Staff Paper

AGRICULTURAL EXTENSION IN AFRICA AND ASIA

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> The Gene Revolution requires a much higher level of institutional capacity than the Green Revolution in terms of agricultural research, bio-safety regulation, intellectual property protection, and agricultural input and output markets.
>
> *- Prabhu Pingali, 2007*

BACKGROUND

Without question, agricultural extension is now back on the development agenda. The acknowledged failure of the T&V extension model in Asia and Africa in the late eighties and early nineties has stimulated debate on extension reforms and the introduction of new extension models such as Farmer Field Schools. Today extension reforms are underway in many countries in Asia and Latin America and to a lesser extent in Africa. The purpose of this review is to summarize the literature on the role of different models of agricultural extension systems in helping smallholder farmers in Africa and Asia increase agriculture production and improve their livelihoods.

Five reasons explain why agricultural extension is an important institution to incorporate into the design of information and knowledge systems for smallholders:

- First, extension departments form the centerpiece in most Ministries of Agriculture in terms of the number of personnel. For example, there are an estimated 100,000 extension agents in India and 10,000 in Ethiopia and the government of Ethiopia is training another 30,000.

- Second, because of calls for market – driven development, the architects of the dominant public extension, research and agricultural education models in both Africa and Asia are being challenged to look for less costly and more pluralistic systems that can be privatized or served by non-governmental organizations (NGOs) (Antholt 1998, Anderson 2007 and Gebremedhin, Hoekstra and Tegegne 2006).

- Third, is a growing recognition that extension must go beyond transferring new food crop technology to farmers and focus on helping the rural poor by promoting agricultural diversification, increasing rural employment, and helping farmers gain access to biotechnology (Pingal 2007) and access to export markets (Van den Ban and Samantha 2006).

- Fourth, the rapid spread of the Farmer Field School (FFS) extension model has encouraged donors to put extension back on the development agenda. IFAD, for example, has now shifted from grants to loans for FFS projects in

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Tanzania. The FFS model is a community learning model that has been adopted in some 50 to 70 countries over the past 15 years. However, numerous economists argue that the model is not financially sustainable after foreign aid is withdrawn. (Feder et al 2004a).

- Fifth, the private sector is playing an important role in extending information to smallholders growing GM crops in India, China, Brazil and South Africa. This new development calls for research on private and new forms of private-public extension models (Anderson and Crowder 2000).[1]

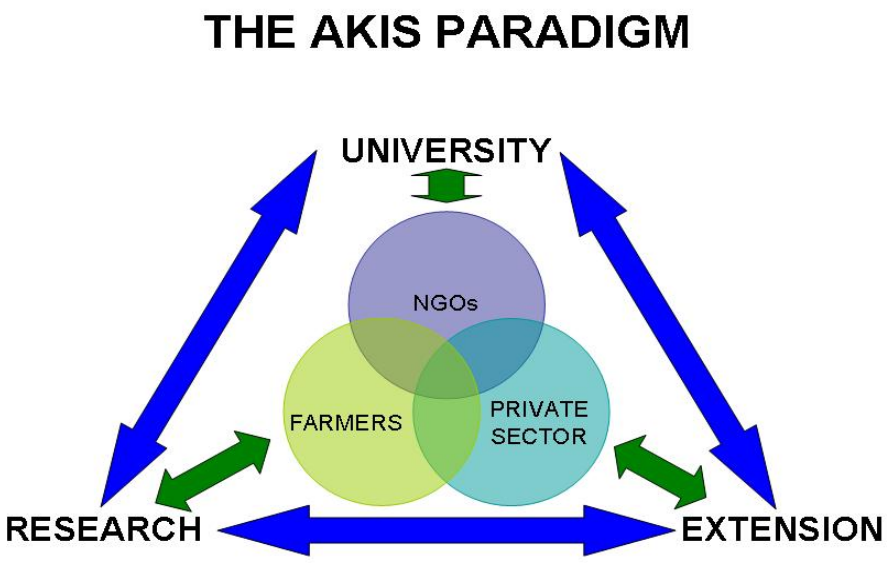
CONCEPTUAL ISSUES

The diffusion of technology has been a powerful source of economic change for generations. During the 1940s and 1950s, diffusion research emerged in rural sociology departments in the United States (Ruttan 2003). By the 1960s, these traditions were continued in communications, geography, marketing and economics. For a discussion of diffusion research, see Rodger's now classic *Diffusion of Innovations,* first published in 1962 and updated in 1971, 1983, 1995 and 2003 and the important work by Roling (1988 and 2006).

Before we discuss the basic extension models, it is important to note how extension is linked to development institutions such as producer groups, research institutions, agricultural higher education and input and product markets. The paradigm of agricultural knowledge and information system (AKIS) which flourished in the 1990s stressed the importance of developing a *system* of institutions (e.g. research, extension and education) that cooperate and communicate with each other to achieve an overall goal of increasing agricultural productivity (Figure 1).

[1] For example, management may become the responsibility of farmer or agribusiness organizations rather than local governments. Extension can still be publicly funded, but funds can flow through farmer organizations that have a controlling interest in fund allocation. Farmer organizations, in turn, may contract out extension services to private providers and NGOs as in Uganda's National Agricultural Advisory Services (World Bank 2008)

Figure 1 Agricultural Knowledge and Information Systems



Source: FAO and the World Bank, 2000.

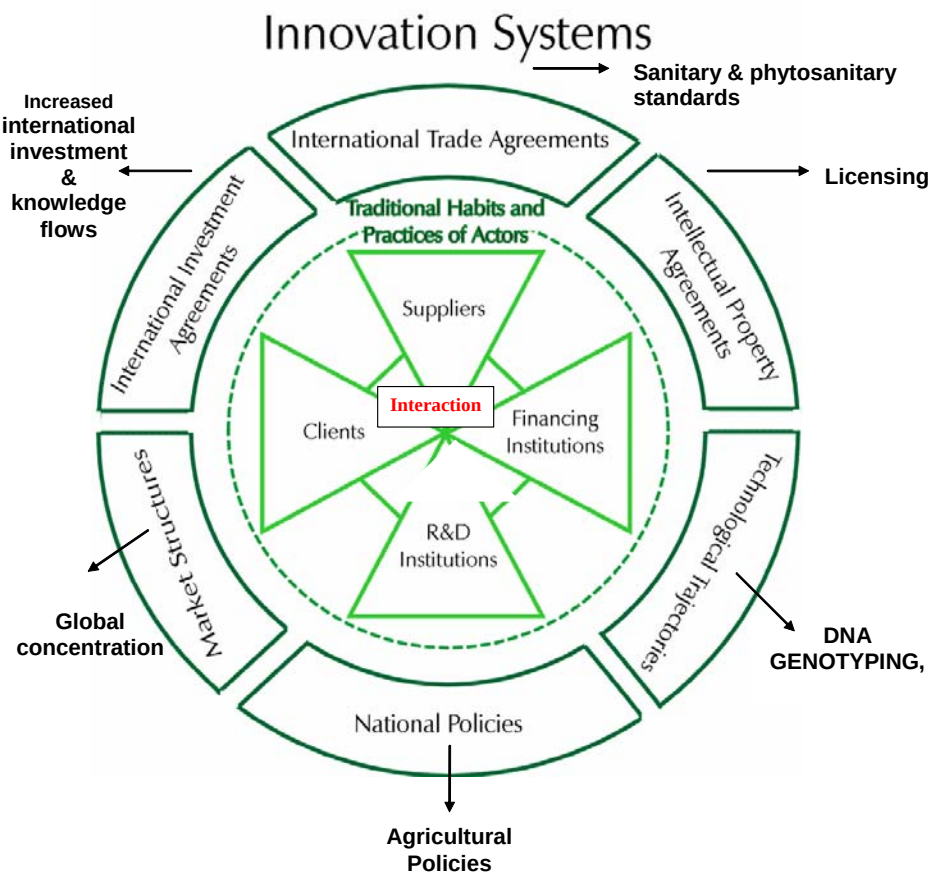
However, the AKIS paradigm has been criticized because of its linear vision on delivering technology to large farms while ignoring farmers with limited land and resources, and not listening to farmers in terms of their problems and priorities for government and university researchers. Therefore, the conceptual debate has now shifted from the AKIS paradigm to agricultural innovation systems (Sulaiman and Hall 2006).[2] Over the past few years, innovations have gained cachet in academic and donor circles just like farming systems research (FSR) did in the late seventies and eighties (Collinson 1987). However, FSR research is now subsumed as part of participatory research. Likewise, FAO/Rome established a Sustainability Department in 1992 and then changed its name to a "Natural Resource Department" in January 1, 2007. Why? Several observers note that the sustainability paradigm never gained intellectual legitimacy and donor support. Will the innovation systems paradigm follow the same pathway as FSR and the FAO's experience with sustainability.

Innovation systems are now used as the centerpiece to develop a new generation of donor projects (Figure 2). Many countries are using enhanced innovation capacity as a "pipeline to donor funding." However, recent reports by (FARA 2007), and the World Bank point out the difficulties in operationalzing the innovation approach. It is an open question whether the innovation approach can be operationalized and be of much help in identifying how to promote the growth of smallholder agriculture in Africa. Although the

[2] Nelson (1993), an economist, used the paradigm to explain the development of innovations that have spurred economic growth in industrial nations.

AKIS paradigm is simplistic, it is still a useful concept in highlighting the importance of developing a *system* of education, technology and extension institutions that are the drivers of transforming traditional agriculture (Bonnen 1998). The three core institutions in the AKIS paradigm need to be interlinked and largely developed with public funding[3] until they reach a point where public-private partnerships and private investors, including farmers are contributing a large share of the investments necessary to drive the agricultural transformation process (Evenson 2004).

Figure 2: A stylized innovation system



Adapted from: Lynn K. Mytelka, "Local Systems of Innovation in a Globalized World Economy" in *Industry and Innovation*, Vol. 7. No. 1, June 2000

[3] In India today roughly 97 percent of its extension budget comes from public sources.

SIX MODELS OF AGRICULTURAL EXTENSION

Currently, there are six basic extension models in various stages of development and implementation in the developing world. Instead of trying to identify the "best fit" extension model for a particular country, the reality is that a pluralism of models is being used in most countries in Asia and Africa (Davis 2006; Birner and Anderson 2007 and Birner et al 2006). Virtually every developing country now has a mixture of public, NGO and private firms (e.g. seed and fertilizer dealers) delivering extension assistance to smallholders. The following six extension models are being used in developing countries.

1. **The national public extension model** has been historically the dominant extension model throughout the world and it has usually been a key institution within and reporting to the Ministry of Agriculture. However, in the United States, public extension is located in the State Land Grant Universities. The transaction costs of the Land Grant model are low because one administrator, the Dean of Agriculture, is responsible for the coordination and management of three interlinked institutions: agricultural research, extension and agricultural higher education. Although India's State Agricultural University (SAU) Model is based on the U.S. Land Grant Model, the SAUs are responsible to the Department of Agriculture in their respective states and the Indian Council of Agricultural Research.[4]

2. **The commodity extension and research model** was introduced by colonial powers in Malaysia, Mali and other colonies exporting cotton, palm oil etc. (Ruttan 1982; Eicher 1989). The model combines research and extension and it is still in operation in many countries today. In Mali, for example, smallholder cotton farmers are served by a self-financed cotton research and extension system while the public extension model serves farmers outside the cotton zone.

3. **The Training and Visit (T&V) extension model** was launched in Turkey in the early seventies and then spread to India and throughout Africa under World Bank sponsorship in the late seventies and the eighties. The T&V model consumed about three billion dollars of donor assistance over the 1975-1995 period. However, the T&V model has proven to be financially unsustainable (Anderson, Feder and Ganguly 2006). Nevertheless, some countries (e.g. Zambia and Mali) are currently using modified T&V extension programs.

[4] Since agriculture is a state subject in India, the SAUs in India are currently receiving approximately 80% of their funding from the state governments and 20% from the national government through the Indian Council for Agricultural Research.

4. **The NGO extension model.** In the nineties, many NGOs shifted gears and moved from providers of food aid and humanitarian assistance to become "agents of development." The NGOs established food and community development projects in many African countries in the 1990s that were primarily financed by bi-lateral donors. For example, in Mozambique in 2005, the international and local NGOs employed 840 extensionists as compared with 770 public extension workers (Gemo, Eicher and Teclemariam, 2005).

5. **The private extension model** is spreading in industrial countries such as the Netherlands, New Zealand, the United States and more recently in some middle income countries such as Chile and low income countries such as Uganda. Under the private model, the farmer is expected to pay some of the cost of extension with the hope that public outlays on extension will be reduced over time (Anderson and Crowder 2000). But there is little evidence to date that small scale farms can "buy their way out of poverty" by paying for extension advice. Several researchers are documenting the privatization of extension in Uganda but the jury is still out on the financial sustainability of private extension (Anderson 2007).

6. **The Farmer Field School (FFS)** approach (model).[5] This model emerged in Asia in the 1980s when extension workers offered advice to farmers on using IPM (Integrated Pest Management) techniques to control pests in rice mono-cropping areas in the Philippines and Indonesia (Feder, Murgai and Quizon 2004a; Gallagher et al. 2006). The model was remarkably effective in reducing pesticide use by up to 80 percent on farms in these two countries. The FFS model is now being used in around 50 to 70 developing countries. But farmers completing a school are reported to have limited success in spreading the new technology to their neighbors. Thus explains why there is a need for research on the following issues: do the field schools increase the knowledge of farmers in the short-, medium- and long- run? Does the increased knowledge of farmers who have completed a school lead to higher crop yields and increased agricultural productivity? Do farmers who have attended the schools pass new knowledge on to their neighbors? Finally, is the model financially sustainable?

We shall now turn to a discussion of the rise and fall of the T&V extension model and the growth of the Farmer Field School model that is now being implemented at sub national and national levels in some 50 to 70 developing countries. We shall also highlight the emergence of the ATMA Extension model that is expanding rapidly in India and comment on China's new role in agricultural extension in Africa.

[5] There is spirited debate among extension experts whether the FFS is an approach or a model.

THE T&V (TRAINING AND VISIT) EXTENSION MODEL

The Food and Agriculture Organization of the United Nations (FAO) provided global leadership in extension from the 1940s to the 1980s by drawing on its world-wide field experience and offering counsel to member states on a range of extension models and issues such as extension/farmer ratios and the performance of different extension models. But FAO's global leadership in extension was challenged in the late seventies and throughout the eighties by the World Bank's aggressive promotion and funding of a new extension model- the T&V model.

The T&V model was first developed in Turkey and then introduced in India in the 1970s and adopted by several dozen countries in Africa in the eighties. The premise of the model was that locally available technology was awaiting adoption by farmers. Therefore, subject matter extension specialists would meet with a group of "contact farmers" from surrounding villages every fortnight and train them to take messages such as improved agronomic practices back to farmers in their villages. The T&V system prohibited front-line extension agents from selling seed and fertilizer because of the belief that extension agents should focus and concentrate on introducing new food crop messages. But as more village extension agents were hired, costs mounted for state governments.

In practice, the T&V system was effective in disseminating Green Revolution technology, especially in the high – potential, irrigated areas in Asia, but it did not reach farmers in rain fed areas in Asia and Africa. Close to 50 developing countries utilized some form of T&V extension during the period from 1975-1995. However, the World Bank withdrew its support for the T&V model following a report that its high recurrent costs could not be reduced (Purcell and Anderson 1997). In India, for example, the introduction of T&V extension greatly expanded the number of Village Extension Workers (VEWs) in the State Departments of Agriculture, resulting in long term financial obligations for state governments. Since the T&V model turned out to cost about 25 percent more than the traditional public sector extension systems that it replaced in Ministries of Agriculture, the extension debate shifted in the late eighties and nineties to a new model- Farmer Field School (FFS) (Anderson, Feder and Ganguly, 2006). But some valuable lessons have been learned from the T&V experience. First and foremost is the need to analyze the cost of new models, fiscal implications of an expanded scale, the degree of dependence on external funding and the likelihood of domestic political support to pay the recurrent costs of scaling up new models over time (Anderson, Feder and Ganguly 2006). Nevertheless, some countries such as Mali are currently using a modified version of T&V called "Block Extension" (Dembele 2007).

THE FARMER FIELD SCHOOL EXTENSION MODEL

The Farmer Field School (FFS) model is a community-based learning system that was introduced in Asia in the eighties as an imaginative response to the overuse of insecticides in irrigated rice fields in Asia in the wake of the Green Revolution (Gallagher et al 2006). Farmers in the Philippines and Indonesia attended weekly meetings and taught themselves how to control insect damage. The FFS model is an example of group-based experiential learning (or "learning by-doing") that encourages farmers in "informal schools" to meet once a week in the same farmer's field and analyze and discuss their farming operations and then determine which IPM interventions should be adopted and evaluated on their own farms. Normally, 20 to 30 neighboring farmers gather for group study on a member's farm once a week for about 14 weeks in a typical growing season.[6] In East Africa, FFS networks, associations and federations have emerged that are farmer-owned and financed (Braun 2006). To date, Farmer Field Schools have turned out about 4 million graduates. The FFS model has facilitated the spread of Integrated Pest Management (IPM) practices in Asia over the past 15 years, and more recently in Africa. But there are some hard questions and more time are needed to answer the central question: is it a cost effective learning innovation? We know that the model is more expensive than the traditional extension model where one extension worker can serve farmers via radio, and newspapers etc. The critical questions are whether the model yields higher returns to pay for its added cost and can it be financed locally after foreign aid is phased out.

What is the empirical record of the FFS model? Four recent studies illustrate why FFS is an attractive model and why there is a need for more research on the short-, medium- and long-term impact of the model. The Sri Lanka Department of Agriculture, with support from FAO and a number of donors, ran an IPM program in Sri Lanka from 1995 to 2002 that included 610 FFS projects throughout the country. Tripp, Wijeratne and Piyadasa (2005) carried out a survey of FFS in southern Sri Lanka and found that FFS farmers growing rice who adopted FFS knowledge derived from IPM practices were able to reduce the number of applications of insecticides by 81 percent. But surprisingly, farmers completing the FFS did not adopt other recommended farm practices and the study provided little evidence of farmer to farmer transmission of the principal practices of the FFS. The authors of the Sri Lanka evaluation have called for more rigorous impact assessment because:

> The insufficient assessment of FFS programs (and their alternatives) is a significant part of the problem. The FFS approach makes a very attractive package for donors and NGOs. It offers a well-defined subject introduced through a specific methodology. Courses and participants can be counted. Enthusiastic participants can be relied on to give glowing testimonials. As these experiences

[6] Group learning among farmers is more than a century old in the Netherlands. Small flower producers held "winter evening meetings" exchanged experience and borrowed different types of greenhouses and green house glass from Denmark, the Chanel Islands and England. These human capital investments laid the foundation for the present global flower industry in the Netherlands (Eicher 2006).

accumulate, an impression develops of FFS as a practical and widely applicable extension model, and while donors are unclear about objectives, and hence disorganized in their attempts at evaluation, FFS expands into new areas and makes new claims (Tripp, Wijerante and Piyadesa 2005).

The Global IPM facility recently commissioned two experienced field researchers, Van den Berg and Jiggins (2007), to prepare a background paper on the state of the art of published and unpublished studies of the impact of FFSs on IPM in Asia. The authors stated their challenge as finding "a form of adult education that would capacitate the millions of smallholders to become experts in decentralized pest management through practical, field-based learning methods" (Van den Berg and Jiggins 2007, p.664) The authors admitted that the cost effectiveness of the Farmer Field Schools programs is a matter of "energetic debate" and that the results of many FFS studies reveal that the methodology for impact evaluation is "still under development." The findings of this valuable survey paper by van den Berg and Jiggings are the following:

- The evaluation of the FFS model combines pest management (IPM), new technology and farmer education makes it difficult to develop methodologies to study the impact of both of these activities over time.
- Most impact studies of FFS have concentrated on measuring immediate impacts, most notably the effects of insecticide use on crop yields. However, this type of methodology is weak for estimating medium- and long-term impacts such as developing social capital to build producer organizations.
- The opportunity cost (income forgone) of farmers attending weekly or bi-weekly or monthly FFS meetings should be taken into consideration as a cost issue. In a study of cotton in Mali, it was found that the *annual* opportunity cost of a farmer's time in attending 14-20 weekly sessions on cotton was US$20. This is a cost that should be included in cost-benefit calculations.
- The immediate impact of FFS on farmers producing rice in Asian countries is the reduction in pesticide use while the achievement of FFS on other continents "remains to be established."
- FFS programs in Asian countries have only covered one to five percent of all farm households (Van den Berg and Jiggins (2007)

Sierra Leone recently launched an ambitious food security program called "Operation Feed the Nation." After a decade of Civil War, the President of Sierra Leone pledged his support for this program so that "within five years, no Sierra Leonean should go to bed hungry." The FAO was invited to help oversee a quick study of the 510 Farmer Field Schools. The study was carried out by the Overseas Development Institute (ODI) and Dunstan Spencer and Associates in early 2006. The study was carried out in three districts over two months and it found that:

- The results of the evaluation were positive but the authors concluded that the overall impact of the FFS cannot be known for certain because of the lack of reasonably accurate baseline data for comparison.
- Impact monitoring is currently lacking.

- The FFS costs between US$ 16 and US$ 47 per farmer served for each cycle or season. (Longley, Spencer and Wiggins, 2006)

In Kenya, a FAO commissioned study reports that Farmer Field School (FFS) Networks emerged in Western Kenya during 2000 as a result of exchange visits and communication between farmers, facilitators, trainers and project staff (Braun 2006). Similar networks have subsequently emerged elsewhere in Kenya, Uganda and Tanzania. These FFS Networks were formed by farmers who graduated from an FFS. FFS networks in Western Kenya have shown how farmers themselves have been able to build bottom-up producer organizations during and after the completion of donor projects. This self-emergence of FFS networks depicts FFS as an effective approach to organize and empower farmers.

To summarize, the Farmer Field School model is an important institutional innovation that needs to be studied in depth in different agro-ecological zones, different institutional arrangements and over time. Because of the lack of baseline data and adequate monitoring of ongoing FFS activities at the farmer and community levels, the available evidence suggests that it is premature to promote the FFS model as the "best model" for developing countries.[7] It will take time and resources for researchers to study and evaluate this important institutional innovation. Meanwhile, international organizations such as the FAO should endorse the concept of the pluralism of extension models, including the FFS models. Countries should be encouraged to collect data on the impact, costs and returns of the FFS model, including its financial sustainability, in a learning-by-doing manner.

Another area that warrants ongoing attention by researchers is the optimal size of national extension systems, including government, private and NGOs. Simply increasing the number of extension agents as the engine of agricultural development was found to be unsuccessful in Latin America in the forties and fifties (Rice, 1971). African governments added 57,000 extension agents to their government extension departments from 1959 to 1980 (Judd 1987). Today, India has around 100,000 extension agents and China has around 140,000. Ethiopia has around 10,000 extension agents and it is training an additional 30,000 agents even though there are many reservations about the fiscal sustainability of such a large build up. Clearly there is a need for an expanded research program on alternative extension models in developing countries. Yet Jock Anderson (2007) reminds us that research on extension is chronically under – funded.

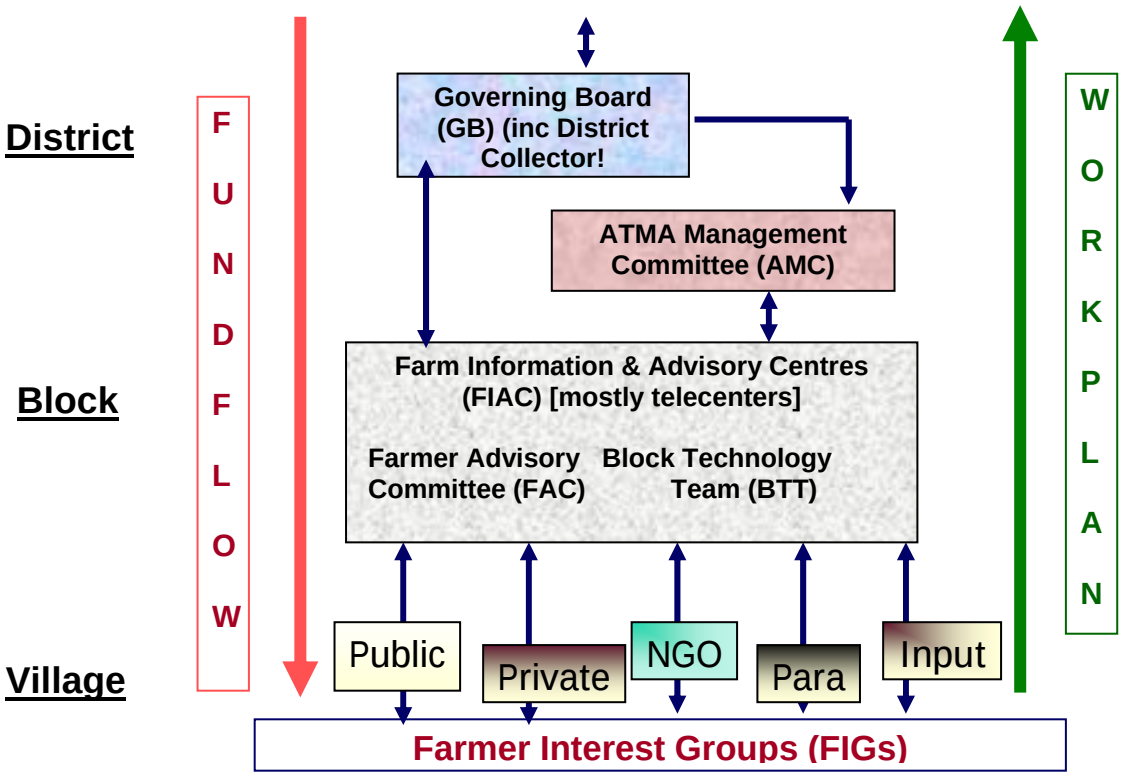
[7] Davis (2006) surveyed the spread of FFRs in Africa and concluded that FFSs do not represent a "silver bullet" for Africa. However, Gallagher et al, 2006 challenged the survey because of an alleged "inadequate sampling of evidence."

NEW EXTENSION MODELS

The Agricultural Technology Management Agency Model (ATMA)

One of the recurring criticisms of national public extension systems is that they are highly centralized and they inhibit the feedback from clients to extension specialists, researchers, policy makers and donors. Decentralization of extension to local governments proceeded rapidly in many Latin American countries in the 1980s and 1990s. Decentralization is now underway in Asia.[8] In India, decentralization is being pursued through a new model of extension – the Agricultural Technology Management Agency Model (ATMA), an autonomous organization that was initially set up in the late 1990s with World Bank support (Singh, Swanson and Singh 2006). The ATMA model (Figure 3) combines decentralization with a focus on agricultural diversification and increasing farm incomes and employment. Decisions on extension are made by a Governing Board with equal representation between

Figure 3. Agricultural Technology Management Agency (ATMA)



Source: Singh, Swanson and Singh (2006).

[8] Van den Ban and Samantha, (2006).

- the heads of the line departments, including animal husbandry, horticulture etc. and key people in the State Department of Agriculture
- research units within the districts and stakeholder representatives and
- a cross-section of farmers, women, disadvantaged groups and the private sector.

The ATMA model is considered a major success in India because after only five years of operation (2001 to 2006), it has been adopted in 60 districts (about 10% of all districts in India). The model is slated to be extended to all 600 districts within the next five years (Anderson 2007 citing Swanson 2006, p. 14).

India: The new Harayana Extension Model

The state of Harayana and the neighboring state of Punjab are considered the breadbaskets of India. But the Vice Chancellor of Harayana Agricultural University (HAU) – J.C. Katyal (2007) reports that the present extension model is in need of reform. Therefore, Harayana University is experimenting with a new extension model that deals with what the Vice Chancellor describes as the "stress points" of the present extension system:

- The technology transfer service does not cover physical, social and economic aspects of an integrated farming system
- The livestock sector is mainly managed by women but their skill and knowledge needs remain neglected.
- Extension has little technology for improving livestock productivity.
- The present technology transfer model needs to be integrated with other development agencies, including the private sector.
- Uniform technology packages are recommended for all categories of farmers.
- The reach of technology transfer is limited, unable to offer real time solutions.
- Use of digital solutions is on the margins.

The new Harayana extension model has the following characteristics:

- Two enterprising farmers with high school qualifications will work at the village level as extension workers
- They will be supported by a full time professional-graduate (PG)
- PG will facilitate backward-forward links with markets, credit and other agencies, KVKs and HAU scientists
- Assess farmers needs and analyze constraints through diagnostic studies
- Based on diagnostic analysis, the village agent will prioritize the activities in association with the local farmers.

The new Harayana model will be tested and applied in two representative villages selected from each of the 20 districts of Haryana.

China's Approach to Agricultural Extension in Africa

President Hu Jintao of China identified agricultural cooperation as one of eight types of technical assistance to Africa at the China-Africa summit in November 2006. The Chinese Ministry of Commerce and Ministry of Agriculture has jointly sent five working groups to 14 African countries to investigate setting up ten agricultural technology demonstration centers in Africa and supplying 100 senior agro-tech experts to assist with Africa's agricultural development.

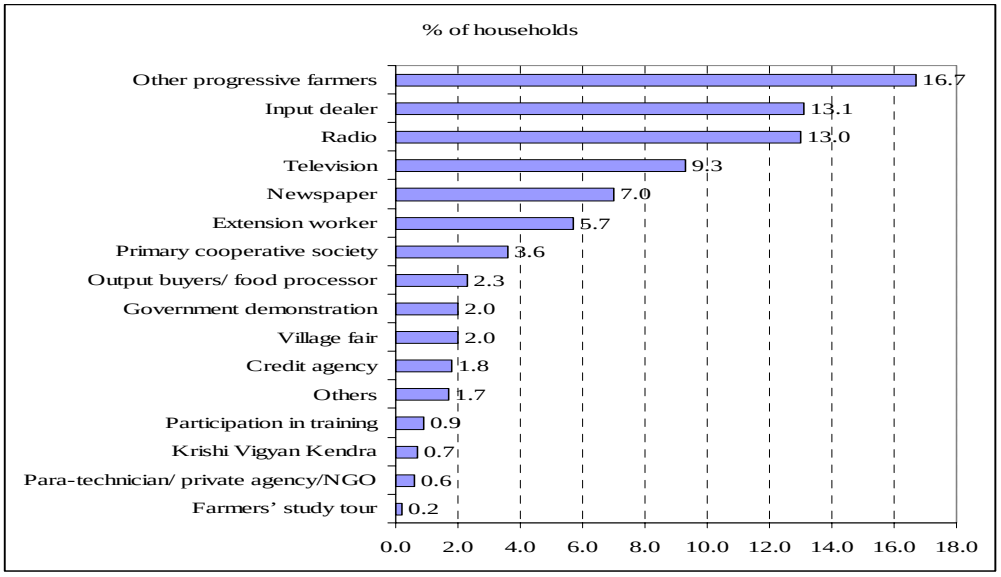
A training course for African officials on the extension of agricultural technology was held by the Chinese Ministry of Agriculture in Beijing in July 2007. A total of 35 agricultural officials from 21 African countries attended the training course, which was billed as the "2007 International Agro-Tech Extension Seminar for Africa." The course included lectures on genetically modified cotton and seed production technologies and the use of water-saving and biological technologies in agriculture.

SMALLHOLDERS' MAIN SOURCE OF NEW TECHNOLOGY

The critics of public extension often charge that it reaches only a small percentage of smallholder farmers. To address this issue, we turn to the results of a 2003 national survey of 51,770 farm households in India who were asked to reveal their main source of information about new technology and farm practices over the past 365 days.

Figure 4, shows that the progressive farmers were the most important source (16.7%) of information for smallholders over a period of 12 months, followed by input dealers, radio and television. Surprisingly, only 6% of the farmers in the national survey gained their information from extension workers.

Figure 4: India: Percentage of farm households accessing information on modern agricultural technology through different sources, 2003.



Source: **Derived from data reported in NSSO (2005: 7)**

To be sure, the 6 percent finding can be used to call for increased privatization of extension. But, closer examination reveals that extension is reaching a small percentage of smallholder farmers because extension is dramatically under funded. For example, India's Extension Policy Framework reports that "States have barely been able to pay the salaries of extension personnel. Less than 10% of the budget is available for operational expenses, which has practically immobilized the service with scarcely any technology dissemination in the field" (Birner and Anderson 2007). This national survey of 51,770 farmers reveals that India's public extension system is not adequately financed. Rather than calling for privatization of extension, new public-financed extension models (such as ATMA) should be piloted over the coming five to seven years.

NEEDED RESEARCH ON WOMAN'S ROLE IN AGRICULTURAL DEVELOPMENT AND EXTENSION

The literature on the role in extension in helping women make decisions on the adoption of improved farm practices is rather thin even though women, especially in Africa, are major producers of food crops and active and shrewd traders in local markets. When Ester Boserup published her path–breaking book *Woman's role in Economic Development* (1970), she charged that women "lose in the development process" because agricultural development projects can lead to an increase in women's work load and a reduction in the workload of men. But Boserup's assertion was not supported by rigorous empirical research. To test the Boserup hypothesis, Dunstan Spencer carried out a study of an agricultural development project in Sierra Leone that had recently introduced land-saving biological and chemical technology. Spencer (1976) recorded the hours worked per day by men, women and children in 23 farming households over a period of one year (1974/75) and found that the new technology increased women's work load slightly but the increase was much less than the increase in the workload of adult males and children. Therefore Spencer rejected Boserup's hypothesis and called for more empirical research.

Sparked by the findings of Boserup, Spencer and others, research on women and agricultural development flourished in the 1970s and 1980s but dried up in the 1990s. The World Bank's poverty reduction mandate generated a 1994 Operational Policy on Gender Dimensions that has produced a string of recent books on gender issues (Gopal 2005; Ellis et al 2006 and Ellis, Manuel and Blackden 2007). However, these books gloss over women's role as farmers, traders and participants in rural non farm activities. The bottom line is that little progress has been made in figuring out how to assist rural women increase their voice, and their profit in farming and related industries.

MEASUREMENT ISSUES

One of the most complex issues for governments and donors is developing a capacity to measure the performance of alternative extension models. Feder, Willett and Zijp (2001) have identified eight generic issues that explain why there is so much confusion about appropriate measurement techniques and the performance of various extension models that developing countries should pursue. These generic factors are as follows:

1. **Difficulty in attributing impact:** Attribution of impact of extension programs is an analytically challenging task due to the lack of baseline information, unavailability of appropriate control groups, and the systemic biases in extension placement and contracts (Birkhaeuser, Evenson and Feder, 1991).
2. **Scale and Intensity:** The cost of reaching large, geographically dispersed and remote smallholder farmers is high, particularly given high levels of illiteracy, limited access to mass media, and high transport costs.
3. **Dependence on broader policy environment:** The outcome of extension efforts depends on policies over which agents and their managers have little influence (input and output prices, credit policies, input supplies, marketing and infrastructure system).
4. **Interaction with knowledge generation:** Public extension and research systems often compete for budgets, but research institutions often have an advantage because of their higher status, better management quality, and links with the global science community.
5. **Weak accountability:** Weak accountability (linked to the inability to attribute impact) is reflected in low-quality and repetitive advice given to farmers, and in diminished effort to interact with farmers, and to learn from their experience.
6. **Weak political commitment and support:** Many donors report that highly visible irrigation or road projects are often more attractive to politicians than extension expenditures.
7. **Public duties other than knowledge transfer:** Governments often use field-level cadres of public servants who are already present in rural areas for non-extension duties such as collection of statistics, distribution of subsidized inputs, assisting and collecting loan applications, and election campaign work on behalf of local or national ruling parties.
8. **Financial un-sustainability:** This can cause the demise of any investment program, but it is observed that at times of general fiscal constraints, extension budgets are more likely to be squeezed due to weak political support (Feder, Willet and Zijp 2001).

SUMMARY

One of the highlights of this review is the vast output of the, papers and articles on extension reforms in Asia relative to Africa. For example, the recent book *Changing Roles of Agricultural Extension in Asian Nations* (Van Den Ban and Samanda 2006) is a comprehensive and valuable survey of extension reforms underway in Asia. There is a need for a similar book on extension reforms in Africa that is based on socio-economic research on the following topics.

- Comparative studies of the FFS model in Asia and Africa.
- Fast track ICT programs to increase farmer extension coverage.
- A study of the ATMA model in India and its lessons for Africa.
- The role on ICTs in reducing the cost of supplying information to farmers.
- Development of impact assessment techniques to measure the short, medium and long term impacts and financial sustainability of Farmer Field School extension programs.
- Case studies of new models of public and private cooperation in delivering extension to farmers.
- Case studies of developing national market information systems in Asia and Africa Tschirle 2007 and Reardon and Timmer 2007.
- What can Africa learn from the global experience in increasing the number of women employed as extension managers and front line extension agents?
- Case studies of scaling up successful NGO extension projects.
- Role of private companies in delivering inputs and extension assistance to farmers in Asia: Lessons for Africa.

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