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The Farming Systems Research Group at Michigan State University, supported by Title XII Strengthening Grant Funds from the U.S. Agency for International Development, and administered by the Institute of International Agriculture, has included Dr. Jay Artis, Department of Sociology; Dr. Robert J. Deans, Department of Animal Science; Dr. Merle Esmay (and Dr. Robert Wilkinson), Department of Agricultural Engineering; Dr. Eric Crawford, Department of Agricultural Economics; Dr. Russell Freed, Department of Crop and Soil Sciences (also representing Horticulture); Dr. Al Pearson, Department of Food Science and Human Nutrition; Dr. Tjaart Schillhorn van Veen, Department of Veterinary Medicine; with Dr. George Axinn, International Studies and Programs and Agricultural Economics, Chair; Ms. Beverly Fleisher and Walter Randolph Adams, graduate research assistants.

THE M.S.U. FARMING SYSTEMS RESEARCH GROUP  
PERSPECTIVE: A SUMMARY AND ANALYSIS

by Walter Randolph Adams

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THE MICHIGAN STATE UNIVERSITY FARMING SYSTEMS RESEARCH GROUP

WORKING PAPER SERIES

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## Farming Systems Research Group - WORKING PAPERS

The papers in this series were prepared during the 1980 - 1981 academic year by members of the Michigan State University Farming Systems Research Group. Papers one through nine were prepared by individual members of the group, after much discussion, and were reviewed by members of the group prior to final revision by the authors. However, each of the papers represents the author's personal perspectives on Farming Systems Research. Each paper is different from the others. All papers are an attempt to answer the following questions:

From the perspective of my discipline - what is Farming Systems Research?

What research has been done in my discipline which relates directly to Farming Systems Research?

What opportunities are there for further research from the perspective of my discipline?

What assistance would scholars from my discipline need from other disciplines in order to carry out Farming Systems Research?

Each individual responded to these questions in his own way. Paper number ten is an attempt to summarize the perspectives of the various disciplines represented, identifying commonalities and differences. Paper eleven sets forth the recommendations of the group for further work in this field at Michigan State University.

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June, 1981

# The M.S.U. Farming Systems Research Group Perspective

## A Summary and Analysis

by

Walter Randolph Adams

Farming Systems Research (F.S.R.) is a relatively new approach taken by international development agencies to agricultural development. It is an ancient approach from the perspective of rural farming families. Michigan State University formed a Farming Systems Research Group in 1980, and that group has prepared a series of working papers. The first nine of these papers discuss F.S.R. from the various perspectives of the members, each representing a different discipline or a different focus within a discipline. This paper serves to analyze the similarities and divergencies of the various views presented and to summarize those nine papers. It presents a brief overview of the historical development of farming systems research in general and its beginning at Michigan State University. We then turn to the presentation of summary statements on farming systems research as they are presented by the individual group members. This is followed by an analysis of the convergences and divergencies of the positions of the authors.

### Historical Development

There are basically two approaches to F.S.R. A primary approach, which Axinn<sup>1</sup> has called "non-formal", is one which has been used since the beginning

of agriculture and is used by the farming family itself. Most of the techniques employed are developed on the farm in response to specific conditions. This approach calls for a continuous learning process of understanding the environment, "solving the problems which face them, and making appropriate adjustments from what they learn" (Axinn, p. 1). The second approach has evolved over the course of the past one hundred years or so. Axinn has called this the "formal" approach. Within this category there are both "centralized" and "decentralized" approaches to agricultural research.

Although the particular applications of the formal approach have varied through time, its basic theme may be described as follows: Some technique is developed on a government-run experimental farm and then made available to "real" farms. If the system is centralized and controlled and operated by non-farmers, it may fail to take into consideration the particular problems with which the farmer has to contend. When farmers themselves control formal agricultural research, it tends to be decentralized and relates more closely to their farming systems and their particular needs.

In earlier formal research in much of Africa, Asia, and Latin America, the "outsider controlled" approach was used in an effort to supply the more "developed" world with commodities such as coffee, cotton, tea, and other cash crops. Low costs and high returns to companies in the developed countries were the major goals of agricultural research. Experimental farms were instituted in many of the so-called "Third World" nations. However, these farms tended to be concerned with the problems facing the production of export crops. With independence of countries in Africa and Asia, the next phase of development in agricultural research was heavily influenced by

European and North American agriculturalists. The ideology held that local problems could be solved through the development of high-yielding varieties of cash crops. The development strategy included attempts to encourage farmers to purchase more agricultural inputs, such as seed, fertilizer, and pesticides. This strategy was expected to result in increased productivity.

The record of successes of adoption of the new techniques by the local population and consequent stimulation of local development was not as widespread as wanted. There are three fundamental reasons for this lack of success. First, the centralized approach was not sensitive to local conditions (Axinn). Second, the development of high-yielding varieties of crops, the introduction of sophisticated machinery and reliance on other purchased inputs did not take into consideration the long-term impacts of these developments on other aspects of farming. The target population was often unable to purchase fertilizer due to high prices in relation to the local value of the produce. The introduction of sophisticated machinery, on the other hand, may not have considered whether the system could support such innovation (Wilkinson). The third reason for the failures of the traditional development programs has been mentioned by Schillhorn van Veen, who writes:

(for Third World countries) It is very unlikely that these systems can easily be transplanted to developing countries since the history and social organization in such countries differs from those in the technologically more developed world (p. 2)

In summary, a basic reason why earlier programs of agricultural research for development tended not to achieve desired results can be seen in its lack of concern for local ecosystemic conditions. The term "ecosystem," as used here,

refers to both the natural and cultural components of a system -- the human, social, economic, political, religious, topographic, climatological, and biological phenomena of the area under study.

Recent interest in F.S.R., then, was developed principally to take into account the understanding of local environmental conditions. Axinn addresses the fact that farmers adapt techniques used in their fields in accordance with knowledge of the particular environmental limitations under which they must work. This knowledge is the result of a non-formal, decentralized learning system. One of the benefits of F.S.R. over the centralized approach is that it "is an effort to achieve some of the benefits to farming families of the decentralized system while also maintaining the strength of the centralized system" (Axinn, p. 7). In particular, F.S.R. attempts to do this through an understanding of a farm from a systems perspective. The systems perspective differs from the more specialized approaches to agricultural development in that F.S.R. looks at the farm as being more than a sum of its parts. The more specialized approach tends to focus on a particular issue without regard for the farm as a system.

The M.S.U. Farming Systems Research Group came into existence through Title XII Strengthening Grant support from the United States Agency for International Development to Michigan State University. A brochure, published by the Group, states the essence of the approach taken at M.S.U.:

The Farming Systems Research Group is a multidisciplinary team of practical, experienced professors, focused on applied research on farming from a systems perspective. It concentrates on the needs of the farmers in the 'developing' nations. Cooperation with farming families and host country research and extension personnel are at the core of this Michigan State University approach

The disciplines represented in the Group's core are agricultural economics, agricultural engineering, agronomy, animal science, food science and human nutrition, and rural sociology. Ancillary personnel from horticulture, anthropology, business management and other disciplines are also part of the group.

A characteristic of the M.S.U. Farming Systems Research Group is that it focuses on the farm family ecosystem and includes diagnostic exploration of the system, viz-a-viz the farm family; the plants and animals produced and consumed; soil, water, and market availabilities; and the larger socio-cultural, ecological, economic and political considerations related to the farming system. The farm family is at the core of the investigation.

#### A Summary of Perspectives

We now turn to a summary of the individual papers written by the core members of the Farming Systems Research Group at M.S.U. This summary will provide the context for a better understanding of the convergences and divergences of opinions expressed by the authors, which will be the focus of the next section.

Crawford's paper notes the historical development of F.S.R. and the benefits it offers over the traditional centralized approach to agricultural research. He views F.S.R. as a method which enables the more effective development of technology for raising farm productivity as a result of improved understanding of the farming system. Better understanding results in a more complete knowledge of the component parts of the system; an awareness of the goals, constraints, and processes brought in from other disciplines; and the inclusion of the farmer's perspective. He believes that an understanding of

the farm household "will be strengthened if the scope of analysis is broadened to incorporate formerly neglected activities and interactions which are now recognized as crucial for understanding household behavior" (p. 9). The analysis of the farm household's activities must be done in such a way that it more adequately reflects reality as it is perceived by the farm family. The knowledge of this perceived reality is effected by realizing that there are: 1) multiple goals and a sequential decision-making process; 2) intra-household patterns of resource allocations; 3) an interdependence between productivity and factors involving credit, marketing, consumption, savings, and investments; 4) a long-term decision frame-work which must incorporate uncertainty; and 5) the interaction of the household with the larger social institutional environment of which it is a part (p. 10). Finally, Crawford (p. 15) notes some of the current limitations of F.S.R. Among them is the need to achieve a "better descriptive and analytical understanding of several subsystems of farm household activity which hitherto have often been excluded", and better data collecting methods. He offers the suggestion of using open-ended interviews with the farming families. This is seen to allow the investigator to gather more detailed information than has been the case with rapid surveys.

Axinn's paper focuses on the differences between the more specialized approach to agricultural research and F.S.R., and some of the reasons why other methods have failed. Seeing international development assistance programs as heavily influenced by formal education, and traditional farming practices as products of a non-formal education, he views the M.S.U. approach

as combining "the wisdom of the farming and herding families with the wisdom of the academic scientists, and addresses both knowledge building and problem solving activities" (p. 3). He suggests that the purposes of F.S.R. are seen as either leading toward an understanding of a system or an attempt to make changes within certain aspects of a system (p. 1). Among the concerns with which F.S.R. deals is the need to develop techniques appropriate for the local conditions in which they are intended to be used (p. 8). However, F.S.R. is currently limited in its capabilities due to lack of work conducted from the perspectives offered by political science, anthropology, and sociology.

Artis' monograph focuses on F.S.R. from a sociological perspective. He, like Axinn and Crawford, notes that each farming system is peculiar unto itself. However, there may be basic similarities between farming systems, such as production of the same products and sociocultural or political administrative homogeneity. He states that sociology can make a contribution to F.S.R. because it can "assess and, hopefully, predict the impact of F.S.R. intervention on social structure and the relationship between the farming system and the larger system contexts in which it operates" (p. 4). However, he notes that current F.S.R. approaches have not considered nutrition, family planning, training of personnel in the farming household, political processes of settling disputes, or boundary maintenance (p. 2). Until these concerns are addressed, he believes that assessing and predicting the consequences of F.S.R. intervention will yield poor results.

Wilkinson (p. 1) suggests that the "fundamental and primary objective

of F.S.R. is (or should be) to increase (world) food availability and agricultural production and to develop or use resources in a manner that will promote a 'better' standard of living (...) for all mankind". In keeping with the perspectives of the Group in general, he focuses on the needs of the individual farmer and improvements are seen to be "any objective the farmer feels is in his best interest" (p. 4). He believes F.S.R. should be able to analyze a system and make assessments and suggestions for improvement; but, at the same time, be flexible enough to accommodate situations where what is "best" may not be in the best interest or cannot be done as a result of peculiar situations. In these cases modified goals should be adopted (pp. 1-2). The multidisciplinary perspective, he feels, is necessary to understand and evaluate ramifications of some improvement on other aspects of the farm system. While Wilkinson views the introduction of techniques and machinery as necessary, the impact of these development projects should be carefully assessed in consideration for the whole system and that people should not arbitrarily be replaced by machinery (p. 10).

Esmay's paper brings up the historical development of F.S.R. He believes that F.S.R. is directed toward improvement and development. It is not, he says (p. 2) "designed to maintain the status quo of small farmers in their lock-in subsistence status". Like Wilkinson, Esmay (p. 2) feels F.S.R. is involved with improving the quality of life of small farm families, "specifically in the sense of improving food production". He then adds "and financial return through the application of appropriate technologies". Esmay sees F.S.R. is an approach which can help identify problems associated

with new developments before the programs are introduced and thus avoid them altogether (p. 5). In this way, F.S.R. is seen to be able to provide recommendations and planning guidance (p. 8). Finally, Esmay (p. 5) believes that F.S.R. should be holistic. It should look at the farm as a system, but not in the sense that F.S.R. should necessarily be designed to change the entire system.

Deans (p. 1) notes that F.S.R. develops more appropriate knowledge about a farm than was the case with the traditional approach to agricultural development. He believes that one of the major differences between the traditional approach and F.S.R. is that the latter reverses "the source and flow of idea generation and changes traditional approaches toward forming innovations for the farm system" (p. 1). This allows for the realization that there are three basic kinds of animal systems: 1) where the animal provides a service as a scavenger; 2) where the system is that of a pastoralist nature; and 3) the specialized group-type animal production system (pp. 1-2). The relevancy of F.S.R. differs with each of these systems. Deans (pp. 1-2) sees a need to understand how the subcomponents of the farming system are linked together. This is especially important, he says, on the farming system where the animal is a scavenger because very little work has been conducted on this type of system (p. 6).

Freed sees the utility of F.S.R. to agronomists because it helps to identify and develop research projects, to implement research programs, and to evaluate new techniques (p. 1). This is possible through a better understanding of why the farmer practices the techniques he does (p. 2). Freed (p.2) uses the term interdisciplinary rather than multidisciplinary to stress

the need for interaction among the scientists involved in the assessment of the farming system. This interaction is necessary to more adequately assess the potential impact of a technique on other subsystems within the farming system. Freed sees F.S.R. as an administrative tool to direct and evaluate research programs and aid in the recommendation of techniques appropriate to the systems in operation on the farm (p. 1). F.S.R. is a tool which is seen to help solve problems in the "Third World" by realizing that the problems stem from social, political, and technological roots. Each of these must be addressed in order to improve the quality of life of the farming family (p. 5). A primary problem which he sees facing F.S.R. at the present time is that it requires the interdisciplinary approach. Ironically, this is, at the same time, its benefit over the traditional approach to research. In his words:

Interdisciplinary research may be difficult to manage, but interdisciplinary communication can function as the needed ingredient to combine our knowledge of the different fields which are needed to solve our agricultural problems (p. 5).

Thus, Freed sees interdisciplinary communication as the bridge to solving the social, political, and technological problems to improve the quality of life in the developing world.

Pearson's work, like that of Artis, Axinn, and Crawford, acknowledges that each farming system is different. Like Artis, Crawford, Deans, Esmay, Freed, and Wilkinson, he sees one of the goals of F.S.R. as being to deliver appropriate techniques to the target population. This is made possible--especially in the M.S.U. approach to F.S.R.--as a result of the "broad

representation across and within disciplines so that each element within the farming system and its related community can be carefully examined and evaluated before intervention processes are recommended" (pp 3-4).

Finally, Schillhorn van Veen's paper focuses primarily on problems encountered in traditional development schemes and the benefits of F.S.R. as seen from the perspective of an animal scientist. Specifically, he notes that the latter approach to development looks at the roles the animal sector plays in production; fertilization; social and spiritual functions; economics; energy-, labor-, and water efficiencies; the provision of labor; and in social relations (p. 5). He notes that traditional development programs "have been chosen for short-term successes without a sufficient knowledge about the system" (p. 8). However, "ecologically sound long-term development plans"--such as those offered through the utilization of a F.S.R. approach--"need thought and good understanding of the system" (p. 8). Thus, he believes that F.S.R. will provide a more complete assessment of the environmental conditions, which will take into consideration a long-term decision framework. The next section of this paper discusses where the authors seem to be in agreement with one another and where there are divergences in their positions.

### Convergences and Divergences

The comments which follow are based upon implied or explicit comments found in the various papers. The authors were asked to comment on an earlier draft of this paper. Their responses have been incorporated into the analysis presented below.

The primary unifying theme in the series of working papers stems from the view that F.S.R. is a multi- (or inter-)disciplinary venture which

requires the cooperation of specialists in many disciplines and sub-disciplines. Each farming system is seen to be unique, and the farm should be studied holistically, with special emphasis on the needs of the farming family. Those authors who addressed the topic were in agreement that earlier approaches failed because local conditions were not taken into consideration, and the needs of the farm families in "Third World" countries were not adequately addressed. The majority of the writers also noted that the needs of the farmer and the farming family must also be viewed in relation to the larger social, political, and environmental conditions in which the farming family under study is part. Some of these authors believe that one of the goals of F.S.R. is to raise productivity levels. They think that this improvement will raise the equality of life.

While the focus of the papers was toward small farming systems, the majority of the writers saw no reason why the perspective offered by F.S.R. could not be employed in the study of larger systems anywhere in the world, nor why the approach could not be used on small farms in the more "developed" countries. The focus on the small systems in the developing countries is seen more to be the result of the primary focus of the Title XII Strengthening Grant and the emphasis on small-scale farms in the developing world by the U.S. Agency for International Development.

Several of the writers said that the need to develop techniques appropriate to the specific conditions present in the farming system was an important consideration for F.S.R. One of the papers went on to say that machinery would not replace people arbitrarily. The determination of

appropriate techniques is seen by several of the writers to depend on whether the farming family would be able to adapt the new technique on the farm. Equally important to some of the writers in the appropriateness of a particular technique was whether the overall social and economic system could support the innovation.

In addition to the convergences of opinions expressed in the various position papers, there were also four discrepancies. Crawford, Esmay, Freed, Pearson, and Wilkinson stress that the goal of F.S.R. is to aid in the development of new programs. Artis, however, views the goal of F.S.R. "to assess and, hopefully, predict the impact of F.S.R. intervention on social structure...". The tenor of his work seems to suggest more of an analysis of the situation and offer recommendations, rather than to actually implement new projects. Axinn suggests that F.S.R. can be utilized for both purposes, but that it adds significantly to the quality of the description of the situation, thus setting the context for more significant research.

Some of the authors seem to suggest that more emphasis should be placed on research involving the interaction with the farmer, rather than immediate attempts to devise development strategies for the small farmer. Other writers, however, feel that immediate action is possible with existing knowledge.

Another discrepancy became apparent in the course of receiving comments from the various authors on an earlier draft of this paper. Above (p. 4), the comment was made that the farmers

adapt techniques used in their fields as result of knowledge of the particular environmental limitations under which they must work. This knowledge is the result of a non-formal decentralized learning system.

Professor Freed indicated to the present writer that he believes these practices have resulted in the high incidences of hunger and malnutrition in the developing countries. Professor Axinn, on the other hand, has said that he believes that hunger and malnutrition in these countries are the result of a maldistribution of resources. Thus, there are two underlying conceptual assumptions. The first, here represented by Freed, asserts that the root of the problems found in the Third World stems from lack of technology. The other assumption, represented by Axinn, rests on the idea that the root of the problems encountered in the Third World nations stems from political, economic, and social factors.

A final apparent discrepancy noted in the various papers is clearly pointed out in the words of two of the writers. Wilkinson (pp. 1-2) has written:

It is recognized that there will be unusual situations where increased production may not be in the best short-run interest of a particular farm group or country. Likewise, certain individuals or farmers may not accept what is generally conceived as 'best' and will choose an alternative.

This view is seen to contrast directly with that offered by Shillhorn van Veen (p. 8), who has written:

Most projects (conducted under the traditional approaches to agricultural development) have been chosen for short-term success without sufficient knowledge about the system. . . . Moreover, livestock owners are interested in some of the modern technologies which may, in the short-term, increase their livestock numbers, and are pressing for developments in this direction, without realizing the potential ecological risks. Ecologically sound long-term development plans, however, need thought and good understanding of the system.

The discrepancy is seen to revolve around short-term or long-term goals as being that which are the concerns of F.S.R.

When an earlier draft of this paper was presented to the various authors for their comments, Professor Wilkinson responded by letter to the discrepancy noted here. In this letter he writes:

I do not think Schillhorn and I are in disagreement, though the choice of words (i.e. short-term long-term) might make it appear so. Schillhorn points out that one of the general thrusts of development is to increase production (specifically increase livestock numbers) and this might be done with a 'short term success'. But if the land and economy cannot support these increased numbers it may prove to be a long term failure. The context of my opening theme is that increased food production (locally and world wide) is a valid goal. However, an increased production could result in a depressed market price and be a short term disadvantage for a particular farming group. Further, high(er) technology is usually considered 'best' by most of the world. But for a particular farmer or group, this may not be true at all. Considering capital, skill, culture, weather, etc., an alternative, something other than 'the best', may be far better. I guess we are both saying that increased production may have some ramifications that should be considered--in the short run, a price or market suppression; and in the long run, ecology concerns.

The wide range of interests and the backgrounds of the various authors would suggest that there would be little agreement among them on the nature of F.S.R. However, by and large, there is a great deal of agreement among them.

In summary, the M.S.U. Farming Systems Research Group perspective is interdisciplinary in scope. Moreover, it focuses on the needs of the farming family and the specific conditions that family faces. The solutions to the problems

are related to the specific situations encountered on the farm and the relation of that farm to the larger sociocultural and environmental factors of which the farm is a part. The M.S.U. Group approach combines the benefits of the non-formal and formal approaches to agricultural research. It addresses farming systems which may be small or large; in developing or developed countries. The suggestions for improvement of farming practices are seen to result in a promotion of a better standard of living for the farming family through the adaptation of technology appropriate for the farming family and the larger social and economic systems.

#### SOME FINAL COMMENTS

All the members of the M.S.U. Farming Systems Research Group share the perspective that small-farmer involvement and participation is necessary at all stages of project design and implementation. In the following pages I wish to focus on the small farmer and forces which go toward explaining why a farmer might be reluctant to become involved in projects. This is an issue of central concern for F.S.R. and has a critical cultural dimension.

Culture can be seen as a series of interrelated institutions. Through socialization, the individual learns the ways in which he is expected to respond to his natural and social environments. Tying these institutions together is an ethos, a system of values, by which one judges his own actions and those of others. The appropriateness of his behavior is measured by the degree to which he is incorporated or shunned by his fellows. Ethos is an integral part of institutions, whether they relate to basic subsistence practices, and is manifested through behaviors relating to agricultural practices (e.g. specific agricultural techniques, specific crops grown, etc.); or, to the relationships

between an individual and his kinsmen--cognatic or affinal--manifested through a complex system of redistribution of goods and services. It is this complex of ethos and cultural institutions which define appropriateness and the solutions to local problems.

Culture is not static, but a very dynamic force. Under normal conditions innovations and culture change are made possible through the consideration of the ethos. If the innovation does not alter the basic fundamental ideas of the culture, culture change is not a major perturbation in the system. The innovation is merely incorporated as part of the culture. This system of values, and institutions which exhibit it, are formulated to permit the long-term adaptation of the social group to its natural environment, barring major perturbations in the system.

But major perturbations in this delicate system of balance relating one human being to others, or a culture to its environment, do occur. These shifts may relate natural ecological phenomena, such as changes in the mean annual temperature, earthquakes, etc.; or, to changes in the social environment as a result of foreign intervention. Foreign intervention will result in culture change. But, unlike the case of indigenous culture change, the alterations are made in local institutions without relating the shift to the ethos. Indeed, the ethos of the indigenous culture is expected to change.

The members of the intervening culture, like the indigenous culture, have their own ethos and their own institutions, through which they perceive the world. These are imposed upon the local population.

With intervention, the delicate system of balance between the individual and his social and natural environment is altered, if not destroyed. This is especially the case if indigenous systems are not incorporated as fundamental components of the new system. The advantage of F.S.R. over the traditional

systems of agricultural development is that F.S.R. does incorporate the indigenous value system. Under the traditional programs of agricultural development, the technicians have imposed their own systems of values and institutions upon the members of the local population. The ethos and the institutions of the indigenous culture were ignored by the technicians.

It must be recalled, too, that foreign intervention is not a new phenomenon to the majority of the Third World nations. European colonists entered these regions at least as early as the beginning of the Sixteenth Century, altering the local system of balance between man and his environment. It is also the case that intervention in some of these locations occurred before the advent of the Europeans. Each time an intervention occurred, especially if it required the participation of the indigenous culture in a new economic system, there were perturbations in the relationships between man and the environment. The ethos did not necessarily change as a result of the intervention in earlier times.

But, European colonialism altered the environment which forced the indigenous population to participate in a commodity and labor market system. The local subsistence based economy were altered as a result of forced work for the Europeans, at the expense of the traditional economic bases. The small-scale farmers in the Third World have been relegated to lands of marginal productivity (Brookfield, 1973; Mayer, 1951; Whetten, 1963; among others). This, in turn, has increased the small-scale farmer's need to accept western technology and participation in commodity- and labor-markets; and the incorporation of these innovations as parts of the culture. As Alverson (1978: 59) has said:

To some extent this acceptance has been forced upon them (The Tswana). They simply have had no choice.

There are a number of reasons why the small-scale farmer in the Third World has been forced to accept the new innovations. On the one hand, they are

participants in the commodity- and labor-markets, due to decreased yield on subsistence plots. On the other hand, exposure to these markets has increased their awareness of commodities which they can now purchase because of the increased income from participation in the labor market. These commodities, originally luxury items, now become cognized as necessities. These goods are the means by which one indicates his social status. Now that commodities are being placed tantalizingly within the economic reach of the peasant, he is more apt to purchase them. At the same time, there are social pressures exerted by his peers which virtually require him to purchase these commodities. Unfortunately, their purchase is done at the expense of such things as basic foodstuffs which ensure adequate nutrition and health. These forces--internal and external--are those which contribute to the phenomenon noted by Professor Schillhorn van Veen; namely, the pressing of small-scale farmers in the Third World for modern technology without an adequate understanding of the long-term consequences these innovations may have on the local system.

The availability of new commodities offered by development schemes brings into question the motivation of individuals who accept them. Are these individuals those who are respected by the community? Some authors have said they are (viz. Cancian, 1965). However, there are also studies which have shown that individuals who deviate from the norm are also shunned by the community (viz. Reina and Hill, 1978: 258). The consideration of introducing a new innovation, then, requires the technician to determine the extent of its use or non-use by the local population, the effects on the individual or individuals who accept it, and the appropriateness of the new innovation to the local conditions. Appropriateness, as I attempted to show above, must be determined through the perception of the individuals for whom the innovation is intended and the extent to which the project answers culturally determined problems.

Not only have traditional programs for agricultural development ignored the ethos of the impacted culture; but they have gone into local areas with an underlying notion that increased agricultural yields results in an increased income. This increase in income is thought to allow the individual to purchase the necessities of life and enhance his well-being. A number of the working papers in this series express the same ideology. Under programs of the "Green Revolution", increased production referred to the increased production of cash crops on large landholdings. These products most typically went to European markets (Nations, 1978; Gross and Underwood, 1971; among others). The labor required for the production of these crops came from the local population. Due to the increased need for money to purchase goods and services, work on these large landholdings often took precedence over labor on subsistence crops. Too, especially most recently, the income from these sources have not gone to purchase foodstuffs, but to buy the now-perceived-necessities of life, such as radios, televisions, etc.

Increased income also results in other problems, for which I can offer one example as illustration. Prior to 1975, minimum wage on coffee farms in Guatemala was \$0.75 a day for men and \$0.50 for women and subadults. Corn was distributed to the workers at the cost of \$0.01 per pound, despite its market price of \$8.00 per quintal, or \$0.08 a pound. When the government imposed the minimum wage law, the clause allowing the lower price of corn to workers was revoked. Prices for corn soared to \$16.00 per hundred pounds because of the increase in the number of people who could now purchase the foodstuff. There were a number of people on the farm on which I worked who had to borrow money in order to buy the other principal staple, beans, not to mention other necessities.

Development schemes have also referred to increased agricultural production of staple crops, such as rice and corn. Unfortunately, increases of these products have not necessarily increased food intake of these sources. For example, The Nutritional Survey of Bangladesh, 1975-1976 (p.21) provides tables showing differences in intake of cereals from 1964-72 and 1975. Per capita intake decreased from 545.8 grams/person/day in 1962-1964, to 523.0 grams per person per day in 1975 (p. 21). This decrease in consumption occurred in spite of an increase in production of cereals from 8915 to 12308 thousand metric tons in those same years (p. 14).

Why does this occur? A possible explanation may be found in another case. Lewis (1973) inducted a study of agricultural production in Santa Ana Mixtan, Guatemala, in which he concluded that farmers sell 2/3 of their corn crop, despite the fact that corn is the basis of life. Increased production of the commodity would increase the amount they could sell on the market, not increase the amount that they would keep for home use. Again, because the people have become involved in a system of commodities- and labor-markets, the increased income from agricultural production (even subsistence crops) allows them more ready access to commodities on the market, by which social status is measured. Agricultural production for better nutrition is not a primary concern, as Newell (1975: x) has observed:

We are only slowly beginning to understand that people are aware that health may have a low-ranking among starting points for change.

In the above pages I have referred to various factors which induce the farmer to act in the way he does. His responses to stimuli are culturally defined. His reactions to these stimuli are based on a complex interaction of economic exigencies, social pressures from other members of his culture, pressures imposed upon him by external market conditions, and historical forces. These are only

some of the forces with which individuals interested in F.S.R. must consider in the determination of acceptable projects to locally defined problems. However, these forces may not always be present in the minds of the local population. As Professor Shillhorn van Veen has intimated, one should exercise caution in introducing new innovations to the small-farmer, despite his pressing for the technique, if the small-farmer is unaware of the long-term consequences these techniques may have. In any event, the long-term consequences of these innovations should be carefully explained to the farmers.

The agents for international agricultural development interested in F.S.R. should also keep in mind another series of conditions which will also play a role in the degree of acceptance of the new innovations being introduced.

It is becoming increasingly evident that projects developed under the traditional forms of agricultural development have resulted in increased environmental degradation (Gross and Underwood, 1971; Nations, 1978; among others) and profound changes in social relationships. The latter, in turn, have led to greater social stratification and economic disparity between the affluent and the peasants in Third World nations. Moreover, Hughes and Hunter (1970) and Hunter (1981) have presented data concluding that agricultural 'development projects' often result in poorer health. Too, the introduction of so-called "high-yielding varieties" (HYVs) are problematic.

The HYVs represent a great investment and an avenue toward social achievement to the peasant. In part, this is because they allow him greater access to the commodities market by virtue of its increased production. However, Lewis (1973: 86) has noted that the HYVs draw "fertility from the soil faster than the native varieties". This requires the use of fertilizer, which is very expensive in Third World nations, relative to the earning power of the farming family, and represent a drain of the family income. Consequently, the HYVs should more

accurately be called low-yielding varieties. As an indication of this phenomenon let us turn to the Nutritional Study of Rural Bangladesh, 1975-1976, which provides a chart relating to acreage and yields of various crops (p.13). With these data, one can easily determine the yields per acre. Between 1969-1970 and 1972-1973, the local variety of rice dropped from 0.43 tons per acre to 0.35. The HYV fell from 1.46 to 0.56 tons per acre. The local varieties, in 1972-1973, produced 81% of the 1969-1970 crop; the HYV produced only 38% of the earlier figure.

This phenomenon is not an isolated event. It is found to recur in various localities of the world. But, the problems which this raises is not merely related to the decreased production of staple crops, but also to the larger social picture developing in the Third World nations.

Over the past number of years, Third World nations have stressed education of the peasantry. This has led to an increased awareness of the peasants to events occurring around them, especially in conjunction with the televisions and radios made possible through their participation in the labor market. The peasants are thus able to better understand the environment degradation, poorer health and agricultural yields, and economic disparity between rich and poor. They perceive these conditions as results of the introduction of new techniques from the developing nations, and an increase in their dependency on the commodities and labor markets. This perception may well result in an increased reluctance to accept innovations from the same developed countries which caused the problems they currently face.

In the above pages I have presented a rapid tour of only some of the issues which must be considered in F.S.R. I have presented concepts which must be borne in mind by the technician in his consideration of the implementation of a project designed to better the circumstances of the small-farmer. In particular, the

program must deal with problems perceived by the farmer, not the technician. The results of the program should yield the results deemed necessary and appropriate by the farmers, not the technicians. The problems and their solutions as perceived by the farmer, involves cultural institutions, ethos, and a consideration of his social position--both with respect to his place in the current social structure and the historic factors which put him there.

Contrary to the idea presented in some of the position statements, increased production does not aid the social position of the poor farmer. If anything, it has further aggravated the situation. Increased production has resulted in increased environmental degradation. The wealth stemming from increased agricultural production has gone toward the purchase of the "necessities of life-- radios, televisions, and the like. These purchases, when combined with increased education, have resulted in a profound awareness of the peasant with regards to his social position.

The social position of the peasant has not been bettered as a result of increased production; unless one is willing to say that increased awareness of his situation has resulted in movements among the peasantry to throw off the shackles of colonialism. However, there have been structural changes in the relationships in which the peasant is a part. In particular, he has become involved in the commodities and labor markets; the social fabric of which he was part has deteriorated; and the tenuous man-land relationship, off-balance as a result of European colonialism, has now been further jeopardized as a result of increased dependency on the commodities offered in the market-places.

These are some of the factors with which individuals interested in F.S.R. must deal. Professors Artis, Axinn, Crawford, Deans and Schillhorn van Yeen

have listed other dimensions which are, as yet, equally inadequately understood. Only when gaps in existent knowledge have been narrowed will F.S.R. be able to "assess, and hopefully, predict the impacts of F.S.R. intervention on social structure and the relationship between the farming system and the larger system in which it operates" (Artis, p. 4). Until scientists understand more fully the dynamics involved in a farming system for all its good intentions, F.S.R. may well go the way of traditional approaches to agricultural development: unacceptable to the local populations for long-term goals and sustenance, and create even more severe problems that are currently present.

The F.S.R. perspective which has evolved at M.S.U. potentially offers the consideration of the multitude of dimensions involved in social change. Among these various dimensions are the consideration of both the long-term and the short-term effects on the environment; and that the environment is now conceived as possessing both natural and social components. Only when all of these dimensions are considered, can it be said, as Professor Esmay has, that the F.S.R. approach will be able to improve the quality of life of small-scale farmers in the developing nations of the world.

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## Footnote

1. Unless otherwise noted, all references cited are those of the M.S.U. Farming Systems Research Group Working Papers series, all of which were published in 1981.

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