for farmers from high MAS cultures, but not for those in MAS cultures where an overriding concern is not to be better than others.

Research over the past decade has revealed that women differ from men in most developing countries in their (a) access to, and control over, productive resources; (b) stakes in development outcomes and (c) responses to development incentives. Research also documents that women do much of the agricultural work (60–80% in African settings), yet are rarely considered in extension, research or technology input efforts. Incentive systems have traditionally been designed for male farmers. Land is still often held in the name of the husband or other male household member, even if purchased with the wife's or other female's money and the wife or other females do the farming.

Even with increased sensitivity to the household's rôle in farming system development, researchers tend to mask sex rôles by using such aggregating terminology as 'family labor', 'hired labor', 'farmers', 'youth' and 'children'. Intra-family dynamics related to distribution of resources and the division of labor by sex and age are often overlooked, as well as the pattern of separate and distinct income streams and expenditures among females and males in the same household and who has access to these streams (USAID, 1982).

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FSR&D approaches offer a way to understand more realistically the sex rôle dimensions of a farming system. However, documentation of the past decade indicates that most agricultural R&D systems need to revise their approaches. FSR&D teams tend to be all male, concentrating their R&D efforts on, and relying on information received only from, male household members.

TIPS ON ADAPTING THE FSR&D APPROACH TO THE HOST CULTURE

If one looks with care at the socio-cultural situation in a country, one can predict the probable success or failure of a FSR&D activity and gain an insight as well into ways in which the FSR&D approach will need to be modified.

From observation, the authors believe that before FSR&D has a chance of success there must, to a certain extent, be a willingness to endorse or engage in FSR&D on the part of the indigenous leadership, researchers, government officials, extension staff and farmers. FSR&D promoters would do better to wait for some local initiative than to force the approach.

The recent experience of one donor agency in a West African country is an example of what might happen when the above caveat is not observed. The donor agency contracted with the government of this country to develop a FSR&D project in one of its districts. Since no one in the country could be found who had a working knowledge of the FSR&D approach, the donor agency invited IITA (The International Institute for Tropical Agriculture) to participate in organizing a FSR&D project. IITA sent an agronomist and a soil scientist, who worked for two years at the site doing field testing and farm trials. The government selected a university in the country to be the national counterpart agency. However, university representatives apparently did not find the FSR&D project important enough to assign a single person to the project or even to visit the research site, about 200 km (4 hours' drive) from the university. Also, the government was unable to fulfil contractual obligations such as providing housing for the FSR&D team, building a research laboratory, or providing adequate transportation. So, after two years of expatriate work, the donor agency decided to discontinue the project.

By contrast, in Guatemala, with government support and enthusiastic leadership, FSR&D has been successful. In that country, with partial financial and expert support from the Rockefeller Foundation, the government established ICTA – the Instituto de Ciencia y Tecnologia Agricolas (Agricultural Science and Technology Institute). ICTA's first Director General, Fumagalli, was a strong FSR&D supporter. Similarly, Ramiro Ortiz, the first Guatemalan Technical Director of ICTA, was an enthusiastic supporter of the farming systems approach.

Similarly, in Honduras, under the supportive leadership of the Honduran Dr Mario Contreras as Director of Research, research aimed at small farmer food production was initiated along FSR&D lines.

Convinced of the suitability of FSR&D for Indonesia and under the influence of leaders like Dr Effendi of the Central Research Institute for Agriculture (CRIA) there, FSR&D has developed productive technologies and cropping systems for small-scale farmers in that country.

Some national FSR&D leaders become foreigners to their own culture because of foreign education, close association with expatriates and acceptance of foreign norms. Useem *et al.* (1963) call this social psychological phenomenon third culture learning – a mixing of host culture and second culture to create a third cultural perspective. Many internationally linked people, such as some of those at international agricultural research centers, are third culture-type individuals. While some are able to work well in their home culture, others become unable to communicate effectively with people back home. The choice of the scientist sent to international centers to learn FSR&D methodologies is extremely important. Those who appear to be unable to adjust to change in procedures at home are apt to find it difficult to adjust to the style of the international agricultural R&D center and the FSR&D approach. If adaptation does occur, the process of transfer back home tends also to be difficult. Leaders making decisions on who should be sent away for additional professional training should consider scientists who manifest an ability to be flexible during change, who can think synthetically and who can learn from, and work with, others from different disciplinary backgrounds.

FSR&D leaders at both the national and organizational levels also need the ability to overcome the resistance of their more traditional or reactionary colleagues in the research and extension community. There have been successful FSR&D leaders who got out of step with their superiors or who had to spend so much time politicking to keep their programs funded that they gave up.

Adapting the research and extension systems to be able to use the FSR&D approach

To make FSR&D more successful in developing countries, both researchers and extension staff must learn to understand their complementary rôles in the FSR&D process. This requires continual communication, co-operation and co-ordination, with responsibility often resting heavily on the FSR&D project co-ordinator. The co-ordinator must have a fairly high competence in managing groups; and the FSR&D team members must establish a common vocabulary and frame of reference.

In most countries, the agricultural research system is managed separately from the extension system. Most countries wish to see innovations from research extended to the common man ideally through extension. However, because organizations tend to have their own sense of mission, very few countries experience good articulation between their agricultural research and extension systems. This reality has led countries world wide to experiment with adjustments in their research and extension organizations.

Shaner *et al.* (1982) give, as an example, a 1978 letter of understanding between ICTA (research) and DIGESA (extension) in Guatemala in which the two organizations attempted to develop closer ties. ICTA was created without formally making extension part of its activities. After several years of operation, realizing the need for closer co-operation, the two drew up an agreement which includes these essential points:

> Agricultural research, promotion, and training should be merged into a single effort leading to technologies that farmers will adopt. DIGESA will convey to ICTA problems arising during technology transfer; and ICTA will provide DIGESA with technologies suitable for farmers' adoption.

Another organizational approach to link extension and research efforts would be to provide a mechanism at the national and regional levels through a committee structure: key staff persons from both extension and research would develop policies and procedures for co-operation. Based on these decisions, the activities of extension and research field staffs could be co-ordinated by an extension specialist in farming systems. Cultural differences between the respective organizations could be dealt with by the committees if the committees were given sufficient authority.

Adding extension training in FSR&D

In many developing countries, extension workers need additional training for their rôle in FSR&D. It should teach them to consider the impact of a new practice on the whole farming system rather than on just one crop or animal. It should emphasize FSR&D methods of working with farmers, collecting data and monitoring activities, as well as bring extension workers up to date with culturally sensitive methods of communication.

In Guatemala, ICTA has, for several years, given in-service training courses in FSR&D to extension personnel. These courses last for ten months, during which the trainees participate in ICTA programs for one to two days per week and spend the rest of their time doing regular extension work. In this way, they have become an integral part of the FSR&D technology development process. They have learned to manage new technologies and to become more effective in their dealings with farmers, researchers and others. Supplementing regular in-service FSR&D courses, there can also be short courses, workshops, seminars and meetings.

Other needed changes in extension

Extension agents shifted to FSR&D projects need more freedom of action than they usually get in the highly centralized extension organizations. For example, an agent should help to select farmers for farmer-managed tests or for keeping farm records, and superiors should listen to his ideas on how to deal with farmers' problems.

Some extension organizations involved with FSR&D, as in Honduras and the Philippines, have become decentralized. More decision-making authority has been shifted to local and regional levels. Changes in power distance are occurring.

Extension's participation in FSR&D should bring higher extension salaries and more money for operations. A better trained staff, with improved relations with both researchers and farmers, can be expected to understand and communicate improved technologies more effectively. Thus, extension becomes more productive and should be able to support its claim for a larger share of the national budget.

Too often, governments use extension personnel for political purposes or give them regulatory duties. Extension workers in FSR&D can only fulfil their rôle if they are trusted by farm families. Thus, they should be relieved of tasks that interfere with the execution of their FSR&D responsibilities.

USING A PILOT PRODUCTION PROGRAM TO EXPAND FSR&D EFFORTS

In some developing countries a new technology is diffused to farmers on a large scale without adequate investigations of its effect on the socio-cultural, economic and physical biological environments. Suitable when used by only a few farmers, it may not be appropriate when many farmers apply it simultaneously. Large-scale adoption may negatively affect the social and cultural system or have such unwanted economic effects as input shortages or flooded markets.

FSR&D practitioners believe that before they extend new technology to a relevant target population, they first need to run a so-called pilot production program in a fairly large test area (e.g. 400 hectares in Central America), involving various government and private groups as well as FSR&D teams and local farmers.

Haws & Dilag (1980) describe the participants in a 1976 pilot production program at Iloilo in the Philippines as follows:

(1) The governor of the province.
(2) The municipal mayor of the target area.
(3) The agricultural agencies such as the Bureau of Agricultural Extension, the Bureau of Plant Industry, the National Grains Authority, the Bureau of Soils, the Philippine Council for Agriculture and Resources Research, the Agricultural Credit Administration and the Area Marketing Cooperative at Iloilo.
(4) Banks such as the Philippine National Bank and the Rural Bank at Santa Barbara.
(5) The International Rice Research Institute.
(6) The local pesticide and fertilizer dealers.
(7) The farmers.

The extension service, especially an Extension Specialist in Farming Systems, could play a leading rôle in bringing about fruitful co-operation between these agencies and people, none of whom are used to working together. In this case, all participants signed a memorandum of agreement stating which specific rôle each was to play in the pilot production program.

OVERCOMING WESTERN INFLUENCES FOUND IN THE FSR&D APPROACH

The more host cultural conditions differ from some of the basic presumptions of FSR&D, the greater is the danger that the latter will not work. FSR&D is adaptable, however. Its practitioners should look for what they think might work in a country, keeping in mind that their methodologies are based on Western cultural values, beliefs, expectations and rules of behavior. Some of these cultural attributes for FSR&D have already been highlighted. Any team using FSR&D methodologies will need to (1) assess the cultural values of host systems and (2) determine areas of conflict between the host culture and FSR&D.

A basic rule is to strive for modest, incremental changes in the farming system. In this way, FSR&D teams can learn as they proceed, correcting a wrong diagnosis of a problem at an early stage. Potential risks, including those to the quality of life of participating families, must be well thought through. An example of what not to do was observed by the authors in Central America, where insecticide tests were attempted on a farmer's entire cabbage crop. The chemicals used resulted in almost complete crop failure and severe loss to the farmer.

This points out another factor in doing R&D work in another culture: scientific knowledge is culture-bound, and one must exercise extreme caution in what one considers universal. A technology that is 'fail-safe' in one setting may not be so in another.

FSR&D teams should pay close attention to (1) identifying indigenous organizations and institutions and the technology currently in use and (2) building on what is already there, rather than starting culturally-new systems. For example, change agents tried and failed to introduce a purchasing co-operative in a South Asian farming area, overlooking the fact that a co-operative endeavor was already functioning successfully there. The farmers had organized themselves generations before to maintain their irrigation canals. If the promoters of the new scheme had thought of expanding the existing organization to include co-operative purchasing, their chances of success would have been greater. In contrast to this failure, FSR&D practitioners in other countries, such as Indonesia, have begun to build the FSR&D approach successfully into the existing research and extension systems and into indigenous farmer practices.

Use of favorable socio-cultural conditions

In initiating operations in a developing country, FSR&D practitioners should point out that FSR&D is not usually competitive with other activities and replaces neither commodity nor disciplinary research nor extension. On the contrary, it requires continuing input from research and contact with farmers through extension.

In selecting staff, FSR&D administrators must look for the type of professional who can work in a team setting and can incorporate into one problem statement many viewpoints, including those of the farm families. Expert knowledge alone is not sufficient in FSR&D projects, but must be combined with other skills. Many professionals are now being trained in systems approaches to research problem conceptualization and gaining the management skills needed to lead group decision-making sessions.

Many agricultural professionals in developing countries are not yet overly specialized, meaning that they have a similar knowledge base and vocabulary. FSR&D practitioners should build on this situation in introducing FSR&D methodologies. For example, agricultural students studying for a B.Sc. degree in Guatemala all receive a common initial training in agronomy, specializing in fields such as entomology or agricultural economics only toward the end of their studies. This makes it easier for them to interact on ICTA's FSR&D teams than specialists trained in the USA. Different disciplines use many words which at first appear to be the same, but the meaning of the words and the professional procedures attached to them are very different. At the outset, FSR&D teams must build a common vocabulary and definitions for research problems, proposed R&D procedures and resolutions.

Where cultures discourage communication between unrelated men and women, FSR&D field teams would do well to include members from both sexes to communicate adequately with the farm household, especially in settings where women are responsible for growing important crops or performing critical operations.

To make participation in FSR&D programs more attractive to professionals of a country, the promotion and reward system might have to be revised so that FSR&D work becomes legitimate professional activity. Improvements on farms must be seen to be as credible as publication in a journal or an increase in farmer contacts. The current emphasis on individual achievement must be offset by greater recognition of team achievement through additional salary, promotion and opportunity for job enrichment. Training for the latter is now given by both international and regional agricultural research centers. Two examples are the International Rice Research Institute's training for FSR&D personnel in countries belonging to the Asian Farming Systems Network and the Tropical Agricultural Research and Training Center in Costa Rica for Spanish-speaking trainees.

FSR&D team leaders should see that co-operation, rather than conflict, characterizes a team's R&D efforts. Below are a few insights into how FSR&D teams have tended to form and operate, based on interviews with interdisciplinary, international and multicultural R&D project team members and leaders (Wilson, 1982).

(1) As people form a working group, they form their own culture, with a shared value, belief, expectation and rule system that influences the object and methods of their investigation. They create patterns of decision-making, social influence, and task and interpersonal relationship maintenance. Leaders of FSR&D teams must be able to handle this group-forming and maintaining process.

(2) FSR&D teams are both effective and ineffective. An effective team is an open system that knows its limitations and draws from outside the information and resources it needs. To determine how information is shared in an FSR&D setting, it is necessary to understand the rôle of networks in farming system change. The reward structure may determine whether a team (or an individual member) decides to share knowledge with other groups of scientists within the immediate R&D setting. Typically, research and extension people do what is necessary to remain employed. When the demand for single-authored publications is the criterion, then, co-operation among individuals will be selective. Team conflicts, seen in a lack of research focus, lack of productivity and enormous proliferation of R&D projects, have been attributed to the failure of administrators to recognize the value of team contributions.

(3) The effective FSR&D teams discuss the professional needs of those who decide to work together. In interviews conducted with over 100 international project members and leaders, one of the authors found that a major problem is the lack of discussion about personal needs in

belonging to the team. For example, when outputs are designed to be multi-authored, and individuals need single-authored outputs, predictable power plays and group conflicts emerge.

(4) Effective FSR&D teams utilize a variety of decision-making processes tailored to the cultural tendencies of the team. Some processes rely less, while others are highly dependent, on central authority figures. Depending on the cultural background of a researcher, an extension agent or a farmer, some processes will seem more 'right' or 'appropriate' than others. When a conflict occurs, the choice of process may be a good indication of the team's cultural tendencies relative to the use of authority (see the discussion of power distance).

(5) Within FSR&D teams will emerge a leadership member pattern broadly consisting of member appointed leader behaviors which attend to three dimensions of FSR&D group life: task activities, interpersonal relationships and individual needs. Effective task groups will have leadership behavior which satisfies the demands of all three. For all groups, but especially for multicultural work groups, members must not only be able to do a task, but help to identify the personal needs of other members and build effective relationships among them. Since culture provides the sense of what appropriate leadership is in these areas, the chances are greater in multicultural teams for differences in perception of what is appropriate in handling certain kinds of human interaction.

(6) FSR&D teams that are open systems share information with significant groups that work on related problems. As a team seeks to communicate outward, it many times becomes a part of a world-wide network. Some FSR&D projects, such as the previously mentioned one in the Philippines, involve several systemic communication layers, each of which has its own networks, ranging from indigenous to international in character. As these networks form, new resources become available to the team. The benefit is that team members can often locate similar projects in other ecological settings. Information can be shared. In some cases the authors have found that links with people from other nations provide researchers and extension agents with the incentives they need to commit themselves to their FSR&D projects.

(7) An FSR&D network often plans scientific activities around the common interests of its members. The resources of these network members and their organizations can be pooled, allowing the opportunity for joint FSR&D projects. Because FSR&D is a social and technological innovation, a network of researchers, in particular, can be identified

which is further spreading the use of the FSR&D approach to cultures other than those where the approach was first tried.

IMPACT OF FSR&D ACTIVITIES ON A SOCIETY AND ITS CULTURE

Most of this paper looks at how culture affects the FSR&D approach, but a few words should be said about the reverse: how is FSR&D affecting the societies and the cultures in which it has been used? Because the FSR&D approach is relatively new, its effect is difficult to trace, but there are some interesting initial insights.

Governments use FSR&D for different reasons. In one Latin American country, the government initiated an FSR&D project in a border area to strengthen the loyalty of the inhabitants, who were being wooed by a neighboring state, which wanted to annex that part of the country. In another country in Latin America, the government initiated an FSR&D program throughout the country to improve the level of living of small-scale farmers and to increase the production of cereals and other basic foodstuffs grown mainly by the farmers.

In one South-east Asian country, the government's FSR&D projects were formed to help improve conditions in settlements in the outlying islands to which small-scale farmers had transmigrated from over-populated areas. The reasons for FSR&D are therefore many. Care is needed when suggesting its use to governments that are looking for cures to social or political problems for which FSR&D was never meant to be a total solution.

As mentioned earlier, not all FSR&D projects have been successful. Those who determine R&D policy within nations need to be aware that it is critical to have the right individuals in FSR&D teams. Otherwise, the risks are great and the costs are high for farmers and for the government and or international or bilateral funding agency that supports the project. Two years of little productivity due to poor FSR&D team relations is a real possibility, and the delay is costly not only to farmers but to the scientific community.

The FSR&D approach has existed long enough to justify rigorous impact investigation by sponsoring agencies and project teams. For the moment, the authors would like to suggest a few areas for further scrutiny in relation to concepts mentioned in this paper. Impact indicators should

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be designed to identify the effect of FSR&D on: team members, farm families, sex rôles, the R&D system in which FSR&D originated, government officials and their policies, the economic infrastructure, the natural ecological system in which FSR&D activities occur and the socio-cultural system of the farm.

The FSR&D approach shows promise of producing the kind of research and development work which will meet the need for greater food production and a better standard of living for small-scale farmers, especially in developing countries. It is hoped that some of the lessons shared in this paper will contribute to a better understanding and the advancement of this social and methodological innovation in R&D.

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