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# Public and Private Agricultural Extension

## Beyond Traditional Frontiers

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Dina L. Umali  
Lisa Schwartz

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Dina L. Umali  
Lisa Schwartz

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# FOREWORD

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The contribution of agricultural support services such as extension in increasing agricultural productivity has long been recognized. Given the importance of the agricultural sector in many developing countries, governments have taken a lead in the provision of such services all over the world. Recently, financial crises, budget cuts associated with structural adjustment programs, and problems of poor governance of publicly run programs have resulted in a declining supply of these services. These, in turn, have spurred a reevaluation of current government strategies and directed attention to the potential for sharing the task of delivering these services with the private sector.

This study was consequently initiated to examine the appropriate roles of the public and private sectors in the delivery of agricultural support services. It is one of a series of studies focusing on this issue; the others discuss the public and private sector roles in agricultural research, seed production and distribution, and livestock and crop protection services. The present study analyzes the economic nature of the different types of agricultural information communicated to rural clients, the results of which are used to generate a framework for establishing the appropriate roles of the various participants in the agricultural extension sector (public, private, non-profit, and non-governmental sectors). A review of worldwide experiences indicate that many governments are undertaking cost recovery programs which are fostering the development of a market for agricultural extension services. The evolving structure of the agricultural sector has also led to increased specialization of farmer technology and information needs, which has in turn created more opportunities for private sector participation. However, the selective participation of the private sector, particularly in only providing services where the economic returns to delivery are reasonable and appropriable, requires continued participation of the public sector, complemented by other non-private organizations, if an optimal level of supply of services is to be ensured.



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## SUMMARY

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Worldwide, the agricultural sector is faced with several serious challenges: the spiralling demand for food, declining cultivated area due to population pressure, declining agricultural productivity due to natural resource degradation, and increasing competition in international markets. One fundamental element in meeting these challenges is the adoption of improved agricultural production and marketing techniques and technologies by farmers and other rural entrepreneurs. This transition from a resource-based to a technology-based system of agriculture, however, places greater responsibility on the agricultural extension sector, since it is a vital conduit of new agricultural information and technologies to farmers as well as a conduit back to researchers and policy-makers of farmer's problems, needs, and concerns.

Governments have traditionally taken the dominant role in the provision of agricultural extension services because of the important contribution the agricultural extension sector makes to agricultural development. However, escalating fiscal deficits in many developing countries and, in several cases, problems of poor governance of public programs over the last decade have increasingly redirected attention towards how to make extension more cost effective and responsive to specific farmer needs. At the same time, this has generated increased attention towards the potential for the privatization of agricultural extension services. To a large extent, this is spurred by the strong global trend towards market liberalization and reinforced by the transition from planned to market economies occurring in Eastern European countries and the newly independent states of the former Soviet Union, which has also sharpened the focus on the appropriate roles of the public and private sectors in the economy.

The privatization of traditionally publicly provided agricultural extension services, however, raises several related issues. Will private sector delivery, particularly fee-for-service systems, necessarily lead towards greater efficiency and equity? What are the social and income distributional implications of privatization, in terms of access to the services by small farmers and the rural poor? What roles can non-profit and non-governmental organizations play in this evolving scenario? Are there potential complementarities among public, private, non-profit, and non-governmental sector activities? How can these linkages be enhanced?

This study uses economic theory to develop a framework for defining the most economically efficient channel for delivering different types of agricultural extension services and, thus, the appropriate roles of the public and private sectors in the agricultural extension system. The factors influencing private sector delivery of agricultural extension services are also examined. A review of country experiences provides a broad picture of the potential for the privatization of agricultural extension services, given the country-specific characteristics of the agricultural sector and the agricultural extension system.

There is a wide range of suppliers of agricultural extension services: the public sector as represented by Ministries/Departments of Agriculture, non-governmental organizations, non-profit

organizations (e.g. universities, commodity boards, and commodity foundations), international research centers, and the private sector. The private sector may include: (i) farmer associations whose membership is organized by locality or commodity; (ii) private production and marketing firms such as input manufacturers and distributors, agro-marketing and processing firms, and trade associations; and (iii) private consulting and media companies (publishing and telecommunications firms). In addition, farmers can be both consumers and suppliers of agricultural information. An FAO survey of agricultural extension organizations in 1988-1989, including 207 institutions in 113 countries, confirms the highly dominant role the public sector plays in the agricultural extension sector (Swanson *et al.* 1990). Approximately 81 percent of the extension work around the world is conducted through a ministry or department of agriculture, at the national, state, or provincial level, while universities, parastatals, and non-governmental organizations account for about 12 percent and the private sector about 5 percent.

Agricultural information transmitted to and from farmers via the agricultural extension system can be classified into two broad groups: pure agricultural information and agricultural information inherently tied to new physical inventions. Pure agricultural information refers to any information which can be used without the acquisition of a specific physical technology. It includes all types of self-standing advice on practices in four main areas: cultural and production techniques, farm management, marketing and processing information, and community development. Agricultural inventions or technologies generally come in the form of inputs to farm production, technologies facilitating farm management, and marketing and processing equipment.

**Agricultural Technologies.** These various types of agricultural information occupy different points in the public-private good spectrum. For modern technologies, such as agricultural machinery, agricultural chemicals, hybrid seeds and livestock, veterinary supplies and pharmaceuticals, agricultural information is embodied in the invention. These technologies are classified as private goods because of their high subtractability and excludability.<sup>1</sup> The nature of some of these technologies<sup>2</sup> and/or the utilization of legal protective mechanisms provide a high degree of excludability and therefore appropriability of returns in their production and distribution. Because they are private goods, private firms have the incentive to supply these technologies and the supporting technical information that accompanies the use of these products to all types of farmers at socially optimal levels.

The use of some technologies involves externalities. A farmer's use of a veterinary drug or vaccine results in positive externalities, because it reduces the risk of livestock disease transmission to neighboring animals (Umali *et al.* 1992), while inappropriate pesticide use can result in the negative externalities of pesticide pollution, pest resistance, and various health hazards. Markets may develop their own mechanisms to account for these externalities. In the case of negative externalities associated with pesticide use, improving technologies in detecting pesticide residues in food and research on the linkages between exposure to toxic materials and human health have all contributed to changing consumer preferences; these have been reflected by the price premiums consumers are willing to pay for organically grown pesticide-free produce (Phipps, 1989). In the case of positive externalities, channelling the product

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<sup>1</sup>Excludability applies when access is denied to those who have not paid for the product, while subtractability (or rivalry) applies when one person's use or consumption of a good or service reduces its availability to others (Feldman 1980; Musgrave and Musgrave 1989; Kessides 1992). A pure private good is characterized by high subtractability and excludability, while a pure public good has low excludability and subtractability.

<sup>2</sup> For example, the nature of hybrid seeds allows the breeder to prevent access by other scientists to the inbred lines. Similarly, the formulation of some agricultural chemicals can be withheld from other researchers.

or service through client organizations (e.g. farmer associations or commodity foundations) may provide for the internalization of these externalities. These institutions, in consultation with their members, determine the level of services needed and charge farmer members accordingly for the services provided. In cases where mechanisms to account for externalities do not exist, governments have to intervene, for example, to subsidize (tax) usage to socially optimal levels in the case of positive (negative) externalities.

There are also moral hazard problems associated with the use of some of these technologies. For example, it may be difficult to visibly assess the difference between a good or bad seed, between an effective or an ineffective livestock pharmaceutical drug, or between an adulterated or pure agricultural chemical. Firms by themselves may enforce quality control to maintain brand loyalty, and trade associations, as a form of self-policing, may enforce industry standards. However, when these measures are absent or are only weakly enforced, it becomes necessary for the public sector to intervene to protect buyers of the products by setting up and enforcing regulatory standards.

**Special Cases.** Self-pollinated seeds are private goods only in the short term, that is, in the introductory phase. Although self-pollinated seeds are highly subtractable, their ease of replicability makes exclusion extremely difficult and costly. For example, wheat and rice farmers ordinarily do not buy new seeds every season, but rather set aside part of their harvest for use as seeds. Often, these can also be passed to relatives and neighbors at minimal or no charge. Therefore, in the medium- and long-term, self-pollinated seeds become common pool goods.<sup>3</sup> Private firms supplying these seeds, therefore, have to compete with farmer seed retention and sales, resulting in very low or negligible profit margins. Consequently, only relatively small and localized private firms with low overhead costs and producing consistently high quality seeds may be expected to earn adequate profits from supplying farmers with replacement seeds (Jaffee and Srivastava 1992). The size of the market and efficiency of operations, therefore, determine private sector participation in self-pollinated supply activities. If these conditions are not met, these seeds (e.g. staples) will not be privately supplied and the task of providing them will have to be undertaken by non-private channels--that is, the public, non-profit, or non-governmental sectors.

**General Information.** General agricultural information designed to improve existing cultural and production practices, farm management, or marketing and processing which is provided to farmers by means of traditional extension approaches, such as personal contact with extension agents, lectures and seminars, training and farm demonstrations, and direct conversations, are toll goods in the short term.<sup>4</sup> While the information delivered to farmer participants does not reduce the availability of the same information to others, attendance in the extension venues is constrained by the facilities and infrastructure and the time it takes for word of mouth to reach a critical mass of interested farmers. In the long term, however, the diffusive nature of general information transforms it into a public good. Similarly, general agricultural information transferred via mass communication channels (public broadcasts, public distribution of published material) is a public good by virtue of the medium. Thus, the speed of diffusion of the information determines its degree of excludability and will be a major determinant of private sector provision. Because of the limited possibilities for charging fees from the direct provision of information and thus earning reasonable profits, private enterprises will have little or

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<sup>3</sup> Common pool goods are subtractable but have low feasibility of exclusion.

<sup>4</sup> Toll goods are characterized by excludability, but low subtractability.

no incentive to provide such services. Because of the public good nature of general information, its delivery will have to remain a public or non-private responsibility.

**Special Cases.** The private sector will provide general information, despite being a public good in the long term, in some special situations. **Private agro-processing and marketing firms** will undertake extension activities when the reduction in input supply and/or quality risks and therefore production costs is greater than the cost of undertaking the extension program. Such backward integration strategies are usually pursued by agro-marketing and processing firms to ensure the volume, quality and timing of their supply of agricultural product inputs. Private firms may also provide information as part of their advertising campaigns to their customers about the appropriateness or the range of uses of their products to expand or protect their market shares. **Farmers' associations** (cooperatives and farmers groups) may serve as an effective mechanism for overcoming the "free rider" problem associated with providing public goods such as general agricultural information to their members. Through membership fees and other charges, the associations are able to recoup the costs of the information.

**Specialized Information.** As farm operations become highly commercialized and the agricultural technology needs of farmers become technically advanced, the corresponding extension services needed to support these activities also become highly specific. Such specialization lends exclusivity to the information and therefore, the extension activity. For example, the results of a soil analysis or the development of computer programs to facilitate farm operations are situation- and client-specific. Such information may not be useful to other farmers, and even if it is, the clients may reserve the information for their exclusive use and not transmit them freely to others, slowing the diffusion process. These characteristics qualify specialized information as toll goods and provide adequate economic incentives for the private sector to supply them at optimal levels. However, there are also moral hazard problems associated with the dissemination of this type of information. Unless the private "fee-for-services" extension industry can effectively police itself to ensure the quality of the information communicated, public intervention will be necessary, such as the establishment and enforcement of quality standards and legal enforcement of contracts.

While the private agricultural extension sector will, according to economic theory, have the incentive to supply the "private good" and "toll good" types of agricultural information because of the appropriability of returns in supplying these goods, the level at which these services will actually be supplied will be determined by the rate of return to private investments in the activity. Specifically, the level of private sector supply of "fee-for-service" agricultural extension is directly dependent upon the costs of and returns to the services a firm provides. The returns to extension service provision are influenced by the nature of the product, the degree of specificity of the information or technology, the size and rate of growth of farmer demand for extension, the level of development of the input and output markets, the degree of development of the supporting infrastructure, and the degree of competition in the extension services market. The cost of providing extension services, on the other hand, is influenced by the supply of and demand for qualified extension personnel, economies of scale in delivery operations, and the availability of publicly generated extension materials. Government policies can greatly affect the costs of and returns to extension. Price, trade, fiscal, monetary, and exchange rate policies influence commodity prices. Commodity prices, in turn, significantly influence the rates of return to research investments in different areas or commodities and subsequently the nature of information (pure or embodied in technologies) that is available for dissemination. Commodity prices as they influence farm enterprise incomes will also determine the affordability of "buying" extension services. The nature of the government's technological and regulatory policy may similarly enhance or restrict access to the technologies which can be introduced by extension firms. The formulation and enforcement of

intellectual property legislation will determine the appropriability of the returns to extension. Government policy with respect to education will influence the absorptive capacity of farmers and consumers for new information.

Farmer demand for agricultural extension services depends upon the **expected net benefits** from the investment in the new information. Strong market competition associated with dealing with highly tradable commodities will further enhance effective demand for new information, since the new information and technologies may provide the "competitive edge." Farmer demand for agricultural extension services will vary with the type of farmer. A distinction can be made between "subsistence farmers", "small farmers" or farmers with small marketable output value, and "medium and large farmers" or farmers with medium and large marketable output value in terms of their potential demand for agricultural extension services.<sup>5</sup> Given that a fixed or negotiated fee is paid for the extension information, medium and large farmers can "spread the cost", resulting in lower per unit cost of extension, which increases the affordability of the service. Consequently, they will have greater potential demand for "fee-for-service" extension. In the case of small farmers, their small marketable output value results in higher per unit cost of extension services, making it less profitable or unprofitable to pay for the extension service. For subsistence farmers, unless they have the desire and capacity to convert to commercialized farming (producing a surplus for the market), they will have limited or no incentive to pay for extension services.

A major implication of such a shift in classification of information from a "free good" to a "purchased good" is that the demand for paid agricultural extension services will exclusively emanate from commercialized farming operations, particularly from medium and large farmers. Areas which are dominated by "medium" and "large" farms will therefore be more capable of sustaining a "fee-for-service" agricultural extension business. Moreover, these farmers are generally located in more productive areas with access to essential infrastructure, which further enhances the profitability of their operations. Conversely, areas which are predominantly composed of "small" and "subsistence" farmers will tend to be neglected by the private sector because of limited or no demand.

There are mechanisms, such as farmer associations, however, which can provide the opportunity for farmers to take advantage of the economies of scale with respect to the "purchase" of the relevant specialized information. The association may employ part-time or full time staff to provide extension information or hire out to consulting firms for their extension needs; examples are developed countries, India, Taiwan (China), Zimbabwe, and the Central African Republic.

Another approach is to stratify the client market and as an "extension safety net" have public sector extension resources targeted towards small farmers (as in Mexico), while graduating larger-scale farmers to fee-for-service extension. But public sector provision or financing remains essential for farmers, regardless of farm size, if the information pertains to public concerns such as environmental protection or natural resource conservation.

While farm profitability can be influenced by the adoption of new techniques and technologies, it is also determined by several other factors including farm size and land quality, input and output prices, access to credit, output markets and information, land tenure arrangements, availability of

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<sup>5</sup> "Medium" and "large" farms also include farms with small land area but producing high value crops.

inputs and infrastructure, favorable government policies, degree of risk aversion, and level of human capital. Numerous studies have found that constraints imposed by these factors have discouraged technology adoption (Feder, Just and Zilberman 1985; Feder and Umali 1992). Often, the majority of these small farmers are also located in remote, underdeveloped, unfavorable areas, where it is unprofitable for the private sector to conduct business. The question therefore arises as to whether public resources will be better invested in relieving these constraints. Such government intervention may include the provision of the necessary infrastructure, improving access to credit, and promoting the growth of input and output markets. A key government role is to provide an enabling environment so that the relatively resource-poor farmers are able to achieve profitable production; a more favorable environment for improving farm profitability will similarly strengthen the incentives for farmers to adopt improved techniques and technologies.

Several conclusions can be drawn in the survey of country experiences. First, private sector extension is generally confined to commercially produced, often high-value commodities; and a considerable bias towards catering to the specialized needs of medium- to large-scale farms also exists. Second, smallholders, if organized into associations, can be strong customers as well. Third, fiscal constraints are a pervasive problem in both developed and developing countries; thus, strategies for (i) streamlining and cost recovery measures (as in Mexico, Chile, and the United Kingdom) and (ii) promoting the development of private sector extension (as in China and Colombia) have been pursued. These public sector constraints, however, do not necessarily imply public delivery; subcontracting to the private sector is also an option.

Based on the previous discussion, it becomes apparent that the private sector will only provide extension services in areas where reasonable returns are directly (for private consulting firms) or indirectly (for input supply, agro-processing and marketing firms) appropriate. For private consulting firms, the nature and extent of their extension activities will be largely determined by the net returns to providing the service. This will imply that they will tend to focus on high value crops, more favorable physical environments (with good infrastructure and highly fertile soils) and "big" individual farmers, because the returns from the production activity will be high enough to make "paid extension" affordable. Aggregation of extension needs by "smaller" farmers through mechanisms such as farmers' associations, however, may help overcome this constraint. Input suppliers, unless competition is intense, will primarily promote their respective products, while agro-processing and marketing firms will provide extension so long as it contributes to other firm objectives (e.g. reduction of input supply risk or promotion of output products). Because of the selective participation of the private sector, the public sector and non-profit organizations (including academic institutions, NGOs, international research centers commodity foundations, and boards) will have to work together to satisfy the needs of those in the "orphan" areas.

In view of the changing conditions facing agriculture today, coupled with the significant governmental and fiscal constraints faced by many developing countries, a structural transformation of the agricultural extension system is becoming increasingly essential. The public monopoly in agricultural extension provision in many countries is no longer feasible or sustainable, and a shift towards a multi-organizational system consisting of the public, private, non-profit, and non-governmental sectors will be vital for the effective performance of this complex task. Capitalizing on the comparative advantage of each of the different sectors will ensure the success of this endeavor.

The private sector can supply "private good" and "toll good" types of agricultural information at socially optimal levels. Thus, as an initial step towards increasing private sector

participation, the transfer of responsibility for delivering private and toll goods, such as the marketing and distribution of agricultural inputs and specialized information, should be promoted. However, sharing the task of agricultural extension provision with private entities presumes that a private sector exists to take on the responsibility. But in many cases, private sector capacity has been continuously suppressed, so that it is often weak or absent in many developing countries. Consequently, like an infant industry, it may have to be promoted in the initial stages. Indirectly, public cost recovery programs are promoting private sector development through subcontracting arrangements in Chile, Colombia, and Mexico. The government merely functions as the coordinating agency. With this approach, the critical public sector role is the establishment of explicit standards and monitoring of firm operations to ensure that quality standards are met. This strategy, however, should not discriminate against subcontracting to other qualified institutions, such as NGOs.

Encouraging private sector participation in agricultural extension implies promoting private sector investments in general. There is no fixed formula, rather the economic, cultural, social, and political character of the economy will determine the optimal program for the "privatization" process. What is clear is that the private sector will invest only if a favorable economic environment prevails and barriers to entry are eliminated. This requires macroeconomic stability, essential infrastructure, and a functioning legal system. These are "public goods" which governments have to provide.

For public good types of agricultural extension information, enhancing the capacity of the government to determine the appropriate type of information and level of delivery nonetheless remains vital. Where a market for extension services exists, farmer needs and demands will be reflected through the mechanism of prices. But for public information, where the market fails to work, there will still be a need to formulate stronger mechanisms to facilitate farmer articulation of their demands to ensure relevance and efficiency in the implementation of extension programs directed to them. Consultation between farmers and representatives from the public, private, non-governmental, and non-profit sectors needs to be promoted. Indeed, in designing an effective agricultural extension program, regardless of the institutional channel, five major issues have to be resolved: (i) What are the objectives of the extension activities? (ii) Who is the target audience? (iii) What is the content or message? (iv) what method(s) will be most effective to convey this message? (v) How can the activities of various extension sources be coordinated to ensure synergism in the extension effort?

It should be noted, however, that public cost recovery programs should be viewed as a **transitional phase** and are at most a **second-best solution** to solving the undersupply of agricultural extension services resulting from fiscal constraints. An important contribution of cost recovery programs is the development and promotion of a market for agricultural extension services. Extension demand is fostered as farmer attitudes adjust from traditionally receiving services for free to a "fee-paying" system. The expectation that governments will always dole out services is eliminated. At the same time, private sector supply of extension services is stimulated as effective farmer demand expands. An important role of the public sector in this situation is the creation of an enabling environment for the private sector to develop and grow, rather than crowding it out by duplicating its activities. Thus, in addition to provisions for the gradual sharing of responsibility, the groundwork for eventual divestment from the public to the private sector of the cluster of paid services should be factored into the broad plans of cost recovery programs. In the case of New Zealand, for example, the public agency was spun off into a full-fledged private entity after achieving 100 percent cost recovery of its operations. Consequently, the public sector can concentrate on areas where its resources can be most productive, that is, in the provision of

public goods, such as general information and information pertaining to public concerns (i.e. environmental protection and conservation).

Cost recovery (both partial and full) implies that a choice of provider exists. Therefore, some attitude adjustment on the part of the public extension agents will also be necessary. The lessons from the British and New Zealand experiences are quite meaningful. Marketing and selling skills have to be added to the basket of technical skills that extension agents offer and a business orientation instilled to all the agents' activities.

Finally, attitude adjustments are also essential on the part of international donors. There is need for the recognition that other sectors (private, non-governmental, and non-profit sectors) can also play an important role in delivering agricultural extension; this new perspective will be crucial for agricultural and economic progress.



The backbone of all agricultural extension endeavors is the transfer of agricultural information to enhance the productive capacity of farmers. The adoption of new technologies and production approaches in farming activities is becoming crucial for countries in order to meet the challenges of rapidly expanding populations and decreasing availability of agriculturally productive lands. In the beginning of this century, almost all increases in world agricultural output were obtained by bringing new land into production; the few exceptions were in the limited areas of East Asia, Middle East, and Western Europe. But as the low-cost land conversion possibilities are continually exhausted, almost all increases in world agricultural production will have to come from higher output per hectare (Judd *et al.* 1987; Ruttan 1987). This long-term process of shifting from a resource-based to a technology-based system of agriculture underlies the demand and supply of agricultural information. This transition has subsequently placed greater responsibilities on the agricultural extension sector; it is a vital conduit to farmers of the agricultural information and technologies required by the new and continually evolving technology-based agricultural system as well as a conduit back to researchers and policy-makers of farmer problems, needs, and concerns.

Agricultural extension traditionally has referred to the work of a professional body of agricultural experts, often government employees, teaching improved methods of farming, demonstrating innovations, and helping farmers to organize and solve their problems. Extension has also served as a link between farmers to transfer the "best practices" of one farmer to another, and as a channel to introduce -- and sometimes enforce -- agricultural policies. Agricultural extension activities presently encompass a wide range of activities (in the public, private, non-profit, and non-governmental sectors), but the exchange of information continues to be the primary focus of extension activities (Moris 1991, Hayward 1989, Lafourcade 1988).<sup>1</sup>

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<sup>1</sup> When public sector services are referred to, they are meant to include all extension services provided by government regardless of approach. There are extension services working on health, home economics and other issues but this study is limited to agricultural extension.

Agricultural extension economic impact studies have shown the positive effect of extension on technology adoption, farm productivity, and farm profits (Judd *et al.* 1987; Birkhaeuser *et al.* 1991). In a recent review of 47 studies of extension's impact on agriculture, Birkhaeuser *et al.* found "a significant and positive extension effect" in 33 cases.<sup>2</sup> Eight studies in the group which calculated net rates of return displayed highly positive results in nearly all cases, ranging from 14 percent to more than 500 percent. The rates of return to extension varied across countries and commodities, ranging from 13 to 500 percent in Brazil, 75 to 90 percent in Paraguay, 100 to 110 percent in the United States and 14 to 15 percent in two states over two time periods in India. A study of extension returns in Asia, Africa, and Latin America showed returns of between 34 and 80 percent, except for staple crops in Latin America.

In view of the valuable contribution the agricultural extension sector can make to agricultural development, governments have traditionally taken the dominant role in its provision. However, escalating fiscal deficits in both developed and developing countries and in many cases, problems of poor governance of public programs over the last decade have increasingly redirected attention towards how to make extension more cost effective and responsive to specific farmer needs. At the same time, this has generated increased attention towards the potential for the privatization of agricultural extension services. To a large extent, this has been spurred by the strong global trend towards market liberalization and reinforced by the ongoing transition from planned to market economies occurring in Eastern European countries and the newly independent states of the former Soviet Union, which has also sharpened the focus on the appropriate roles of the public and private sectors in the economy.

The privatization of traditionally publicly-provided agricultural services, however, raises several related issues. Will private sector delivery, particularly "fee-for-service" systems, necessarily lead to greater efficiency and equity? What are the social and income distributional implications of privatization, in terms of access to the services by small farmers and the rural poor? What roles can non-

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<sup>2</sup> Birkhaeuser *et al.* (1991), however, noted several methodological problems in the precise measurement of the impact of agricultural extension including accounting for the endogeneity of extension-farmer interactions resulting in an upward bias (i.e. the more innovative farmers will tend to adopt extension advice first), indirect information flows from inter-farmer communications resulting in a downward bias, the influence of location-specific variables, the appropriate designation of the extension variable, and the timing of measurement (early vs late stages). The rates of return to extension are also influenced by factors outside the purview of the agricultural extension sector such as government policies affecting economic incentives and prices and the research sector's success in supplying effective technologies.

profit and non-governmental organizations play in this evolving scenario? Are there potential complementarities among public, private, non-profit, and non-governmental sector activities? How can these linkages be enhanced?

This study uses economic theory to develop a framework for defining the most economically efficient channel for delivering different types of agricultural extension services and thus, the appropriate roles of the public and private sectors in the agricultural extension system. The factors influencing private sector delivery of agricultural extension services are also examined.

The study is divided into five sections. The following section provides an overview of agricultural extension, examining the institutions which play a major role in the agricultural extension sector, in particular, the public, private (agro-processing and marketing firms, input suppliers, farmer associations and consulting or "fee-for-service" firms), non-profit organizations (commodity foundations and universities), government parastatals (commodity boards), and non-governmental organizations. Section 3 develops an economic framework for defining the roles of the public and private sectors and investigates the determinants of private sector participation. Section 4 surveys country level experiences of the various groups of institutions in the extension sector, while section 5 presents the major findings of the study and examines the policy implications of these results in terms of the roles of public, private, non-profit and non-governmental sectors in the agricultural extension system. Finally, case studies highlighting illustrative experiences in public cost recovery in the United Kingdom, the privatization of the public extension service in Chile, the stratification of public sector extension beneficiaries in Mexico, the establishment of farmer circles in Norway, NGO extension activities in Pakistan, and farmer association extension services in Bolivia and India are presented in Appendix A.



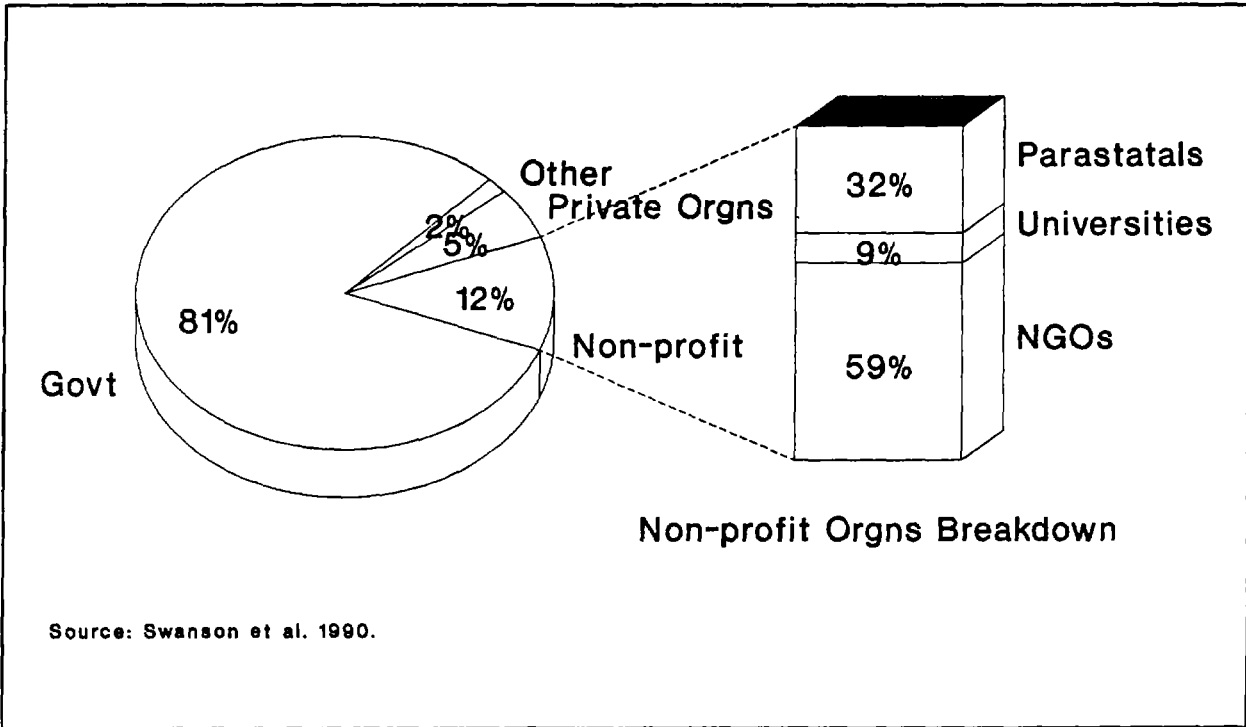
The increased dependence on science-based agriculture, bolstered by the rapid agricultural technological advances in the last half century, has placed greater importance on the rapid and efficient transfer of these advanced knowledge to farmers. Farmers' decisions regarding technology choice and resource allocations are based on their stock of knowledge. Farmers and society in general will benefit from farmers' access to and adoption of improved information (either pure or embodied in new technologies) because it is likely to result in increased productivity and possibly other benefits, such as improved nutrition. Moreover, rapid advances achieved in the electronic and communication technology fields have further accelerated and expanded the avenues for information transmission. This section gives a broad overview of the range of extension institutions (governments, non-profit organizations, and private enterprises), the size of their human resource and financial investments, their motivation for undertaking extension activities and the traditional and newly emerging channels used for the delivery of extension services.

## **AGRICULTURAL EXTENSION SYSTEMS: A GLOBAL PERSPECTIVE**

FAO conducted a survey of agricultural extension organizations in 1988-1989. It included 207 institutions in 113 countries and is the most recent comprehensive study of agricultural extension institutions worldwide. Although the conclusions derived from this study are based on the responses received from a limited number participating countries, the summary indicators estimated shed a little light on the global structure of the extension sector.

The FAO survey confirms the highly dominant role the public sector plays in the agricultural extension sector. Approximately 81 percent of the extension work around the world is conducted through a ministry or department of agriculture, at the national, state, or provincial level (Swanson *et al.* 1990) (Figure 2.1). FAO estimates that in 1988, more than \$6 billion were invested by

Figure 2.1: Distribution of Extension Organizations Based on FAO Survey of 113 Countries.



public agricultural extension agencies worldwide, averaging \$8,500 per extension worker.<sup>3</sup> This level of investments translates into approximately \$5 spent annually on extension services for each economically active adult working in agriculture worldwide. The annual level of expenditure ranged from \$2-3 per farmer in low-income countries to an average of about \$65 per farmer in high-income countries (FAO 1990).

Based on the responses to the survey, universities, parastatals, and non-governmental organizations comprised about 12 percent of the institutions involved in extension, while private sector institutions comprised about 5 percent (Swanson *et al.* 1990). The number of extension organizations by geographic region is presented in Table 2.1. The Latin American, Asian, and the Pacific regions exhibit greater diversity in institutions providing agricultural extension than the other regions. Fifty percent of these organizations was established or reorganized in the last two decades. In many developing countries,

<sup>3</sup> The FAO survey estimated that in 1988, 29 countries in Africa spent \$400 million in agricultural extension, 25 countries in Asia and the Pacific \$2.9 billion, 4 countries in Europe \$195 million, 24 countries in Latin America \$287 million, North America (United States) \$364 million and 15 countries in the Near East \$475 million (Swanson *et al.* 1990). All dollar values are in US dollars.

**Table 2.1: Number of Extension Organizations by Geographic Region Based on the FAO Survey of 113 Countries, 1989.**

AGENCY	R E G I O N						World
	Africa	Asia & Pacific	Europe	Latin America <sup>a</sup>	North America	Near East	
Ministry of Agriculture: <sup>b</sup>							
1) General	8	12	5	8	2	10	45
2) Mainly T&V	38	16	2	11	3	16	76
3) IADP	7	1	1	7	--	2	18
4) MRD-IRDP	6	1	1	7	--	--	15
Universities	--	2	--	--	1	--	3
Commodity Orgns <sup>c</sup>	4	1	--	4	--	--	9
Farmer Orgns	--	1	3	2	--	3	9
Other <sup>d</sup>	1	1	2	9	--	3	16
<b>Total</b>	<b>64</b>	<b>35</b>	<b>14</b>	<b>48</b>	<b>6</b>	<b>24</b>	<b>191</b>

N missing = 16

<sup>a</sup> Includes the Central America and the Caribbean.

<sup>b</sup> The ministry of agriculture (MOA) extension activities is classified according to the predominant approach: general - multiple approaches to extension being utilized; mainly T&V - Training & Visit extension is the predominant approach utilized, IADP - integrated agricultural development program, generally organized by the MOA or rural development at the regional or provincial level; MRD-IRDP - integrated rural development program generally organized by a ministry or department of rural development (MRD) at the regional or provincial level, generally having a broader focus than an IADP (includes health, nutrition, community organization, rural infrastructure development, and agricultural development programs).

<sup>c</sup> Commodity organizations include both parastatal and private production organizations (such as the Federated Coffee Growers of Colombia) that limit their technology transfer efforts to one crop, generally in an ecologically contiguous area.

<sup>d</sup> Other includes non-governmental organizations that provide a variety of extension services, especially to small and marginal groups of farmers.

Source: Swanson *et al.* 1990.

the efforts to establish extension systems in the late 1950s and early 1960s did not fully succeed and some

of these earlier organizations were reestablished in recent years. This trend is explained in part by the renewed interests of the donor community in agricultural extension.<sup>4</sup>

There were approximately 550,000 extension workers in the 108 countries that responded to the survey (Swanson *et al.* 1990) (Table 2.2).<sup>5</sup> Asia and the Pacific accounted for more than 70 percent of all extension workers included in the study. The People's Republic of China reported a total number of 193,000 extension workers, which accounts for 36 percent of all extension workers. More than 90 percent of the personnel included in the study were employed by ministry-based organizations. Universities accounted for 5.2 percent, parastatals 0.7 percent, non-governmental organizations 0.3 percent and the private sector 2.1 percent.

While these statistics provide a broad picture of the agricultural extension landscape, they fail to capture the character and existing linkages among the various participants in the agricultural extension system. The following section reviews the different actors in the system and describes briefly the nature of their activities.

### **MAJOR ACTORS IN THE AGRICULTURAL EXTENSION SYSTEM**

There are a wide range of suppliers of agricultural extension services: the public sector (as represented by Ministries/Departments of Agriculture), non-governmental organizations, non-profit organizations (e.g. universities and commodity foundations), international research centers, and the private sector. The private sector may include: (i) farmer associations whose membership is organized by locality or commodity; (ii) private production and marketing firms such as input manufacturers and distributors, agro-marketing and processing firms, and trade associations; and (3) private consulting and media companies (publishing and telecommunications firms). Figure 2.2 traces the nature of information flows and linkages among the different participants. In addition, farmers can be both consumers and suppliers of agricultural information.

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<sup>4</sup>The World Bank is one of the largest donors for agricultural extension in developing countries; for the period 1964 to 1988, the World Bank lent \$2.06 billion for extension components in 512 projects in 79 countries (World Bank 1990). The United States Agency for International Development (USAID) was involved in 1,065 projects with some extension activities between 1975 and 1984. For the period 1975 to 1985, USAID investments in extension averaged \$80 to \$90 million annually declining to \$20 to 25 million during the period 1986 to 1989 (Cummings 1990). Between 1980 and 1986, FAO was involved in more than 500 field projects dealing exclusively or in part with extension in 70 countries with investments totaling almost \$25 million (FAO 1989; Kimmel 1990).

<sup>5</sup>These results were based on responses from 167 institutions, 40 institutions did not respond.



**Table 2.2:** Total Number of Extension Personnel Differentiated by Region and Type of Position in 1988.

TYPE OF STAFF	R E G I O N						Total
	Africa	Asia & Pacific	Europe	Latin America	North America	Near East	
Administrative Staff	2,390	20,358	535	2,711	835	3,008	29,837
Subj. Matter Specialist	6,966	36,742	2,620	4,089	4,701	4,015	59,133
Field Staff	43,447	224,875	9,276	24,350	9,736	19,857	331,541
Undefined Staff	6,155	108,772	2,067	1,815	2	2,811	121,622
Total	58,598	390,747	14,498	32,965	15,274	29,691	542,330
N =	30	27	10	23	3	15	108

Note: Data received from the US were reported in full-time equivalents for some categories of staff.

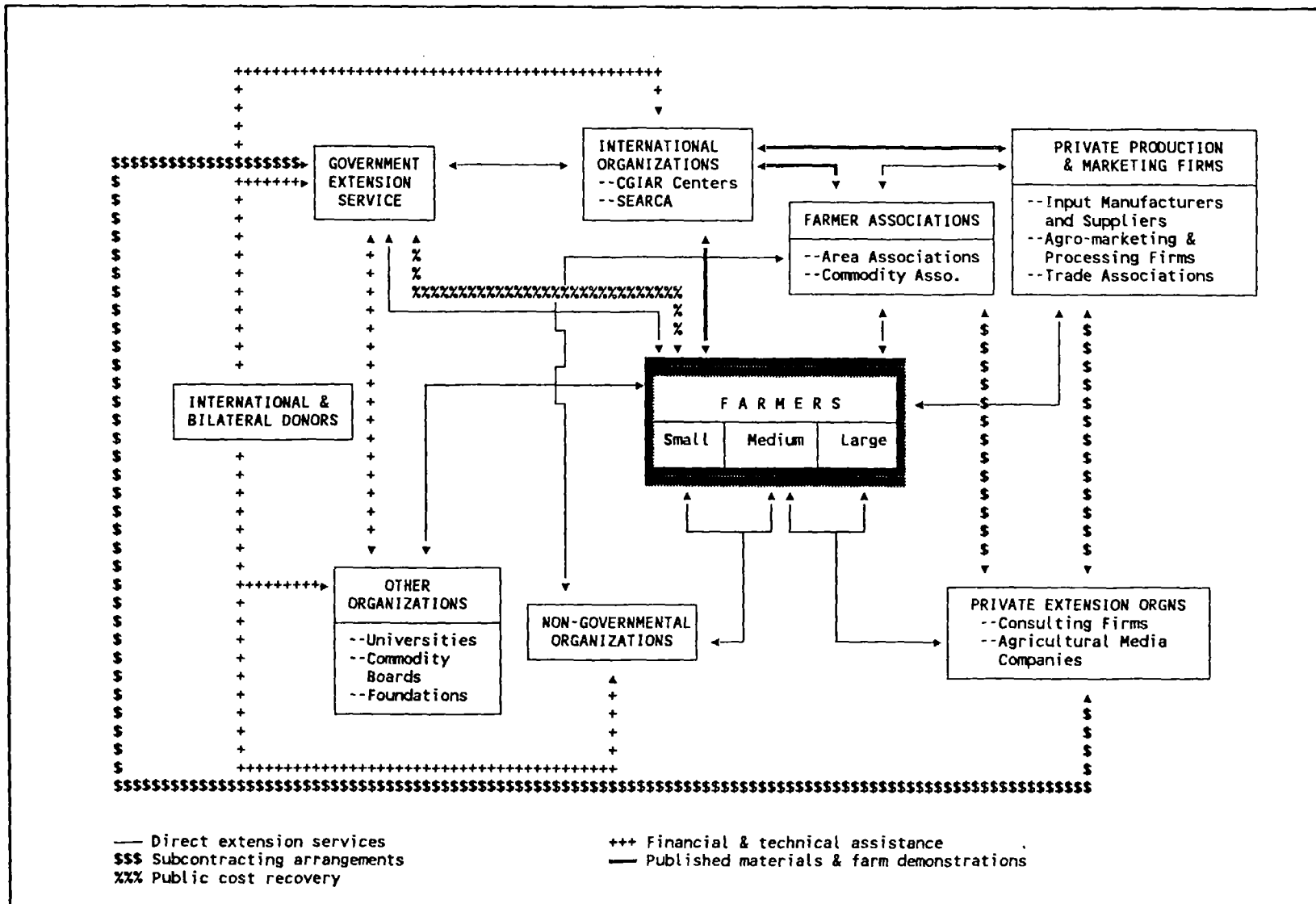
Source: Swanson *et al.* 1990.

As noted earlier, historically, agricultural extension services were primarily delivered by public sector agencies. Organized informally in the 19th century in several industrializing countries around the world, agricultural extension became formalized within public institutions by the end of the same century. In most countries, agricultural extension did not become institutionalized until the 1950s (World Bank 1990a; Rivera 1991).<sup>6</sup> Several countries which gained independence in the post World War II period viewed agricultural extension services as essential for promoting agricultural growth and the enhancement of the use of modern inputs necessary to support government import substitution and industrialization policies. Thus, agricultural ministries were reorganized to include extension units (Prawl, Medlin and Gross 1984).

The growing commercialization of agriculture in many countries and the extensive criticisms directed towards public agricultural extension systems in industrialized, middle-income, and developing countries in the 1980s both contributed significantly to the transformation of the agricultural

<sup>6</sup> Japan in 1893 was the first country to establish by formal policy mandate a national agricultural extension system, followed in 1914 by the United States. The national agricultural extension systems in the United Kingdom was established in 1946, Israel in 1948, India and Pakistan in 1952, the United Arab Republic and the Netherlands in 1953, Nigeria in 1954, Taiwan in 1955, Brazil in 1956 and Belgium in 1957 (Rivera 1991).

Figure 2.2: Major Actors in the Agricultural Extension System and their Channels of Delivery



extension sector. As Rivera (1991, p. 5) notes, "Public sector extension [in the 1980s] was criticized for not doing enough, not doing it well, and for not being relevant." Such "government failures" were attributed to bureaucratic inefficiencies and poor formulation and/or implementation of extension programs, with the result that public agricultural extension programs frequently performed poorly, were inadequately funded, and/or lacked a coherent linkage with its clients (farmers) and with its "information suppliers" (the research sector). Moreover, donor unwillingness in the 1980s to fund and subsidize large-scale public sector recurrent expenditures such as extension services resulted in further underfinancing, staffing shortages, and contraction of extension services in many developing countries (Amanor and Farrington 1991).

In response to these budgetary difficulties, some countries have initiated cost recovery strategies to recoup the cost of operations of public agricultural extension agencies, reorganized their extension units as public corporations, or in some extreme cases, privatized their whole operations altogether (Baxter 1987; Hercus 1991; Le Gouis 1991; Wilson 1991; Harter and Hass 1992). At the same time, there has been continued growth in private sector participation, increased involvement of non-governmental organizations, and an emergence of new types of linkages among the public, private, non-profit and non-governmental sectors and within the private sector.

**Private agribusiness firms** are domestic or international companies which sell agricultural inputs or purchase, process and/or market agro-based output. Input suppliers provide information as a component of their marketing strategy and usually focus exclusively on the use of their respective products. Agro-processing and marketing firms provide agricultural extension services to their farmer suppliers as a means of reducing input supply risks, particularly to ensure the volume, quality, and timing of supply. They may also provide information about the appropriateness or the range of uses of their products to their customers as part of their advertizing campaigns to expand or protect their market shares.

**Private consulting businesses** are growing in strength in many countries. Their growth is driven by the expanding demand of farmers requiring more sophisticated and technically specialized agricultural information and technologies. Subcontracting of services by government extension agencies,

farmers' associations, individual farmers, and agro-processing and marketing firms to private consulting agencies has fostered their development as well.

**Farmers' associations** are traditionally organized around specific agricultural functions (e.g. production, input supply, marketing, advocacy) and/or commodities (e.g. food, livestock, credit) and extension is frequently one of the multiple services they provide. Frequently, these associations are both consumers and suppliers of extension services. Government extension activities are often channeled through the associations. But these associations may also employ their own extension staff or hire the services of private consultants. They may send their own members for training and have them return to disseminate information to their members.

**Academic institutions** (universities, vocational and technical institutes) play a number of roles related to extension that are important to both the public and private sectors. While these institutions are non-profit organizations, they may be funded by the public or by domestic or international private sectors, NGOs, or donor organizations. Academic institutions may have extension programs of their own for the surrounding community, or they may be primarily involved in training people to work in the extension sector. At the same time, they play an important role in training current and future farmers, building their capacity to absorb the new information and technologies. As Byerlee (1987, pp. 38 - 39) notes, "the cost of extension should be significantly reduced by competencies in literacy, numeracy, and cognitive skills imparted through schooling. Better educated farmers can exploit a wider range of information sources." These institutions for higher learning are also one of the primary sources of research output (basic and applied) which is disseminated to farmers via the extension system.

Some **commodity boards** have also played a significant role in providing extension services to their farmer members. To a large extent, the direct involvement of these agencies (often government parastatals) in purchasing farmer produce enable them to take an active role in extension, since they are able to reward compliance from farmers by paying better prices where applicable. In some instances, their regulatory role enables these agencies to force the adoption of preferred production or marketing practices (Narayanan 1991). Some problems, such as political pressure to hire large numbers of low level staff leading to budgetary difficulties, lack of accountability, and poor work norms, however, have weakened the extension programs of these Boards (Moris 1991).

**Agricultural foundations**, as differentiated from commodity boards, are also gaining wide acceptance in many countries. They are independent institutions established primarily for the purpose of coordinating and funding research and extension in specific commodities or agriculture in general. Some foundations may also directly conduct research and extension (technology transfer) activities. They have generally been funded by international and local donors, supplemented by transfers from the government treasury (Coutu and O'Donnell 1991).

**Non-governmental organizations (NGOs)**, local, national or international, are non-profit organizations becoming increasingly involved in agricultural extension activities. Some NGOs provide services directly to their clientele (service providers), while others offer training, research and technical assistance to other NGOs or key individuals or focus on support and advocacy. Their extension activities often target small- and medium-scale farmers and areas not reached by public sector extension services (Amanor and Farrington 1991). They also tend to operate at small-scale levels in specific regional areas and perform research and extension/technology transfer functions together.

The agricultural extension sector covers a broad range of activities and institutions pursuing different objectives. The following section develops an economic framework to analyze the incentive structures which influence the participation of these institutions in delivering the different types of agricultural extension information.



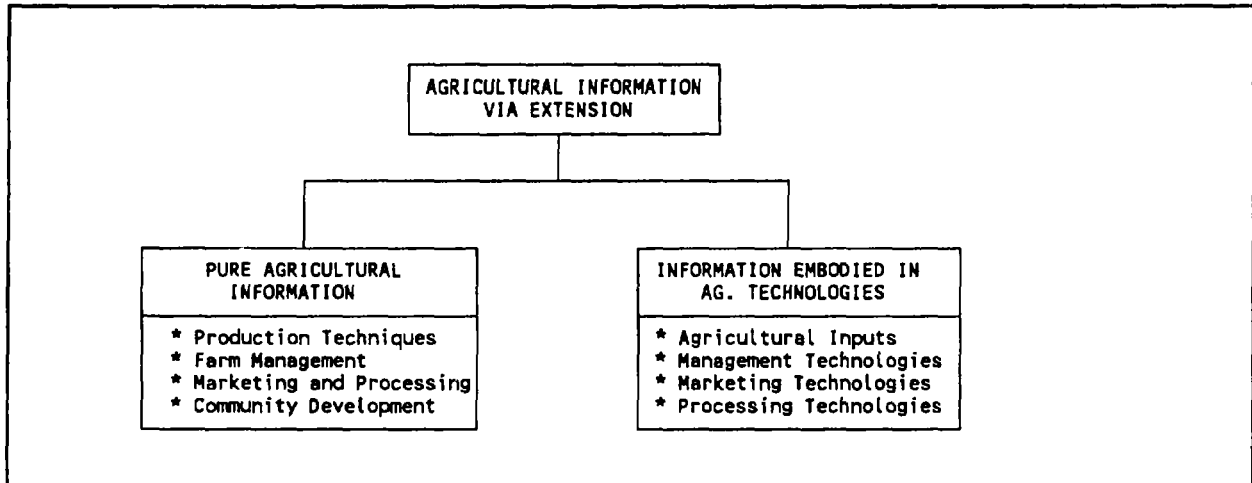
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Public and private sector participation in the agricultural extension system is driven by different sets of motives. Private sector investments in agricultural extension are largely determined by the economic returns from the activity. Public sector involvement is also largely governed by efficiency considerations, but social and distributional objectives may be given substantial weight as well. The next section discusses the types and characteristics of information flowing through the extension system. A brief overview of economic principles which define the economic incentives faced by the public and private sectors in the delivery of agricultural extension follows, from which a more concrete economic framework for determining the appropriate roles of the public and private sectors is developed. Finally, the determinants of private sector participation in the agricultural extension system are examined.

## **NATURE OF AGRICULTURAL INFORMATION**

Agricultural information transmitted to and from farmers via the agricultural extension system can be classified into two broad groups: pure agricultural information and agricultural information inherently tied to new physical inventions (Figure 3.1). Pure agricultural information refers to any information which can be used without the acquisition of a specific physical technology. It includes all types of self-standing advice on practices in four main areas: (i) cultural and production techniques (e.g. timing of land preparation, planting and harvesting, optimal input use, animal husbandry and livestock health, crop protection, and farm building and design), (ii) farm management (e.g. record keeping, farm budgeting, financial and organizational management, and legal issues), (iii) marketing and processing information (e.g. prices, market options, storage procedures, packaging techniques, transport, and international standards for quality and phytosanitary requirements); and (iv) community development (e.g. the organization of farmers' associations).

Agricultural inventions or technologies generally come in the form of: (i) inputs to farm production (e.g. new agricultural machinery, agricultural chemicals, seeds, livestock breeds, and livestock supplies and pharmaceuticals); (ii) technologies facilitating farm management (e.g. electronic,

**Figure 3.1: Types of Agricultural Information Transferred through Extension.**

telecommunications and laboratory equipment and computers and computer software ); and (iii) marketing and processing equipment (e.g. drying, milling, storage, and packaging technologies). These technologies have often been promoted as a package, including credit and technical assistance; the frequently cited examples of which are the Green Revolution technological packages of high yielding crop varieties (rice or wheat), irrigation water, credit, fertilizers, pesticides, and extension. At the same time, the agricultural extension system serves as the channel for the reverse flow of agricultural information. It transmits to researchers and policy makers information about the nature of farmer problems, constraints, and needs that help shape the nature and structure of future research and technological development.

Traditionally, agricultural extension information was transmitted to the farmers and other clients via an extension agent. However, rapid advances in the communication and electronic industries have also spilled over to the agricultural extension system, offering additional options for the mass communication of new agricultural information. For example, the use of television, telefax, video, computer, and satellite technologies has tremendously increased the speed, coverage, and quality of information transmission. These new technologies have begun to change the manner in which agricultural extension services are delivered in several countries (Baxter 1989; Westermarck 1991; Wete 1991; Mody 1992). The specific uses of these technologies for agricultural extension purposes in various countries are elaborated further in Section 4.

## **PUBLIC AND PRIVATE GOODS**

Welfare economics provide the analytical framework for examining the public and private



good characteristics of agricultural information and in determining the efficiency of market forces. The principles of excludability and subtractability determine whether a good or service is closer to being public or private. Excludability applies when access is denied to those who have not paid for the product, while subtractability (or rivalry) applies when one person's use or consumption of a good or service reduces its availability to others (Feldman 1980; Musgrave and Musgrave 1989; Kessides 1992).

A pure **private good** is characterized by high subtractability and excludability. An example of a pure private good is an apple, its consumption provides satisfaction exclusively to the individual who paid for and is consuming it. The high subtractability and excludability characteristics of particular commodities enable private firms to capture reasonable returns on their investments, and given competitive markets, to supply the goods at optimal levels. A pure **public good**, on the other hand, has low excludability and subtractability: if it is available to one person, it is available to all. Common examples are clean air and national defense. Therefore, private firms will find it unprofitable to supply public goods, because it is difficult to restrict use only to people who pay for them (also known as the "free rider" problem). Therefore, it will be up to governments to produce or finance the delivery of these goods, while using their powers of taxation to force all beneficiaries to pay for them.

In between the two extremes of purely private and purely public goods are toll goods and common pool goods. **Toll goods** are characterized by excludability, but low subtractability. An example of a toll good is that of a coded TV broadcast. These cannot be received without a special decoder and this precludes the people who do not pay for the service from enjoying them, but an additional decoder does not diminish other's consumption. For toll goods, the ability to exclude those who have not paid for the service and therefore enables the returns from the activity to be appropriated, provides incentives for private provision. Public regulation, however, will be necessary in terms of establishing property rights, conditions of competition, and pricing of and/or quality standards for the toll services, if concerns exist regarding market power, the equitable access by consumers, or the optimal provision of the service. **Common pool goods** are subtractable but have low feasibility of exclusion. An example is that of a lake. As the number of people sailing in the lake increases, the more congested and difficult it is to move around, but at the same time, it is difficult to prevent other boaters from using it. Common pool goods will be supplied by the private sector provided property rights can be established through government regulation or other mechanisms, such as intellectual property legislation. However, because non-payers

cannot be excluded, indirect financing through the budgetary mechanisms (public subsidies) may be necessary. If property rights cannot be established, public provision or financing will be necessary to raise consumption to optimal levels (Kessides 1992).

## **EXTERNALITIES**

**Externalities** (also called spillovers or third party effects) arise when an individual's actions also affect others. A positive externality arises when the services provided (or consumed) by an individual, also benefits or spills over to others who have not paid for the service. A negative externality, on the other hand, arises when the services provided (or consumed) by an individual spills over and causes harm or injury to others. In both cases, the market does not provide the mechanism for collecting payment from the other people who benefitted or compensation enforced on behalf of the injured parties (Pigou 1932, Head 1974). A farmer vaccinating his/her animals against infectious diseases also reduces the risk of disease transmission to his neighbor's animals, thus resulting in a positive externality. On the other hand, acrid smoke billowing into a community from a nearby smokestack is an example of a negative externality. Unlike a public good, these incidental services need not be identical in nature or quantity to the service for which the payment is made. Typically, individuals causing the externality will not take the positive or negative effects of their actions into consideration when deciding what levels of services they should produce or consume; thus, either too little (in case of positive externalities) or too much (in the case of negative externalities) is produced or consumed.

Externalities imply a divergence between the private and social (public) benefits or private and social costs resulting from specific activities. Therefore, internalizing externalities requires measures that will incorporate the benefits or costs of the incidental services back into the decision-making process, and thus equate the private and social benefits and costs. In situations where property rights are well-defined, the individual causing the externality and the individual(s) affected by the externality can negotiate among themselves for appropriate compensation for the incidental services (Coase 1960). Often, it becomes the responsibility of the state to impose taxes on agents causing the negative externalities to account for the real social costs of their decisions or to provide subsidies to agents producing positive externalities to reflect the social benefits arising from their actions and thus insure socially optimal supply (Head 1974). The state may also regulate activities that embody externalities (e.g. the imposition of quotas); in cases of extreme externalities, the interests of the public may require that the state assume absolute control of the activity.

## **MORAL HAZARD PROBLEMS**

**Moral hazard problems** arise because of asymmetry of information. Consumers are unaware or are unable to assess visibly and directly the quality of the product they are purchasing: for example, the difference between useful or harmful information. This creates incentives for suppliers to pass on substandard products to consumers who are unable to tell the difference at the time of purchase. Moral hazard problems can be overcome through effective regulation, whether by the public sector or through self-policing mechanisms by private sector.<sup>7</sup>

## **INFANT INDUSTRY PROMOTION**

**Infant industry promotion** is based on the premise that the production of some goods and services is subject to economies of time. **Economies of time** result in falling costs over time, due to factors such as the accumulation of experience and knowledge or as a result of the combined effects of increasing market demand over time in the presence of economies of scale (**economies of scale** result in falling costs as output increases due to a large proportion of fixed costs). Economies of time are characteristics that may justify government subsidization of particular industries in their initial stages, because a firm may be uncompetitive in the initial stages of its operational life, but may show clear evidence of profitability in the long-term (Corden 1974).

## **ECONOMIC CLASSIFICATION OF AGRICULTURAL INFORMATION**

### **Agricultural Technologies**

The types of agricultural information discussed in the previous section occupy different points in the public-private good spectrum (Figure 3.2). For modern technologies, such as agricultural machinery, agricultural chemicals, hybrid seeds and livestock, veterinary supplies and pharmaceuticals, agricultural information is embodied in the invention. Thus, they are classified as private goods because of their high subtractability and excludability. The nature of some of these technologies<sup>8</sup> and/or the utilization of legal protective mechanisms provide a high degree of excludability and therefore

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<sup>7</sup>Blankart (1987) suggests that markets can develop devices to overcome the deficiency of quality uncertainty. For such goods, which he refers to as "experience goods," the customers can extrapolate their experiences of previous transactions, and the suppliers accumulate goodwill in order not to disappoint the consumer's expectations. Brand loyalty developed through guaranteed quality of products is an example.

<sup>8</sup> For example, the nature of hybrid seeds allows the breeder to prevent access by other scientists to the inbred lines. Similarly, the formulation of some agricultural chemicals can be withheld from other researchers.

**Figure 3.2: Economic Classification of Agricultural Information/Technologies Transferred via Extension.**

		Excludability	
		Low	High
Subtractability	Low	<b>Public Goods</b> General Ag. Information (LT) Mass Communication of Ag. Information (prices, pest popn)	<b>Toll Goods</b> General Ag. Information (ST): --Cultural and Production Practices, Farm Management, Marketing & Processing  Specialized Ag. Information: --Cultural and Production Practices, Farm Management, Marketing & Processing
	High	<b>Common Pool Goods</b> Modern Technologies: --Self-pollinated Seeds (LT)	<b>Private Goods</b> Modern Technologies: --Ag. Machinery, Ag. Chemicals*, Hybrid Seeds, Self-pollinated Seeds (ST), Biotechnology Products*, Vet. Supplies & Pharmaceuticals*

\* use may involve externalities  
 ST - short term  
 LT - long term

appropriability of returns in the production and distribution of these products. Some examples of legal mechanisms which private firms utilize include: seed and breed certifications, copyrights, trade secret enforcement, patents, utility models, inventor's certificates, and plant variety protection (Umali 1992). Because they are private goods, private firms have the incentive to supply these technologies and the supporting technical information that accompanies the use of these products to all types of farmers at socially optimal levels (Table 3.1).

There are, however, moral hazard problems associated with the use of some of these technologies. For example, it may be difficult to visibly assess the difference between a good or bad seed, between an effective or ineffective livestock pharmaceutical drug, or between an adulterated or pure agricultural chemical. Firms by themselves may enforce quality control to maintain brand loyalty or trade

associations may enforce quality standards. However, when these measures are absent or are only weakly enforced, it becomes necessary for the public sector to intervene by setting up and enforcing the regulatory standards.

The use of some of these technologies, such as agricultural chemicals, pheromones, veterinary pharmaceuticals, and genetically engineered products (e.g. sterile insects), also involves externalities. A farmer's use of a veterinary drug or vaccine results in positive externalities, because it reduces the risk of livestock disease transmission to neighboring animals (Umali *et al.* 1992). The release of sterile insects, for example sterile fruit flies, to control their multiplication, benefits commercial fruit growers, but also benefits residential tree owners. At the same time, the effectiveness of this pest control approach will depend on the control of the insect population in the both commercial and residential areas. On the other hand, pesticide pollution, pest resistance, human health hazards, and the development of secondary pests are negative externalities associated with pesticide use.

Markets may develop their own mechanisms to account for these externalities. In the case of negative externalities associated with pesticide use, improving technologies in detecting pesticide residues in food, expanded information technologies, and research on the linkages between exposure to toxic materials and human health have all contributed to changing consumer preferences. The change in consumer preferences is subsequently reflected by premiums consumers are willing to pay for organically produced pesticide-free produce (Phipps, 1989). These price signals then serve as one factor among many directing private research and extension investments.

When the functioning of the market does not allow for the internalization of externalities, it becomes necessary for the public sector to intervene. Intervention generally takes the form of industry regulation and strict product standards in the case of negative externalities. These include safety tests such as residue analysis, animal feeding, environmental fate and crop injury tests for approval prior to entering the market, and the levying of penalties on firms responsible for negative externalities (Carlson, 1989).

In the case of positive externalities, channelling the product or service through client organizations (e.g. farmer associations, commodity boards or commodity foundations) may provide for

Table 3.1: Sectoral Channel of Delivery of Different Agricultural Extension Products.

Type of Agricultural Extension Product	Public			Private	
	Provision	Financing	Regulation	Primary Task	Secondary Task
General ag. information	XX	XX	XX		C
Specialized ag. information			XX	XX	C
Ag. technology diffusion			XX	XX	C
*Self-pollinated seeds	S	S	XX	XX	

Note: XX - economically justified; C - extension provided to complement another major activity;  
S - economically justified only under special circumstances.

the internalization of these externalities. These institutions, in consultation with their members, determine the level of services needed and charge farmer members accordingly for the services provided. In cases where such mechanisms do not exist, governments have to intervene by providing subsidies to users where necessary to increase usage to socially optimal levels.

**Special Cases.** Self-pollinated seeds are private goods only in the short term, that is, in the introductory phase (Figure 3.1). Although self-pollinated seeds are highly subtractable, their ease of replicability makes exclusion extremely difficult and costly. For example, wheat and rice farmers ordinarily do not buy new seeds every season, but rather set aside part of their harvest for use as seeds. Often, these can be also passed on to relatives and neighbors at minimal or no charge. Therefore, in the medium- and long-term, self-pollinated seeds become common pool goods. Private firms supplying these seeds, therefore, have to compete with farmer seed retention and sales, resulting in very low or negligible profit margins. Consequently, only relatively small and localized private firms with low overhead costs and producing consistently high quality seeds may be expected to earn adequate profits from supplying farmers with replacement seeds (Jaffee and Srivastava 1992). The size of the market and efficiency of operations, therefore, determine private sector participation in self-pollinated seed supply activities (Table 3.1). If these conditions are not met, these seeds (e.g. staples) will not be privately supplied and the task of providing them will have to be undertaken by non-private channels--that is, the public, non-profit, or non-governmental sectors.<sup>9</sup>

<sup>9</sup>Refer to Jaffee and Srivastava (1992) for more detailed discussions of policy issues pertaining to the public and private sector roles in seed system development.

### **General Agricultural Information**

General agricultural information designed to improve existing cultural and production practices, farm management, or marketing and processing activities which are provided to farmers by means of traditional extension approaches, such as personal contact with extension agents, lectures and seminars, training and farm demonstrations, and direct conversations are toll goods in the short term (Figure 3.1). While the information delivered to farmer participants does not reduce the availability of the same information to others, attendance in the extension venues is constrained by the facilities and infrastructure and the time it takes for word of mouth to reach a critical mass of interested farmers. For example, lecture halls, demonstration fields, and classrooms have fixed capacities. In the long term, however, the diffusive nature of general information transforms it into a public good. The speed of diffusion of the information determines its degree of excludability; if information diffuses rapidly, there is an incentive for farmers not to pay for the information and simply free-ride by asking their neighbors or friends about it. Because of the limited possibilities to charge fees from the direct provision of the information and thus earn reasonable profits, private enterprises will have little or no incentive to provide such services. Similarly, general agricultural information transferred via mass communication channels (public broadcasts, public distribution of published material) by virtue of the medium is a public good. Because of the public good character of general information, its delivery will have to remain a public or non-private responsibility (Table 3.1).

**Special Cases.** The private sector will provide extension pertaining to general production, cultivation, marketing and/or processing, despite being a public good (in the long term), in some special circumstances (Table 3.1). **Private agro-processing and marketing firms** will undertake extension activities when the reduction in input supply and/or quality risks and therefore production costs is greater than the cost of undertaking the extension program. Such backward integration strategies are usually pursued by agro-marketing and processing firms (e.g. fruit canning or vegetable exporting companies) to ensure the volume, quality and timing of their supply of agricultural product inputs. The extension service may be provided as part of a technology package (the components of which may vary from firm to firm) supplied to farmers under a contract farming arrangement, with the condition that the farm output is sold to the agribusiness firm. In other cases, private firms account for the cost of the extension services in price discounts on the products delivered for sale. Private firms may also provide information to their customers about the appropriateness or range of uses of their products as part of their advertising.

campaigns to expand or protect their market shares. Indeed, if the extension activity only provides pure information, the private firm may take advantage of the rapid diffusion of the new information to other potential input suppliers or customers through inter-personal interaction, since it expands information coverage at no cost to the firm.

**Farmers associations** (cooperatives and farmers groups) may serve as an effective mechanism for overcoming the "free rider" problem associated with providing public goods such as general agricultural information to their members. Through membership fees and other charges, the associations are able to recoup the costs of the information. Their large membership also provides a mechanism for taking advantage of economies of scale associated with the delivery of agricultural information.

### **Specialized Information**

As farm operations become highly commercialized and farmer agricultural technology needs become technically advanced, the corresponding extension services needed to support these activities also become highly specific. Such specialization lends excludability to the information and therefore, the extension activity. For example, the results of a soil analysis, the formulation of computer programs to facilitate farm operations, analysis and formulation of feeds, planning of on-farm irrigation or farm accounting systems, identification of export market opportunities, and legal representation, including trouble-shooting activities, are all client- and situation-specific. Such information may not be useful to other farmers, and even if it is, the clients may reserve the information for their exclusive use and not transmit them freely to others, slowing the diffusion process. These characteristics qualify specialized information as a toll good and provide adequate economic incentives for the private sector to supply them at optimal levels (Table 3.1).

There are also moral hazard problems associated with the dissemination of agricultural information. Unless the private "fee for services" extension industry can effectively police itself to ensure the quality of the information communicated, public intervention will be necessary, such as the establishment and enforcement of guidelines for competitive operations and quality of services rendered.

### **DETERMINANTS OF FARMER DEMAND FOR "FEE-FOR-SERVICE" EXTENSION**

Farmer demand for agricultural extension services depends upon the expected net



benefits from the investment in the new information. Strong market competition associated with dealing with highly tradable commodities will further enhance effective demand for new information, since the new information and technologies may provide the "competitive edge." Farmer demand for agricultural extension services will vary with the type of farmer. A distinction can be made between "subsistence farmers", "small farmers" or farmers with small marketable output value and "medium and large farmers" or farmers with medium and large marketable output value in terms of their potential demand for agricultural extension services.<sup>10</sup> Given that a fixed or negotiated fee is paid for the extension information, medium and large farmers can "spread the cost", resulting in lower per unit cost of extension, which increases the affordability of the service. Consequently, they will have greater potential demand for "fee for service" extension. In the case of small farmers, their small marketable output value results in higher per unit cost of extension service, making it less profitable or unprofitable to pay for the extension service. For subsistence farmers, unless they have the desire and capacity to convert to commercialized farming (producing a surplus for the market), they will have limited or no incentive to pay for extension services.

A major implication of such a shift in classification of information from a "free good" to a "purchased good" is that the demand for paid agricultural extension services will exclusively emanate from commercialized farming operations, particularly from medium and large farmers. Areas which are dominated by "medium" and "large" farms will therefore be more capable of sustaining a "fee-for-service" agricultural extension business. Moreover, these farmers are generally located in more productive areas with access to essential infrastructure, which further enhances the profitability of their operations. Conversely, areas which are predominantly composed of "small" and "subsistence" farmers will tend to be neglected by the private sector because of the limited or absence of demand.

There are mechanisms, such as farmer associations, however, which can provide the opportunity for farmers to take advantage of the economies of scale with respect to the "purchase" of the relevant specialized information. The association may employ part-time or full time staff to provide extension information or hire out to consulting firms for their extension needs. Another approach is to stratify the client market and as an "extension safety net" have public sector extension resources targeted towards small farmers, while graduating larger-scale farmer to fee-for-service extension. But public

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<sup>10</sup> "Medium" and "Large" farms also include farms with small land area, but producing high value crops.

sector provision or financing remains essential for farmers, regardless of farm size, if the information pertains to public concerns such as environmental protection or natural resource conservation.

While farmer adoption of new techniques and technologies can influence farm profitability, it is also determined by several other factors, including farm size and land quality, input and output prices, access to credit, output markets and information, land tenure arrangements, availability of inputs and infrastructure, favorable government policies, degree of risk aversion and level of human capital. Numerous studies have found that constraints imposed by these factors have discouraged technology adoption (Feder, Just and Zilberman 1985; Feder and Umali 1992). Often, the majority of these small farmers are also generally located in remote, underdeveloped, unfavorable areas, where it is unprofitable for the private sector to conduct business. The question therefore arises as to whether public resources will be better invested in relieving these constraints. Such government intervention may include the provision of the necessary infrastructure, improving access to credit, and promoting the growth of input and output markets. A key government role is to provide an enabling environment so that the relatively resource-poor farmers are able to achieve profitable production and thus create the incentive to adopt and therefore the demand from farmers for the new techniques and technologies proposed through the agricultural extension system.

#### **DETERMINANTS OF PRIVATE SUPPLY OF AGRICULTURAL EXTENSION SERVICES**

Private enterprises will supply a particular agricultural extension service only if reasonable returns (directly or indirectly) can be captured by the firm. Table 3.2 summarizes the conditions under which this will occur. Input suppliers will provide complementary informational extension services as part of the technology sale to promote the product, ensure the product's proper use, and preserve the firm's market share. Agro-processing and marketing firms will provide extension services to reduce agricultural input supply risks. They frequently rely on contract farming or outgrower schemes which generally involve introducing new technologies or techniques to farmer growers.<sup>11</sup> Not all agricultural commodities, however, are amenable to such schemes; their feasibility and success are influenced by several factors. Glover (1990), in a study of contract farming and outgrower schemes in East and

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<sup>11</sup> Contract growing schemes (also called contract or satellite farming, outgrower schemes) involves a contractual relationship between farmers and a central processing, marketing or exporting unit. This unit purchases produce from local farmers under terms arranged in advance through contracts. Contracts are generally signed at planting time and specify how much produce the company will buy and at what price. Often the firm provides credit, inputs, farm machinery rentals, and technical advice and retains the right to reject substandard produced (Glover 1984, 1990).

Table 3.2: Types of Private Extension Providers, their Objectives and Target Markets.

TYPE OF PRIVATE EXTENSION PROVIDER	FIRM OBJECTIVE	TARGET MARKET
Farmer Associations	*Increase output quantity and quality *Increase farmer member incomes	*Member farmers
Agro-Marketing and Agro-Processors	*Backward integration to reduce input supply risks (i.e. product quality, volume and timing)	*Contract farmers
Input Suppliers (Ag. machinery, chemicals, seeds and plant products, animal feeds and veterinary pharmaceuticals)	*Product promotion *Ensure proper use *Preserve market share	*All farmers
Consulting Firms	*Fee for service	*Mostly large and medium-scale farmers
Publishing Companies	*Returns from product sales	*All farmers but mostly large and medium-scale

*Note:* Medium and large farms refer to the value of marketable output.

Southern Africa found that the nature of the crop, prices and pricing policy, land tenure, macro-economic and macro-institutional policies, payment systems, presence of alternative markets, and farmer participation in management are all major determinants of success.<sup>12</sup> These factors, therefore, set the bounds for using this medium for supplying agricultural extension services to farmers.

Farmer associations, in addition to fulfilling their primary function (e.g. organizing production, providing credit or marketing services) may provide agricultural extension services for both economic and/or social reasons. Like the private agro-marketing and processing firms, farmer agricultural

<sup>12</sup> Glover (1990) found that agricultural commodities which require high and skilled labor requirements, where maintaining quality of the product is highly critical, and involve high revenues per hectare (e.g. vegetables) are more suitable to contract farming. Crops subject to significant economies of scale (e.g. sugarcane) are less suitable. Government pricing, macro-economic and macro-institutional (or the number of government agencies dealing with a sector) policies influence the economic environment and thus profitability of operations of the agro-processing or marketing firm. Although contract farming can make land titles irrelevant, uncertainty or security of duration of land-use rights may also pose as a constraint. While the presence of alternative markets increases farmer bargaining power, it can also lead to extensive free rider problems; farmers may take the technology package but sell the output elsewhere. Finally, Glover found that schemes in which farmers play a role in the management and operation of the scheme, or at least in disseminating information, performed well.

marketing and processing associations may provide extension to ensure the volume, quality and timing of supply of the commodities they are dealing with. Credit associations may provide extension services to enhance the farmers' productivity and thus enhance their capacity to pay back their loans. Production associations provide extension to improve farmer member production output and incomes. The profitability and survival of these three groups, therefore, are only indirectly dependent on the level or quality of extension services they provide.

The profitability of private consulting firms and media companies, on the other hand, are directly dependent upon the costs of and returns to the services they provide. Table 3.3 lists the factors that influence the costs and returns to the direct provision of agricultural extension services. The returns to extension service provision are dependent on the nature of the product, the degree of specificity of the information or technology, the size and rate of growth farmer demand for extension, the level of development of the input and output markets, the degree of development of the supporting infrastructure, and the degree of competition in the extension services market.

The demand for agricultural extension information (both pure information and technologies) is frequently higher for high value than low value commodities because they require more specialized information. Although entry costs into the high-value commodity sector may be high, the potential returns from adopting the new technology will frequently be greater, which makes "purchasing the information" more attractive and affordable. As noted above, the large proportion of farms with medium to large marketable output values will offer greater possibilities for generating sufficient demand, since they will be better able to absorb the costs of extension. The level of economic development of the country will determine the volume and rate of growth of agricultural input and output demand, and thus the demand for new technologies and improved information. It will also influence the nature of consumer preferences, particularly changing preferences for better quality products. The number of competing extension providers will also determine the degree of competition and therefore the prices which extension firms can charge. Competition will arise not only from the private service providers, but also from non-private sources (public, non-profit and non-governmental sources). In addition, subsidized services by the non-private sector serve as a barrier to entry to private firms, since the private sector may not be able to compete with the lower (subsidized) rates of the non-private service providers.

The cost of providing extension services is influenced by the supply of and demand for

Table 3.3: Factors Influencing the Costs and Returns to Private "Fee-for-Service/Product" Extension Delivery.

ITEM	FACTORS INFLUENCING THE COSTS AND RETURNS	
	ECONOMIC	GOVERNMENT POLICIES
1. RETURNS TO AG. EXTENSION	<p><b>*Nature of the Market</b>                      --Type of Product: High vs Low Value Items                      --Size: No. of "medium" &amp; "large" farms                      --Rate of market growth and commercialization</p> <p><b>*Level of economic development</b>                      --Degree of development of input and output markets                      --Degree of development of infrastructure                      --Access to credit                      --Income elasticities</p> <p><b>*Degree of competition in extension services market</b></p> <p><b>*Degree of specificity of information/technology</b></p>	<p><b>*Ag. sector policies</b>                      --Input and output price policies                      --Regulatory policy</p> <p><b>*Macro-economic policies affecting input and output markets</b>                      --trade, monetary, exchange rate, fiscal policies</p> <p><b>*Intellectual property legislation</b>                      --Availability of property rights protection                      --Degree of legal enforcement</p>
2. COST OF AG. EXTENSION	<p><b>*Supply of and demand for trained extension personnel</b></p> <p><b>*Economies of Scale</b></p> <p><b>*Availability of publicly generated extension materials</b></p>	<p><b>*Education policy</b></p> <p><b>*Technology Policy</b></p>

*Note:* Medium and large farms refer to the value of marketable output.

qualified extension personnel, economies of scale in the delivery operations, and the availability of publicly generated extension materials. As the extension requirements of farmers become more specialized, so will the technical qualifications, and therefore cost of the supporting extension personnel. The local supply and demand for these personnel will ultimately determine the fees charged by these specialists. The availability and access by private consulting firms to new information, especially if obtained free of charge from the public sector, will also serve to reduce the cost of extension activities. The availability of appropriate infrastructure (e.g. roads, telecommunication facilities) will influence the accessibility of farmers or output buyers and thus the costs of delivering the extension services.

Government policies can greatly affect the costs and returns to extension. Price, trade, fiscal, monetary, and exchange rate policies influence commodity prices. Commodity prices, in turn, significantly influence the rates of return to research investments in different areas or commodities and subsequently the nature of information (pure or embodied in technologies) that is available for dissemination. Commodity prices as they influence farm enterprise incomes will also determine the affordability of "buying" extension services. The nature of the government's technology and regulatory policy may similarly enhance or restrict access to the technologies which can be introduced by extension firms. The formulation and enforcement of intellectual property legislation will determine the appropriability of the returns to extension. Government policy with respect to education will influence not only the absorptive capacity of farmers and consumers for new information but also the domestic supply of extension specialists.

## **SUMMARY**

From the above analysis, it becomes apparent that the private sector will only provide extension services in areas where reasonable returns are directly (for private consulting firms) or indirectly (for input supply, agro-processing and marketing firms) appropriable. For private consulting firms, the nature and extent of their extension activities will be largely determined by the net returns to providing the service. This will imply that they will tend to focus on high value crops, more favorable physical environments (with good infrastructure, highly fertile soils) and "big" individual farmers whose net returns from the production activity will be high enough to make "paid extension" feasible. Aggregation of extension needs by "smaller" farmers through mechanisms such as farmers' associations, however, may enable them to overcome this constraint. Input suppliers, unless competition is intense, will primarily promote their respective products, while agro-processing and marketing firms will provide

extension so long as it contributes to other firm objectives (e.g. reduction of input supply risk or output product promotion). Because of the selective participation of the private sector, the provision of public good types of information will have to remain a public sector responsibility. Moreover, the public and non-profit organizations including academic institutions, NGOs, commodity foundations and boards, will have to work together to satisfy the needs of those in the "orphan" areas. How the activities of these varied participants may be harmonized and coordinated will be discussed in more depth in section 5. Whether the delivery of extension services follows from what economic theory prescribes is discussed in the next section. It describes the structure of the agricultural extension sector in different countries and examines the interactions among the different participants in the agricultural extension community.





# SECTORAL PARTICIPATION IN THE AGRICULTURAL EXTENSION SYSTEM

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There are a broad range of institutions involved in agricultural extension and the nature of the extension activities they undertake differs considerably; the following section examines the nature of their participation. Since a broad wealth of literature and practical knowledge is available on public sector extension activities, the following review will primarily focus on the activities of the private, non-governmental and non-profit sectors whose work in this area has drawn less attention in the past. The recently adopted government approach of cost recovery is also discussed. Detailed case studies which cover key concepts are also presented in Appendix A. These include experiences in the introduction of extension service cost-recovery programs in the United Kingdom, privatization of agricultural extension in Chile, the stratification of public sector extension beneficiaries in Mexico, the establishment of farmer circles in Norway, NGO extension activities in Pakistan and farmer association extension services in Bolivia and India. Finally, a brief review of the uses of more advanced technologies (electronic and telecommunications) by the different sectors follows to provide the reader a flavor of the new trends in the agricultural extension sector.

## **AGRICULTURAL EXTENSION: SOME COUNTRY EXPERIENCES**

### **Public Cost Recovery Programs**

To cope with serious fiscal constraints (and at times facilitated by the changing structure of the farm sector), governments have begun charging fees for some extension services they provide to the rural sector. The degree to which these cost recovery programs have been pursued has varied across countries. At one end of the spectrum are countries like Colombia and the Peoples Republic of China where extension is still fully financed by the government, but provision has been decentralized to the municipal and county levels respectively (Wilson 1991, Fan and Pardey 1993). At the other end of the spectrum are countries such as the Netherlands, New Zealand, and the United Kingdom, where public extension representatives function as extension consultants charging beneficiaries for their services (Netherlands Ministry of Agriculture and Fisheries 1988, Bos 1991, Hercus 1991, Le Gouis 1991, Ingram 1992). In between are: France and Norway, where extension services are provided by private extension

representatives, but whose costs are partially subsidized by the government; Mexico, where the extension services are sub-contracted by the public sector to private consultants, but the proportion farmers pay is a function of their ability to pay; and Chile, where extension services subcontracted to the private sector are provided exclusively to small farmers with a small degree of cost-sharing between the government and the farmer beneficiary (World Bank 1990b, Le Gouis 1991, Wilson 1991).

In addition, a survey of OECD member countries in late 1991 confirm that over half of all extension services of the 14 country respondents received between 20 and 78 percent of all funds from direct charging (OECD 1992 in Dancey 1993). The report concluded that despite the program tending to attract higher-income users, farmers and other clients who use agricultural advisory services under the direct charging method generally appeared satisfied with the products received. The major advantages identified included: (a) a more-market oriented focus and an increase in market-oriented programs; (b) a more efficient and effective use of advisory resources; (c) more motivated staff and higher quality service and advice; (d) enhanced degree of specialization; (e) increased professionalism in client/adviser relationship, including more direct feedback on client satisfaction; (f) stimulation of innovative thinking leading to the development of new advisory packages and techniques; and (g) the reduction of public budgetary costs.

The shifts in program funding in most developed countries, such as France, Netherlands, United Kingdom and Norway, were mainly in response to the evolving structure of the farm sector, particularly a shrinking farm population and increasingly strong farmers' associations taking on partial or full responsibility for the provision or financing of the extension activity. But the majority of cost recovery programs in the agricultural extension services initiated in the last decade in most other countries is largely motivated by growing fiscal constraints. The following section describes some of these country experiences.

The continuing economic reforms in China have also spurred a new trend towards the commercialization of extension services delivery. Although the majority of services are still channelled through the traditional county channels, agricultural technical service companies (semi-official, governmental agencies) have been created based on the previous technical stations at the township

level.<sup>13</sup> An **agricultural technology responsibility system** (similar to the household responsibility system) has also been introduced and is designed to link the remuneration of extension staff to the effectiveness of the extension services they provide; the extension staff signs contracts with farmers or local governments which define the rights and responsibilities of all parties to the contract. By 1990, these technology responsibility contracts between agro-technicians and farmers or agro-technology stations and local governments could be found in virtually every county, township (commune) and village (production brigade) (Ministry of Agriculture [China] 1991 in Fan and Pardey 1993). Ameer (1992) also reports that many non-state extension agents work independently without being officially registered. For instance, individual farmers with experience may provide advice to outsiders for a fee or farmers may organize themselves into producer associations which may advise other farmers on a fee basis.

In Norway, cost-sharing was instituted with farmer agricultural research and extension circles (also called "Agricultural Experimental Groups" or "Experimental Circles") (Haug 1991). During the 1950s and 1960s, the public sector agricultural development officers<sup>14</sup> at local and district levels were given additional administrative tasks that resulted in a decrease in their extension activities. The farmers complained regarding the reduced availability of the extension officers, to the extent that they are out of touch with the farmers' problems. In the early 1970s, the farmers' economic organizations presented these complaints to the government and in 1971, the government agreed to partially fund the farmers' circles. These circles are characterized by a farmer-led structure requiring official membership, combined research and extension activities, and on-farm adaptive research activities. Government funding of the circles range from 50 to 80 percent, with the remainder funded by farmer membership fees.<sup>15</sup>

Cost recovery in the French agricultural development system (of applied research, training and agricultural extension) was initiated in 1966. Nearly three quarters of the total resources for the operation of the system are now collected at the farm level through direct payment, voluntary fees from farm organizations such as cooperatives, compulsory fees levied in the form of taxes on a variety of products, or land taxes collected by Chambers of Agriculture. The basis for cost recovery was the

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<sup>13</sup> Prior to the market reforms of the late 1970s, the extension agents working in these agricultural technical stations were employed as part of an operational group serving the production teams within the commune.

<sup>14</sup>In Norway, public extension professionals are regarded as agricultural development officers and not as extension agents.

<sup>15</sup> A more detailed discussion of the agricultural extension circles in Norway is presented in "Farmer-Led Research and Extension in Norway" in Appendix A.

presumption that more autonomous and proficient farmers would be more willing to pay for individual services that had a direct bearing on their personal income. Also collectively, farm organizations under the leadership of elected boards and a chairman have access to greater management capacity and opportunities to collect funds to finance the additional costs of extension services (Le Gouis 1991).

New Zealand's Advisory Services Division (ASD) and the United Kingdom's Agricultural Development and Advisory Service (ADAS) are both public agricultural extension providers which have continually expanded the proportion of their services which are provided for a fee. (Hercus 1991, Le Gouis 1991, Ingram 1992). New Zealand's ASD commenced cost-recovery efforts in 1986 and by fiscal year 1991, 90 percent of all costs should have been covered by private contracts. Similarly, the British ADAS initiated cost recovery policies in 1987 and the target is to cover 50 percent of operating costs by 1993-94.<sup>16</sup>

The New Zealand and British experiences illustrate the process of restructuring the financing and organization of extension services as well as the changes in the orientation of extension agents. Field staff became directly accountable to farmers rather than supervisors in a bureaucratic structure and thus required new skills to ensure that they could actually generate and maintain the demand for their services. To this end, ADAS hired consultants in marketing and selling techniques to train over 2,000 ADAS personnel before launching its commercial services. The training included sales management, marketing and selling skills, customer service skills, and negotiation and presentation (Ingram 1992).

The shift towards cost recovery in some countries was achieved with donor-assistance and has followed different models. The government of Chile in the 1970s discontinued completely the provision of agricultural extension services forcing commercial producers to obtain extension services from private and non-profit sources. But in order to safeguard the welfare of the small farmers, who generally have less capacity to pay for extension services, two projects were launched in 1986 with World Bank assistance: the Programa de Transferencia Tecnológica Integral (PTTI) and the Programa de

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<sup>16</sup> A more detailed discussion of the British extension experience is presented in "The Public Cost Recovery Program of the British Agricultural Extension System" in Appendix A.

Transferencia Tecnológica Básico (PTTB) (World Bank 1990b, Wilson 1991).<sup>17</sup> A key organization in these projects was the Agricultural Development Institute (Instituto de Desarrollo Agropecuario, INDAP), the government agency providing public agricultural extension services.

PTTI represents a package of extension activities geared to raise the productive performance and incomes of the subgroup of small farmers considered to have sufficient resources to eventually attain self-sufficiency and market surplus production. On the other hand, PTTB strives to assist the poorer segment of the farm population who are deemed to lack sufficient resources to reach self-sufficiency and financial security from on-farm pursuits. PTTB is much more family oriented as opposed to the producer orientation of the PTTI. Beneficiaries of the PTTI program cover 15 percent of the cost of the extension service, although an increase in the financial contribution of beneficiaries to at least 50 percent for PTTI has been proposed. A similar increase from free extension services to 15 percent of total costs for the PTTB has also been planned. A unique feature of the Chilean experience is that it has involved actual privatization in so far as the government discontinued the provision of extension activities to medium and large-scale farmers. Those activities were taken over by privately owned entities (consulting firms) (World Bank 1990b).

In Mexico, a recent World Bank-financed Agricultural Extension Project (PROCATI) is attempting to reduce the costs of public extension services by promoting greater cost sharing between farmers and the state governments and increasing competition from private technical assistance groups already operating in certain areas. Two cost control (i.e. reduction of unit costs) principles are being tested in the project. The first stratifies producers by income level and progressively graduates higher income producers to fee for service extension or requires greater cost sharing if continued publicly funded services are requested. This permits publicly funded services to focus more on low- to middle-income producers in priority areas. The second cost control principle promotes increased direct contact between researchers and farmers. This contact is more likely to occur in higher income irrigated areas and will permit further reductions in extension staff or at least their transfer to other priority areas where coverage is currently low. Several different approaches to cost control are being tested, namely: (a) the focus on farmer groups rather than individuals; (b) the use of mass media to expand coverage; (c) the expansion

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<sup>17</sup> A more detailed discussion of the Chile's public cost recovery program is presented in "Targeting Public Sector Extension Beneficiaries: The Chilean Experience" in Appendix A.

of the use of validation and demonstration plots; and (d) the reduction of coverage ratios over time in certain areas (Wilson 1991).<sup>18</sup>

In addition to cutting the costs of extension, an important element in the Mexican project is cost sharing. Efforts to encourage farmers to pay for extension are focused on higher income irrigated areas where farmers are already paying about 15 percent of extension costs under a general irrigation district charge. The government plans to raise the level of cost sharing of farmer groups (*patronatos*) in irrigated areas to at least 50 percent of extension costs. Other cost sharing mechanisms being tested include: (a) direct charges for services such as soil sampling and animal feed ration formulation; and (b) requiring credit and insurance institutions to pay the public extension service and administration directly for the technical support provided to their sub-borrowers as part of subloan conditionality (Wilson 1991).

In some countries public sector extension agents also undertake unofficial, informal "cost recovery" activities. In several Southeast Asian countries, some government extension agents "moonlight" as salesmen or demonstrators for private input supply companies (Pray and Echeverría 1990). In Ecuador, extension agents provide extension services to farmers in exchange for a share of the farm profits (Van Crowder 1991; Aneur 1992). Their low salaries motivate extension agents to sharecrop. Generally, the farmers would supply the land and labor, although payment for hired labor is shared, while the agents provide inputs and advice. However, the agent's position enables the farmer and the agent to easily obtain farm inputs from suppliers on credit. The harvest profits are equally divided, except that the partner handling the marketing of the output receives a "fee." Some agents considered the field they sharecropped as a "demonstration plot", where other farmers could view the benefits of improved practices being introduced. The agents felt that such activities enhanced their credibility, because they were taking risks along with the farmer as well as learning from farmers.

### **Private Extension**

Several types of private firms currently undertake agricultural extension activities. These include agro-processing firms, input suppliers, farmers associations, media companies and consulting firms. The method they employ to recoup the cost of extension provision varies considerably ranging from input suppliers incorporating the costs into the price of their products to direct charges for services

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<sup>18</sup>A more detailed discussion of the Mexico's public cost recovery program is presented in "Targeting Public Sector Extension Beneficiaries: The Mexican Experience" in Appendix A.

rendered by consulting firms. The following section elaborates on the extension activities of these firms in different countries.

### **Agro-processing/Marketing Firms**

Agro-processing and marketing firms worldwide have provided agricultural extension services to their farmer suppliers as a means of reducing input supply risks. Extension services are typically an integral component of contract growing schemes involved in the production of high value commodities. These firms generally supply farmers with information on new techniques and technologies to increase output, reduce post-harvest losses and improve quality, consistency, and timeliness of output. A broad range of agricultural commodities are promoted in this manner, they include broilers in the Philippines, Thailand, and Turkey (Manarungsan *et al.* 1989, Zijp, 1991); fruits and vegetables for the domestic or export markets in Mexico, Guatemala, the Dominican Republic, Lesotho, Kenya and Zimbabwe (Rama 1985, de Janvry *et al.* 1987, Rogers 1987, Glover 1990, Schwartz 1992); milk in Argentina (World Bank 1989); tobacco in Jamaica (Agribusiness Worldwide 1982); and malt for beer in Turkey (Zijp 1991). Text box 4.1 presents illustrative cases from Argentina, Thailand and Mexico.

In Kenya, the large fresh produce exporters, such as Indufarm, Sunripe, KHE and Homegrown provide inputs and extension services to farmers producing for them on contract. The extension activities are typically focused on the type and levels of use of inputs, disease prevention or control, harvest and post-harvest techniques. A significant problem faced by these firms, however, is "poaching" by competitors of contracted farmer produce, creating difficulties for firms in recovering the benefits of their extension investment.

Contract growing schemes are also being undertaken by domestic firms under joint venture arrangements with multinational firms. The multinational firms generally bringing in the new technology introduced to farmers. Examples include Hanover Brands in Guatemala, Ltd. (Rogers 1987); Campbells, Del Monte, Heinz, Gerber, Birdseye in Mexico (World Bank 1987); British American Tobacco Company in Kenya (Watts *et al.* 1988), Careras Rothman in Jamaica (Agribusiness Worldwide 1982) and Tuborg Beer in Turkey (Zijp 1991).

**Text Box 4.1: Selected Country Experiences in Contract Growing****Argentina**

During the 1970s, the dairy sector in Argentina was plagued with serious problems: low productivity, unstable milk supply, and low milk quality. These problems were mainly the result of poor animal nutrition and inadequate farm hygiene. Dairy processors realized that their own growth would be constrained if they did not take action to address the problem. To overcome these problems, the two largest dairy plants, the Santa Fe-Cordoba United Cooperatives (SANCOR) and La Serenisima decided to act and undertake their own "dairy development projects."

SANCOR formed an extension department with a central office staffed by 7 professionals and 8 regional offices, each managed by an agronomist assisted by middle-level technicians. Each office dealt with almost 40 cooperatives using two basic approaches: providing extension to the cooperatives and assisting small groups of farmers (usually 6-15) to meet monthly on their farms to discuss the visited farm's progress and problems. SANCOR initially assisted in financing the group's technical assistance, but after 30 months, each group of farmers paid for the professional agronomist itself. As of 1990, SANCOR had 120 farmer groups participating in the program. SANCOR also published its own magazine and bulletins and broadcasted radio and television programs. Artificial insemination circuits as well as accelerated heifer-rearing programs aimed at getting heifers calving at less than 36 months of age were also organized by SANCOR. In addition, SANCOR supplied and financed a varied list of farm inputs. As a result of the program, milk production increased by 15 percent between 1976-85 despite a 24 percent decrease in the number of dairy farms participating.

La Serenisima also formed a strong technical assistance department to tackle the same three problems faced by SANCOR. But it deliberately targeted medium- to large-scale farmers. Its staff consisted of over 60 professionals, 30 administrative staff, and 50 milk-quality inspectors working on technical assistance, including three social scientists. It established five regional offices, each with five zone offices, which worked with a group of up to 25 farmers. Magazines, bulletins, radio and television programs were all part of the development effort. During 1978-85, although the dairy farm areas feeding La Serenisima shrank by more than 6 percent, production increased by almost 50 percent.

Source: World Bank 1989.

**Thailand**

Eighty percent of pineapple production in Thailand supplies canneries. Canneries provide information on cultivation, including information on double-row planting, because traditionally, small farmers preferred single-row planting since it requires smaller investments and labor and therefore involve lower risk. The double-row method, however, is gaining popularity because the supply of land is decreasing, highlighting the importance of other factors in technology adoption besides access to information. One cannery, the Siam Agro Industry Co. Ltd has 10 extension agents for 3,500 farmers, and uses them to inspect the output, estimate prices, and recruit more farmers. Another cannery, the Siam Food Products company has five extension staff who visit and recruit into the program about 300 to 400 farmers every one to two months. Because the farmers have mastered the new techniques, the extension staff have stopped holding meetings but only gather data for setting prices.

Source: Manarungsan *et al.* 1989.

**Mexico**

Several multinational companies (MNCs) in the frozen fruit and vegetable industries provide extension services to farmers in Bajio, Mexico. During the 1950s and 1960s, these U.S.-based processing companies established plants in Bajio to supply the U.S. market. They introduced new crops, and delivered input packages--seeds, chemicals, and some machinery--and technical assistance to contracted growers. Over time, some of the largest growers established freezing plants and began to supply processed vegetables directly to the U.S. companies. As the market has grown and larger contract growers have turned from suppliers to processors, the MNCs increasingly expanded their operations to include small-scale growers. The MNCs introduced new technology and skills, which enhanced Mexican capability to compete in export markets for processed fruits and vegetables.

There was, however, a continuous turnover of contracted growers. Consequently, MNCs had to continually search out new potential suppliers and train them in the production of these crops. As a result, they charge new growers for the extension services provided through price discounts. For example, in the summer of 1986, growers who needed a full range of services were paid 6.5 cents per pound for broccoli, while the large integrated growers were selling raw product to the MNCs at up to 13 cents per pound. Moreover, once the grower mastered the production technique, the extension agent's visits served more of a monitoring function to ensure proper chemical use.

Source: de Janvry *et al.* 1987.



### **Input Suppliers**

Input suppliers (e.g. seeds, agricultural chemicals, farm equipment, livestock feed, and veterinary supplies) have traditionally incorporated agricultural extension in their marketing strategies. However, frequently they only provide information pertaining exclusively to the use of their respective products and the extension methods used vary considerably across firms. The ProAgro Company in India, which markets hybrid corn, sorghum, millet and sunflower seeds, use on-farm demonstration trials, field days, and video presentations to promote its products. The Monsanto company in Turkey operates outlets/shops where farmers can solicit information from salespeople (usually with M.Sc. and B.Sc. degrees) through informal discussions, without necessarily making a purchase (Zijp 1991). In the Philippines, sales representatives of agricultural chemical companies (e.g. Shell and Ciba-Geigy) are known to hold village group meetings to introduce or promote their range of products, with the incentive that farmer participants may win a "door prize" such a radio or electric fan.

In some countries, input companies have banded together to provide extension services under an umbrella trade association. For example in Zimbabwe, in addition to the extension activities conducted by individual agro-chemical firms, the agrochemical industry, which is composed of 14 firms, has established a trade association called the Agro-Chemical Industry Association (ACIA). ACIA conducts extension activities on topics including product use and safety. The organization has established a safety committee which is currently involved in developing an inexpensive protective clothing kit (instead of the traditional gum boots, coveralls and gloves) which is more affordable to farmers. It also publishes a newsletter and has recently produced a pesticide registration book (Schwartz 1992). In India, the Fertilizer Association collects and publishes a considerable amount of agricultural data, and has popularized the use of fertilizers by setting up thousands of demonstration plots throughout the country (Pray and Echeverría 1990).

### **Farmer Associations**

Agricultural extension activities conducted by farmer associations are generally combined with other functions such as research, input and credit supply, and product marketing. For many associations, their commodity-orientation limits the range of extension services to one commodity. More successful examples of this type of association are the Tobacco Producers', Commercial Cotton Growers, Commercial Grain Producers', Ostrich Producers, and Crocodile Producers' Associations in Zimbabwe (Schwartz 1992); the Cooperative Integral Campesina (COINCA) for grapes in Bolivia (Tendler 1983);

the Anand Milk Union Ltd and other dairy marketing cooperatives under Operation Flood in India (Umali *et al.* 1992); the Eastern Poultry Raisers Group in Thailand (Manarungsangan *et al.* 1989); the Poultry, Flowers' and Vegetable Associations in Turkey (Zijp 1991); and the Kigezi Vegetable Cooperative in Uganda (Narayanan 1991). The extension services offered by such associations cover a wide range of commodity-specific topics, from the introduction of new technologies and production techniques, farm management, disease prevention and control, to marketing and processing procedures. In the case of COINCA, the association was instrumental in teaching farmers techniques for improving the quality of their grape output, thus enabling them to take advantage of the quality premiums offered by the distilleries. Similarly, effective extension services related to production and livestock disease control provided by the dairy cooperatives in India have been tremendously successful in improving smallholder milk production (See "Farmer Association Extension in the Dairy Sector: Operation Flood in India" in Appendix A).

Farmer association extension services often spill over to non-members as well. One example is the case of the El Ceibo Cocoa Cooperative in Bolivia, which operated a cocoa processing plant. The cooperative introduced a new package of disease-combatting techniques against Black Pod disease to its members to ensure the supply and quality of coffee delivered. Because Black Pod Disease prevalent all over the region, other farmers adopted the technique as well (Tendler 1983).<sup>19</sup>

Some farmers' associations cover a broad selection of commodities. Some examples are the farmer associations in France (Le Gouis 1991), the farmer research/extension circles in Norway (Haug 1991),<sup>20</sup> the National Federation of Livestock Producers in the Central African Republic (World Bank 1986), the Association of Agricultural Experimentation Groups (AACREA) in Argentina (World Bank 1989) and the farmers' associations in Taiwan (Harrold 1991 in Schwartz 1992). In Taiwan, the farmers' associations provide support services such as credit, inputs, marketing, livestock insurance and extension. At least 60 percent of the associations net profits "must be devoted to extension-related

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<sup>19</sup> A more detailed discussion of the extension activities of two farmers' associations, COINCA and the El Ceibo Cooperative is presented in "Making a Difference: Farmers' Associations in Bolivia" in Appendix A.

<sup>20</sup> A more detailed discussion of the Farmer Circles in Norway is presented in "Farmer Research and Extension Circles in Norway" in Appendix A.

activities to benefit farmers and their families" (Johnson *et al.* 1987).<sup>21</sup> The Taiwanese farmers' associations are organized into three levels: national, provincial, and township; and farmer association extension agents at the township level play a key role. They arrange discussion groups with farmers in their villages, set up demonstration plots, distribute seeds, implement home economics education programs, and provide a link between farmers and the Provincial Department of Agriculture and Forestry who operate experimental crop improvement farms. In addition to direct communication with farmers, several modes of mass media communication are used, including newspapers, magazines and television shows arranged by the Provincial Farmers' Association in cooperation with various government bodies (Harrold 1991).

In France, large cooperatives hire technical advisors directly for the benefit of their membership and derive corresponding resources from a fee added to the operating expenses charged to their members. Four major French farm organizations also manage "agricultural development services" (which includes agricultural extension) at the local, regional and national level, including seventeen applied research institutes. Only the National Fund for Agricultural Development (FNDA) is a "joint venture" under the control of the Association Nationale pour le Developpement Agricole (ANDA), an association subject to government control and jointly managed on a parity basis by representatives of the government and the farm organizations. This fund accounts for approximately one-fourth of the total resources and is also used to allocate available funding among areas and sectors in a spirit of equity (Le Gouis 1991).

The Association of Agricultural Experimentation Groups in Argentina is based on the French model. It consists of 15 regional groups and 176 local groups with over 2,000 members. Each local group of 8 - 12 farmers is led by a professional agronomist who works for the group 8 - 12 days per month visiting each of the farmers once a month. The farmers also visit a different member's farm each month as a groups to discuss his/her specific operation. "The individual subscription costs about the price of one farm laborer per month (US\$60), of which 80% covers the professional's fee and 20% goes to the regional and national tiers" (World Bank 1989, p.31).

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<sup>21</sup> At the township level, all association activities are supported by association earnings generated in several ways, including: fees from government for collecting taxes (in rice); rice processing; commodity marketing, transport, and storage activities; fertilizer sales and equipment rentals; fees for special services (e.g. veterinary services), membership dues, government funds and subsidies for special experimental programs.

The National Federation of Livestock Producers (FNEC) in the Central African Republic was organized by livestock producers to facilitate drug distribution after being faced with an almost complete collapse of the government livestock service in 1973. With some initial donor assistance, FNEC has successfully undertaken the distribution of the necessary inputs, mainly veterinary drugs. In 1989, FNEC also began providing extension services and education programs to its members which comprise over 60% of all herders in the country (Umali *et al.* 1992).

The Commercial Farmers Union (CFU) in Zimbabwe has a membership of 4,450 large-scale commercial farmers,<sup>22</sup> and it is the umbrella organization for a number of commodity specific autonomous associations.<sup>23</sup> The CFU is the organizing force behind a range of research and extension activities, such as the Agricultural Research Trust, the weekly magazine "The Farmer", and bimonthly CFU reports. In addition, CFU provides leadership for some of the commodity specific undertakings, such as the Cotton Training Center at Kadoma (Schwartz 1992).

Farmer association research and extension in Zimbabwe evolved due to several factors: (1) a number of European extension staff moved from the public sector into private sector jobs involving similar tasks; (2) public extension shifted from estate to smallholder "communal" agriculture; and (3) commercial farmers wanted to ensure their access to quality services in an uncertain environment. The associations employ extension specialists (referred to as District councilors) who work directly with the farmers in an area, usually on specific commodities. Most farmers are members of multiple associations and have a variety of information sources (including private consultants). The CFU and the commodity specific organizations maintain linkages with public sector research and extension as well as provide some services to the public sector. They provide training at the Cotton Training Center and engage in collaborative efforts in the field such as the Agricultural Research Trust farm trials in communal areas and pesticide demonstrations at farm shows (Schwartz 1992).

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<sup>22</sup> Membership in farmer associations in Zimbabwe is split across the large-scale commercial and the small-scale commercial and communal lines. Small-scale commercial and communal farmers are represented by the Zimbabwe Farmers Union (ZFU), with approximately 65,000 communal and 9,000 small-scale farmer members.

<sup>23</sup> These associations included the Commercial Grains Producers', Oilseed Producers', and Cotton Growers Association, the Zimbabwe Tobacco Association, the Coffee Growers' Association, the Horticultural Producers Council, the Flower Exporters Association, and the Cattle, Sheep, Ostrich, Crocodile and Fruit and Vegetable Producers' Association.

### **Private Consulting Firms**

Some consulting firms such as Chemonics, Harza International and Arthur D. Little engage in international technology transfer (Pray and Echeverría 1990). While many consulting firms have flourished for many years in developed countries, their participation in developing countries remains limited. Their operations are largely sustained by the extension demands of medium and large commercial firms for more specialized technologies. However, there is limited documentation of their activities. The few countries where private consulting has been documented include Argentina, Brazil, Chile, Colombia, Mexico, Uruguay, Korea, and Taiwan (Pray and Echeverría 1990; World Bank 1987, 1990a,b,&c). In Brazil for example, there were over 2,000 private consulting firms largely catering to the highly specialized extension needs of the commercialized livestock sector as of 1988 (Table 4.1). Consulting firms conducting extension in Asia tend to concentrate on plantation crops. A growing number are staffed by ex-plantation managers and technicians (Pray and Echeverría 1990).

Private consulting firms may generate their own research output to be introduced to clients. In Uruguay and Argentina, consulting firms conduct applied research on cultural practices, such as fertilizer application and pastoral management for ranches specializing in livestock and crops. The information and/or technologies are usually sold to the clients as part of a package.

The public sector is indirectly fostering the growth of private consulting firms through subcontracting arrangements in Chile, Colombia and Mexico. To qualify as a subcontractor for the government, a firm must meet technical staffing and professional criteria, bid for the contracts, and agree to have its activities monitored by a designated public agency. Text Box 4.2 describes the requirements in the case of Chile. In Colombia, decentralization of delivery and financing of the extension function from the national to the municipal level was initiated in 1992. The municipal governments may provide extension services directly or enter into subcontracting arrangements with private consulting firms. In Chile and Mexico, the national government continues to coordinate all extension activities, but actual delivery of the services may be subcontracted out to private firms. Unlike the Colombian program, farmer beneficiaries are required to pay for a percentage of the cost of the services.

### **Non-Governmental Organizations**

NGOs have begun to assume a greater role in the agricultural extension sector, frequently focusing on areas that have been neglected or serviced inadequately by the government. Fowler (1988)

notes that one reason for their success has been their community-based focus. In West Africa, for example, the 6-S (Se Servir de la Saison Sèche en Savanne et en Sahel) promotes village organizations, helps village groups to develop programs, and provides funding and technical assistance for projects including village crafts, cereal banks, market gardening, soil conservation, and reforestation. With an annual budget of \$1.25 million, the emphasis on local self-reliance has enable 6-S to extend its influence over a large area. It is now operating in Burkina Faso, Mali, and Senegal and since it founding in 1976 has established 2,000 farmer organizations (averaging 80 members per group) in about 1,000 villages (Amanor and Farrington 1991). In Northern Ghana, the Agricultural Information Service, funded by the Presbyterian Agricultural Station at Langbensi, works with over 20 other church-based agricultural stations and coordinates the government research station at Nyankpala (Amanor and Farrington 1991). In Pakistan, the Aga Khan Foundation is involved in rural development projects, involving both technology transfer and the training of farmer representatives to become livestock, plant protection, marketing, and forests specialists.<sup>24</sup>

**Table 4.1:** Number of Members of the Brazilian Association of Agricultural Consulting Firms (ABEPA) 1988.

STATES	NUMBER OF	
	FIRMS	STAFF
Acre	3	11
Alagoas	7	46
Bahia	164	738
Ceara	73	448
Distrito Federal	12	52
Espirito Santo	12	77
Goias	169	829
Maranhao	23	112
Mato Grosso	77	372
Mato Grosso do Sul	121	600
Minas Gerais	136	898
Para	11	118
Paraiba	34	196
Parana	324	2,810
Peranambuco	54	285
Piaui	19	97
Rio de Janeiro	8	51
Rio Grande do Norte	20	112
Rio Grande do Sul	320	2,860
Rondonia	5	21
Santa Catarina	86	448
Sao Paulo	179	2,110
Sergipe	14	66
Tacantins	33	161
Total	1,904	13,518

Source: Umali *et al.* 1992, p. 72.

Some NGOs have organized regional networks. In Latin America, 8 NGOs from seven countries have formed the Consorcio Latinamericano y Desarrollo (CLADES-Latin American Consortium on Agroecology and Development), to promote, develop and diffuse agricultural options designed for

<sup>24</sup>A more detailed discussion of the Aga Khan rural development activities is presented in "Non-governmental Organization Agricultural Extension Alternative: The Aga Khan Rural Support Program" in Appendix A.

**Text Box 4.2: Quality Control in Public Sector Subcontracting  
to Private Consulting Firms in Chile**

The Agricultural Development Institute (Instituto de Desarrollo Agropecuario or INDAP) is charged with the task of overseeing the public extension services in Chile. It maintains the standards in its extension programs by requiring that consulting firms meet technical staffing and professional criteria before it is allowed entry into INDAP's national registry for tender participation (NGOs are also eligible). In addition, training is provided by INDAP both for its in-house personnel as well as for staff of contracted extension firms. The consulting firm's technical chief (CAT), who supervises and assists three extension workers, oversees the technology transfer program to beneficiaries and is required to visit each beneficiary at least once a year. The CAT is usually a native of the area, is paid by INDAP, but is not an INDAP employee. Special consultants are stationed in INDAP's area offices to monitor the quality of work of the private extension firm in the area.

Firms are required to submit detailed work plans for each extension activity for CAT clearance before implementation. The CAT or an INDAP staff member usually attends every extension group meeting in the area as an observer. The CAT reports any major problem to INDAP's area chief for remedial action or for referral to INDAP's regional director, if warranted. INDAP also requires record-keeping for selected participants and monitors progress to enable evaluation of results.

Source: World Bank 1990b.

small peasant farmers, in association with institutions committed to sustainable agriculture (Altieri & Yurjevic 1989). Many NGOs perform both research and extension activities. In India, the Bharatiya Agro-Industries Foundation (BAIF) runs a program to improve village dairy cattle crossbreeding through 450 artificial insemination centers, together with veterinary and extension services to 8,000 villages in six states. BAIF has a staff of 35 professionals and a research laboratory for vaccine production, epidemiological services, and artificial insemination operations (Amanor and Farrington 1991).

### **Non-Profit Organizations**

Non-profit organizations conducting agricultural extension include universities, commodity boards, and commodity foundations. The following discussion, however, will focus exclusively on the activities of commodity foundations, which have received less attention in the literature.

### **Commodity Foundations<sup>25</sup>**

The agricultural development foundation is an institutional innovation that has been introduced to several Latin American and Caribbean countries. Since 1984, five foundations have been established with the assistance of the U.S. Agency for International Development: the Fundacion Hondurena de Investigacion Agricola in Honduras (1984), Jamaican Development Foundation in Jamaica (1986), Fundacion para el Desarrollo Agropecuario in Peru (1987), Agricultural Development Foundation

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<sup>25</sup> This section is drawn from Coutu and O'Donnell (1991).

in the Dominican Republic (1988), and the Fundacion para el Desarrollo Agropecuario in Ecuador (1988). These foundations perform different functions: they may substitute for public institutions, strengthen selected existing public programs, or support science related activities in areas not included in public programs (e.g. non-traditional export crops, facilitating technology transfer from the international science community) (Coutu 1987, Sarles 1989, Lindarte 1989).

The primary activities of the agricultural development foundations include: (i) clarifying and promoting the role of science in agricultural development; (ii) integrating the activities of public and private scientific institutions in support of priority commodity programs; (iii) serving as a "mentor" for the science system in resolving problems and strengthening the system; (iv) providing competitive grants for research, human capital formation, scientific publications, privatizing technology transfer enterprises, privatizing quality seed services, enhancing credibility of quality control programs; (v) establishing a coordinating and linkage mechanism for problem-solving research involving multiple disciplines and institutions; (vi) serving as venture capitalists in developing or adapting new technologies; (vii) developing and implementing innovative ways to increase interactions between indigenous researchers and educators with the international agricultural research centers and the international agricultural science community (Coutu and O'Donnell 1991). As illustrative example, Text Box 4.3 presents a brief overview of the operations and activities of the Ecuadorian Agricultural Development Foundation.

Each of the five agricultural development foundations, however, were established with a substantial initial grant from USAID. As donor funding is depleted, a serious concern therefore is the sustainability of these institutions. The foundations have recognized this problem and are attempting to devise varied ways to overcome this constraint. The foundation in Ecuador has started an endowment fund in interest bearing accounts, while the foundation in the Dominican Republic has so far been successful in raising funds from local firms and individuals. The foundation in Peru has been evaluating blocked earnings and debt-for-development funding possibilities (Coutu and O'Donnell 1991).

### **Commodity Boards**

Commodity boards often undertake both production and marketing extension in addition to their other activities and most have been established for cash, traditional plantation or export



## Text Box 4.3: The Ecuadorean Agricultural Development Foundation

By the mid-1980s, the agricultural research and extension systems in Ecuador had been seriously weakened as a result continued poor management of the respective public agencies, inadequate operating budgets, and lack of direction and coordination with the private, academic, and other non-government sectors involved in agricultural research and extension. Rather than investing more funds into the weakened public sector organizations, the Government of Ecuador, the United States Agency for International Development, and member of the private sector decided to establish a new institution to serve as a coordinating body and catalytic force in setting clear priorities and forge linkages between research, extension, and education, and between the public and private sectors. Thus, Agricultural Development Foundation (FUNDAGRO) of Ecuador was established. FUNDAGRO is a private, not-for-profit foundation governed by a general assembly drawn entirely from the private sector.

Priority commodities to be supported are selected by the General Assembly and the External Advisory Council. Initially, the Foundation assembles representatives from both the public and private organizations involved in the production of the commodity. A series of meetings help identify the needs and problems of the producers, based on which research and extension priorities are jointly established. A plan of action is subsequently jointly prepared, including a description of the resources provided by each organization. FUNDAGRO, with funding from USAID and other donors, provides complementary funding for personnel, equipment or operational costs that are necessary but beyond the capacity of the participating organization. Currently, USAID is financing a 5-year, \$7 million cooperative agreement with FUNDAGRO to carry out integrated research, extension, and education programs in coffee, cassava, and milk production. There is a cooperative program for coffee, for example, between the national research agency (INIAP), the public sector coffee extension program, and the Federation of Coffee Cooperatives (FENECAFE). Coordinators for the research and extension programs, a portion of the operating funds, vehicles and equipment, and additional personnel of the Cooperative Federal extension program are funded by FUNDAGRO. A number of students are also provided stipends by FUNDAGRO to work with the participating organizations.

Source: Coutu and O'Donnell 1991.

commodities.<sup>26</sup> They are usually financed through levies on the marketed products and farmer membership fees, supplemented by the government subsidies from the treasury. Some examples include the Cocoa Board of Ghana, the Sri Lanka Tea Propaganda Board, the Malaysian Rubber Industries Smallholders Development Authority (RISDA), the Kenya Coffee, Tea, Pyrethrum, Maize Marketing Boards and the Horticultural Development Authority, the Colombian Centro Nacional de Investigaciones de Café, and the Société de Développement du Coton du Cameroun (SODECOTON) (Maalouf et al. 1991, Narayanan 1991, Schwartz 1992).

In Malaysia, for example, more than half a million smallholder farmers by the early 1980s received agricultural extension services from agents hired and managed by RISDA (Maalouf *et al.* 1991). In Kenya, as a result of the extensive research and technology transfer program of the tea and coffee boards, tea production increased from 36,200 tons in 1971 to 96,000 tons in 1982 and coffee production increased from 59,900 tons in 1970/71 to 86,100 tons in 1982/83 (Hobbs IV and Taylor

<sup>26</sup> A common characteristic of parastatals is the vertical linkage of all services concerned with a particular crop, including adaptive technical research, credit, supply of planting materials and inputs, and single-channelling marketing (Moris 1991).

1987). The relative success of these commodity boards in transferring new technology, however, is primarily based on the homogeneous demand of a large constituency of small and large farmers for technology to increase productivity, to reduce production costs, and to improve management, coupled with a total volume of production and sales large enough to generate a financial base from which sufficient research and technology transfer funding can be raised (Umali 1992). It should be noted, however, that the effectiveness of extension activities of commodity boards have to be weighed against other market distortions their operations may create and the impact on farmer income and welfare.

### **Cross-Institutional Partnerships**

In some cases, the provision of agricultural extension services is made possible through the collaborative efforts of several agencies. In Gambia, eight NGOs participated in on-farm testing, in which the NGOs carried on-farm adaptive trials with a variety of technologies provided by government services (Gilbert 1990). The cooperative efforts of the International Livestock Center for Africa (ILCA), the Ethiopian Institute for Agricultural Research, the Ministry of Agriculture, OXFAM (an NGO) and peasant cooperatives enabled the introduction of single-ox ploughs and plowing techniques suited to preserve the vertisols. OXFAM provided the extension services, because of the absence of an ILCA mandate to conduct extension work and constraints in the Ministry of Agriculture extension budget (Kellenberg forthcoming). In Senegal, NGOs and the Senegalese Institute of Agricultural Research cooperated in a pilot rice extension program in Casamance (Osborn 1990). It follows a participatory approach based on the understanding of local rice farming systems and involves identifying constraints, on-farm testing with farmers of adapted improved varieties, and farmer evaluation of varietal performance. These linkages have helped to foster accessibility and stronger accountability of the public and international research centers to their farmer clientele (Amanor and Farrington 1991).

### **New Trends in Agricultural Extension Delivery**

While the traditional extension agent approach still dominates the agricultural extension system, significant developments in the electronic and communication technologies have also opened new channels for agricultural information delivery and generated economic incentives from increased private sector participation. Advances in computer technology and computer software development have tremendously facilitated data collection, sorting and analysis, and in turn have opened up opportunities for private firms to enter into the agricultural extension services market. Advances in satellite communications have facilitated information transmission over television and radio, while video

technologies, computers and interactive video/computer systems have revolutionized teaching and training of clients and extension personnel.<sup>27</sup> Provided that the information is closely attuned to the farmer's/customer's needs and conditions, these technologies have become a strong adjunct to, although not a substitute for field extension services (Baxter 1987).<sup>28</sup> They allow specialists and agents to reach a larger audience, thus permitting faster dissemination of information. They allow for the reduction of travel and printing and mailing costs required of the print media.

Radio and television have been more extensively utilized in most countries. The use of satellite, video, and computer technologies, however, has been largely confined to developed countries. For example, the Green Thumb Project in the United States (Bennet et al. 1984, Clearfield and Warner 1984), Minitels in France (Netter 1989), Agriline Videotex Service in Ireland (Scally 1989), videotex systems in Finland and Denmark (Westermarck 1991), and Viditel in the Netherlands (Westermarck 1991) provided farmers with on-line access to relevant agricultural information from established databases or to agricultural specialists responding to transmitted questions via varying combinations of video, television, computers, and telephone lines. Satellite communications and television have also been used in Australia to successfully stem the spread of footrot (Cullen and Badhan 1989). Computer-assisted farm planning and decision-making programs have also been tested in several countries. Some country examples include Finland for cash flow budgeting, Sweden for computer-assisted farm management, Australia for wheat production (Wheatman program), and the United States for farm financial planning (FINPACK system) and farm production (COMAX system) (Hamilton 1989, Westermarck 1991).

The use of these technologies is gaining more and more popularity in developing countries. Television clubs or groups in India, Sudan, Ivory Coast and Brazil have been successful in transferring and speeding up the diffusion of information to farmers (Wete 1991). In Peru, videotape was one of the three media used in the "Video-based Training for Rural Development" project aimed at

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<sup>27</sup> See Westmarck (1991) and Wete (1991) for detailed review of the use of these modern communication and electronic devices in agricultural extension in both developed and developing countries.

<sup>28</sup> A study conducted by the Academy for Educational Development (AED) (1985) to determine the effectiveness of different communications media (radio, television, print, or extension agents) and the conditions under which they perform best found that no medium is superior to others and suitability is dependent upon the message, target audience, and social environment. AED estimated that radio and television are more appropriate for reaching a lot of people quickly with relatively simple ideas, while print media are better suited to provide timely reminder of information. Interpersonal communications, including extension agents, group meetings, community organizations, and demonstrations are best suited for teaching and enhancing credibility of the information.

mobilizing rural farmers for agrarian reform. Eighteen-minute videos were presented daily to farmers followed by discussion and a review of printed material. By 1981, 102,000 farmers had been reached and analysis of project performance found that video's audio-visual quality overcame illiteracy constraints. Similar programs have also been replicated in Brazil, Honduras, Mexico and Paraguay (Wete 1991). The Directorate of Marketing in India produces documentary films and cinema slides and prepares exhibits and printed literature for the various State Marketing Departments, which in turn use these materials to train their staff and their farmer clients (Narayanan 1992). At the same time, interactive computer-video systems are also used in training modules on pump maintenance and irrigation water management in India (Baxter 1987). Satellite systems are now used to transmit agricultural information in India (Satellite Instructional Television Experiment, INSAT), Peru (INTELSAT), Indonesia and the Philippines (PALAPA Satellite System), and West Africa (AGRHMET) (Wete 1991). The use of mass communication technologies like satellite transmissions, radio, video and television, as expected, has generally been confined to the public sector or non-profit organizations because of the public good character of the information conveyed and their high cost of operation. Their cost has posed as a major constraint to their adoption for many developing countries, although the continued advances achieved in these fields may in time reduce the investment costs required and increase their accessibility to farmers and other clients.

## CONCLUSION

Several lessons can be drawn from the reviews of the nature and extent of institutional participation in the delivery of extension services across countries. First, private sector extension is generally confined to commercially produced, often high value commodities. A large bias towards catering to the specialized needs of medium to large scale farms also exists. Second, smallholders, if organized into associations, however, can be strong customers as well. Third, fiscal constraints are a pervasive problem in both developed and developing countries, thus, strategies for: (i) streamlining and cost recovery measures (as in Mexico, Chile, and the United Kingdom) and (ii) promoting the development of private sector extension (as in China, Colombia) are often necessary and unavoidable. This, however, does not necessarily imply public delivery, subcontracting to the private sector is also an option. Lastly, considering the limitations of the public sector and the selectiveness of the private sector, the participation of other institutions, such as non-profit and non-governmental organizations in delivering agricultural extension services will be crucial.

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The agricultural sector worldwide is faced with several serious challenges: the spiralling demand for food, declining cultivated area due to population pressure, declining agricultural productivity due to natural resource degradation as well as increasing competition in international markets. A fundamental element to meeting these challenges is the adoption of improved agricultural production and marketing techniques and technologies by farmers and other rural entrepreneurs.

Traditionally, the critical task of promoting the adoption of new agricultural information (pure or embodied in agricultural inventions) has fallen in the domain of the public sector. But in view of the previous discussions, it is apparent that the private sector can play an important though selective role in the agricultural extension system. This section first reviews the areas where the private sector has the incentive to participate and examines the implications of this development in defining the appropriate roles of the other major actors in the system, including the public, non-profit and non-governmental sectors and national and international donors.

## **POLICY IMPLICATIONS**

### **Agricultural Technologies and Specialized Information**

Economic classification of the types of agricultural information available indicate that they are not exclusively public goods. They can be categorized into general, specialized and "technology-embodied" information. Information embodied in agricultural technologies (e.g. seeds, agricultural chemicals, agricultural machinery, livestock, animal feeds, marketing and processing equipment) are private goods and thus, can be efficiently supplied by private input suppliers. Specialized agricultural information are toll goods. Since non-paying users can be excluded, private information suppliers have the incentive to supply these services at optimal levels. That adequate economic incentives do exist for private input manufacturers and private consulting firms to offer such extension services is confirmed in the survey of country level experiences.

The level of private sector supply of "fee for service" agricultural extension is a function of the level of effective farmer demand. Effective farmer demand, in turn, will depend upon the **expected net benefits** from the investment in the new information. Strong market competition associated with dealing in highly tradable commodities will further enhance effective demand for new information, since the new information and technologies may provide the "competitive edge." A major implication of such a shift in classification of information from a "free good" to a "purchased good" is that the demand will exclusively emanate from commercialized farming operations and largely from farmers with medium to large marketable output value (these include medium to large scale farms or small farms raising high value crops). Economies of scale in the use of the information result in lower per unit costs of information and therefore greater affordability for farmers with medium and large-scale marketable output value. Moreover, these farmers are generally located in more productive areas with access to essential infrastructure, which further enhances the profitability of their operations.

Since effective farmer demand will largely emanate from the medium to large scale commercial farm sector, this implies that one segment of the rural sector--the subsistence farmers and farmers with small marketable output values--will be neglected by the private sector. One mechanism for overcoming this distributional problem is by pooling the agricultural extension needs of these "small farmers" (farmers with small marketable output values) under the umbrella of farmers' associations. In functioning as a group, they may be able to take advantage of economies of scale in receiving extension services as well as provide other services (e.g. input supply, marketing and credit services). The association may employ part-time or full time staff to provide extension information or hire out to consulting firms for their extension needs (e.g. developed countries, India, Taiwan, Zimbabwe, Central African Republic). Another approach is to stratify the client market and as an "extension safety net" have public sector extension resources targeted towards small farmers, as pursued in Mexico, while graduating larger-scale farmer to fee-for-service extension.

The lower profitability of farm production for many "small farmers" may be traced to the inaccessibility, underdevelopment and unfavorability of areas where they are situated, which makes private business activity unprofitable. It is in these areas where the public sector role of providing other public goods, particularly infrastructure (e.g. roads, bridges, irrigation infrastructures) and macro-stability becomes critical. Creating an enabling environment for improving farm profitability will similarly strengthen the incentives for farmers to adopt improved techniques and technologies.

The use of some types of technologies and specialized information involve externalities. For example, inadequate instructions on and poor monitoring of the use of some agricultural chemicals may result in negative externalities such as health hazards, pollution, and pest resistance. Unless the private sector is able to impose mechanisms to internalize these externalities (e.g self-regulation and self-policing), these externalities will necessitate government intervention, specifically monitoring, regulation, and enforcement of standards (not necessarily provision) to ensure that these externalities are accounted for.

### **General Information**

General types of information are toll goods in the short term, but due to their ease of transmission become public goods in the long term. While the ultimate decision on what types of information and how much resources (financial and/or technical) should be devoted to transmitting such general information will remain a public sector responsibility, it does not necessarily imply public delivery. If the information is not voluntarily supplied by other institutions (e.g. non-profit organizations, farmer associations, and non-governmental organizations), its delivery can be subcontracted out. The participation of these alternative institutions as well as linkages in efforts among these institutions should be promoted. Collaborative programs between the government and international research centers, non-governmental organizations and non-profit organizations in several countries provide evidence that such programs work. At the same time, it remains a public sector responsibility to provide mechanisms to facilitate farmer articulation of their needs.

Agro-processing and marketing firms may provide general information to their farm produce suppliers and output buyers, provided it meets other objectives, particularly the reduction of input supply risks and the promotion of brand loyalty. Such a supplementary role in information provision to farmer and consumers should be encouraged. The degree to which these private enterprises will undertake such investments, however, will be significantly influenced by the economic environment of and the government policies affecting the respective industries.

### **FUTURE DIRECTIONS**

In view of the changing conditions facing agriculture today, coupled with the governmental and fiscal constraints faced by many developing countries, a structural transformation of

the agricultural extension system from exclusive public sector delivery to a multi-organizational extension system is increasingly essential. The public monopoly in agricultural extension provision is no longer feasible nor sustainable in many countries and the joint efforts of other sectors--private, non-profit, and non-governmental sectors--are vital if this task is to be effectively performed. Capitalizing on the comparative advantage of each of the different sectors will ensure the success of this endeavor.

The private sector will supply "private good" and "toll good" types of agricultural information at socially optimal levels. Thus, as an initial step towards increasing private sector participation, the transfer of responsibility for delivering services, such as the marketing and distribution of agricultural inputs and the provision of specialized information, to the private sector should be facilitated. However, sharing the task of agricultural extension provision with private entities presumes that a private sector exists to take on the responsibility. But in many cases, private sector capacity has often been continuously suppressed, such that it is often weak or absent in many developing countries. Consequently, like an "infant industry," it may have to be promoted in the initial stages.

Encouraging private sector participation in agricultural extension implies promoting private sector investments in general. There is no fixed formula, rather the economic, cultural, social and political character of the economy will determine the optimal program for the "privatization" process. What is clear is that the private sector will invest only if a favorable economic environment prevails and barriers to entry are eliminated. This requires macroeconomic stability, essential infrastructure, a functioning legal system and competitive markets. These are "public goods" which governments have to provide.

To cope with fiscal constraints, often coupled with the absence of a private sector, many governments are pursuing cost recovery. Indirectly, this strategy is promoting private sector development through subcontracting arrangements, with the government merely functioning as the coordinating agency. This approach is already being implemented in several Central and Latin American countries. Under this approach, the critical public sector role is the establishment of explicit standards and monitoring of firm operations to ensure that quality standards are met. This strategy, however, should not discriminate against subcontracting to other qualified institutions, such as non-governmental organizations.



Enhancing the capacity of the government to determine the appropriate type of information and level of delivery of public good information nonetheless remains vital. Where a market for extension services exists, farmer needs and demands will be reflected through the mechanism of prices. But for public information, where the market fails to work, there will still be a need to formulate stronger mechanisms to facilitate farmer articulation of their demands to ensure relevance and efficiency of implementation of extension programs directed to them. Consultation between farmers and representatives from the public, private, non-governmental and non-profit sectors needs to be promoted. In designing an effective agricultural extension program, regardless of the institutional channel, five major issues have to be resolved: (i) what are the objectives of the extension activities; (ii) who is the target audience; (iii) what is the content or message; (iv) what method(s) will be most effective to convey this message; and (v) how can the activities of various extension sources be coordinated to ensure synergism in the extension effort.

It should be noted, however, that cost recovery programs should be viewed as a **transitional phase** and is at most a **second-best solution** to solving the undersupply of agricultural extension services resulting from fiscal constraints. An important contribution of cost recovery programs is the development and promotion of a market for agricultural extension services. Extension demand is fostered as farmer attitudes adjust from traditionally receiving services for free to a "fee-paying" system. The expectation of governments always doling out services is eliminated. At the same time, private sector supply of extension services is stimulated as effective farmer demand expands. An important role of the public sector is to create an enabling environment for the private sector to develop and grow, not to crowd it out by duplicating its activities. Thus, in addition to provisions for the gradual sharing of responsibility, provisions for eventual divestment from the public to the private sector should be factored into the broad plans of cost recovery programs. As in the case of New Zealand, the public agency was spun off into a full-fledged private entity after achieving 100 percent cost recovery of all its operations. Consequently, the public sector can concentrate its efforts and resources in areas where they will be most productive, that is in the provision of "public goods," such as general information and information pertaining to public concerns (i.e. environmental protection and conservation).

Cost recovery (both partial and full) implies that a choice of provider also exists. Therefore, some attitude adjustment on the part of public extension agents will also be necessary. The

lessons from the British and New Zealand experiences are quite meaningful. Marketing and selling skills have to be added to the basket of technical skills that extension agents offer and a business orientation instilled in all activities.

Finally, attitude adjustments are also essential on the part of international donors. There is need for the recognition that other sectors (private, non-governmental and non-profit sectors) are capable of sharing the task of delivering agricultural extension; this new perspective will be crucial for agricultural and economic progress.

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# **APPENDIX A**

## THE PUBLIC COST RECOVERY PROGRAM OF THE BRITISH AGRICULTURAL EXTENSION SYSTEM<sup>1</sup>

In 1985, the decision was made that farmers would bear part of the cost of extension services provided in England and Wales by the Agricultural Development and Advisory Service (ADAS) of the Ministry of Agriculture, Fisheries and Food (MAFF). This casestudy provides an illustrative example of the institutional and behavioral changes involved when cost recovery is imposed by a public agency.

ADAS began charging for services in April 1987 and since then has been operating as a commercial business providing consultancy and research and development services to the Government and a wide range of businesses in the food, farming, land and leisure industries. The transition from an extension agency offering services for free to a business charging commercial fees for advice, products, and services has been remarkably successful. Despite being part of a government department with the constraints that it imposes, and despite some reservations that a public agency could be sufficiently aggressive to succeed in a commercial environment, ADAS has consistently met its financial targets and is still the major advisory agency operating in England and Wales.<sup>2</sup>

### A Marketing Approach

Prior to 1987, the driving objective of ADAS was to foster a competitive agricultural industry by transferring educational information to farmers and by promoting the adoption of sound business and marketing practices. After the transformation, its main goal was revised to be the leading consultancy to farmers and the agribusiness sector in Britain by working with clients to provide quality service. To achieve this objective, a Steering Group was created. At the onset, the decision was made that all farmers were to be charged for the service, although the government shall continue to provide free advice on matters of the "public good", i.e. on environmental conservation, animal welfare, and diversification by farmers into non-agricultural enterprises or adding value to primary agricultural products. The Steering Group also concluded that a new management body was required for ADAS and an immediate market survey on the needs, attitudes, and willingness of farmers to pay for services was essential. Parliamentary legislation had to be enacted to allow ADAS to charge for advisory services. The 1986 Agriculture Act provided this legal basis. A board of management and a marketing unit was also created.

The market survey revealed that it would be best to position ADAS in the higher quality sector of the market and it would maximize its revenues by charging higher, rather than lower prices. It was estimated that following such a strategy, ADAS can earn an advisory income of £5 million a year. Between 1985-1987, ADAS also employed a team of consultants to assist in developing its policies and facilitate a change in the ethos of the organization. To achieve this, the consultants trained over 2,000 ADAS personnel in the use of marketing and selling techniques. These trainings included sales management and marketing, selling, customer service, negotiation and presentation skills. The relatively long period between 1985-87 was particularly valuable in allowing the whole organization to undertake this essential training.

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<sup>1</sup>This casestudy is based on materials from LeGouis (1991), Ingram (1992), Harter and Hass (1992) and Dancey (1993).

<sup>2</sup>Though ADAS was the largest extension service in England and Wales, there are independent groups selling advice to the industry. These were relatively small, often one-man units. Their existence, however, provided indications that farmers were prepared to pay for advice. In the past, these units have lodged complaints against the government that the free advice public extension agents provided was, in their view, unfair competition.

The role of the middle management in the transition was crucial. At the divisional level, a unit of about 80 staff, it was the role of the head of the division to direct, encourage, and monitor performance. At this point, although the service had overall revenue targets, individual targets were not set for particular officers. It was felt that this would be counter productive when managers had no basis for the assessment of the market in particular areas or the selling abilities of individuals in their staff. Some members adjusted to the new regime readily, although others encountered difficulties. Part of the problem could be traced to diffidence by the advisors to charge high prices for their services. There was a tendency to underprice and over deliver.

Initially, subscription schemes introduced many farmers to ADAS-charged services. These were particularly suitable for small farmers who could not justify the cost of a consultant's visit, but who could get the essential information needed from newsletters or telephone contacts. Larger and more sophisticated businesses were more willing to enter into tailored contracts with ADAS for the supply of a range of service timed to be relevant to their business enterprises.

### Early Mistakes

In the early years of charging, ADAS encountered several problems. Faced with revenue targets alone, there was an initial tendency for staff to go after and take on any job regardless of size. This enabled the agency to build up a large customer base, but the large proportion of small accounts were very costly to service. At the same time, because of the long tradition of extension work, and the desire to be of service to farmers, insufficient attention was given to matching the time spent on delivering the service to the fee negotiated. This led to over-delivery of services. ADAS also made the classical marketing mistake of developing products and then attempting to sell them, rather than studying client demand and developing products to fulfill these needs.

### Review of Performance

Despite some initial problems, ADAS has been successful in meeting its revenue targets. Between 1988 and 1991, ADAS revenues increased from £5.4 million to £14.1 million (Table A.1). By April 1990, ADAS had provided services to 85,000 customers. As expected, there was a decline in the number of farmers seeking advice after the introduction of fees in 1987. But after a couple of years, demand has begun to rise as customers overcame their reluctance to pay and alternative sources of advice provided by supply industries declined due to the recession. Dancey (1993) reports that by 1991, the number of farm businesses with whom ADAS was doing business had increased to regain the level achieved before charging was introduced. A market survey of farmers carried out by the National Audit

Table A.1: ADAS revenues and costs, £millions.

Year	Target Revenue £ million	Actual Revenue £ million	Operating Cost £ million	Revenue/Cost (%)
1987/88	5.0	5.4	29.7	18.0
1988/89	6.0	8.6	45.0	19.8
1989/90	9.9	11.3	45.5	24.8
1990/91	13.7	14.1	47.5	29.6

Source: Ingram 1992.

Office in 1990/91 also concluded that ADAS advice was now rated more highly than when provided for free (NAO in Dancey 1993). Recipients commented that the advice was 'sharper', addressed the real needs of the individual businesses and encouraged advisers to forge close, long-term links with their clients' businesses.

The entry of ADAS into the market place has also contributed to the changing structure of the agricultural extension sector in the UK. The whole market for consultancy has grown rapidly as farmers and growers have become more used to paying for advice and to appreciate its benefits. ADAS's competition now includes private crop and farm management consultants, firms of land agents and accountants, marketing boards, universities, and other government-sponsored agencies and organizations.

## TARGETING PUBLIC SECTOR EXTENSION BENEFICIARIES: THE CHILEAN EXPERIENCE<sup>3</sup>

Chile provides an example of a developing country that has pursued privatization extensively in all sectors of the economy, including the agricultural extension sector. However, Chile's experience showed that complete privatization of the agricultural extension sector pushed small and subsistence producers out of the extension market. This casestudy describes how the Chilean government is attempting to integrate these neglected groups back into the extension network.

### Historical Overview

In 1962, Chile restructured its public agricultural extension services and created the Agricultural Development Institute (Instituto de Desarrollo Agropecuario, INDAP) to provide credit and free technical assistance to small producers. However, by the 1970s, the government decided to disengage from general extension efforts, forcing larger, more commercial producers to obtain technology from other sources. To fill in the vacuum for small producers and to encourage the development of the private sector technical services, the Ministry of Agriculture paid private consulting firms to provide technical assistance. The results showed that farmers were willing to pay for such assistance and that careful selection and supervision of consulting firms enhanced the chances of success.

Meanwhile, INDAP continued to provide technical assistance to its small farmer clientele, albeit with reduced budgetary resources and staffing. In 1982, it introduced a pilot technical assistance program using subsidized private consulting firms in an agricultural area south of Santiago. This program was limited initially to small farmers with 8-12 "basic irrigated hectares" (BIH), a group deemed to have agricultural potential and viability to be receptive to improved technology, but unable to afford private technical assistance without government subsidy.

In 1986, an Inter-Ministerial Commission for Rural Development outlined a multi-faceted attack on rural poverty, which sought, among other things, to boost the income-generating capacity through modernized agriculture and technology transfer. The program continued INDAP assistance for better endowed, small producers (Programa de Transferencia Tecnología Integral (PTTI), but also initiated a special program for the previously neglected, smaller and poorer segment of the farming population (Programa de Transferencia Tecnológica Básico (PTTB). PTTB beneficiaries are small, marginal producers considered to have inadequate resources to achieve self-sufficiency from on-farm activities, in many cases even with PTTB participation. INDAP considers the PTTB to have primarily a social emphasis. In contrast, PTTI focuses on the productive/commercial development of participants, with social development arising as a secondary benefit.

### Program Implementation

The geographic unit on which INDAP's extension programs are based is a homogeneous agroclimatic zone. INDAP prepares an agricultural development plan for each area based on a detailed assessment of the area's agricultural potential and constraints, including a determination of the number of potential area beneficiaries for each of INDAP's assistance activities. Private consulting firms are selected to deliver extension services through public tender drawn from a registry of professionally qualified firms maintained by INDAP. A selected firm is required to prepare an annual work plan, consistent with INDAP standards and propose a technical program to meet the goals established in the

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<sup>3</sup>This case study is based on the materials from World Bank (1990b) and Wilson (1991).

area program. This action plan is organized around both group activities (training and demonstration) and individual assistance to reinforce techniques learned in groups and to address farm/family specific problems. Farm families are grouped for homogeneity to the extent possible. The number of individual visits and group activities required of extension workers is determined annually by INDAP. To ensure sustained results, both PTTI and PTTB programs are organized into two phases, the first consisting of five years of intensive support to group and individual activities, and the second phase which lasts three years, is less intensive and is structured to reinforce the achievements of the first phase. The Integral Program (PTTI) represents a package of extension activities geared to raise the productive performance and incomes of those small farmers with sufficient resources to attain self-sufficiency and/or market surplus production. The annual costs per beneficiary-family are about \$315 and \$155 for the first and second cycles, respectively. Beneficiaries cover 15 percent of the cost of this service, which can be financed through INDAP credit. In 1988/89, 80 private extension firms participated in the PTTI program, while 29 participated in the PTTB program.

INDAP endeavors to maintain high quality standards in its extension programs. As mentioned above, consulting firms must meet technical, staffing, and professional criteria to gain entry to INDAP's national registry prior to tender participation. In addition, training is provided by INDAP both for its in-house personnel as well as for staff of contracted extension firms. Most importantly, INDAP strives to ensure quality service for the final beneficiaries. The consulting firm's technical chief, who supervises and assists three PTTI extension workers, is required to visit each beneficiary at least once a year. Special consultants are stationed in INDAP's area offices to monitor the quality of work of the private extension firms. These consultants are under contract to INDAP.

#### **Future Directions**

In Chile, therefore, the principle is to target free services, limit the period of coverage to general recipients, and work with groups to reduce unit costs. Under a proposed World Bank technical services project, the goal is to expand services in the PTTB program and to increase the financial contribution under the PTTI program of appropriate end-users from 15 percent to at least 50 percent.



## TARGETING PUBLIC SECTOR EXTENSION BENEFICIARIES: THE MEXICAN EXPERIENCE<sup>4</sup>

Mexico is promoting greater cost recovery in its agricultural extension program. The Mexican experience illustrate an innovative approach of stratifying beneficiaries by income groups and instituting a cost-sharing program based the farmers' purchasing capacity.

### Overview

In Mexico, the recently established World Bank-financed Agricultural Extension Project (PROCATI) is attempting to reduce the costs of public extension services in an environment of acute budgetary stress. To stimulate greater sharing of extension costs by farmers and state governments, and to increase competition from private technical assistance groups already operating in certain areas, the aim is to stratify farmers by income group and tailor the services accordingly. The project is also testing the effect of limiting to about three years the period in which a group of producers receives extension assistance support. A variation on this approach of providing intensive coverage for a limited time followed by a reduction in coverage intensity was tested successfully under the PRODERITH project in Mexico's humid tropics.

Economic sustainability is the key issue in the design of the project. Before the project, Mexico's expenditures on extension were substantial, but had begun to suffer from severe budget constrains, hence the project focusses on increasing efficiency and cost containment and recovery. The impact of these measures is estimated to reduce the unit costs of providing public extension during initial intensive coverage period to \$12 per ha per annum in the higher income, irrigated areas of Northwestern Mexico and to about \$14 per ha per annum in the poorer Central Highlands.

### Cost-Control Principles

Two cost control principles are being tested. The first stratifies producers by income level and progressively graduates higher income producers to private extension services or requires greater cost sharing if continued public services are requested. This permits public services to focus more on low-to middle-income producers in priority areas. The second cost control principle promotes increased direct contact between researchers and farmers. This contact is more likely to occur in higher income irrigated areas and will permit further reductions in extension staff or at least their transfer to other priority areas where coverage is currently low. Several different approaches to cost control (i.e. reduction of unit costs) are being tested, namely: (a) greater use of farmer group contact; (b) the use of mass media to expand coverage; (c) expansion of the use of validation and demonstration plots; and (d) the reduction of coverage ratios over time in certain areas.

The project focuses its efforts on cost sharing in the higher income irrigated areas, where farmers are already paying about 15 percent of extension costs under a general irrigation district charge. Assurances were obtained that the government would raise the level of cost sharing from farmer groups (patronatos) in irrigated areas to at least 50 percent of extension costs. Other cost sharing mechanisms being tested include: (a) direct charges for services such as soil sampling and animal feed ration formulation; and (b) requiring credit and insurance institutions to pay the public extension service and administration directly for the technical support provided to their sub-borrowers.

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<sup>4</sup>This case study is drawn from Wilson (1991).

## FARMER RESEARCH AND EXTENSION CIRCLES IN NORWAY<sup>5</sup>

The Norwegian farmer-led research and extension circles (also called Agricultural Experimental Groups or Experimental Circles), are an example of successful public/private cooperation in agricultural extension. This casestudy describes the elements that facilitated the institutionalization of the circle system and some lessons that can be drawn from the Norwegian experience.

### Farmer-led Research and Extension

During the 1950s and 1960s, the public sector agricultural development officers<sup>6</sup> at local and district levels were given additional administrative tasks that resulted in a decrease in their extension activities. The farmers complained that the officers had little time for extension activities and that they become has lost touch of the farmers' problems. In the early 1970s, the farmer's economic organizations presented these complaints to the government and in 1971, the government agreed to fund in part a new government-supported private extension service call the Agricultural Research and Extension Circles.

The research and extension circles are characterized by the existence of farmer membership and membership fees, a farmer-led structure, combined research and extension activities, and on-farm adaptive research activities. The research and extension circles are based on a structure that already existed in some regions of Norway when the government funding was established. The first completely private circle (Hedemark Forsoksring) was formed in 1937, the second in 1955 and by 1962, twenty-two circles had been established. At present, there are 100 circles with about 22,000 farmer members. In 1990, the annual membership fee varied from \$60 to \$1,500 with an average of \$100. The fee amount is decided by the members themselves. Public (national or local) contribution accounts for between 50 and 80 percent of the circle's expenses depending on the location of the circle (remote areas get more support). About one quarter of all Norwegian farmers are members and maybe explained by the fact that a large number of farmers are only part-time farmers.

Circles are run by farmer members, as represented by a board. The circles generally run adaptive research including low input sustainable agriculture (12 circles). The extension methods used include orientations at membership meetings, issue discussion meetings, field days, newsletters, annual research reports, farm visits and telephone contacts. The research and extension circle system differs from farming systems research and extension because it is regarded more as private extension in contrast to the former which is usually considered as public sector extension. The circles are initiated, controlled and led by the farmers themselves. They developed as informal "grass root" organizations, while farming systems research and extension programs usually involve formal organizations, usually with a top-down approach.

### Institutionalization of the Circles

What facilitated the institutionalization of the circles was the felt need among farmers, the presence of a support system, and the choice of an approach appropriate to the situation. In Norway, the farmers had some experience in organizing themselves and they knew the benefits of organizations both through membership in farmer associations and farmer marketing and sales of cooperatives, which facilitated the establishment of the circles. Second, support from the policy level, the general public, and

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<sup>5</sup>This casestudy based on materials from Haug (1991).

<sup>6</sup>In Norway, public extension professionals are regarded as agricultural development officers and not as extension agents.

professionals contributed to a positive environment. Agricultural policy guarantees that farmers maintain a certain income level through farmer subsidies. This policy is viable since the general public is willing to pay for the subsidies in the form of taxation. Third, the professional agricultural society welcomed the circles and viewed them as a popular and challenging employment opportunity. Some unique characteristics of the Norwegian agricultural economy also helped foster their success: it is a small country with a small homogeneous population; it has relatively few farmers and small highly mechanized farms; and it is a rich country with the political will to support the agricultural sector.

R/E circles suggests that farmer-initiated and farmer-led extension has the potential for success. The circle provides an example of how participatory, farmer-led extension can be implemented in practice. Through the circles, the farmers are in charge of the process at every level from diagnosis to decision-making, from setting priorities to evaluating results. This in turn, shows how farmers can become responsible and motivated to participate in different efforts to develop and improve agriculture in their communities.

## NON-GOVERNMENTAL ORGANIZATION AGRICULTURAL EXTENSION ALTERNATIVE: THE AGA KHAN RURAL SUPPORT PROGRAM<sup>7</sup>

The Aga Khan Rural Support Program (AKRSP) is an example of a non-governmental organization's rural development initiative. The program involves the organization of grass-roots village organizations, which serve as the corner stone for launching commercial endeavors. Commercialization is promoted through the transfer of new techniques and technologies to farmers. This case study describes the Aga Khan experience.

### Overview

The Aga Khan Rural Support Program was designed to assist villagers in the physically remote, undeveloped, and often marginal areas of Northern Pakistan. The project emphasized organization and cooperative management, adapted from the work of Akhtar Hameed Khan at Comilla in Bangladesh in the 1960's and 1970's and further expanded through the work of Shoaib Sultan Khan (general manager of AKRSP) in Pakistan and Sri Lanka in the 1970's. Each village visited by the management group of AKRSP was offered a development partnership with clearly articulated obligations encompassing the willingness of villagers to (i) organize and cooperatively manage their affairs; (ii) generate their own capital through savings; and (iii) upgrade their human skills.

Technology transfer is given high priority in the project and AKRSP has assembled and tested several types of new technologies suitable for the region. These include new varieties of wheat, maize, apple and cherry; fodder crops such as clover, beets and turnip; various vegetable varieties; and a range of livestock related technologies. The AKRSP has also cooperated with other organizations in promoting the adoption of new technologies. For example, a project jointly sponsored by FAO, some commercial companies and various government departments had been launched to develop seed potato production at the village organization (VO) level.

AKRSP uses both its own and line agency staff as extension agents. Much of the farmer training is done by training members to become VO managers, leaders, and plant and animal production specialists. Short courses are held and follow-up training is also given.<sup>8</sup> To date, AKRSP's work in the districts of Gilgit, Chitral, and Baltistan, for example, has resulted in the creation of 1,477 VOs with a membership of 66,887 households (over half a million people), generating nearly a hundred million rupees a savings and the training of approximately 3,000 village managers and over 5,000 village level livestock, plant protection, marketing, poultry, and forest specialists (half of whom are women).

Membership in the VO depended on the size of the interest group and the homogeneity of the agro-ecological area. It ranged from 8 to 130 households, with an average size of 50. Some villages could have as much as 6 VOs. After a village organization is established, a close working relationship is established with the AKRSP staff. A series of planning dialogues are carried out between VO members and AKRSP staff before a grant is given. The process takes time and intensive contact between AKRSP staff and villagers. The project also involves a grant to each village organization of about Rs177,000

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<sup>7</sup>This case study is based on materials from World Bank (1990d) and Khan (1992).

<sup>8</sup> An evaluation of the project by the Operations and Evaluations Division of the World Bank (World Bank 1990d) reports, however, that AKRSP expectations of the skill level attained in such short courses were at times too optimistic.

(\$9,000) as initial capital and the payment of wages to the villagers. This is based on the premise that there is an opportunity cost to the villagers' time required to organize, train for, and operate the VO.

The AKRSP is funded by a variety of donors and the government of Pakistan. Its total funding amounts to almost US\$8.3 million in current dollars. Grants from donors account for about 96.8 percent of the money for the project. AKRSP's staff total 191 of which 92 are field staff. There is one front line staff member for every 200 households served or 1 staff member for every 2.8 village organizations. However, a potential problem for the AKRSP program in the future is likely to be the follow-up after withdrawal of funding. Nevertheless, because the infusion of technical information has raised the village skill levels and has developed the essential institutions, these assets will remain even after all external funding is used up.

## **MAKING A DIFFERENCE: FARMERS ASSOCIATIONS BOLIVIA<sup>9</sup>**

Farmer associations can play an instrumental role in educating farmers and introducing new technologies. This case study describes how two farmers associations, the Cooperativa Integral Campesina and the El Ceibo Cooperative made that difference.

### **Cooperativa Integral Campesina**

The Cooperativa Integral Campesina or COINCA started its own winery in order to service its grape-producing members. However, because it could only absorb 40 percent of the output of its 130 grape-producing members, the farmer members sold the remainder to one of the large distilleries in the area (Tarija Valley) either directly or through COINCA as an intermediary. When members sold their grapes to the distillery directly, they were often being shortchanged when their grapes were graded for their sugar content. As a result, COINCA began to monitor the sugar content at the distillery for small producers to guaranteed appropriate grading. This led to the establishment of a premium for higher quality grapes. The premium had "significant productivity implications", since the absence of grading systems for agricultural produce often acted as a disincentive to growers to improve the quality of their product. The establishment of the winery project also led to the dissemination of information to producers on how to judge sugar content and how to market their crop more successfully.

### **El Ceibo Cooperative**

Farmer information services can also spillover to non-members. The El Ceibo cooperative's experience with its cocoa processing plant illustrates such a case. The plant was started by the cooperative to meet the cocoa processing needs of its member producers in the Alto Beni region. Previously, producers had to travel to the processing plant in La Paz which was 8 hours away or sell to middlemen at lower prices.

After the establishment of the plant, some problems arose. Growers continued to ferment and dry cocoa at home even though it was very labor intensive. Moreover, the plant required unprocessed cocoa and could not run at capacity if growers insisted on drying cocoa at home. The reason behind farmers drying the cocoa at home was to disguise the incidence of blackpod disease, which had infected almost all of the Alto Beni's cocoa plantings. Since there is a price discount for diseased wet cocoa, both at La Paz and the local El Ceibo plants, drying helped the grower evade the price penalty.

To encourage farmers to sell their cocoa wet, El Ceibo decided to provide a price premium for wet beans to farmers without the blackpod disease and encouraged the adoption of disease combatting techniques. Effective methods of combating cacao disease had become available and El Ceibo worked with the local experiment stations on a small program to demonstrate these new methods. The Alto Beni's cacao producers were initially reluctant to adopt the new package of disease-combating techniques. This was in part due to bad experiences with Ministry of Agriculture operations in the area-- one on

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<sup>9</sup>This casestudy is based on material from Tendler 1983.

coffee and one on cacao--which disappointed and angered producers and in part due to the lack of incentive to adopt relatively costly remedies.<sup>10</sup>

The El Ceibo also carried out extension activities for all cacao farmers in the area that were more appropriate than those previously carried out by the MOA. First they selected two members and sent them for a week of training in Colombia on the new techniques of disease eradication. Upon their return the El Ceibo extensionists worked together with researchers conducting disease control studies from the IBTA (the state extension and research agency) station in the Alto Beni and set up demonstrations in their communities with considerable success.

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<sup>10</sup> The campaign against coffee rust involved extension staff arriving unannounced at farmers' fields and spraying indiscriminately. The cacao campaign had pushed intense use of fungicide and pruning. The chemicals were ineffective and expensive; the pruning was labor intensive and resulted in a 1 - 2 years of wait for normal fruit production.

## **FARMER ASSOCIATION EXTENSION IN THE DAIRY SECTOR: OPERATION FLOOD IN INDIA<sup>11</sup>**

India's dairy development program was embodied in Operation Flood, a nationwide effort to replicate a pattern of milk producers' organizations that evolved in Gujarat and is commonly referred to as the AMUL model. AMUL is the acronym for Anand Milk Union Ltd.; it is a milk marketing cooperative in the Kaira District of Gujarat organized by a group of dairy producers in 1946 for the purpose of obtaining better prices and access to the Bombay markets. This case study describes the structure and development of this highly successful program, which was a joint effort between farmers, the national and state governments, and a donor agency.

### **THE AMUL Model**

The AMUL model consists of a three tier cooperative structure, owned and managed by the member farmers. At the base is the Dairy Cooperative Society (DCS), a village level cooperative which receives milk twice a day, pays producers regularly based on the quantity and quality of milk delivered, and organizes production services to farmers. These support services included the sale of cattle feed concentrate, the promotion of fodder seed, artificial insemination, the provision of veterinary health services, and training programs for members. The DCS's are subsequently organized under a Milk Producer's Union, with usually one union per district. The union organizes milk collection for and milk processing at the Union dairy (pasteurization and packaging of fresh milk, and production of other dairy products), engages in distribution and marketing in urban centers, and provides production inputs and technical services to the DCSs. The unions in most states are members of a Federation, which may also own and operate a larger dairy plant. Aggregate planning of cooperative sector input services, milk marketing, pricing policy, and participation in the National Milk Grid for transport and storage of milk is organized at union and federation levels. In the AMUL model, the Boards of the DCSs, the unions, and the federation are from farmer representatives elected by the members and have full autonomy over operations, pricing and marketing policy, with all technical management personnel appointed by and responsible to the boards.

### **Operation Flood**

Operation Flood was first initiated in 1970; it consisted of projects implementing the AMUL model in three states: Karnataka, Madhya Pradesh, and Rajasthan.<sup>12</sup> The replication of the AMUL model in the different states entailed the coordinated efforts of the national and state governments, farmers, and donor agencies. The center for coordination and implementation of the project activities was the Dairy Development Corporations established in each state. The corporation's task primary task was the organization of the village cooperative societies and milk producer's union. It was responsible for recruiting the spearhead teams who were to form the nucleus staff of the producer's unions and the promotion, organization, and supervision of the operations of the DCSs. The Dairy Development Corporations also operated breeding farms to produce cross-breeds for sale to farmers (Karnataka), semen for distribution (Karnataka), and bulls for union bull farms (Madhya Pradesh and Rajasthan). The bull farms were to supply fresh semen that would be delivered daily to the DCSs by the milk collection trucks.

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<sup>11</sup>This case study is based on materials from World Bank 1987b and Doornbos *et al.* (1990).

<sup>12</sup> Subsequent projects aimed at duplicating the model in other areas followed. The National Dairy Project (Operation Flood II) was initiated in 1980 which involved the further expansion of the program in the three original states and the intensive development of the AMUL model in other states. Operation Flood III was launched in 1987 as part of the Government of India's Seventh Five Year Plan to extend the program into more areas.



To ensure the proper care of the early crossbred calves during the critical first three months of their lives and to encourage the spread of cross breeding, the national government and the state governments of Madhya Pradesh and Rajasthan subsidized the provision of calf starter rations to members of the DCS up to a maximum of Rs200 per member. The Animal Husbandry Departments of Madhya Pradesh and Rajasthan administered the calf rearing subsidy program.

The National Dairy Development Board, the government agency overseeing the planning and execution of dairy development nationally, assisted these corporations by training the Dairy Development Corporation's and the union's staff. It was also in charge of supervising the dairy cooperatives during the first year. In addition, the Board assisted the Dairy Development Corporations in the design and construction of the union milk and feed plants, the preparation of marketing studies to determine plant product mixes, and other consulting services. Capital for establishing these corporations were supplied by the national government, the state governments (at least 20%), and the Union themselves.

### **Government Price Policy Reform**

Although milk prices were uncontrolled in the three states, pasteurized milk from state dairy plants were sold at prices significantly lower than the prevailing market rate. This policy of government subsidization of consumer milk prices was lifted upon commencement of the project to improve competition in the milk market.

### **Project Performance**

Operation Flood was relatively successful in strengthening the dairy sector in India. Moreover, the cooperatives provided farmers the opportunity to gain greater access to services (production, marketing, and livestock health services) that previously were out of their reach. Shah and Bhargava (1982) found that as a result of the project, milk yields were significantly higher in villages that were part of the program, resulting in higher farm incomes. Its attractiveness to farmers is evidenced by the jump in the number of farmer participating families from 1.8 million in 1981 to 4.5 million in 1986. The number of dairy cooperative societies increased from 10,400 to 42,700 during the same period; while the volume of milk procured more than doubled from 2.6 million liters in 1981 to 7.9 million liters in 1986. Moreover, per capita milk consumption in the project areas as monitored by the National Dairy Development Board increased from 107 g/day prior to project implementation to 142 g/day in 1985. The rapid rise in the rate of participation can be traced to the fact that during the term of implementation of the National Development Project, the financial rate of return (FRR) to landless families with cross-bred cows was 37 percent and was greater than 37 percent for farmers who could grow their own fodder. The FRR for the DCSs was 28 percent, and for producer unions 17 percent. Economic rates of return were not calculated, but were expected to be significantly higher than the opportunity cost of capital in India which was estimated at 12 percent. With respect to the initial state projects, the Rajasthan and the Karnataka projects registered economic rates of return of 28 and 22 percent respectively. Madhya Pradesh, however, displayed a negative economic rate of return.

### **Project Constraints**

The project, however, was not free of problems. There were bureaucratic delays, particularly at the state level where widespread AMUL cooperative development was often perceived as a threat to state functionaries and entrenched milk industry interests. State government collaboration was not always forthcoming and depending on individual state attitudes, the pace of implementation varied. A central plank of the AMUL cooperative organization is farmer ownership/control at the DCS, union, and federation level, and most importantly, freedom of the cooperative organizations to manage all aspects of milk procurement, processing, marketing, and pricing. This required transferring state ownership and

control of the milk industry to farmer participants which the majority of states were reluctant or extremely slow to do.

Despite the implementation difficulties, Operation Flood stands out amongst the many joint government-private sector-donor undertakings because of its sustainability. There is widespread and enthusiastic support amongst Indian villagers; the approach has had a solid grassroots base. Direct benefits accruing to participating DCS farmers include a reliable market for their milk and a higher family income; these benefits have served as a strong incentive for farmers to become part of the program and for the national government to establish AMUL dairy cooperatives all over India. At the same time, a few lessons can be learned from the Indian experience. The AMUL model depends for its efficient functioning on autonomous farmer control at all levels. Operation Flood showed that as long as the financing of the interdependent aspects of AMUL operations continue to be dependent on individual state budgeting procedures, then coordination, efficiency, and financial viability are impaired.

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