

Agricultural Extension

Generic Challenges and Some Ingredients for Solutions

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The agriculture sector must nearly double biological yields on existing farmland to meet food needs, which will double in the next quarter century. A sustainable approach to providing agricultural extension services in developing countries — minimal external inputs, a systems orientation, pluralism, and arrangements that take advantage of the best incentives for farmers and extension service providers — will release the local knowledge, resources, common sense, and organizing ability of rural people.

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Summary findings

Is agricultural extension in developing countries up to the task of providing the information, ideas, and organization needed to meet food needs? What role should governments play in implementing or facilitating extension services?

Roughly 80 percent of the world's extension is publicly funded and delivered by civil servants, providing a range of services to the farming population, commercial producers, and disadvantaged target groups. Budgetary constraints and concerns about performance create pressure to show the payoff on investment in extension and to explore alternatives to publicly providing it.

Feder, Willett, and Zijp analyze the challenges facing policymakers who must decide what role governments should play in implementing or facilitating extension services. Focusing on developing country experience, they identify generic challenges that make it difficult to organize extension:

- The magnitude of the task.
- Dependence on wider policy and other agency functions.
- Problems in identifying the cause and effect needed to enable accountability and to get political support and funding.

- Liability for public service functions beyond the transfer of agricultural knowledge and information.
- Fiscal sustainability.
- Inadequate interaction with knowledge generators.

Feder, Willett, and Zijp show how various extension approaches were developed in attempts to overcome the challenges of extension:

- Improving extension management.
- Decentralizing.
- Focusing on single commodities.
- Providing fee-for-service public extension services.
- Establishing institutional pluralism.
- Empowering people by using participatory approaches.
- Using appropriate media.

Each of the approaches has weaknesses and strengths, and in their analysis the authors identify the ingredients that show promise.

Rural people know when something is relevant and effective. The aspects of agricultural extension services that tend to be inherently low cost and build reciprocal, mutually trusting relationships are those most likely to produce commitment, accountability, political support, fiscal sustainability, and the kinds of effective interaction that generate knowledge.

This paper — a joint product of Rural Development, Development Research Group, and the Rural Development Department — is part of a larger effort in the Bank to identify institutional and policy reforms needed to promote sustainable and equitable rural development. Copies of the paper are available free from the World Bank, 1818 H Street NW, Washington, DC 20433. Please contact Pauline Kokila, room MC3-544, telephone 202-473-3716, fax 202-522-1153, Internet address pkokila@worldbank.org. Policy Research Working Papers are also posted on the Web at <http://www.worldbank.org/html/dec/Publications/Workpapers/home.html>. The authors may be contacted at gfeder@worldbank.org, awillett@worldbank.org, or wzijp@worldbank.org. May 1999. (32 pages)

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Agricultural Extension — Generic Challenges and the Ingredients for Solutions

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Abstract

Agricultural extension faces great challenges. The agriculture sector needs to nearly double biological yields on existing farm land to meet gross food needs that will also double in the next quarter century. To help meet this challenge, the role of extension is clear — there is a great need for information, ideas, and organization.

About 80 percent of the world's extension is publicly funded and delivered by civil servants, providing a diverse range of services to the general population, commercial producers, and disadvantaged target groups through a variety of approaches. Budgetary constraints and concerns about performance are pressuring these services to show the payoff to investment in extension and explore alternatives to public provision. This paper analyzes the key challenges facing policymakers who must decide what role governments should play in implementing or facilitating extension services, and to what extent.

Our focus is on international, primarily developing country, experience. The core of the paper identifies a number of generic challenges

inherent in the nature of extension that make its organization difficult — the magnitude of the task, dependence on wider policy and other agency functions, problems in tracing cause and effect, and consequently, difficulties in obtaining political support for funding, accountability, liability to public service functions beyond agricultural knowledge and information transfer, fiscal sustainability, and interaction with knowledge generation.

Subsequently, we identify a range of innovations that have emerged in order to overcome the generic difficulties. These include improving extension management, decentralization, single commodity focus, fee-for-service public provision, institutional pluralism, empowerment and participatory approaches, privatization, and interconnecting rural people and the use of appropriate media. Analyzing their varying success alone or in combination, we note the ingredients of those approaches that appear most promising to increase the effectiveness of agricultural extension.

I

Extension — A Dilemma for Policymakers

Challenge for agriculture and rural development

Poverty, hunger, economic growth, food production, and natural resource degradation are all great challenges in today's world. As the global population climbs to an expected 8,000 million by 2025, today at least 800 million people suffer from chronic hunger. Pervasive poverty will remain largely rural, even as urban populations triple in the same time period.

Ensuring a thriving agricultural economy is critical for reducing poverty, enabling food security, and managing natural resources in a sustainable fashion. Agriculture provides a livelihood for more than 60 percent of developing country populations, and in many countries, farm families make up 80 percent or more of the population (World Bank, 1990).

Agriculture has already reached the limits of land and water, thus future increases in food production must exploit biological yields on existing land (World Bank, 1997). In the face of this technological challenge, agriculture faces a crisis in many parts of the developing world. In Asia, the growth rate fostered by the green revolution has slowed. In Africa, per capita food production has declined in most years since 1970 and is reflected in recurrent famine. In many parts of Latin America and the Caribbean, population pressure and extensive agriculture seriously threaten the environment (World Bank, 1990). And in the industrialized world, opposition to high input agriculture is mounting in response to such issues as animal rights, fears of genetically engineered products, and soil and water pollution.

Challenge for extension

As the world grapples with these issues, agricultural extension faces at least two challenges:

Information and organization in the agriculture sector must assume greater importance. People involved in agriculture need improved skills, information, and ideas in order to develop an agriculture that will meet complex demand patterns, reduce poverty, and preserve or enhance ecological resources. Extension has an important role to play.

Extension funding and delivery face difficulties inherent in the extension mandate:

- magnitude of the task;
- dependence on wider policy and other agency functions;
- problems establishing the cause and effect necessary to obtain political and financial support;
- liability for public service functions beyond agricultural knowledge and information transfer;
- fiscal sustainability; and
- interaction with knowledge generation.

Many observers are concerned that public extension is not doing enough, not doing it well, and is not always relevant. In developing countries, bureaucratic inefficiency and poor program design and implementation have led to poor performance and incoherent links with client farmers and the research sector. Support for extension declined in the 1980s and donors were unwilling to fund large-scale public-sector recurrent expenditures, which led to further underfinancing, staffing shortages, and contraction of extension services (Amanor and Farrington, 1991).

As they seek solutions, policymakers must confront clashing views of what extension

should do, and choose among a number of extension priorities, products, mandates, and models. Given fiscal restraint, there is extreme pressure to demonstrate the payoff to investment in extension and explore alternatives to public financing by involving the private sector, local authorities, and producer groups.

Section II of this paper defines what we mean by extension and describes the varying roles that governments have historically played. Section III identifies eight challenges that we

regard as inherent in the nature of extension and that make extension services difficult to finance and deliver. In section IV, we review some of the most important institutional innovations that were induced by the challenges faced by extension, and analyze them within the framework developed in section III. We note the ingredients of those approaches that appear most promising for the future of agricultural extension.

II

Government Investments in Extension

Defining extension

The term agricultural extension means different things to different people (Purcell and Anderson, 1997). Van den Ban and Hawkins (1996) arrive at a concept of extension that seems to synthesize diverse perspectives into five goals — transferring knowledge from researchers to farmers; advising farmers in their decisionmaking; educating farmers to be able to make similar decisions in future; enabling farmers to clarify their own goals and possibilities and to realize them; and stimulating desirable agricultural developments (rural guidance). They note that stimulating desirable agricultural development is the most common goal of extension directors.

We have reviewed a number of efforts to define or characterize extension². The context will dictate different rural development, agricultural, and human resource development priorities, and hence extension goals and functions. Our view is that it is helpful to see extension as both a system and the set of functions performed by that system to induce voluntary change among rural people.

A set of functions includes:

- transferring technology in multiple directions for sustainable agricultural production, transformation, and marketing;
- transferring management to mobilize and organize farming, rural groups, and communities; and
- transferring capacity to educate, build human resources, and enhance local capacity, for example, in integrated pest management, market intelligence, farm

management, and in negotiating financial, input, and market services.

A system includes all public and private institutions that transfer, mobilize, and educate rural people, as distinct from a service or single institution that traditionally provided advice only (Zijp, 1998).

Public investment in extension

Worldwide, agricultural extension employs at least 800,000 extension workers and hundreds of thousands more farmer technicians or leader farmers, reaching about 1,200 million people.³ Currently, about 80 percent of the world's extension services are publicly funded and delivered by civil servants (World Bank, 1997). Universities, parastatals, and nongovernment organizations deliver about 12 percent of services, and the private sector another 5 percent.

Government involvement tends to be at many levels and in many forms. It may fund, staff, or facilitate extension by establishing conducive regulations and policies for other providers — and it may pursue a range of purposes. Some of the generic problems of extension are caused in part by this complexity.

The traditional view of the 'public good' of many aspects of agricultural knowledge diffusion induced most governments to take exclusive responsibility for extension delivery (Birkhaeuser et al., 1991; Umali-Deininger, 1996). Public funding has also been justified for many extension programs by social goals such as poverty alleviation and targeting specific groups, including rural women (Wilson, 1991).

2. Albrecht, 1986; Antholt, 1991; Birkhaeuser et al., 1991; Bunting, 1986; Evenson, 1986; Gustafson, 1991; Purcell and Anderson, 1997; Roling, 1986; Russell, 1986; Swanson, 1984; Umali and Schwartz, 1994; World Bank, 1990.

3. Based on Swanson et al., 1990, and taking into account recent Chinese data reported by Songlin, 1998.

As recently as 1990, the World Bank (1990) perceived “no substitute (for a large nationwide public extension system) for a corps of well-trained and well-supported extension workers and subject matter specialists to serve as competent, motivated, and trusted agents of change.”

Developing-country governments invested heavily in agricultural extension, expecting increased agricultural production. Between 1959 and 1980, spending in real terms for extension grew more than six-fold in Latin America, tripled in Asia, and more than doubled in Africa (World Bank, 1990).

FAO⁴ surveyed the current status of agricultural extension in 113 countries, contacting 207 agricultural extension organizations that were considered to be generally representative of agricultural extension systems throughout the world (Swanson et al., 1990). Eighty-six percent of these agencies were funded by a ministry of agriculture or similar government agency. Based on this survey, FAO estimated that in 1988, \$6,000 million were spent on public agricultural extension agencies worldwide, representing an average expenditure per extension worker of \$8,522. Annual per farmer spending on extension services ranged from \$2 to 3 in low-income countries to \$65 in high-income countries.

The rate of public investment in agricultural extension as a percentage of overall MOA⁵ resources is directly related to the proportion of the labor force employed in agriculture in different countries. Where less than 20 percent of the population is employed in agriculture, extension receives about 2 percent of ministry resources, compared with slightly more than 20 percent of resources where more than 60 percent of the population is in agriculture.

4. Food and Agriculture Organization of the United Nations.

5. MOA is used throughout this text to denote government Ministries of Agriculture.

History

Changes and challenges affecting extension are symptomatic of wider forces at work in society. Public policy that affects extension tends to parallel development policy, and extension's institutional evolution reflects what is occurring in other institutional arenas (Rivera and Gustafson, 1991). Major trends and shifts in extension praxis have been induced by changes in the economic, political, technological, sociocultural, and fiscal environments for extension.

In developing countries, the early colonial emphasis on commodity programs, many of which still exist today, gave way to broader multipurpose rural development efforts, often set up by colonial powers that sent expatriate ‘rural agents’ to organize communities and serve as contact points for government authorities, input and credit suppliers, and buying agents. Their broadly defined roles often extended into human health, census taking, and tax collection. Formation of nation states and state-led, planned development, and the institutionalization of many national extension services occurred in the 1950s. Because agricultural universities were weak or nonexistent, agricultural extension became attached to ministries of agriculture, a structure that made weak links to research (Axinn, 1988). Confidence in Western technology led to the ‘diffusion model’ of MOA extension delivery — a hierarchical, unidirectional process of technology transfer backed by advances in mass media.

The 1960s were the era of interpersonal communication and community development, and also the beginning of the green revolution. The technology transfer orientation was still strong. From the mid-1970s, public sector extension again limited advice to technical agricultural matters, mainly major annual food crops, and the multipurpose agents began to be replaced by systems that focused more closely on extension and its management (World Bank, 1990). Fifty percent of extension agencies in FAO's 1989 survey became organized or reorganized from 1970 onward (Swanson et al., 1990). The main features of the 1970s included

integrated rural development approaches, and the rise of the training and visit (T&V) extension system. The 'diffusion' model of extension gave way to the 'get the technology right' model, where farm-level constraints explained non-adoption of technology, with a prescription to ease the constraints through integrated packages of services (Axinn, 1988).

The transformative decade of the 1980s brought an increasing emphasis on participatory approaches. Concerns with increasing the productivity of women and preserving ecosystems were added, along with attempted cost recovery and privatization schemes (World Bank, 1990). Now, the 1990s is the era of alternatives where new approaches are being piloted in an environment of fiscal stringency. Democratization has resulted in a dramatic fall in public sector power. Methodologically, direct farm-level links are stressed between researchers and farmers. More sustainable approaches to extension funding involve greater flexibility and multiple partners (Gustafson, 1991).

Extension staffing⁶

About 95 percent of extension staff work in public agricultural extension systems (Umali and Schwartz, 1994), and 90 percent of extension workers in the world are located in developing countries, over 70 percent in Asia alone.

Extension coverage (the ratio of extension personnel to farmer population) by public extension services in developing countries varies from 1:1,800 to 1:3,000. Developed countries of Europe, North America, and Asia have ratios averaging about 1:400.

Although staff numbers are high in many developing countries, staff quality is often low. Fiscal constraints face managers of public extension systems, forcing them to hire staff with few skills to cut operational costs. FAO found 40 percent of extension personnel had only a secondary school education, and another

33 percent with an intermediate diploma or certificate.

Purposes of public extension investments

FAO reported that around 58 percent of extension resources were directed toward commercial farmers, including specialized producers of cash and export commodities. The vast majority of smaller, marginal farmers in the world receive slightly more than one-third of all extension resources.

Not all extension is directly related to agricultural knowledge transfer. FAO found that extension personnel in developing countries spend about one-quarter of their time on non-educational activities, representing "about 140,000 full-time equivalent years of extension personnel time." FAO regarded this as a "major loss of educational resources, especially in developing countries where extension coverage is still grossly inadequate, both in quantitative and qualitative terms."

In commodity programs, extension workers may spend considerable time helping farmers to acquire inputs, credit, and marketing services. In contrast, general government extension staff may be engaged in a variety of local government servicing activities, as well as responding to information requests, such as crop forecasting and census taking, from extension or ministry headquarters.

Roling (1986) interprets the range of extension functions in terms of two traditions in extension — technical innovation (TI), and human resource development (HRD). From his perspective, most of the world's extension agencies are engaged in pure TI financed by tax revenues to make the production of food, raw materials, and export commodities as effective and efficient as possible. The focus of HRD is on rural people themselves and on the social systems in which they function, and deals with such processes as community and leadership development, building institutions, and farmer mobilization and organization.

6. Data cited are from the FAO study by Swanson et al. (1990), unless stated otherwise.

III

Generic Challenges Make Extension Difficult

The generic problems of agricultural extension are bound to its diverse functions, as well as the bureaucratic, political, and social operating environments within which extension systems operate. We believe that focusing on these generic problems — regardless of the management system or approach to extension — highlights the areas that should form the agenda for future directions in extension.

Eight generic problems

There are generic problems inherent in extension functions — many aspects of the services performed by extension are public goods or toll goods, require collective action, and often involve government. We define eight generic problems:

- scale and complexity;
- dependence of extension on the wider policy environment and other agency functions;
- inability to trace cause and effect;
- commitment and political support;
- accountability;
- liability to public service functions beyond agricultural knowledge and information transfer;
- operating resources and fiscal sustainability; and
- interaction with knowledge generation.

Scale and complexity

These issues are at the top of the list because in most respects they represent a ‘given’ situation. The scale and complexity of the extension task can be understood in terms of numbers, distribution, and diversity of staff, farmers, and other clients and stakeholders, and in terms of mandate and methodology.

In Sections I and II, we mentioned the 800,000 extension agents and their 1,200 million clients, many of whom are poor and have limited resources. The success of extension depends on the individual farm management decisions of these millions of people. Many populations are widely dispersed and hard to reach (Chambers, 1983). In developing countries, clients generally have a low level of literacy and formal education, and live far from information sources. They have specific needs depending on their natural habitat, culture, farming/production system, and gender (Zijp, 1998).

Complexity involves the diverse sources of farmers’ agricultural information and advice, the multiple stakeholders and partners in the agricultural development effort, and the range in extension mandate. The variety of communication forms — such as individual farm visits, farmer-to-farmer extension, use of mass media, and most recently, computerized information technology — adds to the complexity facing extension decisionmakers.

The main manifestation of the magnitude problem is coverage. Many public services are reaching only 10 percent of potential clientele, a minority of which are women. Magnitude interacts with quality of governance and adequate operating resources and technology to determine coverage and focus (Nagel, 1997).

The most common response to the coverage problem has been to establish relatively large, hierarchical, centralized, public-sector structures, with large numbers of extension agents widely dispersed in the rural areas, where their work is not easily observed or checked. The top-down managerial style characteristic of large bureaucracies tends not to be amenable to participatory, bottom-up approaches, and the

many layers in the hierarchy remove decisionmakers from the field action.

This exacerbates the often obscured tendency of extension agents to favor more responsive clients who are typically better endowed and more capable of undertaking risks (Axinn, 1988). Such biases were observed in countries as diverse as the Netherlands, Estonia, and Tanzania (Zijp, 1988; Chambers, 1983). An inherent tension exists between creating a strict hierarchy capable of managing such a large system and being accountable to all strata of farmers.

Dependence of extension on the wider policy environment and other agency functions

An inherent problem of agricultural extension, especially in low-income countries, is that it has to be combined with other policy instruments to achieve agricultural development (Van den Ban, 1986). Thus the effectiveness of extension investment is highly contingent on relaxing wider barriers to the successful development of the agricultural sector as a whole, including such potentially limiting factors as credit, technology stock, input supplies, price incentives, institutions, and human resource constraints (Purcell and Anderson, 1997).

Specifically, institutional frameworks and agricultural policies may discriminate against the rural sector, underinvest in technology development and maintain inappropriate agrarian structures, lock-up arable land in low-productivity ranching, undervalue and waste natural resources, underinvest in health and education of the rural population, discriminate against private sector initiatives in food marketing, and fail to maintain existing or invest in new rural infrastructure (World Bank, 1997).

Lack of access to resources and the inefficient operation of complementary agricultural services thus limit the impact of extension on production. Coordination and links with complementary agricultural services are key problems for extension organizations, especially the links with research, input supply systems, credit, and marketing organizations (Axinn, 1988). Often this dependence is not

considered adequately, compromising the usefulness of extension investment.

Inability to trace cause and effect

The difficulty of tracing the relationship between extension input and its impact is another generic issue faced by extension. This difficulty leads to several other inherent problems, including political support, budget provision, and accountability.

Evaluating extension's impact involves measuring the relationship between extension activity and changes in:

- farmer awareness, knowledge, and adoption of particular technologies or practices; and
- farm productivity and efficiency, and profitability, input demand, and output supply.

These same indicators are also influenced by many other factors that have confounding effects. In their review of World Bank agricultural research and extension projects, Purcell and Anderson (1997) observed serious data constraints and inability to include all the contributing variables affecting production outcomes. Numerous factors contribute to a specific production response and to farmers' decisions about the use of available resources.

Sophisticated econometric studies are needed to glean insights into these relationships. Feder and Slade (1986) looked at the problems of observing and measuring changes in operational efficiency of extension agents, farm husbandry knowledge, and agricultural productivity induced by more intensive systems introduced by extension. They noted insufficient time-series data to cover the post-project situation, and an inability to compare subject and control areas.

Birkhaeuser et al. (1991) note that an ideal simulated experimental framework (before/after and with/without an intervention) is rarely available. Second-best approaches involve various biases depending on the level of analysis. Farm-level studies are vulnerable to problems of self-selection and the prevalence of inter-farmer communication. Aggregate effects of extension measured in a region are subject to

estimation problems that relate to confounding factors.

Axinn (1988) summarizes the methodological challenge by noting how much easier and cheaper it is to monitor inputs than outputs. When extension indicators are more sophisticated and higher level, the cost of collecting information is also higher, and it is more difficult to prove causality between the selected extension activity and changes in farm income or welfare. The inherent problem, however, is that this is precisely the information needed to improve extension effectiveness and establish its justification.

Commitment and political support

Lack of commitment by senior government officials has been cited as a factor adversely affecting implementation and funding support in nearly half of World Bank-assisted free-standing extension projects (Purcell and Anderson, 1997). Government failure to allocate necessary funds to run extension systems is one key indication of such lack of commitment. Umali-Deininger (1996) records how inadequate recurrent funding inhibits the field operation of World Bank-supported extension projects, affecting 87 percent of projects rated as satisfactory and 100 percent of those rated unsatisfactory.

Roling (1986) relates fiscal problems to bargaining power and terms of trade for the agriculture sector. Lack of commitment to agriculture and extension is often fed by urban bias and poor understanding of rural information (Zijp, 1998). Another possible explanation is that there is no immediate payoff to politicians and policymakers for support and commitment to extension, because the attribution of production results to extension is so problematic.

Accountability

Howell (1986) identifies three aspects of accountability:

- extension performance in terms of its effectiveness, impact, or benefit/cost ratio in

providing required services and appropriate information;

- accountability of dispersed, relatively unsupervised field staff to supervisors; and
 - public sector staff accountability to farmers.
- We are primarily interested in the second and third aspects.

The third accountability problem arises especially in the public sector environment of a 'top-down', supply-driven extension hierarchy in which agents feel accountable to their ministry supervisors rather than to farmers. However, because even their supervisors cannot easily monitor and evaluate their performance (because of the difficulty of relating cause and effect), agents become accountable to no one. On the contrary, rent-seeking opportunities provide a counter incentive for extension agents to focus on non-extension tasks with more easily observable results, such as credit and input invoicing.

Purcell and Anderson (1997) found evidence of accountability problems in many World Bank extension projects. There was little attention to the farming community's systematic participation in problem definition, problem solving, and extension programming. Staff quality and attitudes were major constraints for both farmer contacts and technical support. The World Bank's 1994 ex-post evaluation of extension projects noted 'entrenched top-down attitudes' in 48 percent of satisfactory projects and 75 percent of those ranked unsatisfactory.

Accountability is not just an issue in developing countries. Hercus (1991) found that agricultural extension services in New Zealand accounted to government for money spent in terms of "activities not results, and . . . almost exclusively [in terms of] expenditure and hardly at all with outputs or efficiencies. The mandate of extension was derived by the agricultural extension service itself, and in the absence of any challenge or alternative definition by the taxpayers' representatives, the service regarded its charter as the right to exist on the prevailing terms and conditions."

Liability to public service functions beyond agricultural knowledge and information transfer

The extension service is often the most widely-distributed representative of government at the grass roots level in the rural sector, therefore, there is always the temptation to load it with more and more functions. Historically, public extension has been entrusted with various public functions, including collecting statistics, conducting surveys, writing reports, erosion control, and various regulatory functions such as production quotas or pesticide usage. Feder and Slade (1993) note that in many countries the agricultural field service was given a range of additional functions as governments increased their role in the rural economy. In rural extension, dissemination of agricultural knowledge is one part of wider government involvement in changing rural attitudes and promoting community self-reliance (Oakley, 1997). The village-level worker is considered by the government as a relatively low-cost, flexible administrative instrument to help disadvantaged groups with multifunctional services, gaining wider acceptance in the process.

We see both 'push' and 'pull' factors involved in this encroachment on extension services. The 'push' is the temptation for other agencies to use extension because it is the most widely distributed apparatus for contact with rural communities. The 'pull' is that agents are willing to take on other duties, especially input distribution, because such tasks often increase an extension agent's influence over farmers, as well as providing opportunities to extract rents which compensate for low salary. The inability to relate extension cause and effect makes it feasible for field staff to do this.

Because time spent on noneducational tasks reduces potential educational impact by as much as 25 percent (Swanson et al., 1990), the assignment of input supply duties to extension workers tends to be discouraged. Van den Ban (1986) notes, however, that alternatives to delivery of these services by extension — such as by the private sector or farmer organizations — may be problematic if demand is limited or

'big' farmers dominate farmer groups. Even if separate agencies are organized, extension must still coordinate.

Operating resources and fiscal sustainability

Purcell and Anderson (1997) cite inadequate public funding to operate services properly as a common phenomenon in World Bank-assisted free-standing extension projects, with 76 percent of projects having an uncertain or unlikely sustainability rating. According to Antholt (1994), training and visit (T&V) extension systems actually exacerbate operational funding problems by increasing staffing, and typically cost 25-40 percent more than multipurpose extension (Feder and Slade, 1993).

The generic problem for extension is the inherent difficulty of cost recovery. Much information disseminated by extension is a 'public good', and dissemination costs cannot be easily recovered from individuals, thus there is a dependence on direct public funding. Lack of political support and commitment arises, as well as confusion over the 'model controversy' (Rivera, 1991) and the role of the state — is it implementer, organizer, financier, or controller?

Part of the problem is due to magnitude — a large extension service to serve large numbers of farmers with a large staff that is inherently expensive to operate. Fixed costs for salaries are high, and operating costs are then treated as a residual, which makes them vulnerable in a budget shortage. If a government has to cut the operating budget, there are obvious consequences for effectiveness if extension agents cannot get to the field, causing operational as well as morale problems (Axinn, 1988).

Howell (1985) sees a cyclical pattern in which extension agencies hired more staff when funds were available, but when budgets declined, operating costs were cut. Ameur (1994) also sees the problem as a vicious circle of fiscal difficulty, curtailed services, inefficient operation, poorer results, and reduced staff motivation, training, and competence.

Interaction with knowledge generation

Many would argue that the 'bottom line' of extension is the quality of its message. Yet insufficient relevant or new technology necessary to improve productivity is one of the most common constraints in extension, and a major constraint in rainfed, resource-poor environments (Axinn, 1988; Anderson and Purcell, 1997). The World Bank's 1994 ex-post evaluation of extension projects found inadequate research-extension links to adversely affect a large proportion of the projects reviewed, and insufficient available technology to be an even more common problem.

The inherent problem is that extension disseminates information and advice generated by a knowledge-generating system which is generally not under extension management. This leads to a crucial dependence, which itself is not necessarily a problem. However, research and extension often tend to compete for power and resources, and fail to see themselves as part of a broader agricultural technology system. There is also a tendency for both extension and research to look for solutions within national borders, whereas relevant information and technology might be readily available across such artificial boundaries.

Kaimovitz (1991) identifies the following obstacles to effective research-extension links:

Historical perceptions. Policymakers still fail to recognize research and extension as closely interdependent activities. Extension's credibility as a research partner remains damaged by the historical experience. The generally higher status of researchers tends toward patronizing behavior that is resented by extension agents. Both research and extension assign a lower priority to linking activities than to core activities in allocation of time, resources, and management attention.

Coordination. Resistance to coordination is perceived as limiting autonomy by both sides.

Goals may differ. The two organizations may not share the same goals. The official mandate may be to provide agricultural technology to farmers, but in practice, researchers may be more interested in producing

scientific papers, and therefore do not generate research relevant to farmers. Extension agents may be more rewarded by distributing inputs and credit.

No pressure. Lack of effectively organized outside pressure groups, such as national policymakers, donors, farmer organizations, or private companies, may hamper cooperation.

Interactions

The generic problems we have identified cannot be seen in isolation from one another. They are interrelated and often represent conflicting imperatives. Pressures may exist to maximize coverage while minimizing costs, to emphasize firm management control while ensuring bottom-up participation, and to increase human resource competence while exploiting the cost-saving potential of mass media (World Bank, 1990).

We have already emphasized some important causal relationships, in particular the influence of scale and complexity on size and top-down management of national extension organizations, and the consequences for political support and the inability to trace cause and effect. Although poorly trained and motivated personnel; lack of qualified, competent, and trusted staff; and staff quality and low morale have been described (Antholt, 1994); Axinn, 1988; Nagel, 1997), we view such problems as symptomatic of the generic problems that have been identified.

The interactions can also be related to the vicious circle of fiscal difficulty, curtailed services, and inefficient operation noted by Ameer (1994). Kaimovitz (1991) records how low salaries, limited operating resources, and an unclear mandate led to a general decline in morale, and given difficult supervision, lower quality extension work, higher staff turnover, and lower credibility. These problems make it more difficult for extension to obtain resources. This crisis in extension directly affected relations with researchers who, perceiving

extension as ineffective, became reluctant to cooperate.

Other significant interactions to note include those between:

- 'Top-down' orientation and (because of limited farmer feedback) potential irrelevance of technology generation. If biased, it may also distort coverage and focus, whereby less powerful target groups and their crops, and more marginal, resource-poor areas are neglected (Axinn, 1988).
- Inability to trace cause and effect and coverage. If extra work is not observed or rewarded, there is little incentive to work harder to reach more, especially resource-poor farmers. Field staff may instead focus on larger farmers and high input technology.
- Accountability and sustainability. Without farmer participation, an extension service gains only limited ideas about how willing users would be to contribute (Ameur, 1994).
- Lack of operating resources and fiscal sustainability (as the independent variable), and coverage, relevance, responsiveness, staff morale, and hence accountability, and (by undermining extension credibility in the eyes of research) knowledge generation.

IV

Overcoming Generic Problems — Experience and Promise

A range of institutional innovations emerged as policymakers have confronted the generic problems identified in the previous section. Over time, however, the emphasis of these innovations has changed. Earlier, the emphasis was more on communication, then farming systems and limiting factors. Later, the emphasis shifted toward improving the organization and management of existing public extension services.

More recently, attempts to resolve the problem of fiscal sustainability have come into focus. Many innovations make use of the notion that not all collective action needs to be organized or executed by government agencies. Thus, collective action at the community level has many advantages that overcome generic problems. Furthermore, not all aspects of extension's role are pure public goods, and thus some innovations focus on separating elements that can be privatized and subjected to the discipline of the market, thus overcoming the incentive problems inherent in public service delivery.

Innovations and modifications

We selected eight innovations and attempted modifications for our analysis:

- improving extension management;
- decentralization;
- single commodity focus;
- fee-for-service public provision;
- institutional pluralism (mobilizing other players);
- empowerment and participatory approaches;
- privatization; and

- interconnecting rural people and the use of appropriate media.

Figure 1 summarizes our analysis of how the innovations address the generic problems.

Improving extension management

The importance of improving extension management is recognized in the latest FAO reference manual on extension (FAO, 1997). The training and visit (T&V) system of extension is used as an example of improving management because it is a well-documented, widely-implemented field model of an attempted systematic and comprehensive improvement in the organization and management of public extension. Other formulations of management principles are plentiful, but their implementation has been more piecemeal and less well documented.

Starting in the late 1960s, T&V has been implemented or tried in national systems in at least 76 countries in all major regions of the world (Umali and Schwartz, 1994, citing FAO, 1990). It was the system employed in 90 percent of World Bank agricultural extension projects reviewed by Purcell and Anderson in 1997.

Kaimovitz (1991) interprets T&V as a response to an historical crisis in effectiveness, credibility, and morale — all results of the generic problems — that public extension suffered in the 1960s and 1970s. To be effective, the designers of T&V stressed that certain key features had to be preserved — professionalism, a single line of command, concentration of effort, time-bound work, field and farmer orientation, regular and continuous training, and close links with research (Benor et al., 1984). Over the years, many adaptations have evolved,

however, the reference here is to the original design, which we view as an induced

institutional innovation.

Figure 1. Matrix of generic problems and innovations. A [+] indicates a positive effect, [0] indicates little or no effect, and [-] indicates a negative consequence. Areas in the matrix left blank indicate inadequate data reported in the literature we studied from which to draw conclusions.

	Innovations and/or attempted modifications, and key ingredients		
	Improving extension management	Decentralization	Single commodity focus
	Single line of command; exclusive devotion to extension work; strict scheduling; regular, continuous training; field & farmer orientation; links with research	Varying degrees of deconcentration and/or devolution of extension program and funding decisions and staff accountability to local units	Focus on a single crop, commodity, or input; vertical integration of extension and complementary functions throughout production-marketing system; public, private, or social sector organization
<i>Generic problems</i>			
Scale and complexity, hence coverage and focus	[+/-] larger organization, more staff, higher staff/farmer ratio; but low HRD skill in selecting contact farmers [-] rainfed, marginal areas	[+] more municipalities and small-scale farmers reached; simplified management	[+] focus on a selected commodity simplifies extension task [-] other crops, areas neglected
Dependence on wider policy and other agency functions	[0]	[+] better potential for integration with other local initiatives	[+] through vertical integration of complementary services
Ability to trace cause and effect	[0]	[0]	[+] through vertical integration
Commitment and political support	[0] frequently cited problem in World Bank project evaluations	[+] if local government democratic, but local interference more of a problem	[+] powerful interests and lobbies
Accountability	[+] tight, hierarchical supervision improved accountability within the service [-] inflexible & non-participatory in relation to clients	[+] responsiveness may improve if local system democratic	[+] ease of structuring staff incentives [-] if commodity organization interests diverge from farmers' or society's interests
Liability to other public service functions	[+] increased focus on dissemination function	[-] Local govt. may be tempted to use extension agents for other rural programs	[+] narrow commodity concern
Operating resources and fiscal sustainability	[-] significantly higher costs of increased staffing, supervisory visits, & training	[+/-] lower cost per beneficiary but increased staff numbers and gross cost [-] uncertain feasibility of local government resource mobilization	[+] through levies and other cost-recovery mechanisms
Interaction with knowledge generation	[-] In practice coordination still a problem	[-] research-extension links may be more difficult	[+] for the single crop [-] for rest of the farming system
Other aspects		Quality control more difficult	Involving private and social sector (farmer organizations) may improve

Modification efforts and key ingredients

	Fee-for-service public provision	Institutional pluralism: mobilizing other players	Empowerment, farmer organizing, and participatory approaches
	User charge/fee-based commercialization of public extension service; farmer stratification; often transition stage toward privatization.	Unlinked funding and delivery; decentralization; client stratification; public-private partnership & cost-sharing; contracting out to private & nonprofit sectors; AKIS; enabling MOA role	Varying participation forms, from passive to self-mobilized farmer-to-farmer extension and organization; decentralization; range of participatory appraisal methodologies; extension agent training in HRD/ group interaction methods
<i>Generic problems</i>			
Scale and complexity	[-] tendency for general participation in extension to drop, and poorer, less market-oriented farmers to be excluded [+] if accompanied by stratification and "extension safety net" features	[+] if mobilizes NGO field presence	[+] farmer-to-farmer 'networking effect' effective in reaching small-scale farmers
Dependence on wider policy and other agency functions			
Ability to trace cause and effect		[+] if contracting process involves design of indicators with farmer involvement, and if mobilizes NGO participatory skills	[+] farmers are the closest to the real situation
Commitment and political support	[-] may be opposition to reclassifying extension from free to purchased good		[-] farmer organizations can mobilize support; centralized governments may fear loss of control
Accountability	[+] stronger client orientation and more professional relationship; staff commissions and job satisfaction	[+] if mobilizes NGO responsiveness and HRD skills; and through provider competition, client orientation, and stakeholder involvement	[+] farmer ownership and heightened trust and <i>camraderie</i> of participatory methods; farmers may hire or themselves serve as the field agents
Liability to other public service functions		[+] Rationalizes public sector role within broader range of institutions	[+] farmer control ensures service delivery
Operating resources and fiscal sustainability	[+] increased efficiency reduces overheads; income from fees charged; although may be high administrative costs of collecting charges	[+] Private and voluntary organizations contribute resources and roles; may involve beneficiary co-payment [-] costs associated with initial increased complexity	[+] Group approaches less staff intensive; farmer organizations mobilize local resources; sustainable agriculture paradigm is lower cost
Interaction with knowledge generation	[-] less interaction and reduced feedback in the broader AKIS	[+] if mobilizes NGO and nonprofit diagnostic & feedback skills	[-] May still be a problem
Other aspects		Positive outcomes depend largely on partnership arrangements capitalizing on partner strengths	Outcomes less positive in more 'passive' forms of participation

Modification efforts and key ingredients

	Privatization	Interconnecting rural people, and use of appropriate media
	Transfer of ownership of extension service to private entity; non-public good-type information; support for infant advisory industries; public relations & media support; policy reform; stakeholder participation	To enhance other innovations, various information/ communication technologies and applications, including mass media; documentation and exchange of local knowledge.
<i>Generic problems</i>		
Scale and complexity	[0]	[+] if supports participation, farmer organization, and efforts to reach target groups [-] if reinforces existing biases against coverage
Dependence on wider policy and other agency functions	[0]	[+] if helps strengthen farmer organization negotiating ability, or reinforce policy reform efforts
Ability to trace cause and effect	[+] potentially, feedback through improved private sector relationship with client farmers; concern for quality, efficiency; imperative to provide data to justify reforms	[-] Feedback mechanism more difficult
Commitment and political support	[0] initial resistance to reforms from vested interests but, once established, little dependence on public budget	[0]
Accountability	[+] priority to farmer-customer interests in long-term relationship; competition; farmer representation on board	[0]
Liability to other public service functions	[+] by definition	[+/-] Depends on how used.
Operating resources and fiscal sustainability	[+] cost efficiencies; mobilization of private and community resources to complement public funds	[+] May economize on cost of accessing information; mass media more cost-effective than face-to-face; self-financing in the case of telecottages. [-] most IT applications involve significant initial investment and operating costs
Interaction with knowledge generation	[+] Private entities have incentives to link with knowledge generating agencies	[+] If developed jointly with knowledge generating agencies
Other aspects		Outcome highly dependent on appropriateness of use in conjunction with other efforts.

T&V attempts to tackle several of the generic problems identified in section III. Using T&V as a reform tool for the problem of scale, many governments have covered most regions of their countries with denser extension agent/farmer ratios by focusing on contact farmers who are expected to pass information on to fellow farmers with similar problems (Nagel, 1997). The attempt to cover many farmers, however, led to more dependence on annual public budget allocations for recurrent costs.

While dependence on external factors and other agency functions was not eliminated, the design called for village extension workers (VEWs) to advise farmers on prices, availability of necessary inputs, and market conditions, as well as report on actual availability and farmer responses to supervisors. This would have allowed for adjustments to extension instructions. Accountability was to be provided through the tight, line-of-command supervision system and the strict timetable of contact farmer group visits. Exclusive devotion to information dissemination tasks relieved staff from the 'push' and 'pull' to do tasks that are not related to agriculture or extension. Finally, T&V designers attempted to resolve the problem of interaction with technology generation by structuring research-extension links involving regular training and continuous feedback of farmers' problems.

In practice, T&V could not escape some generic problems, and aggravated a couple of them. The contact farmer coverage method frequently faced problems because contact farmers were not representative of the farming community (Nagel, 1997). Strict scheduling enabled closer checking on what field staff were doing and improved monitoring, but it has not resolved the problem of relating input to impact. The dependence on other rural development factors could not be eliminated, and the independent status that the extension system received under T&V initiatives did not help to resolve coordination problems with other programs.

In spite of some successes, there were quite a few countries where T&V has not generated sustained political support and commitment.

There remained a tendency to neglect participatory aspects, and accountability to farmers was not established (Axinn, 1988; Nagel, 1997). T&V's most obvious disadvantage has been its "highly questionable sustainability" (Antholt, 1994) as a nationwide system due to the substantially increased staff allocations and recurrent and operational costs (Axinn, 1988).

Decentralization

Decentralization has been described as "the first step on the long road to privatization" because diversity becomes more tangible and different approaches to extension can be explored as the local level becomes accessible (Ameur, 1994).

Decentralization includes administrative and political-fiscal devolution of program and funding decisions and staff accountability to local units. Its impact depends on the extent of political and societal democratization at the local level. Specifically, the major factors affecting the effectiveness of decentralization are:

- the existence of an elected, representative local government and a central government willing to actually decentralize;
- the ability of local government to raise revenues; and
- MOA capacity for efficient quality control and monitoring (Garfield et al., 1996).

If these requirements are met, various actions may be taken and functions decentralized, such as building local capacity for farmer involvement in extension programming, housing extension agents locally and making them responsible to farmers' associations, and designing resource mobilization and funding mechanisms.

If implemented effectively, and if local government is reasonably well funded, decentralization can transform the top-down structure and operation of a public service bureaucracy, and positively affect several of the generic problems of extension. The scale and complexity problem is reduced in proportion to the number of local government units that take on extension functions in a country, and how 'local' they are. Extension's dependence on

other agency functions is reduced because of the potential for better interaction with other local initiatives. Commitment and political support, along with responsiveness (an aspect of accountability) are enhanced if the local government is democratic. To some extent, this circumvents the inability to relate cause and effect because client satisfaction is in the interest of the locally elected government. On the other hand, the scope for local political interference in technical matters is increased.

Experiments in decentralizing public extension services have been carried out in several Latin American countries, building on major national decentralization initiatives that are common in the region (World Bank, 1997). Between 1989 and 1993, the government of Colombia decentralized extension to all but 10 of the country's 1,050 municipalities. Each was required to create its own extension office, *Unidad Municipal de Asistencia Técnica Agropecuaria* (UMATA), which provides technical assistance to small farmers on a full range of issues. The 1,040 UMATAs employ 3,500 technical and professional staff, and provide 450,000 small farmers with free extension services (28 percent of all small farmers in Colombia). Thus far, almost all costs are sustained by the central government through a complex system of budget transfers to municipalities and matching grants.

To date, the Colombian decentralization has improved coverage (through larger staff inputs) and possibly responsiveness. The number of municipalities served is up over 300 percent, while beneficiaries are up over 250 percent, with the beneficiary/technical staff ratio falling 17 percent to 129, and cost per farmer diminishing by 10 percent (in line with staff increases). Municipality staff are reportedly more accessible to small farmers than staff who were formerly under the MOA-directed Colombian Institute for Agriculture and Livestock (ICA). At least in these early stages, however, the decentralization has complicated staff and program quality control (monitoring and accountability), exacerbated political interference at the local level, interrupted research-extension links, and increased staffing

and total costs roughly in proportion to the increase in coverage.

Overall, staff numbers have increased by a factor of 3.5, more than doubling the total cost. According to Garfield et al. (1996), assuring service quality is more complex now that there are more than 1,000 decentralized units. Technology generation is cited as another weakness of the decentralized arrangement.

A recent World Bank-financed agricultural extension project in Venezuela began with pilot innovations in decentralization that may counteract some of Colombia's potential problems. The pilot activities included subcontracting a university or NGO⁷ to provide an extension team in each of the five pilot municipalities. The main project decentralizes planning and implementation of extension to the municipality level; forms farmers' associations to administer the municipal extension service; contracts private extension consultants, NGOs, and universities to manage the extension service provision; and provides for cost-sharing between national, state, and municipal levels of government and the beneficiaries themselves. Field visits have confirmed client (farmer) satisfaction with the service they now receive from extension agents.

Single commodity-focused extension

Commodity-specific extension has been practiced across the public, parastatal, private, and social sectors, including by agroprocessing and marketing firms and farmers' associations (Nagel, 1997; Umali and Schwartz, 1994). The focus is often on one commercial or export crop linked to established marketing or processing outlets, or on one aspect of farming, such as livestock or dairying (Purcell and Anderson, 1997; Axinn, 1988).

The distinctive feature of commodity-specific extension lies in vertically integrating most of the components of the production and marketing system, including research, input

7. We use the term 'NGO' throughout the text to denote nongovernment organizations or private voluntary organizations.

supply, product marketing, credit, extension, and sometimes price assurance. It thus deals most effectively with the generic problem of dependence on wider policy and other agency functions by internalizing the complementary services. Complexity and scale are simplified by a narrow focus on one commodity. As a relatively small organization that includes all aspects of the commodity process, this organizational format to a large extent resolves the problem of relating cause and effect. For the same reasons, staff accountability is readily assured by uniform salary, training, and staff conditions of service.

The focus on narrow commodity concerns reduces liability to other public service functions. The small-and-focused approach is relatively cost-effective, and through levies on product sales or by factoring cost-recovery into product or input prices, fiscal sustainability is achieved. Finally, almost by definition the vertically-integrated structure assures a 'technology fit'.

Agroprocessing and marketing firms provide extension services to their farmer suppliers to reduce input supply risks, reduce post-harvest losses, and improve quantity, quality, consistency, and timeliness of output. In the agroprocessing and marketing operations, extension services are typically an integral component of contract growing schemes involved in producing high-value commodities. Umali and Schwartz (1994) provide numerous examples from around the world of the broad range of commodities promoted in this manner. They also document many examples of farmers' associations and cooperative commodity ventures.

The commodity approach has inherent limitations. As Nagel (1977) observes, the advantages are largely defined from the perspective of the commodity organization. Obviously, in situations where farming is not a monoculture, the approach does not fit as well because the narrow commodity focus tends to leave the rest of the agriculture sector and the extension system with many unaddressed needs. As a result, scale and coverage, other public service functions, and issues relating to the

interaction of the commodity with other components in the smallholder production system are neglected (Purcell and Anderson, 1997). Accountability to farmers is often questionable unless the commodity organization is controlled by a farmers' association (Axinn, 1988).

Fee-for-service public provision

Introducing user charges or fees for services is an approach some public extension services have adopted, primarily as a cost-recovery strategy. Farmers pay a portion of the fees, but the government also pays on a contract basis. In some cases, commercialization is a transitional stage toward privatization. Issues of fiscal sustainability and accountability are the primary generic problems addressed by this approach.

Apart from recovering costs from farmer clients who can afford to pay for information and advice, the fundamental effect of introducing fees for services, along with performance-related staff commissions, is to bring about a more professional, client-oriented relationship between extension agent and farmer, thus improving both accountability and efficiency. In the New Zealand example described below, there is evidence of some positive outcome by integrating extension with other functions, and tracing cause and effect. Positive impact on the scale (coverage) problem is only obtained if the introduction of user charges is accompanied by stratifying the client market and arranging special services for less commercial farmers. In the absence of such protection, fee-for-service extension would likely exacerbate the generic problem of coverage in lower-income countries, and as with most reforms directed toward privatization, present problems of commitment and political support. Other weaknesses are discussed below.

The advisory services of New Zealand and the UK were both public extension providers that expanded the proportion of their services available for a fee. New Zealand began cost-recovery efforts in 1986. Agriculture New Zealand (AgNZ), formerly the ministry advisory service, was sold by the government to Wrightson's, a farm service and stock trading

company, in 1995 (Mavromatis, pers. comm.). Government contracts and training contribute 50 percent, and the balance is derived from extension contracts with individual farmers and farmer organizations, research institutes, and agribusiness companies.

The UK's advisory service, ADAS, initiated a system of charges in 1987. It became a more autonomous, government-owned agency in 1992, received no government subsidies in 1996, and as of April 1997, became a private-sector company purchased by management and staff (Griffis, 1996 and pers. comm.). When charges were introduced in 1987, cost recovery was the objective, with farmers required to contribute to the cost of advice that directly benefited their businesses. Privatization was not a stated objective at that time, but became one in 1994/95 when it became clear that full cost recovery was possible (Griffis, pers. comm.). The UK government's Ministry of Agriculture, Fisheries, and Food (MAFF) remains the largest customer for ADAS — undertaking a range of activities concerned with policy development, implementation, and monitoring, which includes contracted extension.

As the commercialized ADAS looked for other business, its client structure changed, focusing on farmers willing to pay, and corporate business clients associated with agriculture. Commercial pressures meant that less time became available for extension, and this was soon limited to the activities that MAFF required and for which they were willing to pay. As a result, the total number of farmers reached dropped slightly. In the UK context, this was not viewed as a significant problem because a great deal of information is available to farmers from other sources.

While no formal assessment of the impact of the New Zealand changes has been undertaken, the increased activity of consultants has improved their performance and job satisfaction (Mavromatis, pers. comm.). Commercialization may also have had a positive overall effect on coverage through the growth in the number of farm consultants throughout the country. Mavromatis reports that the gap in public good extension resulting from privatizing AgNZ has

been filled by the creation of a number of organizations funded largely through producer levies.

Citing Hercus (1991), Rivera and Cary (1997) note that commercialization in New Zealand, besides reducing the public fiscal burden, improved accountability and ability to trace cause and effect by involving extension staff in the entire production-processing-transporting-marketing chain. It also shifted toward a stronger client orientation and a concern to identify and produce results rather than simply to engage in activities.

For ADAS, Griffis describes increased efficiency and reduced cost to government, higher job satisfaction for the majority, more professional relationships with customers, and better focus. On the negative side in New Zealand, there remained some concerns about interaction with knowledge generation and coverage for small farmers. Research agencies and advisory consulting work became sharpened in focus and efficiency. AgNZ engaged in some specific 'public good' technology transfer projects on a contract basis to commodity research agencies and the national Foundation for Research, Science, and Technology. But interaction among organizations diminished and feedback from farmers to science providers declined.

In the view of Mavromatis, AgNZ's general manager, less well-off farmers tended not to attend field days when AgNZ was a government-funded extension service, but today farmers are exposed to more diverse opinions. Also in the UK, services to low-income farmers have been reduced because some of these farmers have not been convinced that benefits outweigh fees for ADAS services, given the availability in the UK of information from other sources.

Howell (1986) and Rivera and Cary (1997) note the limited scope for funding public extension services by user fees in developing countries. Obvious difficulties may be in collecting user fees, establishing cost-accounting procedures, and reorienting and retraining extension staff (Griffis, pers. comm.).

In primarily subsistence economies, user charges for 'common good' general extension information would be difficult to enforce and possibly reduce general participation in extension (Howell, 1986). Umali-Deininger (1996) notes that the demand for fee-based extension services will almost exclusively come from market-oriented farming operations, particularly from areas dominated by medium- to large-scale farmers. Accordingly, she proposed that partial cost recovery may be a means of fostering a more demand-driven system and serving as an important transitional phase toward developing a market for fee-for-service extension. Cost recovery and user co-financing components have been incorporated into World Bank-funded projects in Chile, Mexico, and Venezuela, and Nicaragua.

Wilson (1991) describes how cost reduction in Mexico is achieved partly by stratifying the client market by income level, and either progressively graduating higher-income producers to private extension services or requiring greater cost-sharing. Stratifying for cost recovery reduces both generic fiscal and liability problems, releasing public resources for an 'extension safety net' targeted at low- to middle-income producers in priority areas (Umali-Deininger, 1996).

Institutional pluralism — mobilizing other players

Innovations within this category are designed to create a more pluralistic system of complementary extension services that would reach and respond to diverse farmers and farming systems (World Bank, 1997). A fine line separates some of these arrangements, such as cofinancing and subcontracting, from fee-for-service extension. The emphasis in fee-for-service extension was (with some exceptions) more on cofinancing public provision, while here the emphasis is on moving more toward private provision. After discussing the broad ways in which innovations in this category overcome some generic problems, we offer examples of subcontracting arrangements with private sector firms, including voucher and

coupon schemes, cofinancing, and collaborative arrangements with NGOs and farmer organizations.

By involving a variety of stakeholders in forging contracts and collaborative partnerships, pluralistic arrangements have the potential to help resolve two fundamental generic problems — linking cause and effect, and accountability or incentive to deliver quality service. In subcontracting arrangements, the provider's client orientation is strengthened through the contracting process, and the farmer's influence as a fee-paying customer increases. Accountability in these arrangements tends to be multifaceted, with several stakeholders involved in developing contract terms of reference, competitive bidding, and direct input from farmers in the design of indicators.

The motive behind subcontracting may be to "get around the institutional inefficiencies associated with public delivery" (Umali-Deininger, 1997). These usually include various tenurial problems affecting staff performance that apply less in the private sector. Involving nonprofit NGOs may further improve responsiveness, cost-effectiveness, and equity in coverage.

The difficulty of institutional pluralism is for central government to adjust to a position of reduced direct control over either program or staffing. Additionally, financial and administrative management may increase in complexity, at least initially, as new systems are developed. Additional resources and efforts may be required to monitor service quality. Where these challenges can be overcome, and where complementarity can be achieved through rationalizing public and private sector roles, mobilizing other players through these approaches can resolve the problems of coverage, ability to relate cause and effect, accountability, fiscal sustainability, and interaction with knowledge generation.

Several principles underpin innovations in this category. First is unlinking public funding from public delivery (Zijp, 1998). Second, pluralism implies changes in governance. New institutions and institutional arrangements, such as public-private partnerships, are involved. A

key governance principle is to open and democratize extension control so that all stakeholders may express their perspectives and interests, and play appropriate roles in extension design, implementation, and evaluation.

Third, with pluralism the government recognizes that to meet diverse needs and conditions in the farming sector, it should invest more broadly in the whole agricultural knowledge and information system (AKIS), rather than in public sector extension services alone. Implied in each of the above principles are significant role changes for ministries of agriculture as they move away from service delivery toward providing an enabling policy environment, coordinating and facilitating the work of other players, and assisting farmers in negotiating terms of contracts, monitoring quality, and exercising financial control.

Recognizing that complete privatization of agricultural extension services is often not feasible, several Latin American countries are attempting to address such problems as fiscal sustainability and poor client orientation by integrating the private sector into extension systems (Umali-Deininger, 1996). Contracting only specific functions, for example staff training and video production, is one alternative, as in Morocco. More comprehensive *subcontracting* of extension services has been attempted in countries as diverse as Estonia, Turkey, Madagascar, Costa Rica, and Mexico.

Coupons attached to agricultural bank loans, committing a certain percentage of the loan for extension services, have been used in Colombia (Rivera and Cary, 1997). *Extension vouchers* are a subcontracting innovation launched in Costa Rica and Nicaragua. In Nicaragua, farmers issued with vouchers were able to choose their extension supplier, either public or private (Umali-Deininger 1996). The government retains a role not only in financing, but also in regulating extension providers. In Costa Rica, vouchers vary according to the types of farmers and levels of technology requiring high- or low-intensity technical assistance. At project completion, beneficiaries are expected to continue with solely private technical assistance. The private extensionist is to indicate to the

MOA which individual farmers should graduate from the program.

There is still insufficient information to judge whether these coupon and voucher systems entail significant costs. Experience of voucher systems in the education field (West, 1996) suggests that administrative costs might be substantial, threatening the sustainability of the voucher system as a whole.

Cofinancing in Ecuador and Honduras aims to replace the public extension services with a 'technology transfer market' financed jointly by government and the beneficiaries, in which private agents will compete to provide services. Both cases involve stratification of farmers into small-scale producers and medium- and large-scale producers, with separate programs and graduated scales of copayment designed for each farmer category.

Collaborative arrangements with the *NGO and nonprofit sector* include cooperative arrangements with universities, commodity boards, and commodity foundations (Umali and Schwartz, 1994; Nagel, 1997). Non-government organizations represent a highly prevalent partner in agricultural extension in developing countries, frequently focusing on areas inadequately served by the government. Many NGOs strive to be participatory, democratic, responsive, cost-effective, community-based, and focused on the needs of hard-to-reach target groups.

However, NGOs do not always live up to their articles of faith. Some NGOs push their own agenda and are more accountable to external funding sources than to the clientele they aim to serve (Farrington, 1997). Hence, care must be exercised to ensure that partnership arrangements with NGOs capitalize on their strengths and avoid their weaknesses.

Empowerment and participatory approaches

Evolving control by beneficiaries may be the single most important initiative to make extension accountable to clients for performance, a key generic weakness of extension organizations (Antholt, 1994). Resolving this issue eliminates the weakness

emanating from inability to trace cause and effect. We have already alluded to farmers' groups as beneficiary organizations required by some decentralized, cost-recovery, subcontracting, and cofinancing arrangements. Farmer organizing is a key element in the client-based extension strategies of NGOs (Nagel, 1997). We also mentioned in a previous subsection that farmers' associations organized on commodity lines actually provide extension services to their members (Umali-Deininger, 1996). Some of these commodity-based farmers' organizations have been highly successful, for instance in the dairy industry in India (Chamala and Shingi, 1997).

A wealth of experience and lessons on participation and farmer control testifies to potentially positive effects on generic problems. However, their impact depends where on the 'participatory continuum' a particular initiative lies. Pretty and Volouhe (1997) reviewed the rapid/participatory rural appraisal field, citing no less than 30 different terms and names for alternative systems of participatory learning and action that have sprung up over the last decade or so. Many of these involve 'self-mobilizing' methods — in group and team dynamics, sampling, interviewing and dialogue, and visualization and diagramming.

It is clear from examples they give that the conscious use of these methods, which pay great attention to monitoring and self-evaluation, has a significant impact in raising the level of trust, understanding, and links among the various actors and agencies involved in a rural situation, with the farmers at the center of the process. Chamala and Shingi (1997) review lessons learned in establishing and strengthening farmer organizations, confirming valid extension roles in farmer empowerment, community organizing, human resource development, and problem solving and education. Axinn's analysis of the 'participatory approach' also notes its advantages and disadvantages (1988).

Participatory approaches have positive effects for most of the generic problems of extension. On the problem of scale and coverage, participatory approaches produce farmer leaders with appropriate local

backgrounds, including women, who are able to perform many extension agent roles in a cost effective manner (Axinn, 1988; Russell, 1986). Participatory approaches have been found to adjust complementary services more closely to farmer needs (Axinn, 1988), as well as reduce farmer dependence on external inputs (Roling and Pretty, 1997).

Farmers' union formation in Europe improved the integration of complementary services and raised political support (Roling, 1986)⁸. Participatory approaches also have a positive effect in terms of tracing cause and effect through farmer-led experimentation and analysis, and farmer feedback (Axinn, 1988). A key positive impact of participation is accountability. Axinn goes as far as to state that 'automatic quality control' is achieved through raising farmer awareness and confidence. The quality of trust established (Pretty and Volouhe, 1997) and ownership (Chamala and Shingi, 1997) are also emphasized.

Fiscal sustainability is improved through mobilizing local resources. Cost-effectiveness and efficiency are achieved by using relevant methods that focus on expressed farmer needs and local people taking over many extension roles (Axinn, 1988). Participation has positive effects on the interaction with knowledge generation by combining indigenous knowledge with feedback into the agricultural knowledge system (Axinn, 1988; Chamala and Shingi, 1997), and identifying and verifying applicable technology and technology generation needs for farming systems (Purcell and Anderson, 1997).

France, Norway, and Taiwan provide examples of the prominent role farmers' organizations can play in funding and organizing agricultural extension (see Ameer, 1994; Umali and Schwartz, 1994; Haug, 1991; Nagel, 1997).

In Taiwan, 90 percent of the country's farmers belong to farmers' associations

8. In the Netherlands, 95 percent of farmers operate within provincial organizations linked to national and even European farming unions, and are able to exercise substantial influence on agricultural policies and hold extension accountable.

organized at township, county, and provincial levels (Nagel, 1997), with an overall extension policy defined by the government that includes strong, institutionalized links with research and other services. Extension is carried out by agents employed by the farmers' associations at the township level and financed largely by the farmers themselves. In Argentina, the farmer group movement CREA (Agricultural Experimentation Regional Consortia) has spread to Brazil, Chile, Paraguay, and Uruguay. It exemplifies fully self-supporting extension organized by farmers (Tobar, 1996).

Not all participatory attempts produce a wholly positive experience. Often decentralization is virtually a prerequisite for effective local participation. On the other hand, in conventional agriculture with more passive forms of participation, there is a risk that the elite will capture delivered benefits (Howell, 1986).

Privatization

Use of the term privatization often tends to be misleading. In its pure sense, privatization implies full transfer of ownership (usually by way of sale) from government to a private entity, with that entity meeting all costs and receiving any profits (Rivera and Cary, 1997). In most cases, governments have not actually privatized their agricultural extension services in this sense.

The private sector has the incentive to provide private and toll-good information to 'better-off' commercial farmers and members of private associations for whom extension service delivery is profitable. In areas dominated by commercial farming and farmers with marketable output, it makes sense to mobilize the private sector to provide investment capital and services (World Bank, 1997). Input suppliers have strong incentives to provide advice on a range of crop and livestock activities. With the increased commercialization of agriculture in many developing countries, this source of technical knowledge may assume a much more prominent role. Fully privatized extension is not economically feasible in

countries with a large base of small-scale, subsistence farmers (Umali-Deininger, 1996). In such circumstances, public sector finance remains essential, mixed with various cost-recovery, cofinancing, and other transitional institutional arrangements that are appropriate to the pace of structural and commercial changes in agriculture.

If privatization is appropriate, some generic problems will be positively affected. All privatization efforts report improvements in accountability, usually expressed in terms of client orientation and satisfaction (thus avoiding the cause and effect problem). Obviously, private sector initiatives are not affected by other public service liabilities. All privatized efforts claim improved efficiency, cost-effectiveness, and reduced public sector costs by servicing the needs of farmer clients who can afford to pay for the information, thus overcoming the problems of sustainability and dependence on fiscal allocations. Incentives exist for private providers of extension to maintain close links with knowledge generation agencies in order to have a marketable product.

For other generic problems, the impact of privatizing extension is mixed. Overreliance on private extension risks neglect of less commercial farmers and lower-value crops. Stratification and separate, publicly-funded targeted programs are needed to counter this risk. Privatization also does not deal with the complexity of providing a socially and environmentally optimal service.

Most analysts suggest a cautious, evolutionary approach toward privatization within a clearly formulated mission and strategy, along with open communication among all stakeholders. Privatization may start with more commercial farmers for whom technology packages already exist and extension is largely a delivery function. It may begin in a single region and expand over time, bringing farmers to the point where their future extension needs can be met by private-sector services or provided on a fee-paying basis, leaving the public service to serve new clientele and cropping systems, including more marginal groups (World Bank, 1990). Below we describe a few cases where

governments have privatized all or part of their extension services, usually in stages. There are plenty of other instances where private entities have found it profitable to provide extension services.

Chile completely privatized its extension system in the 1970s, forcing commercial producers to obtain extension services from privately-owned consulting firms (Umali-Deininger, 1996), and has since been taking steps to rationalize services for different farmer categories. While the large commercial farmers were not seriously affected by the shift to full private-sector delivery, small-scale and subsistence farmers were left out of the extension market.

As a result, the Chilean government had to actively target extension services to groups with smaller marketable output. Two target groups were identified and served by specially designed programs with World Bank assistance. One subgroup of farmers considered to have sufficient resources to eventually attain self-sufficiency and market surplus production received a producer-oriented extension package through a special program. This beneficiary group paid 15 percent of extension costs, a rate which may reach 50 percent. The second subgroup of poorer, subsistence farmers received a more farm family-oriented, 'basic' service for free, with a proposed eventual contribution of 15 percent of total costs.

Services for both programs were delivered by contracted private consulting firms. Wilson (1991) notes the goal is to increase commercial and family farm contributions, and that the overall Chilean cost reduction principle is to target free services, limit the period of coverage to general recipients, and work with groups to reduce costs. To qualify for the Chilean program, a firm must meet technical and professional staffing criteria, bid for contracts, and agree to have its activities supervised and evaluated by a designated public agency.

Ameur (1994) reports that these programs reach a large number of small-scale farmers, the typical farmer/agent ratio is as low as 48 to 1, consulting firms focus only on technology transfer, and farmers contract with their

consulting firms to contribute up to 30 percent of the cost of the program. The government agency prepares terms of reference for the contracts. A recent program for medium- and large-scale farmers in Chile is now totally privately funded and executed by the National Agriculture Society.

In the Netherlands, the government is half-way through a 10-year phased privatization process in which its public extension service, DLV, became a foundation with farmers' organizations and the government equally represented on the board (Rivera and Cary, 1997). In December 1997, agreement was reached with the Dutch government that all direct bilateral financial contracts with DLV would terminate after three more years.⁹ From 2000 onwards, government contracts for extension programs will be tendered in the open market with competition among all parties interested in carrying out the programs. The foundation will then change into a stock company with shares held by employees, and temporarily, by the MOA.

In some respects, the Dutch privatization was an upheaval. Tacken (1996) records how 50 percent of DLV's original staff had to be fired or take early retirement in a process characterized by considerable tension as DLV changed its organizational culture.

Tacken reports a number of positive effects of the privatization, including a 50 percent reduction in overhead. Client satisfaction jumped 40 percent in three years, attributed to improved client orientation, quality control, and more specialization of advice. Extension programs before privatization were closely related to national policy goals, often conflicted with farmers' interests, had low impact, and led to conflicting roles, low morale and turnover of extension staff and lack of farmer confidence. The service was neither needs-driven nor problem-oriented, and overused mass media for delivery. After privatization, farmer interests became a priority as farmers became strongly represented on the DLV board and sectoral

9. Personal communication, May 1998.

councils. Staff attitudes on efficiency, effectiveness, and job satisfaction improved as DLV monitored individual performance.

Albania is another recent case where privatization has been attempted on a national scale. With World Bank assistance, the government created a nationwide competitive private-sector network of 300 dealers to deliver inputs and technology to 600,000 newly established, small-scale private farmers (Schultz et al., 1996). The initiative explicitly tackled the generic problem of dependence on wider policy and other agency functions because the government implemented policies in a consistent and coordinated manner to support private-sector development. In addition, a private sector trade association (AFADA) and the Albanian Farmers Union it sponsored both lobbied the government to reduce import duties and remove a value-added tax on fertilizer.

The reformed MOA role became entirely related to supporting policies, services, and fair rules for competition in the infant private sector, including an information base, weekly market price information, and reliable agricultural data. The other generic problem improved by privatization was accountability through the long-term relationships private dealer firms create with customers. To overcome the generic problem of political commitment, a direct approach to the private sector (that bypassed vested power and rent-seeking interests which delayed and disrupted the reform process) was required. The generic problem of interaction with knowledge generation remained a problem. Schultz et al. (1996) record that although privatization facilitated transfer and adoption of technology, reduced government funding also created competition rather than cooperation within the knowledge system, hampering communication with research, education, farmer organizations, private consultants, and suppliers.

Finally, as we have mentioned, farmers' associations, often along commodity lines, provide their own private extension services to members. Umali-Deininger (1996) also documents the role of private consulting firms providing extension services in Argentina, Brazil, Colombia, Mexico, Uruguay, Korea, and

Taiwan. In Brazil around 1988, there were over 2,000 private consulting firms largely catering to the specialized needs of the commercial livestock sector. In Asia, consulting firms tend to concentrate on plantation crops, often staffed by ex-plantation managers and technicians.

Interconnecting rural people and using appropriate media

The arrival of the information age has naturally led to an interest in its potential for innovative applications of the latest information technologies (IT) to enhance extension delivery. Considering appropriate media for extension also includes the place of more traditional extension methods, such as mass media, group meetings, field days, demonstrations, and exchange visits (Campbell and Barker, 1997).

Innovations in this category are most directly associated with overcoming the generic problems of scale and complexity and — through cost-efficiencies associated with certain mass media — fiscal sustainability. In Albania, the privatization effort described above involved extensive use of mass media (television, radio, and a widely-circulated monthly agribusiness newsletter) to inform, create public awareness, and change attitudes. This media effort supporting the reformed MOA role helped to overcome the generic problem of dependence on wider policy.

In a study by Wete (1991), the most traditional approach — print with graphics and radio — emerges as most appropriate and cost-effective in a developing country. Zijp's (1994) study provides numerous examples of cost-effective use of different IT applications. Their positive impact, however, is sometimes achieved only at a significant initial and operating cost. Further, this impact tends to occur when the media are used in combination with other innovations that we have reviewed, indicating that IT is best considered not in isolation, but as a 'force multiplier' enabling or enhancing the effectiveness of other innovations and conventional extension methods (Antholt, 1994). Generalization about the effect of IT on the generic problems is also complicated by the

range of media that may be considered for different extension purposes.

AED (1985) found the suitability of different media dependent upon the message, target audience, and social environment. Radio and television are more appropriate for reaching many people quickly with relatively simple ideas, while print media are better suited to provide timely reminders of information. Interpersonal communication, including extension agents, group meetings, and demonstrations are best suited for teaching and enhancing credibility of information. Based on Lionberger's (1968) model of the adoption process, Campbell and Barker recommend:

- mass media and popular theater to provide new or additional information in the 'awareness' stage;
- group meetings, radio, and field days to increase knowledge in the 'interest' stage;
- result and method demonstrations, and farmer exchange to improve skills in the 'evaluation' stage;
- individual visits, farmer exchange, on-farm trials, and method demonstrations to induce behavioral change in the 'trial' stage; and
- recognition programs, competitions, and incorporating practices into farming systems to consolidate attitudinal change in the 'adoption' stage.

'Interconnectivity' describes the use of appropriate information and communications technology (IT) to enable people to connect with other people (Zijp, 1997). To harness its full potential requires considerable commitment and some radical changes in perspective. One change is to lessen our reductionist, sectoral orientation in favor of a pluralist, cross-sectoral, systems perspective. Thus, interconnectivity is closely interrelated to decentralization and institutional pluralism. Community communication centers, or telecottages, exemplify the new partnerships emerging for local information access, communication, and education in rural areas. They are as diverse as the communities they serve, but many are self-financing after initial start-up, and they all shift control and accountability to focus on the

information, educational, and organizational needs of the community.

In Sweden, 50 telecottages became operational within five years after the first one opened in 1985. Their aim is to counteract geographical disadvantages, and provide isolated villages with access to databases, data processing, fax, e-mail, computer-assisted services, open university and on-line tutorials, and village hall facilities.

Wete (1991) pointed out some limitations:

- information alone is an insufficient condition for social change;
- far from being neutral, provision of information can actually widen the gap between rich and poor;
- communications technology (CT) does not have produce effects without government commitment to change, reflected in its provision of budgetary support and conducive policy and complementary services; and
- most developing countries cannot afford CT hardware costs; as a result, the benefit/cost ratio of some CT applications is doubtful.

In overcoming generic problems, the limitations of IT/CT have much to do with innovations in this category not standing alone. Thus, by itself, IT cannot overcome the problem of relating cause and effect. The principle of 'garbage in, garbage out' applies, and care must be taken that the overzealous use of IT does not give biased or inaccurate information an aura of veracity. In terms of coverage, IT cannot replace face-to-face contact between extension agents and farmers. Also, there are tendencies toward urban and other biases (for example, against the disadvantaged and traditional culture) in some IT applications.

Nevertheless, increased investments in many IT applications appear to make sound economic and social sense, and deserve public sector support (Zijp, 1997).

Interpretation and conclusions

In designing extension, an approach is less important than its ingredients. Using the framework developed above, it is important to

isolate ingredients of success and find ways to replicate or transfer these characteristics to improve the performance of another approach. A familiar example is to explore ways of integrating positive characteristics of private-sector or NGO operations into public-sector management. A less familiar example, but one which springs from this framework, is to explore modifications to the vertical integration feature that contributes to the success of the commodity approach.

This implies broadening the historical tendency of extension to focus on production, and pay more attention to transformation and marketing. Perhaps most important would be to integrate farmer participation and control into other extension modifications and a means to overcome several critical generic problems of scale and complexity, relating cause and effect, and accountability. This requires decentralization, and is even more effective when institutional pluralism is built in.

Looking across the rows of the matrix in Figure 1, we can assess which innovations, alone or in combination, offer solutions to a given generic problem or set of interrelated problems, and whether a gain in overcoming one problem is to be had at the expense of another problem. In some instances, care is required to avoid a potential pitfall and achieve a positive trade-off between the pros and cons inherent in an approach. To a large extent, our framework confirms most current professional wisdom.

For example, impact on the coverage problem is most powerful through participation and control by farmer organizations, mobilizing other players (e.g., NGOs), and using appropriate media. These ingredients involve using local people as field agents who belong to target groups, training extension workers in human resource development skills, and collaborating with community organizations and their support groups to help them use their own systems of knowledge, experimentation, and communication.

Impact on coverage can also be obtained by prioritizing, categorizing, and stratifying farmers into target groups, using cost-recovery schemes with more commercially-oriented farmers to

release public funds to serve smaller-scale farmers. Conversely, increased coverage by enlarging the MOA and attempting to improve the management of its general services is not sustainable in the long run.

Not surprisingly, moving to the right in row 7 of the matrix (Fig. 1), the generic problem of funding begins to look more positive — the matrix is arranged in the direction of public to private.

Innovations that resolve the generic problems of scale, dependence on other policies and services, and inability to trace cause and effect tend to resolve several other generic problems as well. Here, we notice some significant findings. The conventional wisdom of the past has tended to look to massive, technocratic, and sophisticated efforts — in management and media — to seek impact in proportion to the perceived scale and complexity of these problems.

In contrast, we notice that the most significant effect on these three problem areas involves concepts and practices falling broadly within the approach of sustainable agriculture. Without a full discussion, its advocates¹⁰ believe that a sustainable approach — low external inputs, a systems orientation, pluralism, and reliance on arrangements that use the incentives of both farmers and those who serve them — releases the local knowledge, organizing ability, resources, and commonsense of rural people to overcome policy constraints.

Rural people know when what is being done is relevant and effective. The ingredients of a sustainable approach tend to be inherently low cost and build relationships of mutual trust and reciprocity. From these relationships, commitment, political support, accountability, fiscal sustainability, and effective interaction with knowledge generation develop.

10. Such as Roling and Pretty (1997), Axinn (1988), Antholt (1994), Rivera (1991), Haverkort and de Zeeuw (1991).

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