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BACKGROUND PAPER

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Agricultural Advisory Services

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AGRICULTURAL ADVISORY SERVICES

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Summary

Agricultural advisory (extension) services are a vital element of the array of market and non-market entities and agents that provide critical flows of information that can improve farmers' and other rural peoples' welfare. After a period of neglect, agricultural advisory services have returned strongly to the international development agenda. Apart from their conventional function of providing knowledge for improved agricultural productivity, agricultural advisory services are expected to fulfill a variety of new functions, such as linking smallholder farmers to high-value and export markets, promoting environmentally sustainable production techniques, and coping with the effects of HIV/AIDS and other health challenges that affect agriculture. Therefore, it is highly appropriate that the WDR 2008 acknowledges the roles and the challenges of an effective evolution of agricultural advisory services in the coming decades.

The services provided by agricultural extension have significant public-good attributes. It is, therefore, not surprising that there are rather more than half a billion official extension

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workers of various types and competencies worldwide, most publicly-funded and most still publicly employed. The magnitude of investment in extension in most countries is similar to that for agricultural research to which it is supposedly closely linked, so it is a significant component of agricultural development effort, and thus warrants careful reflection by development investors.

Providing and financing agricultural advisory services in an efficient and sustainable way is confronted with major difficulties, which are associated with: the scale and complexity of extension operations; the dependence of success in extension on the broader policy environment; the problems that stem from the often less than ideal interaction of extension with the knowledge generation system; the profound problems of accountability incentives of extension employees both upward (to the managers) and downward (to their clients, particularly female farmers); the oftentimes weak political commitment and support for public extension; the frequent encumbrance with public duties in addition to those related to knowledge transfer; and the severe difficulties of fiscal unsustainability faced in many countries. Moreover, as many factors affect the performance of agriculture in complex and contradictory ways, it is difficult to trace the relationship between extension inputs and their impact at the farm level and beyond, so that commitment by public and other investors is often problematic.

A number of specific formats of extension operations emerged over recent decades in endeavors to overcome these widely acknowledged problems. These newer (and now, for some, not so new) approaches, which depart from the traditional public service models, entail institutional innovations and reforms, often pluralistic, where specific design features reflect attempts to overcome weaknesses inherent in earlier public extension efforts.

The T&V model of extension organization was promoted by the World Bank, from 1975 to 1995, as a national public extension system, ultimately with application in more than 70 countries. The T&V design attempted to tackle directly or indirectly most of the weaknesses highlighted above. But some of the modifications exacerbated other weaknesses, and the eventual result was a widespread collapse of the structures introduced. The most regrettable part of this experience to report was the slowness of the Bank to admit that the model was inappropriate for the situations of many of its client countries.

New approaches of providing and financing agricultural advisory services include decentralization to lower levels of government, involving farmers' associations and non-governmental organizations, contracting-out of extension services, public-private partnerships, privatization, embedding advisory services in other types of contracts, and broadening the types of advisory methods applied, including the use of modern information and communication technologies, all of which are conveniently elaborated with country-specific experience in Module 3 of the updated web-based World Bank *Agriculture Investment Sourcebook*.

The decentralization of extension services retains the public delivery and public funding characteristics of traditional centralized extension, but transfers the responsibility for delivery to local governments (district, county, etc.) in diverse ways. For instance, many Latin American governments undertook this approach in the 1980s and 1990s, and it is being initiated enthusiastically in several African and Asian countries. The main expected advantage of the approach is in improving accountability, as agents become employees of local government, which—if democratically elected—would be keen on receiving positive

feedback on the service from the clientele-electorate. This is expected to improve extension agents' incentives, and induce better service. Improved management capacity is another advantage, as the scale of the operation is reduced for each decision-making unit. Political commitment may be stronger as well, since the clientele is closer to the political leadership, and this can lead further to improved fiscal stability. Many contemporary extension systems, such as the Agricultural Technology Management Agency (ATMA) approach in India, and the reforming systems of China, are moving in this direction under a diverse set of governance structures. An important element in these approaches is the involvement of farmers' organizations in decentralized decision-making. In the ATMA model, for example, farmers' organizations are involved in planning and priority-setting of extension activities.

Farmers' organizations can play an even more important role in approaches to devolution when extension functions become the responsibility of farmers' associations, rather than being just devolved to local governments. This strategy has been pursued in several West African countries, where there have been some notable successes. This approach is likely to have a greater impact on accountability, as the employer represents even more closely the clientele, and thus the incentives for higher quality of service are better. Decentralization and devolution may also be associated with the contracting out of extension services to private providers and non-governmental organizations (NGOs), an approached followed in Uganda's NAADS (National Agricultural Advisory Services) system, although with the limited evidence yet to hand, the jury is still out on the worth of such contracting. Another approach to involve the private sector is that involving public-private partnerships, where a private company and a public agency jointly finance and provide advisory services, as in cases in India.

In addition to developing new institutional arrangements for financing and providing agricultural advisory services, advisory methods have also become more diverse and include, for example, participatory and group-based extension method. One approach that has gained wide application is that known as Farmer Field Schools (FFSs), which were designed originally as a way to introduce knowledge on integrated pest management (IPM) to irrigated rice farmers in Asia. The Philippines and Indonesia were key areas in implementing this farmer training effort. Experiences with IPM-FFSs in these two countries have since been documented and used to promote and expand FFSs and FFS-type activities to other countries and to other crops. Currently, FFS activities are being implemented in many developing countries, although only a few operate FFSs as a nationwide system. A key drawback of the farmer field school approach is its cost, which is likely to raise problems of financial sustainability. The limited evaluations to date have thus far not demonstrated the hoped-for effectiveness in service delivery, so evidence that might support the wider adoption of this model is regrettably incomplete. But the model is being adapted to an ever-increasing range of themes and contexts, so it is likely that aspects of the approach will be important features of the future landscape of agricultural advisory services.

Economic analysis of past agricultural extension interventions in countries rich and poor has provided seemingly strong justification for many past extension investments, but does not always tell the full or even necessarily, given several methodological challenges such as attribution problems, the correct story. Concern over data quality, along with difficult methodological issues regarding causality and quantification of all benefits, must be important qualifiers to the prevailing evidence of good economic returns from extension. Hard data, particularly pertaining to the more recent "reformed" approaches, are urgently

required to inform policy on extension (and related training), and these data are still in exceedingly short supply, as detailed herein.

The Extension Research Group at IFPRI has recently proposed a framework for addressing this knowledge gap and learning efficiently about "best-fit" solutions. The framework "disentangles" the major characteristics of agricultural advisory services: (1) governance structures, (2) capacity, management and organization, and (3) advisory methods. Four sets of frame conditions are identified that need to be considered when deciding on these characteristics: (1) the policy environment, (2) the capacity of potential service providers, (3) the type of farming systems and the market access of farm households; and (4) the nature of the local communities, including their ability to cooperate. The framework suggests an impact-chain approach to analyze the performance and impact of advisory services. The framework can be applied in a dynamic perspective to analyze processes of change over time. Focusing on the question "What works, where, and why?", the framework aims at supporting a shift from a "best practice" or "one-size-fits-all" to a "best fit" approach in the reform of public advisory services. It is to be hoped that the work sketched can soon be undertaken, although unfortunately the results will not be available in time for the completion of this background paper for the 2008 WDR.

There is clearly much yet to be done in bringing needed extension services to the poor around the world, particularly among overtly disadvantaged and needy groups, such as female-headed households in many parts of Sub-Saharan Africa. Understanding of what works well in the diverse circumstances of the developing world is still far from complete and there is thus a clear need for continuing research effort to try to fill these voids. Meantime, investors need to be cautious in designing and adjusting public extension systems if they are not needlessly to re-learn the lessons of the past. Informed by such lessons, governments should be able to increase the chance of reaping high returns to their investment and successfully assisting farmers to boost their productivity and income, and thereby contribute more strongly to economic growth and sustainable agricultural development.

1. Why information and advisory services are important in agricultural development

Agricultural advisory (extension) services have long been recognized as an important factor in promoting agricultural development (historical perspectives are set out by, e.g., Birkhaeuser, Evenson and Feder 1991 and Anderson and Feder 2007). Hence it is highly appropriate that the 2008 World Development Report (WDR), *Agriculture for Development*, should acknowledge the role of extension and the challenges of its effective evolution in coming decades. The terms agricultural advisory services and agricultural extension refer to the entire set of organizations that support and facilitate people engaged in agricultural production to solve problems and to obtain information, skills and technologies to improve their livelihoods. Agricultural advisory services are relevant in all three types of countries identified in the WDR 2008—agriculture-based economies, transforming economies and urbanized economies—yet the scope and types of advisory services and the ways in which these services are best provided and financed differs between as well as within these groups.

The services provided by agricultural extension have significant public-good attributes. It is, therefore, not surprising that there are more than half a billion official extension workers worldwide (World Bank 2006b). About 90% of the world's extension personnel are located in developing countries, even though the farmer: extension agent ratio is more favorable in industrialized countries. The magnitude of investment in extension in most developing countries is similar to that for agricultural research so it is a significant component of agricultural development effort and thus warrants careful reflection.

From a development-policy perspective, the investment in extension services or the facilitation of non-government extension, are potentially important tools for improving agricultural productivity and increasing farmers' incomes. Accordingly, the conceptual framework developed in the WDR 2008 identifies access to science, technology and skills as an entry point for public interventions that aim at using agriculture as a pathway out of poverty by improving returns to households' assets. Apart from the "classical" objective of agricultural advisory services to improve agricultural productivity, advisory services can also play an important role to meet the new challenges agriculture is confronted with: changes in the global food and agricultural system, including the rise of supermarkets and the growing importance of standards and labels; growth in non-farm rural employment and agribusiness; constraints imposed by HIV/AIDS, and other health problems that affect rural livelihoods; and the deterioration of the natural resource base and the emerging need to cope with climate change.

While the continuing and evolving need for agricultural advisory services is well established (e.g., Byerlee 1988a, b, Anderson 1999, Alex, Zijp and Byerlee 2002), the challenge is to devise systems for providing and financing these services in a cost-effective and sustainable way that fits country-specific frame conditions (e.g., Leeuwis 2004). So far, the record of extension impact on farm performance is rather mixed. The literature overviewed below from various perspectives contains analyses indicating very high rates of return on extension investment, as well as documentation of cases of negligible achievements, implying a misallocation of public resources. Clearly, the format by which

extension services are rendered, as well as the circumstances in which recipients of extension services operate, will affect the extent of the impact that is observed.

In assessing the impact of extension on agricultural productivity, one needs to take into account that productivity improvements are possible only if a differential exists between the actual productivity on the farms and what could potentially be produced with better know-how, subject as always, to farmers' preferences and resource constraints. In the past, rapid technological advances have created such a differential in many developing countries. This productivity differential can be broadly classified into two types of "gaps": a technology gap and a management gap. The former might entail additional investment and higher recurring costs (e.g., for inputs such as seeds of improved cultivars or fertilizers) while the latter may offer the farmer a low-cost means of raising productivity by applying improved management practices. These gaps are, in the first instance, a manifestation of the difference in knowledge and skills that farmers possess and the best-practice knowledge that exists at any point in time. Extension helps to reduce the differential between potential and actual yields in farmers' fields by accelerating technology transfer (i.e., to reduce the technology gap) and helping farmers become better farm managers (i.e., to reduce the management gap).

Extension also has an important role to play in helping the research establishment tailor technology to the agroecological and resource circumstances of farmers. Extension thus has a dual function in bridging blocked channels between scientists and farmers: it facilitates both the adoption of technology and the adaptation of technology to local conditions. The first involves translating information from the store of knowledge and from new research to farmers, and the second by helping to articulate for research systems the problems and constraints faced by farmers. Moreover, it has increasingly been recognized in recent years that important innovations, for example, those relevant in natural resource management, are developed by farmers themselves rather than from agricultural research stations. Agricultural advisory services can play an important role in promoting the spread of farmer-based innovations. These several interactions among research, extension, education and farmers are well articulated in a world view described as agricultural knowledge and information systems (AKIS), which can serve as a useful organizing principle for discussions of policy relevant to agricultural advisory services (Anderson 1999, FAO/WB 2000).

Adoption of innovations by farmers is inevitably affected by many factors. In general, farmers will adopt a particular technology if it usefully suits their socioeconomic and agroecological circumstances. The availability of improved technology, access to "modern" inputs and resources, and profitability at an acceptable level of risk are among the critical factors in the adoption process. Adoption can be influenced by educating farmers about improved varieties, cropping techniques, optimal input use, prices and market conditions, more efficient methods of production management, storage, nutrition, etc. To do so, extension agents must be capable of more than just communicating messages to farmers. They must be able to comprehend an often-complex situation, have the technical ability to spot and possibly diagnose problems, and possess insightful economic-management skills in order to advise on more efficient use of resources. The training extension workers receive in many cases unfortunately does not prepare them well for such demanding tasks. Likewise, the training of extension personnel is often a considerable challenge for the range of new tasks that agricultural extension is expected to address, such as facilitating market access, promoting environmental sustainability and helping farm families to cope with the effects of HIV/AIDS.

The majority of the extension personnel in developing countries is funded and employed by the public sector. However, reform efforts in the public sector, which included decentralization, cost-recovery and outsourcing, and an increasing involvement of the private sector and the third sector (non-governmental organizations, farmers' organizations) have led to the emergence of pluralistic forms of agricultural advisory services (e.g., Sulaiman and Hall 2002, 2006). Table 1 illustrates the diverse options that exist for financing and providing agricultural advisory services. Since all options have advantages and disadvantages, it is an important task for the development of extension policies to identify the mix of options that is best suited to support a country's agricultural development strategy in a cost-effective way, taking the country-specific conditions into account.

Table 1. Options for Providing and Financing Pluralistic Agricultural Advisory Services

	Source of Finance for the Service				
Provider of the service	**Public sector**	**Private sector: Farmers**	**Private sector: Companies**	**Third sector: NGOs**	**Third sector: FBOs**
Public sector:	(1) Public sector advisory services, no fees different degrees of decentralization	(5) Fee-based public sector advisory services	(9) Private companies contract staff from public sector advisory services	(12) NGOs contract staff from public sector advisory services	(16) FBOs contract staff from public sector advisory services
Private sector: Companies	(2) Publicly funded contracts to private service providers	(6) Private sector companies providing fee-based advisory services	(10) Embedded services: Companies provide information with input sale or marketing of products	(13) NGOs contract staff from private service providers	(17) FBOs contract staff from private service providers
Third sector: Non-governmental organizations (NGOs)	(3) Publicly funded contracts to NGO providers	(7) Advisory services agents hired by NGO, farmers pay fees	(11) Private companies contract NGO staff to provide advisory services	(14) NGOs hire own advisory staff and provide services free of charge	
Third sector: Farmer-based organizations (FBOs)	(4) Publicly funded contracts to FBO providers	(8) Advisory service staff hired by FBO, farmers pay fees		(15) NGOs fund advisory service staff who are employed by FBOs	(18) FBOs hire own advisory staff and provide services free to members

Source: Birner et al. (2006: 18), adapted from Rivera (1996) and Anderson and Feder (2004, p. 44).

In designing agricultural extension systems, one has to take into account that the need for advisory services changes over time. While extension cannot be expected to be a single factor that can transform traditional agriculture, it usually has had maximal impact in the early stage of dissemination of, say, a new technology, when the informational disequilibrium (and the "productivity differential") is the greatest. At that stage, extension's role as decoder and transmitter of information from research is prominent. The decoding service provided by extension can potentially substitute for farmers' education, and possibly also complement it.

This view of extension has its roots in the insights of T.W. Schultz, about traditional farmers being poor but efficient, and their contribution to economic growth and their own escape from poverty—the latter coming largely from their being able to cope with disequilibria presented by the availability of new technology and new information. Over time, as increasing numbers of farmers become aware of a specific technological thrust, the impact of such extension diminishes, until the opportunity and need for more information-intensive technologies arise. The dynamic resolution of the information disequilibria associated with specific extension initiatives makes observing the impact of extension difficult. At the same time, the uneven flow of benefits from any particular extension message has significant implications from a policy and program design point of view. The cost-effectiveness of information delivery at a given point in time should thus be established in the light of current and future benefits and costs in order to justify the marginal resources allocated to delivering the information. The usual situation noted above is likely changing as the important disequilibria shift from production technology issues increasingly to market linkages and information-access issues.

Market distortions and infrastructural bottlenecks further affect the adoption of new technology and can variously help or hinder the effectiveness of extension services. Again, from an operational point of view, the cost-effectiveness of delivering messages must be considered within the prevailing policy and market environment. A restrictive environment has a high opportunity cost in terms of foregone benefits from extension advice, creating a divergence between potential and actual benefits. The prevailing policy regime thus has potentially important implications for an appropriate sequencing of interventions and for program design.

2. Historical perspectives on past interventions by governments and their external supporters (including the World Bank)

The types of interventions by governments and external supporters, including the World Bank, have changed considerably over time. The changes in interventions are reflected in the different frameworks that have guided thinking and practice regarding agricultural technology development (e.g., Rivera et al. 2006). In many developing countries, commodity-oriented technical advice was provided during colonial times to farmers producing commercial crops, but national agricultural advisory services were not formally established until the 1950s and 60s. As originally conceived, these services were designed to bring new knowledge and techniques from public research organizations to a broader spectrum of farmers (Purcell and Anderson, 1997). This focus on technology transfer from research organizations to farmers was later criticized as a "linear model." This approach was replaced by a more systemic perspective, which emphasized the feedback linkages between agricultural research, agricultural extension, agricultural education, and the farmers. The above-noted AKIS framework captured this perspective (FAO/WB 2000). More recently, an "Agricultural Innovation Systems" framework has been articulated (e.g., World Bank 2007). This framework emphasizes focusing more broadly on the factors that stimulate innovative

behavior and stresses linkages and partnerships with a wide range of actors along agricultural value chains, including the agribusiness sector. The innovation systems perspective also stresses the role of a country's communication infrastructure. While modern information and communication technologies hold considerable promise in promoting agricultural innovation, rural areas usually lag behind urban areas in their access to these technologies, and developing countries generally lag behind more developed countries in this regard.

As indicated in section 1, the views on the role that the public sector should play in agricultural extension have also changed over time. Until the time of structural adjustment, interventions focused mostly on extension services that were publicly financed and publicly provided. This approach was supported by the fact that many aspects of extension work entail strong public-good characteristics and other market failures that are not easy to overcome through taxes, subsidies and regulatory interventions. While there have been some notable successes, public-sector extension has been subject to a range of government failures. Apparently there have been some generic, possibly universal, difficulties in the operation of public extension systems, and in the typical bureaucratic-political environment within which they are budgeted and managed. The reduction of public funding for agricultural advisory services under structural adjustment programs aimed at limiting the inefficient use of public resources for extension, but it also further reduced the capacity to provide such extension services. A worldwide review by Rivera, Qamar and Crowder (2001, p. 15) at the beginning of the 2000s found that extension systems had become "failing" and "moribund," being in a state of "disarray or barely functioning at all." Or as Davidson and Ahmad (2003, p. 141) anguished: "the cycle of despair will continue". Others had made similar observations a decade earlier (e.g., Kaimowitz 1991, Ameur 1994). After the structural adjustment period, agricultural advisory services are now "back on the agenda" (Nagel 2003). Yet, as indicated in section 1, pluralistic forms of extension rather than pure public sector models are now being promoted. The focus on pluralistic systems is also associated with an emphasis on making advisory services "demand driven", as advocated by the Neuchâtel Initiative, for example (Chipeta 2006) and on increasing voice and accountability. Extension methods have also changed over time. Participatory and group-based approaches, which focus on learning and empowerment, have increasingly gained in importance (e.g., Pannell 2006).

To assess whether these new approaches can succeed, it is useful to be aware of the difficulties that are inherent in providing agricultural extension services. Feder, Willett and Zijp (2001) have identified a set of interrelated frequently encountered factors affecting the performance of agricultural extension systems: the scale, scope, and complexity of advisory activities caused by the nature of agricultural production; the associated problems of monitoring, evaluation and impact assessment; the complexity of interactions between advisory services and national and international agricultural research systems; a key task to promote learning processes and establish feedback linkages. While these factors affect public, private and third-sector extension provides alike, public-sector extension is confronted with additional challenges: the need to address public issues, such as environmental concerns, which go beyond production-oriented agricultural knowledge and information transfer; the problem to ensure political commitment and fiscal accountability; and the influence of the wider policy environment and political economy.

In countries where the farm sector comprises a large number of relatively small farmers (as is common in most developing countries), the clients of extension services live in geographically dispersed communities, where the transport links are often of low quality, adding to the cost of reaching them. The incidence of illiteracy and the limited connections to

electronic mass media can further limit the ability to reach clients via means that do not require face-to-face interaction (e.g., written materials, radio, television, Internet). Thus, the number of clients who need to be covered by extension is large, and the cost of reaching them is high. Even though recent figures are unfortunately unavailable, one can assume based on earlier surveys that typical farmer-to-extension agent ratios are in the range between 1,000 and 2,500 to 1 (Swanson, Farner and Bahal 1989). The challenge of reaching farmers is complicated further by the fact that farmers' information needs vary even within a given geographical area due to variations in soil, elevation, microclimate and farmers' means and capabilities. The large size of the clientele inevitably leads to a situation where only a limited number of farmers have direct interaction with extension agents. Since direct contacts are rationed, agents often exercise selectivity as to which farmers they interact with, and the selectivity often manifests preference for larger, better endowed, and more innovative farmers, who can provide some in-kind payment. This sort of supply-side rationing is exacerbated by self-selection on the part of farmers, where those with a higher value (larger demand) for information tend to be large-scale farmers, with better opportunities to take advantage of information. Needless to say, resource poor socially disadvantaged female farmers often are among the more neglected categories, as elaborated at the end of section 4.1 below.

Public research and extension organizations often compete for budgets (as they are commonly located within the same ministry). Researchers typically enjoy a higher status (they are often better educated and have greater independence), and this produces tensions in the interactions between research managers and extension, which is not conducive to coordination and to a two-way feedback. The outcome is detrimental to extension effectiveness, as the information available to agents may not be specifically tailored to the problems faced by farmers, given their resource constraints (e.g., Mureithi and Anderson 2004 on the situation in Kenya. A review in the World Bank of a large portfolio of extension projects (Purcell and Anderson 1997) pointed out that research-extension linkages were generally weak, and neither research nor extension was sufficiently conscious of the need to understand the constraints and potentials of the different farming systems as a basis for determining relevant technology and technology development requirements. Consequently, the inadequate research-extension links and poor technology foundation led to adverse outcomes in a large proportion of the projects reviewed, and claims of insufficient relevant technology were frequently found. More recent World Bank operations have naturally built on the lessons of experience, so the contemporary landscape of extension-type interventions (including support for business development services assisting small and medium enterprise) differs greatly from that of earlier decades.

In public-sector extension, as in any public bureaucracy, extension personnel are accountable to the managerial cadres, but because the effectiveness of their activities cannot be easily established, their performance is measured in terms of input indicators that are easy to provide and confirm. The field staffs are thus practically not accountable for the quality of their extension work, and often even the quantity can be compromised with impunity. The higher level managers are nominally accountable for extension performance to the political level but, due to the same impact attribution problems, the extension system's performance is monitored in terms of budgets, staff levels, and other bureaucratic, rather than substantive, indicators. As is common in other large bureaucracies that are fully publicly funded, the **accountability to the clientele** (i.e., to the farmers) is only nominal, as typically there is neither a mechanism, nor incentives, to actually induce accountability to farmers (e.g., Howell 1986, Farrington et al. 2002). This is ironic, as the farmers are the only ones who can

relatively easily observe the quality and effectiveness of the extension service they receive. In the absence of mechanisms to implement accountability to farmers (which would improve the effectiveness of extension), incentives are distorted. Non-extension activities, for which extra remuneration can be earned, such as promotion of certain inputs for which a commission can be secured, or intermediation in the acquisition of credit (e.g., assistance in filling forms), are undertaken by agents, as the amount of extension time diverted to these tasks cannot be easily detected.

Earlier extension projects yielded evidence of accountability failures in many cases (e.g., Farrington et al. 2002). Little attention was given to the introduction of systematic participation by the farming community in problem definition, problem solving, and extension programming (e.g., Katz 2002). In more than one-half of the projects reviewed in a World Bank retrospective, an "entrenched top-down" attitude by staff was noted, and, not surprisingly, three-quarters of failed extension projects were characterized by such conduct (Purcell and Anderson 1997). This pattern of behavior has been common in both more- and less-developed countries, and is derived from a common distorted incentive system, as reviewed by Anderson and Feder (2007). References to fiscal inadequacy, and the consequent unsustainability of extension operations, are common in the extension literature (e.g., Howell 1985, Röling 1986, Ameur 1994, Feder, Willett and Zijp 2001, Hanson and Just 2001). Purcell and Anderson (1997) cited funding shortfalls as such a common phenomenon that over 70% of the extension projects in their sample of Bank-supported operations faced "unlikely" or "uncertain" sustainability. And this issue was no stranger to the experience with the Training and Visit (T&V) system of extension championed by the World Bank (e.g., Anderson 2006 verbally), and with which this brief tour of historical experience is closed.

The T&V model of extension organization was promoted by the World Bank between 1975-1995 as a national public extension system, with application in more than 70 countries (Anderson, Feder and Ganguly 2006). The T&V design attempted to tackle directly or indirectly some of the weaknesses highlighted above. But some of the modifications exacerbated other weaknesses, and the ultimate result was a widespread collapse of the structures introduced. The most regrettable part of this experience to report was the slowness of the Bank to admit that the model was inappropriate for the situation of many of its client countries.

The single most crucial factor that eventually brought about the dismantling of the T&V extension system was the lack of financial sustainability, a generic problem made worse by the high cost of the system. As the ability to demonstrate impact was not improved, there was no significant change in the political commitment to support extension, and, in country after country, even in India, once the World Bank ceased funding, the local budget process implied a return to the smaller funding levels of the past. With lower funding, the T&V system could not be sustained and hard-pressed governments have struggled with downsizing options, in some cases supported directly by bilateral donors, inevitably coupled with other extension reforms, such as elaborated by Rivera and Alex (2004) and World Bank (2006a, b).

3. New approaches around the world in recent times; their rationales and achievements

3.1 Classifying new approaches

As indicated in section 1, novel formats of extension operations have emerged in recent times to try to overcome the perceived and widely acknowledged problems noted in the historical overview (e.g., Anderson and Feder 2007). These newer approaches, which depart from the traditional public service models, entail institutional innovations and reforms, often pluralistic (e.g., Rivera and Alex 2004), where specific design features reflect attempts to overcome some of the weaknesses inherent in the public extension systems of the deep past and also of recent decades. To classify the new approaches, it is useful to distinguish between three major characteristics of an extension service (cf. Birner et al. 2006):

(a) *Governance structures*: Role of the public, the private and the third sector in providing and financing the service; decentralization to lower levels of government;
(b) *Capacity and management*: Financial and human resources available, relative to the number of farmers to be reached; management system (incentives to extension personnel, supervision and reporting; results-orientation); and
(c) *Advisory methods*: Numbers of clientele involved (individual, group-based or mass methods); type of training and technology transfer (demonstration plots; field days; courses; farmer-to-farmer exchange; involvement of clients into planning and problem-solving (participatory vs. top-down), specificity of content; type of media used; adult-education-orientation.

As shown in Table 1, a wide of governance structures is possible, if one takes into account that the public sector, the private sector and the third sector can be involved in different combinations in providing and financing advisory services. Examples include: involving non-traditional players such as farmers' associations and non-governmental organizations; contracting-out of extension services; public-private partnerships; privatization; and embedding advisory services in other types of contracts. Even if provision and financing of extension remain fully within the public sector, changes in governance structures are possible, especially by decentralization, which may take the form of deconcentration—transfer of responsibilities to lower levels, but retaining accountability within the respective line departments, or devolution—which according to some authorities implies making extension staff accountable to locally elected governments (notably Rondinelli 1981, 1989). The term devolution has also been used to describe where there is a transfer of responsibility for resource-allocative decisions out of government to farmers' associations (e.g., Meinzen-Dick and Knox, 2002).[2] Changes in governance structures may be combined with changes in capacity and management, and with changes in advisory methods, such as broadening the types of advisory methods applied, including the use of modern information and communication technologies. These new approaches are conveniently exposited with country-specific experience in the updated web-based *Agriculture Investment Sourcebook* (World Bank 2006b, Module 3).

[2] William M. Rivera, in a personal communication, has kindly corrected my present use of this word in this context, based on his drafting of the Decentralization Module 2 for Rivera and Blum (2007/8).

One challenging aspect of evaluating such new models is that they often represent different combinations of change in governance structures, capacity, management and advisory methods. Moreover, which combination is most suitable for a given situation depends on a number of frame conditions, such as the type of farming system, socioeconomic conditions and state capacity (Birner et al. 2006). Hence, it is inherently difficult to establish which factors account for observed changes in outcome, if a new model is introduced. In the following, examples are illustrated of new approaches that have received particular attention in the international extension debate. Section 4 reviews the available evidence on performance and impact of such new approaches.

3.2 Reform of governance structures

Decentralization of extension is a widely used approach, as it is linked to a general trend of decentralization in developing countries (e.g., World Bank 2006b, Boxes 3.10-12 and related text). Several Latin American governments undertook decentralization of extension in the 1980s and 1990s, and more recently this approach is being initiated in many Asian (e.g., Qamar 2002) and increasingly also African countries. The main expected advantage of the general approach is in **improving accountability**, especially if agents become employees of local government, which (if democratically elected) can be expected to be keen on receiving positive feedback on the service from the clientele-electorate. This was expected to improve extension agents' incentives, and induce better service. Improved management capacity is another advantage, as the scale of the operation is reduced for each decision-making unit. Political commitment may be stronger as well since the clientele is closer to the political leadership, and this can lead further to improved fiscal stability. The combination of these rationales has compelled policy makers in many countries, including some large ones such as China and India (as noted below in other contexts), to embrace decentralization as a central element of reform (e.g., Sulaiman and Hall 2006, Swanson 2006).

In spite of the opportunities that decentralization entails, decentralized extension agencies also face a variety of potential problems. There is greater potential for political interference and utilization of extension staff for other local government duties (including election campaign activities). Moreover, better-off farmers may use their influence on local governments to get privileged access to extension services (local elite capture). Economies of scale in training and the updating of staff skills can be lost. Similarly, extension-research linkages are usually more difficult to organize. Analysis (Garfield, Guadagni and Moreau 1996) of Colombia's experience with the decentralization of extension, for example, confirms these concerns, and documents a significant increase in the aggregate number of staff (and thus in aggregate costs). Issues of financial sustainability and other problems may, therefore, not have been resolved, but merely transferred to the local level.

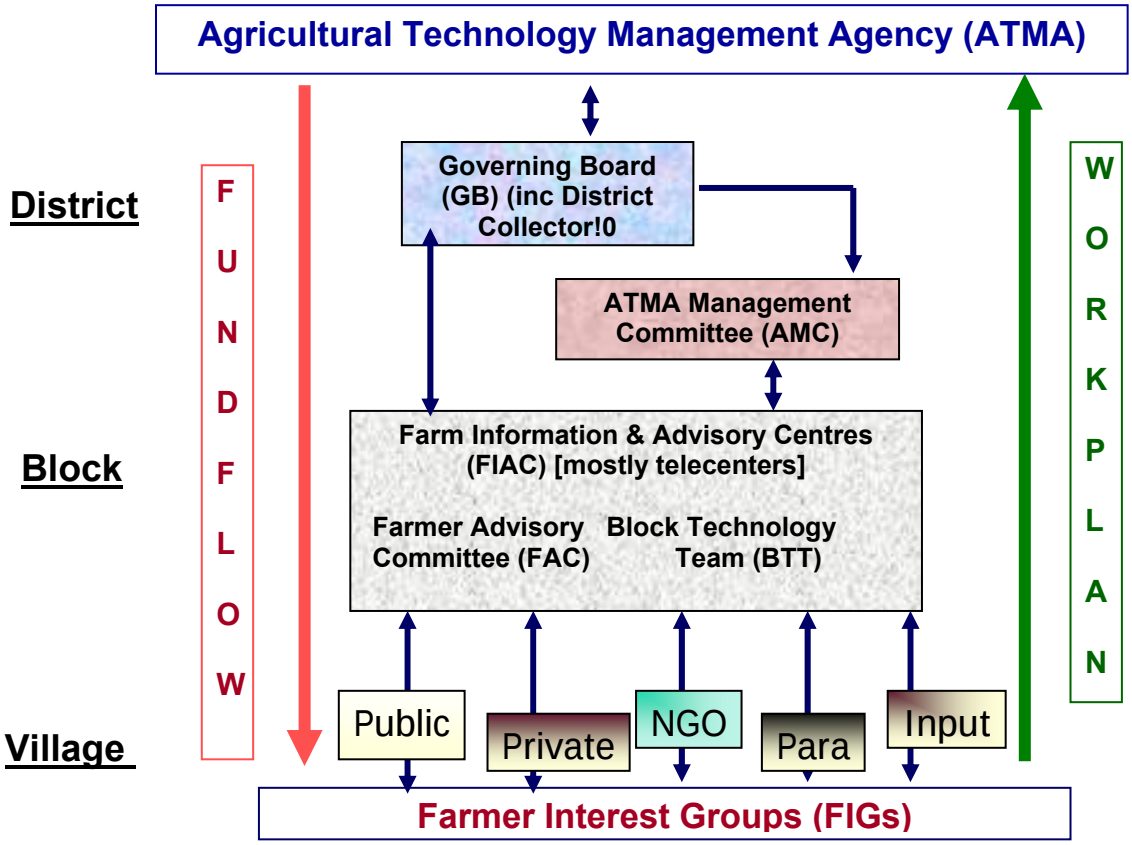
The situation in Ghana is typical of many of the recent reforms (Asuming-Brempong, Sarpong and Asante 2006). The 2003 modified extension policy represented an attempt to change a previously modified T&V system that was not working, bring it into line with a 1997 national policy to decentralize services, and to try to get a system that would perform in socially productive ways. It was based on nine principles to guide the Ministry of Food and Agriculture (MOFA). MOFA will: (1) promote farmer-driven extension and research to ensure that services provided are relevant to farmers' needs; (2) will empower farmers

through the formation and development of Farmer Based Organizations (FBOs) including marketing and agro-processing associations and cooperatives in collaboration with the Department of Co-operatives; (3) will promote the best agricultural practices; (4) will improve on the efficiency and cost-effectiveness of publicly-funded extension services; (5) will broaden extension services delivery; (6) will ensure that appropriate institutional structures are developed at all implementation levels to operate the new agricultural extension policy. MOFA will therefore make more operational the roles and responsibilities of staff at the various levels (national, regional and districts) as defined in the decentralization policy; (7) will implement an effective monitoring and evaluation system for agricultural extension services; (8) will undertake a broad-based human-resource development program by ensuring continuous capacity building of agricultural development workers; and (9) last but not least, the national agricultural extension system will respond to the emerging issues of the HIV/AIDS pandemic, environmental degradation and poverty reduction. Extension efforts will also focus on the areas of gender, equity and client empowerment as they relate to sustainable agricultural production. Putting such an ambitious policy into effect has been challenging and seemingly is taking rather longer to accomplish than was anticipated (as noted in section 4).

To exploit the opportunities of decentralization and overcome the problems of implementation, some countries have also tried to combine decentralization with other reform models. An interesting example is India. The Agricultural Technology Management Agency (ATMA) model, which was introduced in two World Bank-assisted projects beginning in the late 1990s (e.g., Singh, Swanson and Singh 2006, World Bank, 2006b, IAP 3.2), combines decentralization with a strong coordination across different line departments, and with the involvement of farmers' groups, private-sector representatives and NGOs in decision making on extension (Swanson and Samy, 2003, and Box 1). The model is judged by many as a major success in extension reform. After a modest beginning in a few states, it has by 2006 been adopted in some 60 districts, about 10% of all in India over just 5 years, and (as discussed in the following section on evaluative evidence) is slated to be extended to all 600 rural districts within the next five years (Swanson 2006, p.14), supported by a centrally-funded government scheme (GoI undated). A key feature not brought out in Box 2 is the strong shift of Indian extension to an explicit market orientation. This new approach is in line with the trend noted in the WDR for agricultural research and extension generally, of bringing knowledge generation much closer to market and value-chain development, as well as to the creation of social capital at the grass-roots level. These new approaches are then also better suited to focus on income generation, rather than merely productivity increases.

Box 1. Institutional Innovation in India: The Agricultural Technology Management Agency (ATMA)

- Promotes and facilitates:
  - farmer input into planning and implementation
  - collaboration between line Departments
  - partnership with private sector players
- Management concept, rather than an institution
- Established as district-based Registered Societies
  (government owned - but not government rules)
- Minimal additional staff (Coordinator & Deputy + few support staff – entrepreneurial style of Coordinator crucial)
- More effective use of existing public funds; levering private involvement through PPPs



Source: Robert Epworth, SAS, ARD, World Bank, 2006, personal communication.

A pioneering approach of extension reform in Africa is Uganda's National Agricultural Advisory Services (NAADS) system (e.g., World Bank 2006b, IAP 3.6). Like the ATMA model, this approach combines decentralization with the involvement of farmers' organizations and a strong market orientation. However, unlike the ATMA model, in which extension services are provided by public-sector extension agents, the NAADS model involves contracting out of extension provision to private sector firms or NGOs. The model is further described in Box 2. The mentioned Ghana policy involves similar design features. China, which operates the largest public sector extension system in the world, also decentralized extension in combination with a variety of other approaches (see Swanson, Nie Chuang and Feng Yan (2003), Hu and Huang (2006) and, for a recent overview, Swanson (2006)).

Box 2. Uganda's National Agricultural Advisory Services (NAADS): A pioneering approach awaiting confirmation by the gathering of stronger evidence

Uganda's National Agricultural Advisory Services (NAADS), created in 2001, constitutes a promising new approach towards financing and providing demand-driven extension services. Uganda's history of agricultural extension is quite similar to that of many other African countries: While the country took promising steps to create an effective extension service after Independence, extension was largely neglected during the period of political repression and dictatorship. After a more conducive political environment emerged in the mid-1980s, various extension approaches, including the T&V System, were tried without much success.

Failed attempts to decentralize extension, and the downsizing of public services during a period of Structural Adjustment eventually led to complete breakdown of agricultural extension. At the end of the 1990s, policy makers realized, however, that an effective agricultural extension service was essential to realize Uganda's new agricultural sector policy, the Plan for the Modernization of Agriculture. It also had become clear that an alternative to the traditional model of publicly financed and publicly provided extension had to be found. After studying extension approaches in other countries, most notably Latin America, a new extension model was created: The NAADS [http://www.naads.or.ug/] has the following design features:

1) *Decentralization*: In an effort to bring decision-making closer to the farmers, the lowest tier of local government—the sub-county administration—is responsible for awarding the extension contracts. A system of regulation and technical auditing for the extension contracts was established.
2) *Outsourcing*: Extension services are contracted out to private or non-governmental service providers in a competitive process, using the public procurement system.
3) *Farmers' empowerment*: Farmers are encouraged to form interest groups at the village level, which send representatives to Farmers' Fora at the sub-county level. The representatives of the Farmers' Fora participate in priority setting for extension activities. Importantly, they have a vote in the procurement committees that award the extension contracts.
4) *Market orientation*: The extension service does not only concentrate on increasing agricultural productivity, but also on helping farmers to get integrated into national and international markets and to link with other support services.
5) *Increasing cost recovery*: While NAADS was introduced as a publicly financed service, the expectation is that farmers will increasingly be able to contribute to cost recovery by paying extension fees, thus reducing the burden on the state budget.

NAADS is being introduced in different phases, starting with some "trailblazing" Districts, e.g., Soroti (Friss-Hansen 2005). An impact evaluation in the Districts where NAADS was first introduced indicated that farmers who had access to NAADS did indeed benefit in terms of farm income. There is also evidence that a critical mass of private service providers is in fact emerging, even though efforts need to be made to upgrade the skills of those providers in terms of marketing advice and use of innovative extension methods (e.g., Benin et al. 2005). Since NAADS is still in a phase of expansion, some open questions remain, which will need further evaluation: How well is the system of public procurement working? How can the problems of farmers' organization empowerment be overcome? To what extent do marginalized farmers and female farmers benefit from the new system? As the NAADS management places high emphasis on learning and evaluation (e.g., Ekwamu and Brown 2005), there are good chances of finding answers to these questions and making the necessary adjustments over time. NAADS provides an interesting example for other African countries to observe and evaluate critically and, indeed, a network for doing just that inter alia has been launched, viz. the Sub-Saharan Africa Network On Agricultural Advisory Services (Nahdy 2007).

Source: Project documents and an evaluation project in progress at IFPRI

An assignment of extension functions to farmers' associations, rather than to local governments (e.g., Carney, 1996; World Bank 2006b, on Client Groups), is increasingly

happening in many parts of the developing world. This strategy has been pursued in several West African countries (e.g., Rondot and Collion, 2002), where there have been some notable successes (e.g., Guinea). This approach is likely to have a greater impact on accountability, as the employer represents even more closely the clientele, and thus the incentives for higher quality of service are better. There is also a better potential for financial sustainability, especially if crops are commercialized, as the farmers' association that provides the public good may be better able to recover costs (say, as general membership fees) from its members, although typically government funding is also provided to the associations. Extension agents may be permanent employees of the associations, or contract employees from private entities, NGOs (e.g., especially as in NAADS in Uganda), or universities. Contract employees are often former public sector extension personnel. In principle, they face stronger incentives for better service as their contract may be terminated if the clientele is discontented. The difficulties with maintaining agents' quality due to loss of economies of scale in training, and the problematic linkages with research that sometimes characterize decentralized systems, are likely to be present in this variant as well. The fiscal burdens of extension can be mitigated to some extent if partnerships and complementarities with local NGOs' training activities can be exploited. These can entail cost sharing and allow expanded coverage. However, in many developing countries, NGOs do not have secure autonomous budgets, and thus the reliance on such partnerships over an extended period of time may not be generally feasible.

Farmer organizations are naturally of diverse type and size, and mention should be made of novel attempts to engage groups of farmers in mutual assistance activities, in countries as diverse as Benin and Nicaragua (Appendix Table A1), although this aspect is also a feature of several of the schemes mentioned above too in, say India and Uganda. Perhaps on to the best documented cases is that of Tanzania where there is a national network of farmer's groups working, known by its Swahili acronym MVIWATA (e.g., Kaburire and Ruvuga 2006). Diverse means of communication are used to facilitate farmer-to-farmer knowledge exchange, ranging from group meetings, to mass media and, of course, government and other extension agents. The knowledge exchanged is diverse; from cutting edge science-based new methods and materials, to indigenous robust agricultural technology (e.g., Reij and Waters-Beyer 2001, Waters-Beyer and van Veldhuizen 2005, Stoop and Hart, 2005) to market, finance other managerial information.

While **contracting-out** and **cost-recovery** (fee-for-service provision) have often been introduced together with decentralization and devolution, these two approaches can also be combined with other models. They reflect a broader trend in public-sector service provision, where contracting-out is also referred to as outsourcing (e.g., Rivera, Zijp and Alex 2000). It reflects the idea that the state should play a "facilitating role" rather than engaging itself in delivering frontline services. Rivera and Zijp (2002) compiled experiences and emerging practices of a range of industrialized and developing countries with contracting for agricultural extension. In developing countries, contracting-out usually still entails considerable public funding even if the provider is private (e.g., in the form of government-funded vouchers or other government funding, such as reported by Keynan, Manuel and Dinar (1997), Dinar and Keynan (2001) and Roseboom et al. (2006)). Under such an arrangement, small groups of farmers typically contract extension services to address their specific information needs. The free-rider problems and nonrivalry in information use are resolved by defining the public good at the level of a small group, and having the whole group share in the cost. The difficulty of tracing extension impact is much less of a problem, although issues of asymmetric knowledge of the value of information and identifiability of benefits (e.g., Hanson and Just 2001) will still be present and raise design issues accordingly.

In spite of such issues, in Africa, in particular, there was donor pressure to transfer some aspects of extension to private or other non-government providers although, reflecting on the experience in Mozambique, Gemo, Eicher and Teclemariam (2005) concluded that a gradualist approach to outsourcing initiatives is the wisest policy, especially pending careful evaluative processes.

The rationale of cost-recovery, which may or may not be combined with contracting out, is two-fold. On the one hand, cost recovery aims at addressing the fiscal sustainability problems inherent in publicly funded extension. On the other hand, cost recovery is expected to make extension more demand-driven, as clients are expected to exercise voice if they pay for the services (e.g., Gautam 2000, Holloway and Ehui 2001). However, cost recovery may further exclude poor farmers and marginalized groups (e.g., Heemskerk and Wennink 2005). Voucher systems can address this problem, but the empirical evidence in using this approach is mixed. Moreover, as long as farmer-to-extension agent ratios are of the order of 1000:1 or higher, it is a difficult task to develop channels by which individual farmers, including women farmers and marginalized groups, can in fact exercise voice and hold extension providers accountable. Farmers' organizations that follow internal principles of democracy play an important role in this regard.

Systems that involve contracting of private sector extension agents are also referred to as **public-private partnerships** (PPPs). This term is also used to refer to systems where a private sector firm and a public sector extension agency decide to jointly finance and/or provide extension services. Sulaiman (2003) describes such a case in Madhya Pradesh, India. Contracting out and increasing cost-recovery can also be seen as an avenue to full privatization. An example is Chile's experience with **privatized extension**, where government-funded contracts were expected to be gradually reduced as farmers' cost sharing would increase. However, this case also shows that willingness-to-pay may be slow to materialize (e.g., Cox and Ortega 2004). There is, however, a variety of other private-sector extension approaches, which have emerged in recent years, often without specific government intervention. Input providers play an increasingly important role in providing advice. Another form of extension that is gaining increasing importance is that of embedded services. In vertically integrated market chains, for example, companies combine extension with contract farming as it is in their interest to assist farmers in achieving required quality standards.

3.3 Change in advisory methods

In addition to changes in governance structures, a range of new advisory methods has been developed. One approach that has been promoted in many counties is the **farmer field school (FFS)** approach, which was designed originally as a way to introduce knowledge on integrated pest management (IPM) to irrigated rice farmers in Asia (e.g., Tripp, Wijeratne and Piyadasa 2005, van den Berg and Jiggins 2007). Experiences with IPM-FFS there have since been documented and used to promote and expand FFS and FFS-type activities to other countries and to other crops (e.g., Anandajayasekeram, Davis and Workneh 2006). Currently, FFS activities are being implemented in many developing countries, although only a few operate FFSs as a nationwide system (e.g., Davis 2006, van den Berg and Jiggins 2007).

A "school" typically educates farmer participants on agro-ecosystems analysis, including practical aspects of "…plant health, water management, weather, weed density,

disease surveillance, plus observation and collection of insect pests and beneficials" (Indonesian National IPM Program Secretariat 1991, p. 5). The FFS approach relies on participatory training methods to convey knowledge to field school participants to make them into "…confident pest experts, self-teaching experimenters, and effective trainers of other farmers" (Wiebers 1993). A typical FFS entails some 9-12 half-day sessions of hands-on, farmer experimentation and non-formal training to a group of 20-25 farmers during a single crop-growing season. Initially, paid trainers lead this village-level program, delivering elements and practical solutions for overall good crop management practices. Through group interactions, attendees sharpen their decision-making abilities and are empowered by learning leadership, communication and management skills (e.g., van de Fliert 1993). Some of the participating farmers are selected to receive additional training so as to be qualified as farmer-trainers, who then take up training responsibilities (for some fee, possibly paid by their community) with official backup support such as training materials. While there is some debate on whether the FFS is an extension system or an informal adult education system, the objectives of the FFSs are similar to those of many extension systems. The approach whereby the training focuses more on decision making skills than on packaged messages is perceived by its advocates as superior to traditional extension methods.

The FFS especially seeks to rectify the problem of accountability. This aspect is addressed in two ways: (i) The official trainers who conduct the field school are bound by a strict timetable of sessions within a pre-specified curriculum, which can be easily verified by supervisors; and (ii) Continuous interaction with a cohesive group of trainees creates accountability to the group, which is enhanced by the participatory nature of the training methods. Later, when farmer-trainers who are members of the same community administer the training, accountability is presumed to be even greater. These features are thus expected to ensure the quality and relevance of the service (knowledge) provided to the farmers.

Use of modern Information and Communication Technologies

The declining costs of information and communication technologies (ICTs) are giving farmers and rural people in developing countries much greater access to information. The situation is exemplified by the spread of mobile telephony, instructively surveyed by *The Economist* (2005): e.g., China has about 60 percent mobile coverage; India yet only about 20 percent but expanding quickly; and in Sub-Saharan Africa about 9 percent of the population is a mobile phone subscriber. In Uganda the data are exceptional, where the mobile phone network coverage increased from 36 percent in 2003 to 92 percent in 2005. The increased coverage, rather than the possession of individual mobile phones, induced market participation by reducing transaction costs in crop marketing and increasing the prices received for sales, especially for perishable goods. Foodnet, a multi-partner public network in Uganda, collects the latest market price information for coffee and maize, which farmers can access at very low cost through a Short Message Service (SMS).

Farmers can also use ICTs for accessing extension advice from a range of sources, but it takes time to develop demand-driven services. While ICT-based models of advisory services, such as online advice, have become common in industrial countries, these technologies have great potential for developing countries (e.g., Gao and Li (2006) and Ramachander and Jhunjhunwalla (2006) provide insightful analyses of the rapidly changing Chinese and Indian situations, respectively). An interesting approach is the e-Choupal model in India, which has been developed by the Indian Tobacco Company (ITC). An e-Choupal is a village Internet kiosk run by a local farmer, which helps villagers to access free of charge

information on farm practices, weather, and prices of inputs, services and outputs. This model was launched in 2000 and by 2005 comprised 4,000 e-Choupals serving 2.5 million farmers in six states (Umali-Deininger 2005). Another example of using the Internet in India is the fee-based and-Logue model of Ulagapitchampatti. Farmers can show crops affected by diseases to a web camera and receive advice on treatment (Bhatnagar 2005).

Despite the huge potential of new ICTs, better use of old, low-cost, methods should not be neglected, such as community radio (diverse experiences are reported in id21 2006), and as experience with pest management in Vietnam has instructively illustrated (Heong et al. 1998). There it was found that the mass media approach to scaling up can be highly successful when it communicates a single intervention or message. It may also be useful to "brand" the new intervention for easy communication and recall. In the campaign to reduce insecticide use in the first 40 days, it was branded it "No early spray". In the subsequent campaign to include the reduction of seeds and fertilizers as well as no early spraying, it became "Three Reductions, Three Gains". To sustain motivation of farmers, an entertainment-education program, an IPM Radio soap opera reaching two million farm households was developed, where these IPM messages were weaved into storylines. This series of 135 episodes broadcast twice a week for 1.5 years contributed to farmers in Vinh Long reducing their insecticide use by 30%.

Policies to improve access to ICT in rural areas need to focus as much on content and education as infrastructure. Education is one of the key factors affecting the returns to ICT in agricultural production, together with electricity, roads, and appropriate business models (Lio and Liu 2006). Local content creation needs to be linked to institutional innovations to provide farmer-responsive extension services. Such is one of the several lessons to emerge from the World Bank-supported Agricultural Reform Implementation Project of the late 1990s in the Russian Federation (e.g., Janakiram undated ca 2003). In short, ICTs offer many exciting opportunities in development in general, mostly depending on private initiatives but in turn relying on wise regulatory activities of governments; and for agricultural extension in particular, the possibilities are in principle almost boundless (e.g., Gray 2006, Richardson 2006).

3.4 In search of "best fit" approaches

An overview of the diverse reforms under implementation around the developing world has been made by Rivera and Alex (2004). This compilation, which includes an instructive table highlighting the different reform elements observed in various countries, shows that agricultural extension systems have indeed become highly plural. The variety of approaches being tried has certainly advantages over the promotion of a "one-size-fits-all" approach, which has long dominated extension, most notably with the T&V system. Yet it has remained a major question for policy-planners and analysts to identify those types of extension systems that are most appropriate to meet country-specific goals and frame conditions. To support the move from a "one-size-fits all" or "best practice" to a "best fit" approach, an interdisciplinary group of researchers at IFPRI recently developed a conceptual framework for the design and analysis of pluralistic agricultural extension systems (Birner et al, 2006, Part II, especially Figure 2, p. 26). The group also discussed a range of methods that can be used for design, monitoring, evaluation and impact assessment of such systems (Birner et al., 2006, Part IV). Yet, empirical evidence on the comparative advantages and disadvantages and the cost-effectiveness of different reform approaches is still scarce. The next section summarizes the evidence available to date.

4. Evidence on impacts of new approaches: a critical review of the formal, grey and emerging literature that bears on this chronically under-researched field

4.1 Issues in assembling evidence on impact of extension

The extension operations of the past four decades may well be the largest institutional development effort the world has ever known. Evenson (2001) reviewed many of the impacts of such endeavors, and the present section is intended primarily to update the story to account for the emerging evaluations of the newer approaches. The endeavor to provide agricultural advisory services has been extensive; hundreds of thousands of technicians have been trained; and hundreds of millions of farmers have had contact with and likely benefited from such services. As countries struggle with declining public budgets, a key question must be "How effective have these extension investments been and what impacts have they had?"

Because many factors affect the performance of agriculture in complex and contradictory ways, it is difficult to trace the relationship between extension inputs and their impact at the farm level. This difficulty, in turn, exacerbates other inherent problems related to political support, budget allocation, incentives of extension employees, and their accountability, both upward (to the managers) and downward (to their clients). The evaluation of extension impact involves measuring the relationship between extension and farmers' knowledge, adoption of better practices, utilization of inputs, and ultimately farm productivity and profitability and the related improvement in farmers' welfare. But farmers' decisions and performance are influenced by many other systematic and random effects and thus reliably ascertaining the impact of extension advice to farmers requires fairly sophisticated econometric and quasi-experimental methods (e.g., Birner et al. 2006), thus far rarely applied, especially to the newer institutional experiments under way. The decision makers who allocate public funds, and even the direct extension managers, have faced great difficulties in assessing the impact of extension and in differentiating it from other contributing factors, or making allowances for the effects of counterveiling factors, and this situation is not changing as rapidly as would be desired, at least by the present reviewer.

The most comprehensive review of impacts is found in a meta-study of 289 studies of economic returns to agricultural research and extension, with 1128 estimates of rates of return. However, only 18 were for "extension only", while in contrast, 598 were for "research only"; 512 were for "research and extension" combined. This study found median rates of return of 63 percent for the few extension-only investments, 48 percent for research, and 37 percent for combined investments in research and extension (Alston et al. 2000). Similar success has been documented even for Sub-Saharan Africa alone (e.g., Oehmke, Anandajayasekeram and Masters 1997). Economic analysis of such diverse studies (and differing analytic methods) has thus provided strong circumstantial justification for many past extension investments, but yet tells an incomplete story. Concern over data quality, along with difficult methodological issues regarding causality and quantification of all benefits, must be important qualifiers to the prevailing evidence of good economic returns from

extension. In Kenya, although previous evaluations had indicated remarkably high positive economic returns to extension investments, a comprehensive evaluation based on improved and new data revealed a disappointing performance of extension, with a finding of an ineffective, inefficient, and unsustainable T&V-based extension system (for the present purpose not treated here as a "new" approach) and, disturbingly, no measurable impact on farmer efficiency or crop productivity (Gautam 2000).

Such findings bolster the skepticism of policy makers (reinforced by observations such as those of Hassan, Karanja and Mulamula (1998)) about getting returns to investment in public extension that are actually rather low, a skepticism that seems more than well justified. Evidently more evaluative work is called for, especially of the vaunted new approaches for which some evidence is offered below. Because in the past the future was like the past, it seems likely that "ordinary" economic assessments of recent extension investments will indicate apparently reasonable and even high returns, reflecting the conventional wisdom of the past. But it is conceivable that deeper analyses of the Gautam (2000) type, ideally based on careful analysis of panel data, may indicate returns that are sometimes low. It is to be hoped that fresh evidence from the newer approaches will belie this anticipation. As noted in section 3, such approaches have strived diligently to learn from the lessons of the past in seeking more effective models of provision and thus higher returns to public investments, as well as economically useful returns to the increased private investments.

This review is concerned primarily with evidence on the efficiency of public investment but, before moving to that, some notes on the more private side are in order. In **fee-for-service modalities** that characterize most private provision, farmers clearly determine the type of information that is of priority to them, and thus the impact of extension advice is expected to be higher. Practical problems of governance can lead to distortions in public fee-for-service provision, such as favoritism of well-connected (but not necessarily high-quality) providers, and illegal trade in government-issued vouchers for extension (e.g., Berdegué and Marchant 2002, Cox and Ortega 2004). Similarly, training and the update of skills will usually have to be undertaken by agents individually, with loss of economies of scale. These matters pose further design issues.

An important role for public extension and policy (such as has been supported by the World Bank in Latin America) is to facilitate the development of private provision of extension services, so that the public system can withdraw as appropriate (World Bank 2006a). A key drawback of fee-for-service modes of extension is that less commercial farmers (i.e., poorer farmers and those farming smaller and less favored areas), for whom the value of information is lower, may purchase fewer extension services, as the price of the service will tend to be market-determined (thus reflecting also the demand from farmers with higher value of information, to the extent that such farmers use these channels for their information). This may entail not only social considerations, but may be an inefficient outcome if the poor have a lesser ability to prejudge the value of information and tend to undervalue it. The resolution of this concern (e.g., Sulaiman and Sadamate 2000) is the stratification of extension systems by types of clients within the country, as variously pioneered in Chile, for instance (e.g., Rivera and Alex 2004). That is, smaller-scale and poorer farmers may be served by public extension or by formats of contract extension receiving larger shares of public funding (e.g., an association of smaller farmers receives a larger matching allocation to hire extension staff). In such ways, the particular needs of women farmers, for instance, may be addressed, at least in principle, if yet too rarely in

practice (e.g., Saito and Weidemann 1990 for an early critique), as taken up in the paragraph that follows. At the same time, commercial farmers are expected to pay a higher share of extension cost in a fee-for-service system (e.g., Wilson 1991, Dinar and Keynan 2001). As rightly emphasized by Hanson and Just (2001), there may be several externalities (such as related to soil conservation) that imply likely social inefficiency if a fully privatized extension system is introduced. Given the spread of cost-recovery initiatives around the world (e.g., World Bank 2006b), one compelling argument for implicitly high returns to such pluralized extension is that the returns to all concerned must be sufficiently rewarding to underpin the proliferation.

In all the contemporary efforts to make agricultural innovation systems more demand-driven (e.g., Chipeta 2006), there is a great need to pay attention to how underprivileged farmers' and especially women's demands can be better represented (e.g., Gladwin 2002, Blagden et al. 2006, Rangnekar 2006). Particular efforts must be made to accommodate women's time constraints (in, say, farmer organizations) and employing women in advisory services to increase effectiveness of service delivery (Doss and Morris 2001, Moore, Hamilton, and Thiongane 2001); in some cases, regrettably, the contemporary efforts go in exactly the opposite direction (e.g., Adato and Meinzen-Dick 2007, p. 340, on Zimbabwe).

4.2 Impact of new governance structures

Many of the new arrangements for organizing public extension discussed in section 3.2 feature explicit concerns about doing an improved job on monitoring and evaluation (M&E) in general, and institutionalizing impact assessment in particular. But thus far these good intentions have yet to be translated into good hard evidence. The evidence that could be assembled is summarized in Appendix Table A1.

Decentralized, mainly public delivery: Evaluation of the **ATMA pilot operations in India** has been seemingly positive and encouraging, based on the restricted sample data indicators (unpublished project documents), such as average changes in the 28 NATP districts 1999-2003 in area of crops focused on in ATMA: Horticulture 12 to 16%; Oil Seeds 3 to 11%; Herbs and Medicinal Crops: 1 to 5%; while cereals declined from 55to 47% but, importantly, yields increased by 14%. There was an increase in farm income recorded, of an average of 24% in project districts, compared to 5% in non-project districts, perhaps statistically significant if more careful controlling for non-project effects can be subsequently handled, and surely economically significant if such desired changes can be sustained in the scaled up "new" areas, perhaps in rather less favorable zones of future expansion of this more market-driven approach. Collection of more broad-based geographic data and careful comparisons of better paired comparisons with remaining non-project cases will be key to substantiating this major switch in approach in India, especially as new modifications are brought into the decentralized program such as: Moving from pure technology transfer to a marketing/technology approach (Strategic Research and Extension Plans to become District Agricultural Diversification and Marketing Strategies; and new concepts such as Agri-marts (proposed as ATMA owned but SME operated; hub and spoke/one-stop-shop approach).

The other cases for which there are some impact data in Table A1 do not provide compelling evidence on the effectiveness of simply decentralizing a service, certainly both Kenya (e.g., Anon. 2006) and Ghana (e.g., Asuming-Brempong, Sarpong and Asante 2006) reveal more of the difficulties of implementation than the benefits of so doing. The data on

the recently completed Decentralized Agricultural and Forestry Extension Project (DALEP) in Indonesia may eventually yield some uncontroversial insight when analysis is complete.

Decentralized, mainly contracted out. The evidence on Uganda NAADS in Table A1 is incomplete in several respects, especially given that two key studies remain to be finalized; the final IFPRI report following the preliminary one by Benin et al. (2005) based on targeted surveys of early, late and non-project districts, and one being conducted in DECRG of the World Bank, led by Klaus Deininger, based on the 2005/6 National Household Survey, which included questions specifically on NAADS. The emerging evidence (including other unpublished analyses of the same Survey data) is mixed (and not strong on induced income effects except marginally returns from livestock), so it is premature to come to strong conclusions about impact, and to use this emerging experience as a guide to effective investment elsewhere, in spite of the positive indications of improved extension processes and activities toward better knowledge sharing. It will surely be quite some time before the "jury returns" with harmonized judgment on the relevance of the NAADS model for advisory services in Uganda, let alone for elsewhere. Meantime, high priority should be put on a fuller interpretation with careful propensity score matching of the emerging new data, regrettably seemingly not available for the completion of this background paper.

4.3 Impact of new advisory methods

A key drawback of the **farmer field school approach** is its cost, which is likely to raise problems of financial sustainability. The intense training activities are expensive per farmer trained (Norton, Rajotte and Gapud 1999, Quizon, Feder and Murgai 2001a, b, Thiele et al. 2001), so the amount of service actually delivered (the number of farmers trained) on a national level would be small. Cost-effectiveness and financial sustainability could be improved if farmer-trainers were to become the main trainers, perhaps with significant community funding, and if informal farmer-to-farmer communications were effective in facilitating knowledge diffusion. In practice, however, farmer-trainers have been a minor factor in national FFS initiatives in Indonesia and the Philippines (Quizon, Feder and Murgai 2001a). This reflects the observations of Davidson and Ahmad (2003) concerning the extremely limited farmer-to-farmer knowledge transfers made by "contact" farmers of various schemes in Pakistan.

A study in the Philippines documented improved knowledge among trained farmers, but little diffusion of knowledge from trained farmers to other farmers, presumably because the content of the training is difficult to transmit in casual, nonstructured communications (Rola, Jamias and Quizon 2002). Similarly, recent analysis of FFSs in Indonesia found superior knowledge among field school graduates, but no significant diffusion of knowledge from trained to untrained farmers (Feder, Murgai and Quizon 2004b). A related study concluded that the training had no significant impact on yields and pesticide use by trained farmers or members of their communities (Feder, Murgai and Quizon 2004a).[3] A study by Godtland et al. (2004) of potato growers in Peru reported on knowledge gains among trained farmers, but the study took place at an early stage of the program and could not analyze diffusion effects. Such findings suggest that both the curriculum and the training approach

[3] Limited diffusion of information from field school graduates to other farmers is also reported by van de Fliert (1993, ps. 202, 230) and International Potato Center (2002). These studies, however, did not include a rigorous analysis of diffusion.

need to be modified so as to make information simpler and easier to diffuse, and to prioritize the content of the training in order to shorten the duration and reduce the cost.

The above-mentioned and other recent evaluative studies are summarized in cryptic form in the appended Table A2, which is based on reviews by Kristin Davis, of the ISNAR Program of IFPRI. The methods adopted have varied widely and the findings, not surprisingly, are diverse. It is commonly found that pesticide use among farmer trainees is indeed reduced but that the intended multiplier effects do not eventuate, which can then mean relatively high cost of service per influenced farmer. They indicate that there is yet far to go in coming to a good understanding of the value (especially relative to cost) of relatively expensive new advisory delivery models such as FFS. But the model is being adapted to an ever-increasing range of themes and contexts, so it is likely that aspects of the approach will be important features of the future landscape of agricultural advisory services (e.g., Tripp, Wijeratne and Piyadasa 2005, Van de Fliert 2006).

The other major novelty in delivery methods concerns use of ICTs. As observed in section 3.3, India is something of a powerhouse of the developing world in the development and application of such methods, although application to agricultural advisory work came relatively late, so there is not yet a strong body of evaluative evidence to assess the worth of achievements to date. But the GoI (undated) is committed to proliferating recent ICT initiatives in the sector, indicating that it is convinced of the cost effectiveness of such approaches, which seem likely to be widely adopted in other countries as telecommunications generally, and Internet connectivity specifically, improves in rural areas. How advisory services of various kinds might best exploit such ICT resources is yet to be well worked out and, as for other themes discussed above, remains as a knowledge gap seemingly well worth filling quickly, and the longer experience of using ICTs in many more-developed countries will be worthy of close analysis.

5. Conclusion: The Way Forward

Many administrative and design failures have proved problematic in public extension effort in the past, most notably those associated with: the scale and complexity of extension operations; the dependence of success in extension on the broader policy environment; the problems that stem from the less than ideal interaction of extension with the knowledge generation system; the difficulties inherent in tracing extension impact; the profound problems of accountability; the oftentimes weak political commitment and support for public extension; the frequent encumbrance with public duties in addition to those related to knowledge transfer; and the severe difficulties of fiscal unsustainability faced in many countries. Wide-ranging reforms have been experimented with and new approaches introduced in many parts of the world to do a needed job better, and this review has sought to summarize what is presently known about what has worked and where possible why.

As the review has shown, our knowledge about the benefits and costs of new reform models is current still skimpy. Most models that have been studied combine different reform elements, such as changes in governance structures, changes in the management system and changes in advisory models. However, the existing studies do not make it possible to identify which of those reform elements is effective under which circumstances. Hence, there is clearly a need for more empirical research to find out “what works where and why.” The use of a common framework, such as the one developed by IFPRI (Birner et al., 2006), would

help to make the results of different research or evaluation teams for different reform models more comparable. It would also be useful to plan pilot projects in ways that allow for a rigorous evaluation, for example, by using appropriately designed experimental methods. The World Bank, as a major funding agency for new extension approaches, could play a particularly important role in this regard (compare the Deaton et al. 2006 review of World Bank research). Efforts to evaluate new extension approaches rigorously before making major investments to promote them across countries are well justified, in order to avoid the pitfalls of the T&V "one-size-fits-all" experience. Even reform models that resonate well with currently held paradigms of good practice, such as decentralization, outsourcing and cost-recovery are doubtless not necessarily the best reform approaches for agricultural extension under all circumstances. Considering the diversity and the difficult tasks that agricultural extension is confronted with, evidence-based policy-making is particularly necessary in this field.

Notwithstanding the sparsity of solid evidence, this review emphasizes the efficiency gains that can come from locally decentralized delivery with incentive structures based increasingly on private provision, much of which will inevitably remain largely publicly funded extension efforts, especially (and properly so) for impoverished regions of developing countries.

Extension investments should create the **capacity** to identify new, promising alternatives at the farm level and ensure that they are supported in the right way (for example, through NGOs, by engaging private companies or farmer organizations, or by providing market information). This requires pluralism in service providers and organizations that have the attitude and the ability to find the right approach in different situations; in short, smart best-fit choices. Investments in such models will by definition be more flexible and less defined in terms of the training needs, numbers of agents, vehicles etc. that will be acquired. To counterbalance the risks involved in such flexibility, governance and accountability should receive more careful attention than has typically been devoted in the past. True to form, one of the largest training endeavors under way in Ethiopia does not follow a plural route and involves the government establishing (with World Bank assistance) some 25 agricultural technical and vocational education and training colleges and some 15,000 farmer training centers (all not surprisingly viewed with some concern by Spielman et al. 2007).

There is clearly much yet to be done in bringing needed extension services to the poor around the world. As the eminently quotable Davidson and Ahmad (2003, p. 142) put it: "bold new innovations in extension systems (and development) are required that not only facilitate agricultural development, but ones that do not leave some farmers behind." Understanding of what works well in the diverse circumstances of the developing world is still far from complete and there is thus a clear need for continuing research effort to fill these voids. Meantime, investors need to be cautious in designing and adjusting public extension systems if they are not needlessly to re-learn the lessons of the past. Informed by these lessons, governments should be able to increase the chance of reaping high returns to their investment and, likely also through fostering other investors too, successfully assist farmers (and extension workers) to boost their productivity and income, and thereby contribute more strongly to economic growth and poverty reduction and also foster greater consciousness and concern for sustainable agricultural development.

Text References

Adato, M. and Meinzen-Dick, R. (2007) "Impacts of Agricultural Research on Poverty: Synthesis of Findings and Implications for Future Directions", In M. Adato and R. Meinzen-Dick (eds), *Agricultural Research, Livelihoods and Poverty: Studies of Economic and Social Impacts in Six Countries*, Johns Hopkins University Press for IFPRI, Baltimore, 331-68.

Alex, G., Zijp, W. and Byerlee, D. with input from the AKIS Thematic Team (2002), *Rural Extension and Advisory Services: New Directions*, Rural Development Strategy Background Paper # 9, ARD, World Bank, Washington, DC.

Alston, J.M., Chan-Kang, C., Marra, M.C., Pardey, P.G. and Wyatt, TJ. (2000), *A Meta-Analysis of Rates of Return to Agricultural R&D: Ex Pede Herculem?* Research Report 113, IFPRI, Washington, DC.

Ameur, C. (1994), *Agricultural Extension: A Step Beyond the Next Step*, World Bank Technical Paper 247, World Bank, Washington, DC.

Anandajayasekeram, P., Davis, K. and Workneh, S. (2006), Farmer field schools: An alternative to existing extension systems? Experience from Eastern and Southern Africa, IFPRI, Addis Ababa, mimeo, Processed.

Anderson, J.R. (1999), "Institutional reforms for getting an agricultural knowledge system to play its role in economic growth", Pakistan Society of Development Economics Papers and Proceedings, *Pakistan Development Review* 38, 333-50.

Anderson J.R. (2006) "Training and visit (T&V) extension method", in the *Sustainable Funding for Agricultural Innovation Systems* Electronic discussion at: http://www.dgroups.org/groups/worldbank/LAC-AgInnovations/index.cfm which includes the Anderson video clip at: http://www.gdln-lac.org/wms/Agriculture_Message_Series-08-15-2006-high%20bandwidth.WMV

Anderson, J.R. and Feder, G. (2004), "Agricultural extension: Good intentions and hard realities" *World Bank Research Observer* 19(1), 41-60, at http://wbro.oupjournals.org/cgi/content/abstract/19/1/41

Anderson, J.R. and Feder, G. (2007), "Agricultural extension", In R.E. Evenson and P. Pingali (eds.), *Handbook of Agricultural Economics, Chapter 44, Volume 3 Agricultural Development: Farmers, Farm Production and Farm Markets*, Elsevier, Amsterdam, 2343-78, in press.

Anderson, J.R., Feder, G. and Ganguly, S. (2006), "The rise and fall of Training and Visit extension: An Asian mini-drama with an African epilogue", In A.W. Van den Ban and R.K. Samanta (eds.), *Changing Roles of Agricultural Extension in Asian Nations,* B.R. Publishing Corporation, New Delhi. Chapter 6, 149-74; an expanded version is available as World Bank Policy Working Paper Series 3928, at http://www-wds.worldbank.org/external/default/main?pagePK=64193027&piPK=64187937&theSitePK=523679&menuPK=64187510&searchMenuPK=64187511&theSitePK=523679&entityID=000016406_20060519144915&searchMenuPK=64187511&theSitePK=523679

Anon. (2006), National Extension and Livestock Agriculture Programme (NALEP) Phase I, Impact Assessment Report to SIDA, Stockholm, Opto International AB, Nairobi.

Asuming-Brempong, S., Sarpong, D.B and Asante, F. (2006), Institutional bottlenecks of agricultural sector development: The case of research and extension provision in Ghana, University of Ghana, Legon, Accra, for the OECD Development Centre, Paris.

Benin, S., Nkonya, E., Okecho, G., Pender, J., Nahdy, S., Mugarura, S., Kato, E. and Kayobyo, G. (2005), Assessing the Impact of the National Agricultural Advisory

Services (NAADS) in the Uganda Rural Livelihoods, draft report, IFPRI, Washington, DC, mimeo, September, presented at a seminar, September 13, 2006.
Berdegué, J.A. and Marchant, C. (2002), "Chile: The evolution of the agricultural advisory service for small farmers: 1978-2000", In W.M. Rivera and W. Zijp (eds), *Contracting for Agricultural Extension: International Case Studies and Emerging Practices*, CABI Publishing, Wallingford, 21-27.
Bhatnagar, S. (2005), ICT Use in Rural India: Opportunities and Challenges. Presentation at the IFAD Conference on "Innovation Challenges for Rural Development," November 14-17, 2005.
Birkhaeuser, D., Evenson, R.E. and Feder, G. (1991), "The economic impact of agricultural extension: A review", *Economic Development and Cultural Change* 39, 607-50.
Birner, R., Davis, K., Pender, J., Nkonya, E., Anandajayasekeram, P., Ekboir, J., Mbabu, A., Spielman, D., Horna, D., Benin, S. and Cohen, M. (2006), *From "Best Practice" to "Best Fit": A Framework for Analyzing Pluralistic Agricultural Advisory Services Worldwide*, DSGD Discussion Paper No. 37, IFPRI Washington, DC, at http://www.ifpri.org/DIVS/DSGD/dp/dsgdp37.asp
Blackden, M., Canagarajah, S., Klasen, S. and Lawson, D (2006), "Gender and growth in Sub-Saharan Africa: Issues and evidence", Washington, D.C. and Gottingen: United Nations University (WIDER), Research Paper 2006/37. Available at http://www.wider.unu.edu/publications/rps/rps2006/rp2006-37.pdf.
Byerlee, D. (1988a), "Agricultural extension and the development of farmers' management skills", In J. Howell (ed.), *Training and Visit Extension in Practice*, Agricultural Advisory Unit Occasional Paper 8, ODI, London, pp. 8-27.
Byerlee, D. (1988b), "Knowledge-intensive crop management technologies: Concepts, impacts, and prospects in Asian agriculture", In P. Pingali (ed.), *Impacts of Rice Research,* Thailand Development Research Institute, Bangkok and International Rice Research Institute, Los Baños, 113-34.
Carney, D. (1996), "Formal farmers organizations in the agricultural technology system: Current roles and future challenges", *Natural Resource Perspectives* 14. Overseas Development Institute, London.
Chipeta, S. (2006), *Demand Driven Agricultural Advisory Services*, Neuchâtel Group, Lindau. http://www.neuchatelinitiative.net/english/documents/DemandDrivenAgriculturalAdvisoryServices.pdf.
Cox, M. and Ortega, H. (2004), "Chile: Origin and evolution of a privatized extension system", In W. Rivera and G. Alex (eds), *Extension Reform for Rural Development, Volume 2 Privatization of Extension Systems, Case Studies of International Initiatives,* Agriculture and Rural Development Discussion Paper 9, World Bank, Washington, DC 9-15. at http://lnweb18.worldbank.org/ESSD/ardext.nsf/11ByDocName/PublicationsExtensionReformforRuralDevelopment
Davidson, A.P. and Ahmad, M. (2003), *Privatization and the Crisis of Agricultural Extension: The Case of Pakistan*, Ashgate, Aldershot.
Davis, K. (2006), "Farmer field schools: A boon or bust for extension in Africa? *Journal of International Agricultural and Extension Education* 13(1), 91-97.
Deaton, A., Banerjee, A., Lustig, N., Rogoff, K. and others (2006), *An Evaluation of World Bank Research, 1998 – 2005*, DEC, World Bank, Washington, DC, processed.
Deininger, K. and Faye, I. (2005), "Do new approaches to extension improve access and outcomes? Evidence from rural Uganda", Paper prepared for an AAEA Meeting, DECRG, World Bank Washington, DC. Mimeo.

Dinar, A. and Keynan, G. (2001), "Economics of paid extension: Lesson from experience in Nicaragua", *American Journal of Agricultural Economics* 83, 769-76.
Doss, C.R. and Morris, M.L. (2001), "How does gender affect the adoption of agricultural innovations? The case of improved maize technology in Ghana", *Agricultural Economics* 25(1), 27–39.
Ekwamu, A. and Brown, M. (2005), "Four years of NAADS Implementation: Programme Outcomes and Impact", In *Proceedings of the Mid-Term Review of the National Agricultural Advisory Services, 31st May – 2nd June 2005*, Ministry of Agriculture Animal Industry and Fisheries, Kampala, 25-39.
Evenson, R.E. (2001), "Economic impacts of agricultural research and extension", In B.L. Gardner and G.C. Rausser (eds), *Handbook of Agricultural Economics*, Vol. 1A, Elsevier Science, Amsterdam, 574-625.
FAO/WB (2000), *Agricultural Knowledge and Information System for Rural Development (AKIS/RD): Strategic Vision and Guiding Principles*, Food and Agriculture Organization of the United Nations and the AKIS Thematic Group of the World Bank, Rome.
Farrington, J., Christoplos, I., Kidd, A., and Beckman, M. with Cromwell E. (2002), "Creating a policy environment for pro-poor agricultural extension: The Who? What? And How?" *Natural Resource Perspectives* 80, ODI, London.
Feder, G., Willett, A. and Zijp, W. (2001), "Agricultural extension: Generic challenges and the ingredients for solutions", In S. Wolf and D. Zilberman (eds), *Knowledge Generation and Technical Change: Institutional Innovation in Agriculture*, Kluwer, Boston, 313-56.
Feder, G., Murgai, R. and Quizon, J.B. (2004a), "Sending farmers back to school: The impact of farmer field schools in Indonesia", *Review of Agricultural Economics* 26, 45-62.
Feder, G., Murgai, R. and Quizon, J.B. (2004b), "The acquisition and diffusion of knowledge: The case of pest management training in farmer field schools, Indonesia", *Journal of Agricultural Economics* 55, 217-239.
Friis-Hansen, E. (2005), Demand driven advisory service as a pathway out of poverty: Experience from NAADS in Soroti district, Uganda. online at: www.neuchatelinitiative.net/english/Demanddrivenadvisoryservicesasapathwayoutofpoverty.ppt
Gao, Qijie and Li, Xiaoyun (2006), "Agricultural information infrastructure development and information services in China", In A.W. Van den Ban and R.K. Samanta (eds), *Changing Roles of Agricultural Extension in Asian Nations,* B.R. Publishing Corporation, New Delhi, 369-87.
Garfield, E., Guadagni, M. and Moreau, D. (1996), "Decentralization of agricultural extension in Colombia", Proceedings of Extension Workshop, Alternative Mechanisms for Funding and Delivering Extension, World Bank, Washington, DC, mimeo.
Gautam, M. (2000), *Agricultural Extension: The Kenya Experience: An Impact Evaluation*, Operations Evaluation Department, World Bank, Washington, DC.
Gemo, H., Eicher, C.K. and Teclemariam, S. (2005), *Mozambique's Experience in Building a National Extension System*, Michigan State University Press, East Lansing.
Gladwin, C.H. (2002), "Introduction to gender and soil fertility in Africa", *African Studies Quarterly* 6(1-2):1–24.
Godtland, E.M., Sadoulet, E., de Janvry, A., Murgai, R. and Ortiz, O. (2004), "The impact of farmer field schools on knowledge and productivity: A study of potato farmers in the Peruvian Andes", *Economic Development and Cultural Change* 53, 63-92.

GoI (undated), *Policy Framework for Agricultural Extension*, Ministry of Agriculture, Government of India, New Delhi, ca. 2005: http://agricoop.nic.in/policy_framework.htm

Gray, D. (2006) "On information and communication technologies" in the *Sustainable Funding for Agricultural Innovation Systems* Electronic discussion at: http://www.dgroups.org/groups/worldbank/LAC-AgInnovations/index.cfm, specifically http://www.lcr-results.org/wms/David_Gray_Message_10-25-2006.WMV

Hanson, J. and Just, R. (2001), "The potential for transition to paid extension: Some guiding economic principles", *American Journal of Agricultural Economics* 83, 777-84.

Hassan, R.M., Karanja, D. and Mulamula, L. (1998), "Availability and effectiveness of agricultural extension services for maize farmers in Kenya", In R.M. Hassan (ed.), *Maize Technology Development and Transfer: A GIS Application for Research Planning in Kenya*, CAB International, Wallingford, 175-88.

Heemskerk, W. and Wennink, B. (eds.) (2005), *Stakeholder-Driven Funding Mechanisms for Agricultural Innovation: Case studies from Sub-Saharan Africa*, KIT Bulletin 373, Royal Tropical Institute, Amsterdam at www.kit.nl

Heong, K.L., Escalada, M.M., Huan, N.H. and Mai, V. (1998), "Use of communication media in changing rice farmers' pest management in South Vietnam", *Crop Protection* 17(5), 413–25.

Holloway, G.J. and Ehui, S.K. (2001), "Demand, supply and willingness-to-pay for extension services in an emerging market setting", *American Journal of Agricultural Economics* 83, 764-68.

Howell, J. (1985), *Recurrent Costs and Agricultural Development*, Overseas Development Institute, London.

Howell, J. (1986), "Accountability in extension work", In G.E. Jones, ed., *Investing in Rural Extension: Strategies and Goals*, Elsevier Applied Science, London, 213-217

Hu, Ruifa and Huang, Jikun (2006), Prospects and Challenges of China's Agricultural Research and Extension, Center for Chinese Agricultural Policy, Chinese Academy of Sciences, Beijing, personal communication.

id21 (2006) *Insights #58*, November 2005, leading into an e-discussion reported in http://www.id21.org/communityradio/finalreport/index.html

Indonesian National IPM Program Secretariat (1991), "Farmers as experts: The Indonesian national IPM program", Indonesian National IPM Program, Jakarta.

International Potato Center (2002), Impact Evaluation of Participatory Development of Integrated Insect and Disease Management (IPM) for the Potato Crop in San Miguel, Peru, CIP, Lima.

Janakiram, S. (undated), Rural information and knowledge system: A case study from Russia, SASKI TG, World Bank, Washington, DC, processed ca 2003.

Kaburire, L. and Ruruga, S. (2006), "Networking for agricultural innovation: The MVIWATA national network of farmers' groups in Tanzania", In B Wennink, and W. Heemskerk (eds), Farmers' organizations and agricultural innovation. Case studies from Benin, Rwanda and Tanzania, Bulletin 374. Development Policy and Practice, KIT, Amsterdam, 79-85.

Kaimovitz, D. (1991), "The evolution of links between research and extension in developing countries", In W.M. Rivera and D.J. Gustafson, eds., Agricultural Extension: Worldwide Institutional Innovation and Forces for Change, Elsevier, Amsterdam, 101-112.

Katz, E. (2002), "Financial participation in practice: Experiences with participation of clients in the financing of extension services", *BeraterInnen News* 16-23.

Keynan, G., Manuel, O. and Dinar, A. (1997), "Co-financed public extension in Nicaragua", *World Bank Research Observer* 12, 225-48.

Leeuwis, C. (2004), *Communication for Rural Innovation: Rethinking Agricultural Extension*, Blackwell, Oxford.

Lio, Monchi, and Meng-Chun Liu. (2006), "ICT and agricultural productivity: Evidence from cross-country data", *Agricultural Economics* 34(3), 221–28.

Meinzen-Dick, R. and Knox, A. (2001), "Collective action, property rights, and devolution of natural resource management: A conceptual framework", In R.S. Meinzen-Dick, A. Knox and M. Di Gregorio (Eds),Collective Action, Property Rights and Devolution of Natural Resource Management: Exchange of Knowledge and Implications for Policy, Zentralstelle für Ernahrung und Landwirtschaft (ZEL), Feldafing, Germany, 41-73, http://www.capri.cgiar.org/workshop_devolution.asp

Moore, K.M., Hamilton, S. and Thiongane, S. (2001), "Access to technical information and gendered NRM practices: Men and women in rural Senegal", *Agriculture and Human Values* 18(1), 95–105.

Mureithi, J. and Anderson J.R. (2004), "Farmer-extension-research interfaces", In C.G. Ndiritu, J.K. Lynam and A.N. Mbabu, eds., *Transformation of Agricultural Research Systems in Africa: Lessons from Kenya*, Michigan State University Press, East Lansing, 261-86.

Nahdy, S.M. (2007), Enhancing Agricultural Innovation Workshop presentation, World Bank, Washington, DC, 22-13 March, processed.

Nagel, U.J. (2003), Back on the Agenda: Extension and its Institutional Linkages - Some Personal Observations on the Re-discovery of a Key Player. Paper Presented at the Tropentag in Goettingen, Germany, mimeo.

Norton, G., Rajotte E. and Gapud V. (1999), "Participatory research in integrated pest management", *Agriculture and Human Values* 16, 431-39.

Oehmke, J.F., Anandajayasekeram, P. and Masters, W.A. (1997), *Agricultural Technology Development and Transfer in Africa: Impacts Achieved and Lessons Learned*, Office of Sustainable Development, Bureau for Africa, USAID, Washington, DC.

Pannell, D. (2006), "Adoption of conservation practices by rural landholders: Implications for research and extension" Pannell Discussions No. 86, 23 October, at http://cyllene.uwa.edu.au/~dpannell/pd/pd0086.htm

Purcell, D.L. and Anderson, J.R. (1997), *Agricultural Extension and Research: Achievements and Problems in National Systems*, A World Bank Operations Evaluation Study, World Bank, Washington, DC, pp. xxi + 264, a summary available at http://wbln1023.worldbank.org/oed/oeddoclib.nsf/DocUNIDViewForJavaSearch/4CC2B2C8CC4DB10A852567F5005D5A14?opendocument

Qamar, M.K. (2002), "Global trends in agricultural extension: challenges facing Asia and the Pacific region extension", Education and Communication Service FAO Research, Extension and Training Division, Keynote paper presented at the FAO Regional Expert Consultation on Agricultural Extension, Research-Extension-Farmer Interface and Technology Transfer, held in Bangkok; 16-19 July.

Quizon, J., Feder, G. and Murgai, R. (2001a), "Fiscal sustainability of agricultural extension: The case of the farmer field school approach", *Journal of International Agricultural and Extension Education* 8, 13-24.

Quizon, J., Feder, G. and Murgai, R. (2001b), "Fiscal sustainability of agricultural extension: The case of the farmer field school approach: Supplementary remarks", *Journal of International Agricultural and Extension Education* 8, 73-6.

Ramachander, S. and Jhunjhunwalla, A. (2006) "ICT and agricultural diversity", In A.W. Van den Ban and R.K. Samanta (eds.), *Changing Roles of Agricultural Extension in Asian Nations,* B.R. Publishing Corporation, New Delhi, 388-407.

Rangnekar, D.V. (2006), "Agricultural extension and the underprivileged farmer: A case for change in extension paradigm", In A.W. Van den Ban and R.K. Samanta (eds.), *Changing Roles of Agricultural Extension in Asian Nations,* B.R. Publishing Corporation, New Delhi, 273-89.

Richardson, D. (2006), *ICTs: Transforming Agricultural Extension?* Report of the 6th Consultative Expert Meeting of CTA's Observatory on ICTs, CTA Working Document No. 8034, Wageningen.

Rivera, W.M. (1996), "Agricultural extension in transition worldwide: Structural, financial and managerial reform strategies", *Public Administration and Development* 16, 151-61.

Rivera, W. and Alex, G. (eds.) (2004), *Extension Reform for Rural Development, Volume 5 National Strategy and Reform, Case Studies of International Initiatives,* Agriculture and Rural Development Discussion Paper 12, World Bank, Washington, DC, 39-51. at http://lnweb18.worldbank.org/ESSD/ardext.nsf/11ByDocName/PublicationsExtensionReformforRuralDevelopment

Rivera, W., Alex, G., Hanson, J. and Birner, R. (2006), Enabling Agriculture: The Evolution and Promise of Agricultural Knowledge Framework, University of Maryland, College Park, mimeo.

Rivera, W.M. and Blum, M. (eds.) (2007/8), Agricultural Extension in Transition Worldwide: Policy and Strategies for Reform. Extension, Education and Training Unit, Sustainable Development Department, FAO, Rome, in preparation.

Rivera, W.M., Qamar, M.K. and Crowder, L.V. (2001), *Agricultural and Rural Extension Worldwide: Options for Institutional Reform in Developing Countries*, FAO, Rome.

Rivera, W.M. and Zijp, W. (eds) (2002), *Contracting for Agricultural Extension: International Case Studies and Emerging Practices*, CABI Publishing, Wallingford.

Rivera, W., Zijp, W. and Alex, G. (2000), *Contracting for Extension: Review of Emerging Practice*. AKIS Good Practice Note, Agricultural Knowledge and Information System Thematic Group, World Bank, Washington, DC.

Rola, A.C., Jamias, S.B and Quizon, J.B. (2002), "Do farmer field school graduates retain and share what they learn? An investigation in Iloilo, Philippines", *Journal of International Agricultural and Extension Education* 9, 65-76.

Röling, N. (1986), "Extension and the development of human resources: The other tradition in extension education", In G.E. Jones (ed.), *Investing in Rural Extension: Strategies and Goals*, Elsevier Applied Science, London, 51-64.

Rondinelli, D.A. (1981), "Administrative decentralisation and economic development: The Sudan's experiment with devolution", *Journal of Modern African Studies* 19(4), 595-624.

Rondinelli, D.A. (1989) "Decentralizing public services in developing countries: Issues and opportunities", *Journal of Social, Political, and Economic Studies* 14(1), 77-99.

Rondot, P. and Collion M.-H. (2002), "Investing in Rural Producer Organizations for Sustainable Agricultural Development", Paper presented at Policies and Approaches for Rural Poverty Reduction: What Works in Practice, sponsored by the European Commission and the governments of France, Germany, the United Kingdom, and the Netherlands, September 4-6, Agropolis, Montpellier, France.

Roseboom, J., McMahon, M., Ekanayake, I. And John-Abraham, I. (2006), "Institutional Reform of Agricultural Research and Extension in Latin America and the Caribbean", *en breve* No. 90, May, ARD LAC, World Bank, Washington, DC.

Saito, K.A. and Weidemann, C.J. (1990), *Agricultural Extension for Women Farmers in Africa*, Working Paper Series 398, World Bank, Washington, DC.
Schultz, T.W. (1975), "The value of the ability to deal with disequilibrium", *Journal of Economic Literature* 13, 827-46.
Singh, J.P., Swanson, B.E. and Singh, K.M. (2006), "Developing a decentralized, market-driven extension system in India", In A.W. Van den Ban and R.K. Samanta (eds.), *Changing Roles of Agricultural Extension in Asian Nations,* B.R. Publishing Corporation, New Delhi, 203-23.
Singh, K.M. (2006), The ATMA Experience, Presentation, Agriculture Summit, Vigyan Bhawan, New Delhi, India, at http://www.ficci.com/media-room/speeches-presentations/2006/oct/agri/SessionIII/Singh.pdf
Spielman, D.J., Davis, K.E., Negash, M. and Ayele, G. (2007), Enabling smallholder innovation: Findings from Ethiopia, Paper presented at Enhancing Agricultural Innovation Workshop, World Bank, Washington, DC, 23 March, Processed.
Stoop, W. and Hart, T. (2005), "Research and development towards sustainable agriculture by resource-poor farmers in Sub-Saharan Africa: Some strategic and organisational considerations in linking farmer practical needs with policies and scientific theories", *International Journal of Agricultural Sustainability* 3(3), 206-16.
Sulaiman, R.V. (2003), *Innovations in Agricultural Extension in India*, National Centre for Agricultural Economics and Policy Research, Indian Council of Agricultural Research, for FAO, Rome, at http://www.fao.org/sd/2003/KN0603a_en.htm
Sulaiman, R. and Hall, A. (2002), *Beyond Technology Dissemination: Can Indian Agricultural Extension Re-invent Itself?* Policy Brief 16 (National Centre for Agricultural Economics and Policy Research, Pusa, New Delhi).
Sulaiman, V.R. and Hall, A.J. (2006), "Extension policy analysis in Asian nations", In A.W. Van den Ban and R.K. Samanta (eds.), *Changing Roles of Agricultural Extension in Asian Nations,* B.R. Publishing Corporation, New Delhi, 23-54.
Sulaiman, V.R. and Sadamate, V.V. (2000), *Privatising Agricultural Extension in India*, Policy Paper 10 (National Centre for Agricultural Economics and Policy Research, Pusa, New Delhi).
Swanson, B.E., Farner, B.J. and Bahal, R. (1989), The Current Status of Agricultural Extension Worldwide, In FAO: Report of the Global Consultation on Agricultural Extension, Rome, Italy, 4-8 December 1989, FAO, Rome.
Swanson, B.E. (2006), "The changing role of agricultural extension in a global economy", *Journal of International Agricultural and Extension Education* 11(3), 5-17.
Swanson, B.E., Chuang, Nie and Yan, Feng (2003), "Trends and developments within the Chinese agro-technical extension system", *Journal of International Agricultural and Extension Education* 10(2), 17-24.
Swanson, B.E. and Samy. M.M. (2003), "Decentralization of Agricultural Extension Systems: Key Elements for Success." Proceedings of Regional Conference on Operationalizing Reforms in Agricultural Extension in South Asia, sponsored by the Ministry of Agriculture of the Government of India and the World Bank's South Asia Rural Development Unit, May 6-8, New Delhi, India.
The Economist (2005), "The real digital divide", March 12th, p. 11.
Thiele, G., Nelson, R., Ortiz O.N and Sherwood, S. (2001), "Participatory research and training: Ten lessons from the farmer field schools (FFS) in the Andes", *Currents – Swedish Academy of Agricultural Sciences* 28, 4-11.
Tripp, R., Wijeratne, M. and Piyadasa, V.H. (2005), What should we expect from farmer field schools? A Sri Lanka case study", *World Development* 33(10), 1705–20.

Umali-Deininger, D. (2005), "Improving the delivery of extension services to rural people: New perspectives", Paper presented at the International Conference on "Agricultural and Rural Development in Asia: Ideas, Paradigms, and Policies Three Decades After" on 10-11 November 2005, Makati City, Philippines. Online at http://web.searca.org/ard/sked.htm.

Van de Fliert, E. (1993), *Integrated Pest Management: Farmer Field Schools Generate Sustainable Practices. A Case Study in Central Java Evaluating IPM Training*, Paper No. 93-3, Wageningen Agricultural University, Netherlands.

Van de Fliert, E. (2006), "The role of the farmer field school in the transition to sustainable agriculture", In A.W. Van den Ban and R.K. Samanta (eds.), *Changing Roles of Agricultural Extension in Asian Nations,* B.R. Publishing Corporation, New Delhi, 325-42.

van den Berg, H. and Jiggins, J. (2007), "The impacts of farmer field schools in relation to integrated pest management", *World Development* 35(4), 663-86.

Waters-Beyer, A. and van Veldhuizen, L. (2005), "Promoting local innovation: Enhancing IK dynamics and links with scientific knowledge", IK Notes #76, http://siteresources.worldbank.org/EXTINDKNOWLEDGE/Resources/iknt76.htm

Wiebers, U.-C. (1993), *Integrated Pest Management and Pesticide Regulation in Developing Asia*, World Bank Technical Paper Number 211, World Bank, Washington, DC.

Wilson, M. (1991), "Reducing the costs of public extension services: Initiatives in Latin America", In W.M. Rivera and D.J. Gustafson (eds), *Agricultural Extension: Worldwide Institutional Innovation and Forces for Changes*, Elsevier, Amsterdam, 13-21.

World Bank (2006a), *Institutional Innovation in Agricultural Research and Extension Systems in Latin America and the Caribbean*, ARD LAC, World Bank, Washington, DC.

World Bank (2006b), "Investments in Agricultural Extension and Information Services", Module 3 in the *AgInvestment Sourcebook*, World Bank, Washington, DC, http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTARD/EXTAGISOU/0,,contentMDK:20930620~menuPK:2756949~pagePK:64168445~piPK:64168309~theSitePK:2502781,00.html

World Bank (2007), *Enhancing Agricultural Innovation: How to Go Beyond the Strengthening of Research Systems*, Agriculture and Rural Development Department, World Bank, Washington, DC.

Appendix

Table A1 Evidence on outcomes of new governance structures for agricultural extension

Study	Setting	Approach/Methods	Results/Conclusions
Part I: Decentralization: Mainly public delivery			
	China	Not yet found	
Asuming-Brempong, S., Sarpong, D.B and Asante, F. (2006), Institutional bottlenecks of agricultural sector development: The case of research and extension provision in Ghana, University of Ghana, Legon, Accra, for the OECD Development Centre, Paris, France.	Ghana	Program review based on interviews with 59 stakeholders	Decentralization has not happened as planned, with much control still coming from central units. The review recommends a major re-think of the 2003 policy.
ATMA (there was quite a comprehensive end of project study),	India	End of project survey and analysis	Average changes in 28 NATP districts 1999-2003: Area changes: Horticulture: 12% → 16%; Oil Seeds: 3% → 11%; Herbs and Medicinal Crops: 1% → 5%; Cereals declined: 55 → 47%; yields increased 14% Farm income increase: Average 24% in project districts, compared to 5% in non-project districts
Decentralized Agricultural and Forestry Extension Project (DAFEP) World Bank, Indonesia (TL Shobha Shetty)	Indonesia	Baseline (2001) and end-of-project (2006) – both by CIRAD. Three samples – DAFEP, control and a "spillover" – non-DAFEP hhs but located in areas where extension workers were part of DAFEP. 39 indicators (9 quantitative) clustered in income/welfare; technology/productivity /participation/empowerment. Analysis not yet complete.	No significant differences in rice, maize or soybean yields; Diversification was high to begin with – baseline – 20 crops in DAFEP; 19 each for Reference and Spillover samples. At EOP – changed to 21, 21, 20, respectively. Input/Output Ratio (proxy for higher input efficiency) significantly higher for DAFEP vs. Reference for rice and soybean Accessibility of output markets – significantly higher for DAFEP vs. Reference but joint purchase of agric. inputs higher in the reference. Overall, effects not completely clear.

Opto International AB, Nairobi (2006), Impact Assessment (June) NALEP Phase I. Key pillars of the NALEP approach are: 1) Participatory, 2) Demand-driven extension with focus on empowerment, 3) Pluralism in the provision of extension services and 4) Transparency and accountability in the management of resources	Kenya	Internal and an external (Sida) program review carried out in 2006 "Impact" described in terms of subjectively judged relevance, sustainability, efficiency, and risk perceptions	Demand driven extension service has emerged also reaching the poorer segments of the rural communities, such as landless, HIV/AIDS widows Increased business orientation: An internal assessment 2006 recorded that 55% of common interest groups (CIGs) visited were actively involved in marketing of members produce. In short, no hard evidence of impact yet.
Kosana Consulting AB Report on Mid-Term Review of the Agricultural Support Programme	Zambia	Program review for Sida, December 2005	Critical description of arrangements, complains of lack of reliable data on agricultural performance and extension performance; essentially data-free, so only anecdotal evidence on any impact
ECON Analysis Oslo (2005), Impacts of Extension Services in Rural MZ	Mozambique	Survey tabulations and regressions	Slight positive effects recorded for knowledge increase and livelihood improvement of farmers; more positive than earlier impact studies of Finney 2003 and Walker et al. 2004
Part II: Decentralization: Mainly contracted out			
Friis-Hansen, E. 2005. Agricultural development among poor farmers in Soroti District, Uganda: Impact assessment of agricultural technology, farmer empowerment and changes in opportunity structure. Paper presented at Impact Assessment Workshop at CIMMYT, Mexico, 19-21 Oct. 2005	Uganda	*Participatory impact assessment* Stratified random sampling, including households 300 households that were members of FFS &/or NAADS groups and 111 households who were not members of any farmer group.	Group members were better off (well-being) Farmer empowerment + learning + changes in opportunity structure. Establishment of sub-county farmer fora, and emergence of private service provider, has been successful in reducing rural poverty. Agricultural growth among poor farmers in Soroti district has been the key reason for poverty alleviation.
DECRG (Klaus Deininger et al.), analysis and interpretation of 2005/6 National Household Survey, which had specific questions about NAADS; work incomplete, still in progress, so this entry is still tentative	Uganda	Propensity score matching of participants vs. others	(i) NAADS has significantly improved farmers' (self-rated) access to information - by about 30%; (ii) few if any significant effects of NAADS on increasing objective knowledge (iii) although NAADS participants claim that they changed production practices, there is as yet no significant difference in the area planted to modern crop varieties between NAADS and non-NAADS households. (iv) there is no significant difference between participants and nonparticipants in overall profits from agricultural production, per capita consumption expenditures, or yields for the crops included in the survey.

Benin, S., Nkonya, E., Okecho, G., Pender, J., Mugarura, S. and Kato, E. (2005), Quantifying the Impact of the National Agricultural Advisory Services in the Uganda Rural Livelihoods. Preliminary Report. IFPRI, Washington, DC: further analysis is underway	Uganda	**Objective:** quantify the initial impacts of NAADS **Data:** survey of 116 farmer groups and 894 farmers in: 6 Initial NAADS Districts (introduced in 2001/02) 4 late NAADS Districts (2002/03) 4 non-NAADS Districts	Positive impacts on availability and quality of advisory services to farmers ➨ adoption of new crop and livestock enterprises and use of modern production technologies and practices No significant differences in yield growth between NAADS and non-NAADS districts for most crops, reflecting the still low levels of adoption of these technologies However, NAADS was seemingly effective in reducing large declines in farm income that affected most farmers between 2000 and 2004, especially in the initial NAADS districts
Evaluating a Publicly-Funded, Privately-Delivered Agricultural Extension System [Contracting for the Delivery of Public Goods: Properly specified contracts between rural villages and private delivery companies can be utilized to accomplish social goals in addition to those associated with profit-making] Analysis done by (Proyecto de Administracion de Areas Rurales – PARA, assisted by University of MD agricultural economists James Hansen and Richard Just)	Honduras	Thirty-one projects have completed three years of extension educational programs. Fifty percent or 16 projects were randomly selected for study. Six of the projects were in Olancho and ten projects were in Yoro. The six projects in Olancho were operated by three extension companies and the ten projects in Yoro were operated by six. To complete the outcomes evaluation, interviews with the extension companies and farm villages were conducted in June 2003. Fifty percent of the villages in the 16 identified projects were randomly selected for interview	FPPL had a positive internal rate of return (IRR) of 8 percent and 10 percent in Olancho and Yoro, respectively. The most successful extension activity was crop production followed by family gardens and homes
PCaC (or Programa Campesino a Campesino- literally *The Farmer to Farmer Programme)*	Nicaragua	No serious evaluative study found	Some positive indicators of better NRM practices (especially for soil conservation) are reported at http://www.ifap.org/en/publications/documents/Desertification-E-part7.pdf

Jock Anderson's notes from various (stated) sources.

Appendix (continued)

Table A2. Evidence on outcomes of new advisory methods for agricultural extension

Study	Setting	Approach/Methods	Results/Conclusions
Davis, K. 2006. Farmer Field Schools: A Boon or Bust for Extension in Africa? *Journal of International Agricultural and Extension Education 13*(1): 91-97. http://www.infobridge.org/ffsnet/output_view.asp?outputID=2499	Global	*Commentary on diverse pieces including evaluations*	FFS not a silver bullet!
Bingen, J. An Alternative Perspective on Farmer Field Schools: A Preliminary Note. January 2001. MSU.	General	*Commentary; in response to Quizon et al.*	We should look beyond diffusion of information and related fiscal sustainability and look at field schools as empowerment tools.
K.D. Gallagher, A.R Braun and D. Duveskog. 2006. Demystifying Farmer Field School Concepts. *Journal of International Agricultural and Extension Education*, in press, http://www.infobridge.org/asp/documents/3200.pdf	General	*Commentary criticizing Davis 2006 for inadequate sampling of evidence*	List other evaluations. Including some in press.
Bunyatta, D.K. JG. Mureithi, C.A. Onyango and F.U Ngesa. 2005. Farmer field school as an effective methodology for disseminating agricultural technologies: Up-scaling of soil management technologies among small-scale farmers in Trans-Nzoia District, Kenya. Proceedings of the 21st Annual Conference of the Association for International Agricultural and Extension Education. 25-31 May 2005, San Antonio, Texas. http://www.infobridge.org/ffsnet/output_view.asp?outputID=1953	Kenya	Ex post facto *design with survey methodology*	FFS acquire more knowledge FFS disseminate more FFS adopt more
De Jager, A., D. D. Onduru, L. N. Gachimibi, G. Gachini, and C. L. Van Beek. N.d. Farmers field schools for rural empowerment: From experimentation and learning in integrated nutrient management to platforms for income generation and market linkages; experiences in central and Eastern Kenya. Draft. Wageningen University.	Kenya	*Survey; latitudinal and longitudinal* *Limited number of respondents* *Control & non-FFS* *Baseline survey*	Positive impact on knowledge, skills, experimentation/innovation Adoption selective Diffusion limited Role of outsiders essential trigger

Dieu ne dort, N. W., Julius, L. N., Gockowski, J. J., & Issac, T. (2006, August). *Socio-economic impact of a cocoa integrated crop and pest management diffusion knowledge through a farmer field school approach in southern Cameroon.* Paper presented at the International Association of Agricultural Economists Conference, Gold Coast, Australia.	Cameroon	*Socioeconomic evaluation based on survey (n=284) and baseline data*	Reduction in spraying Increase in non-technical skills Increase in labor
Feder, G. R. Murgai and J. B. Quizon. 2004a. Sending farmers back to school: the impact of FFS in Indonesia. *Review of Agricultural Economics* 26 (1) 45-62.	Indonesia	*Survey- impact evaluation*	No significant impact on economic performance Environmental & health impacts not significant Performance of FFS grads or neighbors not significant
Feder, G., R. Murgai and J. B. Quizon. 2004b. The acquisition and diffusion of knowledge: the case of pest management training in farmer field schools, Indonesia. *Journal of Agricultural Economics* 55(2) 217-239.	Indonesia	*Impact study using panel data* N = 52 control; 156 exposed; 112 graduates Difference-in-differences model	No diffusion Decreased pesticide use Increased knowledge
Godtland, E., E. Sadoulet, A. de Janvry, R. Murgai and O. Ortiz (2003). The impact of FFS on knowledge and productivity: A study of potato farmers in the Peruvian Andes. CUDARE Working Paper 963. Department of agricultural and resource economics, University of California, Berkeley. #261	Peru	*Survey; impact evaluation* Regression analysis & propensity score matching (create comparison group similar to FFS farmers) N = 486 households	Positive impact on knowledge & productivity
Khisa, Godrick S. and Ed Heinemann, 2005. In: Penning de Vries, F. W. T. (Ed). 2005. Bright spots demonstrate community successes in African agriculture. Working Paper 102. International Water Management Institute, Colombo, Sri Lanka. p. 71-83 http://www.infobridge.org/ffsnet/output_view.asp?outputID=2504	Kenya	*Case study of IFAD/FAO IPPM-FFS* *Data from project database?*	Contributes to food security Flexible Job satisfaction for extension
Khisa, Godrick S. and Wekesa K. Richard. n.d. Farmers field school feedback- A case of IPPM FFS programme in Kenya. Unpublished document. Farmerfieldschool.net	Kenya	*N = 400 individuals , random selection* *Questionnaire* *200 groups interviewed (open-ended)*	FFS contributes to poverty alleviation Farmers perceived a yield increase, risk reduction, increase in profits, enthusiasm for information sharing

Lambarta, Ricardo A. & Scott M. Swinton. 2006. Multi-institutional implementation of farmer field schools among Nicaraguan bean growers. Do different NGOs perform differently? Paper presented at the 26th conference of the International Association of Agricultural Economists (IAAE), Brisbane, 12-18 August 2006.	Nicaragua	*Evaluation of program impacts using counterfactual and treated groups*	Institutional characteristics affect impacts of programs IPM training had little effect on pesticide use or adoption of IPM
Mancini, Francesca. 2006 Impact of integrated pest management farmer field schools on health, farming systems, the environment, and livelihoods of cotton growers in Southern India. . PhD Thesis, Wageningen University. http://www.infobridge.org/ffsnet/output_view.asp?outputID=2476	S. India	*Double difference model b/c no random sample* (Before and after, control and experimental) 5 villages, 137 households *Double delta for SL*	Strategies based on education can be effective. IPM reduced pesticide use, increased female labor Empowerment outcomes reported
Mutandwa, Edward & J. F. Mpangwa. 2004. An assessment of impact of FFS on IPM dissemination and use: Evidence from smallholder cotton farmers in the lowveld area of Zimbabwe. *Journal of Sustainable Development in Africa* 6(2). Fall issue. http://www.jsd-africa.com/Jsda/Fall2004/article.htm	Zimbabwe	*Experiment; survey, regression*	FFS knowledge greater Knowledge⇔Income Stability in income variance Sustainability not addressed
Mwagi, G. O., C. A. Onyango, J. G. Mureithi and P. C. Mungai, 2003. *Effectiveness of FFS approach on technology adoption & empowerment of farmers: A case of farmer groups in Kisii District, Kenya.* The Soil Science Society of East Africa: Proceedings of the 21st Annual Conference, 1-5 December 2003, Eldoret, Kenya.	Kenya	*Ex post facto*	Much higher adoption of technologies by FFS Greater cohesiveness of FFS groups Sig. more knowledge on leadership
Nathaniels, Nicholas Q. R. 2005 (July). Cowpea, farmer field schools and farmer-to-farmer extension: A Benin case study. AgREN Network Paper No. 148. The Agricultural Research and Extension Network.	Benin	*Qualitative study* RAAKS- semi-structured interviews, direct observation; 3 visits to 2 districts	FFS vital source of new skills, information, housed in knowledge-sharing rural networks
Odendo, M., J. Ojiem and E. Okwuosa. 2003. *Scaling-up green manure technologies for soil fertility management in Western Kenya: Application of farmer field school.* The Soil Science Society of East Africa: Proceedings of the 21st Annual Conference, 1-5 December 2003, Eldoret, Kenya.	Kenya		Useful in increasing knowledge Some dissemination Time-consuming Positive empowerment

Onyango, C. A. 2003. The Soil Science Society of East Africa: Proceedings of the 21st Annual Conference, 1-5 December 2003, Eldoret, Kenya.	Kenya	*Keynote address; overview/lit review* Technology transfer/up scaling for improved land resources management.	Positive results for empowerment, cohesiveness, dissemination & adoption in Kenya
Praneetvatakul, Suwanna and Hermann Waibel. *Impact assessment of farmer field school using a multi-period panel data model*. Paper presented at the 26th conference of the International Association of Agricultural Economists (IAAE), Brisbane, 12-18 August 2006.	Thailand	*Panel data, double delta*, difference in difference model N = 241 Questionnaire administered 3 times	Sig. reduction of pesticides Reduction in negative environmental impact Farmers retain knowledge No diffusion No diff. in gross margin
Price, L.L. Demystifying farmers' entomological and pest management knowledge: A methodology for assessing the impacts on knowledge from IPM-FFS and NES interventions. 2001. *Agriculture and Human Values* 18: 153-176.	Philippines	*Experimental design*; 3 groups (FFS, another intervention, & regular practice) Pre and post-tests of knowledge	Increased knowledge from education linked to better pest management. Does not discuss differences in the groups?
Quizon, J. G. Feder and R. Murgai. 2001. Fiscal sustainability of agricultural extension: The case of the farmer field school approach. *Journal of International Agricultural and Extension Education* Spring 2001, 13-23.	SE Asia	*Review of several econometric studies*	Not sustainable Too expensive Farmer-led doesn't work
Rola, A.C., S.B. Jamias and J.B. Quizon, 2002. Do FFS graduates retain and share what they learn? An investigation in Iloilo, Philippines. *Journal of Agricultural and Extension Education* 9(1), 65-75.	Philippines	*Case study*	FFS retain knowledge FFS do share what they learn but not showing with non-FFS Therefore not cost effective; too small impact FFS participants sig. women, tenants (not owners) & have other source of income
Simpson, B. & M. Owens, 2002. FFS and the future of agricultural extension in Africa Paper presented at the 18th Annual conference of the Association for Agricultural and Extension Education, Durban, South Africa.	Africa	*Institutional analysis; group & individual interviews; qualitative data*	FFS capable of being responsive to local needs

Tripp, Robert, Mahinda Wijeeratne, and V. Hiroshini Piyadasa. . (2004). What should we expect from FFS? A Sri Lanka Case study. *World Development 33*(10), 1705-1720. http://www.infobridge.org/ffsnet/output_view.asp?outputID=1757	Sri Lanka	*Case study* 7 sites; 10 control, 10 participant; 10 non-participant farmers (n = 210) Or 30 farmers per site Questionnaire + observation All rice farmers Regression Correlation Group differences	FFS more knowledge & practice Use less insecticide (1/3 pesticide; less fungicide) Labor diff. not sig. More "green" farming in FFS Impact at farm level but not national Difference in participation- more time, wealthier, more informed in FFS Little evidence of f-to-f despite enthusiasm by FFS No increase in experimentation Groups don't usually continue Reaches only fraction of farmers Insufficient assessment Costs in time and commitment Important innovation that is only one part of complex strategy for building local agricultural institutions Social capital no difference in groups. FFS does not increase experimentation. or innovation
van den Berg, Henk. 2004. IPM FFS: A synthesis of 25 impact evaluations. Report prepared for the Global IPM Facility. Wageningen: The Netherlands.	Worldwide	*Synthesis of impact studies*	Need concerted studies to increase scope & rigor Need to measure sustainability Burkina: Increase skills, profits, yields; decrease risks (perception)
Yamazaki, Satoshi & Budy. P. Resosudarmo. 2006, May. Does sending farmers back to school have an impact? A spatial econometrics approach. Paper presented at the International Association of Agricultural Economists Conference, Gold Coast, Australia.	Indonesia	*Spatial econometrics; time series data* (same as Feder et al., 2004a, b)	Positive impacts on productivity by graduates and neighbors but impact does not stay in the long run (only short-term productivity) No evidence FFS contributes to decline in use of pesticides Knowledge diffusion occurs
Züger, Regula. 2004. Impact assessment of farmer field schools in Cajamarca, Peru: An economic evaluation. Social Sciences Working Paper No. 2004-1. Lima: International Potato Center.	Peru	*Quantitative survey data* Correlations, t-tests, regression, cost/benefit	Reduction in pesticides Increase in yields

Source: The above comes from a review of FFS by ISNAR's Kristin Davis (1st item in table) updating her earlier tabulation in Birner et al. (2006, Table 2, p. 48), and the present reviewer is most grateful for her permission to use these summary notes.