Experiences on and Directions of Farming Systems Research and Development in the Philippines

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ABSTRACT

The Department of Agriculture (DA), in partnership with other institutions involved in agricultural research and development (R and D), has had rich lessons and fruitful experiences in farming systems development. The concept of farming systems approach to R and D was formally introduced to DA in the mid-70s. It triggered the development of various R & D methodologies and strategies. Then, in 1982, the 12 Regional Integrated Agricultural Research System (RIARS) and the Provincial Technology Verification Teams (PTVTs) were operationalized. This helped intensify the generation, verification, and adaptation of relevant agricultural technologies. It provided the small Filipino farmers the means of optimizing the use of limited farming resources. In spite of these developments, there are still areas of concern that need to be further addressed, namely: 1) improvement of research efficiency, 2) real farmer participation, 3) effective research-extension linkage, 4) active interaction of on-station and on-farm research, and 5) sustainability. Even with these challenges and with the increasing complexity of the agricultural development process, and its partners are reaffirming their commitment to the further strengthening and institutionalization of the farming systems approach. They envision that the farming communities will play an increasingly active role in farming systems as a means of increasing agricultural productivity.

INTRODUCTION

The last years of the 1980's witnessed political crises, such as the recurrent attempts to overthrow the present leadership and conflicting views on the retention of the US bases. While these subjected the country to high-risk conditions, they lacked the intensity to disrupt the pace of life in the country. Unknown and unfelt by many, however, is the presence of bigger threats.

As we move closer to the end of this century, population increase and environmental degradation continues to increase in proportion that they shall become gravely inimical to food security, thus, seriously affecting our chances for economic recovery. A feasible recourse is the development of sustainable, higher yielding agricultural systems and institutions.

SYSTEMS THINKING FOR AGRICULTURAL DEVELOPMENT

The limitations of conventional research and extension models in dealing with the interaction of farmers with their natural and social environments are well recognized. The government is particularly guilty for having treated farmers as people with homogenous needs, expectations and resources, forgetting that each farm exists as a single and unique functioning system. In effect, government services, which focus on increasing productivity, have excluded the farmer from the development process. This has resulted in a wide gap between technology development and utilization, particularly for resource-poor farmers. In addition, the past production programs of the government were heavily oriented towards a few favored commodities, such as rice, corn and sugarcane. Thus, success was confined to the lowlands, especially the irrigated areas, resulting in a lopsided development favoring the already affluent farms. In due time, the government became wiser. It eventually realized that majority of the farms are located in rainfed areas where there is much variation in physical and social environment. This has led to the call for the development of systems approaches to development.

Attempts to broaden the production base including the highly diversified systems and resource-poor rainfed lowlands, uplands and hilly lands, where the vast majority of Filipino farmers reside, initially failed. In these areas, sociopolitical and environmental concerns are at their maximum and production technologies must be adapted to these realities. The need for integrative and farmer-collaborative approaches was, therefore, great. This has given rise to the Farming Systems Approach (FSA).

APPLICATION OF THE FARMING SYSTEM APPROACH TO RESEARCH AND EXTENSION (FSR/E)

It was in the mid-70s that the use of the FSA to research and development (R and D) came into prominence in the Philippines later than other countries. The pioneers were the International Rice Research Institute (IRRI), Department of Agriculture (DA), UP Los Banos (UPLB) and the then National Food and Agriculture Council (NFAC), which used this in multiple cropping schemes. The IRRI and DA were involved in a project in Sta. Barbara, Iloilo, advocating the planting of two rice crops in a year instead of the traditional rice monocropping. With the introduction of the technology, other factors for successful production were quickly identified and services for these were brought in. Eventually, this early effort graduated into what is now known as the `'Kabsaka" project.

At about the same time, the UPLB and the then NFAC introduced the concept of multicommodities production (crop and/or livestock) in several provinces in Region IV (Laguna, Quezon, and Mindoro) on a test basis. These relatively small efforts did much to enhance the subsequent understanding and development of better concepts of farming systems.

Since its introduction, FSR/E has been utilized in various ways in a number of rural development projects. It has also been institutionalized in the on-farm research and outreach activities of the DA. The experiences gained have been varied as there were differences in concepts, strategies and procedures across time and among projects. This paper presents some DA endeavors which feature the use of the FSA, including the direction in FSR/E.

The "Kabsaka" Experience

"Kabsaka," which means "Kabusugan sa Kaunlaran" (Bounty in the Farm), was an interagency effort in Iloilo province in the early 1980s led by the then Ministry of Agriculture (MA). It had strong support from the provincial government, NFAC, IRRI and the then Philippine Council for Agriculture and Resources Research and Development (PCARRD). It was both community and technology-based, and an offshoot of the earlier project in Sta. Barbara, Iloilo.

The project aimed mainly to raise farm incomes by increasing cropping intensities and production in the traditionally single-cropped rainfed areas of Iloilo. The main intervention was the introduction of a multiple cropping technology involving livestock and fish production as determined by the farmers' resources. The

other components included: 1) marketing and transport system, 2) seed supplies, 3) human nutrition and health, 4) institutional staff resources, 5) construction of small water impounding sytems, 6) pilot village development, and 7) conduct of adaptive research on rainfed cropping.

By the end of the project in 1985, the new technology had been implemented in 40,584 ha (77% of the target of 52,500 ha). The average cropping intensity rose to as much as 200% as compared to the projected 160%. Average yields of upland crops, such as mung bean, melon, and vegetables, registered increases of up to 47%.

On the negative side were difficulties in project implementation due to budget constraints. The assumed level of increase in multinational agricultural credit, rural road construction and extension services which were to be provided by other related projects, failed to materialize. The water impounding project had to be stopped after the construction of 16 of the planned 40 dams because it turned out that only a few farmers were benefitting from these and not the greater majority.

Overall, the "Kabsaka" experience was an example of the impact of an acceptable technology (as a result of rigorous on-farm trials involving the farmers) coupled with community-oriented support services. Even without the expensive peripheral efforts, the project, by concentrating on the basic multiple cropping component, would still have achieved much of its targets. The important thing was that the Iloilo farmers learned to appraise the merits of the technology on their own and used this according to their resources and capabilities. A strong indication that this, indeed, is the case, is that 2 years after the end of the project, multiple cropping has continued to spread beyond the original adopters.

The Farming Systems R and D Program of Bicol

This project is a pioneering effort under the Rainfed Resources Development Project (RRDP) of the DA which uses the FSA in the development of the Bicol rainfed areas. It seeks the participation of small farm families in the development and improvement of agricultural production technologies and enterprises appropriate to their needs and capabilities. It also aims to identify strategies for mobilizing the farm families and the community to participate in the project's research activities and developing their capability to sustain and disseminate the results. Corollary to these objectives is the need to improve project capability to effectively use the FSA in working with the farm families in the rainfed areas.

Field activities commenced in 1984. Research and extension activities focused mainly on crop production, crop-livestock integration and home industry projects. The project first sought to actively involve the Bicol farmers, both as individuals (farm family) and as community in the different stages of the farming systems R & D process.

To improve field level implementation, the project even commissioned the Institute of Philippine Culture (IPC) to conduct a six-month process documentation study during the first half of 1986. The results provided much of the data inputs which led to improvements on activities involving farmer participation.

Some of the project's major finding on the importance of farmer involvement are on site selection, site assessment, design and planning and selection of project cooperators.

Site selection. Insights on prospective sites are best provided by farmers in the areas. Project planners should not rely exclusively on information gathered from secondary sources.

Site assessment. Key informants are crucial in generating a comprehensive picture of the project site. Thus, their selection was not left to the local leaders, who were likely to allow political interest to bear upon project design, and planning.

Farmers' interest in the project can be developed and sustained by involving them in site information gathering and analysis. By helping the project implementors obtain a complete profile on the community, particularly on its resources, needs, priorities and concerns. They begin to appreciate the context in which the project goals are set by. Moreover, the farmers develop the motivation and commitment to implement a plan which they themselves helped to conceive.

Design and planning. A thorough collaboration with the farmers at the design and planning stage is crucial. In the project, the farmers participated only at the baangay level. They were not a part of the decision making on the conduct of specific trials and where these were to be carried out. This gave rise to the perception that the trials were merely research-managed and for demonstration.

Selection of project cooperators. Even if the project provides guidelines for selecting cooperators, farmers should be given the chance to articulate their own criteria. This is a potential source of information indicating farmers' concepts of risk-taking and technology experimentation.

Consultation with the community or at least the immediate group of farmers from among whom a cooperator shall be chosen is highly advantageous. A cooperator serves as the representative of his group and, as such, becomes accountable to his peers. Thus,

he does not perform research tasks only for himself or as a favor to the project staff but for the whole group as well.

As far as local officials are concerned, their cooperation is important, but they should not be allowed to have a voice in the selection of cooperators as experience shows that their choice is politically motivated.

The project, as an exercise in utilizing a people-oriented approach, shows that farmers participation is possible in agricultural research and even leads to more responsive work planning and implementation. It also reveals that small farmers, even if their resources are limited, when given viable alternatives, can respond positively to invitations to experiment, innovate, and adopt new ways of production, processing and marketing of farm and household products.

The Farming Systems Development Project of Eastern Visayas

This project was a collaborative effort of the DA and the Visayas State College of Agriculture (VISCA). It aimed to establish mechanisms for adapting agricultural technologies to the resource conditions of Region VIII.

The project staff started activities at a disadvantage because they had very little previous research experience in upland agricultural situations. Thus, on-farm trials were designed by the researchers with no farmer participation. The farmers were not asked what they thought would be appropriate technologies or what they really needed.

The project staff were trained at UPLB and IRRI on farming systems research. The training was geared mainly towards the resource conditions of Central Luzon and Laguna, but not for the poor, upland areas of Leyte which had high environmental and resource variability. After 3 years of cropping pattern trials with little sucess, the project staff realized the inappropriateness of their orientation.

The cropping pattern trials were expensive, both in terms of time and physical inputs, especially because soil conditions could not support intensive cultivation. Likewise, the uncertain weather conditions, pests, diseases and rodents made cash investments food requirements, market opportunities, land quality, and aggressive weed species made it difficult for farmers to adopt all the recommended practices.

Despite the setbacks and seeming project failure, something good still came out of the efforts. One of the successful early activities was a visit to Cebu by Leyte farmers to see terracing of steep or sloping areas with hedgerows of ipil-ipil. These farmers

did not only adopt the method but also, on their own, taught other farmers how to do it.

This started the refocusing of the project activities on appropriate technologies for the project areas. It also led to research on the type of ipil-ipil variety that best grows on acid soils and the identification of optimal pruning schemes. This redirection provided new alternatives for the project.

The project had four major findings on research and extension mechanisms.

Listening to the farmers.. By listening to the farmers, it was found that resource-poor upland farmers are not interested in maximizing a particular commodity's productivity, but rather, in improving the resource base and the efficiency of resource use of the system as a whole. An example is their preference for certain sweet potato varieties. The subsistence farmers wanted their sweet potato to vine vigorously on an exhausted soil so as to compete with weeds and cover the soil to prevent further soil erosion. In addition, they preferred sweet potato varieties that are dry and not sweet. Hence, their criteria for selecting varieties included tolerance to acid infertile soil conditions. This differs greatly from the preference of commercial growers.

Taking an expanded perspective of the farm.. The systems problem approach, if focused solely on the farm as a collection of enterprises or commodity mixes, is difficult to use in identifying apropriate solutions. However, farmers take in more of the total landscape in defining their problems. For example, for cogonal lands, the farmers said that the cogon seeds came from nearby fallow fields. These easily germinated on degenerated soils which have been rendered such by overcropping and erosion. The further lack of soil fertility may have been caused by accidental burning and intensive tillage.

Other external sources of constraints such as labor, draft power and supply of inputs also have to be considered. Poor health and limited cash affect the availability of labor, and access to the land is also restricted by tenure. This is compounded by the unavailability of cash to pay the rent, volatile peace and order situation, and demands and needs of a growing population.

Use of low input sustainable technologies as test factors. The farmers have indigenous knowledge of their immediate areas and coupled with research knowledge, they are able to identify low-input, sustainable technologies. A good example is in the problem of shifting cultivation. The farmers tried a legume live mulch, *Desmodium heterophylum*. The legume was found to enrich natural fallows and shorten the fallow periods. It dominated the

natural vegetation for 12 to 18 months, and could be used in cogonal lands for easier tillage.

Use of farmers to extend technologies to other farmers. This was found to be a superior means of information dissemination in that it is rapid and has the added feature of farmer participation. In the project, this was used to train farmers in hedgerow contour planting of ipil-ipil and in subsequent hedgerow improvement and maintenance. The extension agents acted as facilitators and not as resource persons. Thus, another lesson is that the "right" type of farmers must participate in the training, that is, only those with similar resources and practices must be trained at the same time.

Regional Integrated Agricultural Research Systems (RIARS)

While there has been a number of DA special efforts, mainly projects which featured the FSA, it has been in the RIARS that the department has had the most experience in farming systems. The RIARS is a regional research and outreach network established in all the 13 regions with the development of location-specific farm technologies as its main concern. It started in 1982 under the Agricultural Support Services Project (ASSP) and since then, has been active in enhancing farmer participation in farm trials.

The RIARS farming systems application starts with the identification of "target" areas and the development of new technology and ends with the adoption of the technology by the farmers. The first step in technology formulation is technology generation accomplished mainly by State Colleges and Universities (SCUs), and to some extent, by the DA. The results are then passed to the RIARS which subjects these to technology verification in the farmers' fields which serve as the test sites.

The end of the long process is a technology piloting stage called Barangay Pilot Production (BPP) which is participated in by farmers of one or more barangays. The field activities include identification of target area, site characterization, design of site research program, and selection of farmer-cooperators.

Identification of target area. The "Target Area" is the place expected to benefit from the interventions. At least one target area is identified in each province based on the major existing agroecological zone(s). A target area has an environment that is homogenous enough and representative of the agroecological zone to allow the conduct of common trials across a number of farmers' fields in a selected test site usually one barangay.

Site characterization. A detailed description of the test site (the barangay) is made. The data serve as inputs for the design of

a research program. Primary and secondary sources of information are used, such as surveys and ocular inspections and information from local DA offices.

Design of site research program.. Based on the results of the survey and data from other sources, research activities are designed for each test site.

Selection of farmer-cooperators. Some 12 to 24 farmer-cooperators are selected at the test sites according to two criteria: 1) their farm size is smaller than the average farm size in the area; and 2) they have been growing the main crop produced in the area.

All aspects of field work are carried out by a Provincial Technology Verification Team (PTVT) which is composed of at least two agricultural production technicians. This team is backstopped by an interdisciplinary RIARS core staff who operates at the regional level and coordinates all PTVT activities. The RIARS core staff, numbering about five or more, is composed of at least one agronomist, livestock specialist, soils specialist, economist and pest management specialist.

The research program design for each site includes: 1) Technology Adaptation (TA), 2) Technology Verification (TV), and 3) Technology Dissemination (TD) or Barangay Pilot Production Program (BPPP). The farmers' close collaboration and participation are encouraged in the conduct of all site activities.

Technology Adaptation (TA) is designed to evaluate the single components of a technology. Examples of such components are: choice of variety, fertilizer application, pest management, weed control, and tillage practices. It is researcher-managed. On the other hand, **Technology Verification** (TV) evaluates the performance of experimental cropping patterns by comparing these with that of the farmers' cropping pattern. It aims to improve the productivity of one or two of the most dominant cropping patterns in the target area. These trials are farmer/researcher-managed.

The Technology Dissemination (TD) or Barangay Pilot Production Program (BPPP) occurs when, after several seasons of on-site testing and demonstration, alternative cropping patterns are verified and proven to be superior to the existing farmers' practice. The results are then subjected to multi-location testing to demonstrate the new and superior technology to all farmers in a target area. The degree and extent of adoption by farmers would indicate the socioeconomic feasibility and adaptability of the particular technology.

1. The rice farmers are the most receptive to change and the most technologically advanced sector. It may be prudent to shift more attention to nonrice based trials.

2. The farmers found the improved variety as the easiest component of the technology to adopt because of its relatively low cost and usually substantial returns. Fertilizer came in a far second for although it is the most promising in terms of profit, the added cost is rather high.
3. A higher return on investment encourages farmers to adopt technologies.
4. The high cost of inputs and lack of capital were the frequently mentioned reasons for nonadoption. Riskiness or difficulty in learning new practices were reasons of a lesser degree. There appears to be a direct relationship between extent of adoption (i.e. how much of the new technology the farmers are willing to adopt and the individual farmer's available resources.
5. About 25% of the new technology did not outperform the present farmers' practices. The remaining 75% success should be viewed with some skepticism and local technology verification should be extended to increase the reliability of the results of the trials.
6. The addition of a new crops in the field often fails when the climate is less favorable. The capability of new crops to withstand suboptimal conditions should be studied further.
7. Continuing staff development is a must. The teams operating at the field and regional levels have to be given refresher courses on the farming systems at regular intervals to update them on developments and new technologies. But more important is their regular exposure to the dynamics of farming systems under various actual settings.

The other observations worth considering are as follows.

1. The DA staff, except the RIARS/PTVT personnel, are not fully prepared on the implementation of farming systems. This has created difficulties in the transfer of farming systems technology from the research to the extension sector and from the extension system to the clientele system.
2. The farmers have a low adoption of farming systems technology. Farmers are generally wary of new technology and farming systems technology is no exemption. To overcome this, plans are being made to include farmers' participation in as many steps of FSR/E as possible.

To strengthen its lead role in FSR/E, the DA has initiated the holding of a series of conference intended to identify and resolve the remaining issues in the R/E linkage. In addition, the department has adopted the policy of using farming systems approach as a basic principle in all DA R/E activities. The RIARS has also been transformed from a project activity to an institutionalized effort in the various regional offices

ACCELERATED AGRICULTURAL PRODUCTION PROJECT: RESEARCH AND OUTREACH SUBPROJECT (AAPP-ROS)

The latest ongoing effort of the DA which features the use of farming systems is the AAPP-ROS. It is chiefly an enabling mechanism to allow the DA to meet certain objectives which would not normally be possible under the present DA set up and resources.

The AAPP-ROS aims to:

- accelerate the operation, verification, utilization and dissemination to farmers of available technology;
- support the DA's efforts in decentralizing planning and implementation of R/E programs;
- improve the linkage between technology development and dissemination/utilization process;
- support the re-orientation of technology development so that a client oriented rather than a researcher-oriented process is promoted; and
- strengthen the capabilites of the DA regional offices and other institutions' R/E staff to ensure the attainment of objectives.

To enable AAPP-ROS to meet the desired objectives, it has implemented four main strategies:

Decentralization Planning and Implementation

A bottom-up approach to planning is now being followed. Field workers of the DA, the Agricultural Production Technicians (APTs), facilitate the preparation of the municipal research and outreach programs, in consultation with the farmers. The initial focus of these programs is the enhancement of the production and income of the farmers based on priority agricultural enterprises which consider the farmers' present resources and the availability of requisite technologies. The programs are the centerpoints in the

planning and implementation of all support activities of the DA and other agencies in the localities. As such, R/E component activities are planned and executed at the municipal, provincial and regional levels.

Prioritization of Regional Research and Extension Activities

Specific subprojects activities in each region are based on development zones, sectors, commodities and problems/opportunities prioritized in the National Agricultural Research and Extension Agenda (NAREA). The NAREA is the embodiment of development priorities of each of the 13 regions and the outcome of an interactive and participatory process conducted in each region by government agencies, farmer-representatives and Non-government Organizations (NGOs).

Empowerment

To focus technology adaptation and verification activities on the specific problems of the farmers, they are fully involved in identifying and diagnosing problems that constrain yield and profits as well as in designing needed responsive activities. Furthermore, they fully participate in the evaluation exercises and are given the privilege to make the final decision on what technologies should be recommended for adoption by other farmers in the community.

SCUs which involved in the R/E activities are also encouraged to participate.

Enhancement of Farmers' Entrepreneurial Orientation

Subproject activities are focused on developing the entrepreneurial orientation of farmers to manage their farms as a business enterprise. To carry out this activity, the extension workers were trained on the agribusiness perspective to make them effective management partners of the farmers.

The Rapid Rural Appraisal (RRA) technique was extensively used. The RRA is essentially a learning process about rural conditions carried out in an extensive, interactive and expeditious manner. The DA technicians visited identified barangays and generated field-relevant data on community resources needed to identify gaps, opportunites and options for the areas. Appropriate intervention were identified with the participation of the key informants in the barangay. The output of the RRA was used in the Barangay Research and Outreach Program (BROP). The BROPs of three * barangays in a

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target municipality constitute the Municipal Research and Outreach Program (MROP). At the provincial level, it is the Provincial Rsearch and Outreach Program (PROP); at the regional level, the Regional Research and Outreach Program (RROP).

At this stage of subproject development, it is still too early to make a thorough evaluation of its merits. Nevertheless, an initial study found that there is a good prospect for the operational of a decentralized and participatory approach to programplannning and implementation.

DIRECTIONS ON THE USE OF FARMING SYSTEMS APPROACH IN RESEARCH AND EXTENSION

As stated earlier, it was in the light of the failure of the Western type of agriculture to contain the increase in the incidence of rural poverty which led to the development of the FSA, especially as applied to R/E. Since then, some of the important changes in the processes have taken place. some of these changes, which were described in our examples, are:

- client orientation and research focus geared toward specific groups of local people;
- systems orientation of research and the growing realization that farmers operate systems with limited resources;
- shift to "demand-drive" research rather that the technology-push approach, and
- improved focus of applied research on development constraints.

Since the inception of farming systems in Asia two decades ago, there has been considerable experiences gained. Unfortunately, there is also variability in the approaches, concepts, procedures and terms evolved by each country and even among individual initiatives within a country. This is perhaps due to the large diversity in the social and physical environments of sites where farming systems are most applicable and appreciated. These differences have defied any satisfactory grouping or classification. On the other hand, FSR/E might be better off as it is, allowing it to enrich the knowledge and be applied as seen fit.

Nevertheless, most farming system concepts entail the blending of nine core characteristics:

- Farmer-oriented
- Involves the clients as participants in the research and extension process
- Recognizes the locational specificity of technical and human factors
- Problem-solving approach
- Systems-oriented
- Interdisciplinary
- Complements, not replaces, the conventional commodity and discipline research.
- Tests technologies in on-farm trials.
- Provides feedback for shaping research priorities and agricultural policies.

The DA is at that stage where it still has to win over converts to the FSA from within its ranks of researchers and extensionists before it can effectively apply these to more farming situations across the country. The shift to the approach appears inevitable and the department has even made it a policy that its R/E activities be guided by a farming systems perspective. We are in the process of making our R/E structure more responsive to the needs of small farmers and their difficult environment.

As the principal agency responsible for the promotion of agricultural development, the DA's primary objective is to increase the income of small farmers and fishermen. This is considered a major means of helping achieve the national goals of alleviating poverty, generating productive opportunities, fostering social justice and equity, and promoting sustainable growth. To address its primary objective, the DA encourages the maximum participation of the people in the development process. The approach is seen as an attractive means for making this possible in the countryside.

However, inspite of the lessons and experiences accumulated by the DA, some areas still require much concern, namely:

- Improvement of the DA's research efficiency;
- Real farmer participation;
- Operationalization of a research-extension linkage;
- Active interaction of on-station research and on-farm research; and
- Sustainability

CONCLUSION

Future workers would do well to heed the advice of the wise: ". . . Realities require agricultural systems that focus as much attention on people as they do on technology, as much on resources as on production, as much on the long-term as on the short-term . . . (Gro Harlem Brundtland of the World Commission on Environment and Development in 1987) and ". . . We must find ways to grow more food without draining the soil of its fertility, to raise more livestock without turning grazing land into wasteland, and harvest more fish without robbing the waters of their life. . . (FAO Director Edward Saoma in the 1989 world food day)".

We have just begun work in the totality of the instances where the FSA can be applied. While we have made much headway, we have yet to examine, in a much greater depth and detail, the social and economic implications of the use of the FSA. We still have to determine the extent to which farming systems programs have led to the rehabilittion of degraded areas and provided tangible benefits for the farmers and consumers.

With the improvements in the institutional capability of FSR/E, we envision the next theater to be in the farming communities themselves. These communities will face the challenge of how to increasingly carry out, on their own, the use of the FSA as a community-based agricultural resources management system to achieve agricultural productivity.

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