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DILEMMAS OF AGRICULTURAL EXTENSION IN PAKISTAN: FOOD FOR THOUGHT

Andrew P. Davidson, Munir Ahmad, Tanvir Ali

Abstract

Since their inception, agricultural extension services in Pakistan have been organised as a part of the Ministry of Agriculture. A number of extension models and styles have been tried and rejected. Currently, the Government is looking for an extension service that is cost effective, responsive to farmers' needs, and environmentally sustainable. To this end, the government is inclined towards the privatisation of extension services. The study was conducted among cotton farmers in Punjab Province to determine the comparative effectiveness of public and private sector extension as perceived by the stakeholders. Data were collected from contact farmers and extension personnel from both extension systems, as well as from non-contact farmers. A number of biases were identified in both systems. Overall, neither system appears to be working for the benefit of the wider farming community.

Research findings

- *The public and private extension systems offer competing, conflicting and overlapping programmes.*
- *Both private and public extension rely on a strategy of using contact farmers, which severely limits the diffusion of information.*
- *Private sector extension is more concerned with serving the needs of larger, resource-rich farmers to the exclusion of other farmers because of its primary interest in generating profits.*
- *Public sector extension is biased towards better-educated farmers, although not necessarily towards those with large landholdings.*

Policy implications

- *A simple strategy of privatising agricultural extension will not be sufficient to provide the technology and support required by the majority of farmers.*
- *Policymakers should be aware that those farmers who are excluded from public or private extension are forced to seek information from input dealers who may not be well informed or properly motivated to provide appropriate assistance.*
- *Urgent attention is required for rethinking extension strategies for Pakistan so as not to exacerbate the growing information gap between rich and poor farmers.*

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CONTENTS

Tables

Acronyms

FAO	Food and Agriculture Organisation
AO	Agricultural Officer
BDS	Basic Democracies System
CLCV	Cotton Leaf Curl Virus
FA	Field Assistant
FO	Field Officer
IPM	Integrated Pest Management
IRDP	Integrated Rural Development Programme
NGO	Non-Governmental Organisation
TSO	Technical Sales Officer
USAID	United States Agency for International Development

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1 INTRODUCTION

Many factors contribute towards the development of agriculture, including extension as an institutional input. Agricultural technologies and techniques are constantly changing and farmers need to be made aware of and know how to use agricultural innovations for the exploitation of inherent yield potentials. Worldwide the public sector plays a dominant role in the provision of agricultural extension and services (Axinn and Thorat, 1972; Lees, 1990; Swanson, Bentz and Sofranko, 1997). According to a worldwide survey conducted by the FAO in 1988–9, about 81% of extension work around the world is carried out through a ministry or department of agriculture (Umali and Schwartz, 1994; Swanson, Farner and Bahal, 1990). Globally, some 600,000 extension workers are engaged in the provision of agricultural information to farmers (Maalouf, Contado and Adhikarya, 1991; Swanson, Farner and Bahal, 1990), of which 95% is carried out by public extension (Swanson, Farner and Bahal, 1990, cited in Rivera and Cary, 1997).

Now, however, serious reservations are being expressed about the performance and capability of this sector, placing the future of the public extension system in doubt. Rogers (1987), for example, argues that the performance of public agricultural extension in developing countries has been disappointing and has failed to transfer agricultural technology to the farmers. Furthermore, large numbers of farmers remain outside the ambit of extension providers (Prinsley et al., 1994). Presently, three out of four Asian farmers have no contact with extension services (Maalouf, Contado and Adhikarya, 1991). This is attributed to a number of factors including poorly motivated staff, a preponderance of non-extension duties, inadequate operational funds, lack of relevant technology, top-down planning, centralised management, and a general absence of accountability in the public sector (Antholt, 1994 and Baxter et al., 1984). Overall, public extension services have consistently failed to deal with the site-specific needs and problems of the farmers (Ahmad, 1999). The same is true in the case of Pakistan (Ahmad, Davidson and Ali, 2000; Sofranko, Khan and Morgan, 1988). As a result of the relatively poor performance record of public sector extension over the past two decades in Pakistan and elsewhere, politicians, extension specialists, and industry experts have been advocating a thorough reconsideration of extension delivery as the old system was 'not doing enough, not doing it well and … not being… relevant' (Rivera 1991: 14). As further noted by Rivera (1989, cited in Prinsley et al., 1994), farmers with large-scale farm operations often bypass extension agents in preference for direct contact with research scientists. In all likelihood, these farmers are dissatisfied with the technical competencies and services of public sector extension personnel. Critics of public extension claim that its services need to be reoriented, redirected and revitalised (Rivera and Cary, 1997). The inclusion of the private sector to ensure competition is gaining credence as one solution, especially with regard to agricultural input-supply firms. It is assumed that a market-driven extension service will provide the most rational and efficient mechanism to 'get agriculture moving' and usher in a second Green Revolution.

Agriculture is an important element in the social fabric of Pakistani society and plays an essential role in the formation of its cultural identity. Too, whatever the economic structure has been in the past or is today, unquestionably Pakistan's economy is, and will continue to be, based on agriculture in the foreseeable years. A vibrant agriculture in Pakistan is central to the well-being of the largest and most rapidly growing section of the population living in approximately 45,000 rural villages, as well as for the welfare of the urban population and those working in agro-industrial enterprises (Government of Punjab, n.d.).

Pakistan's agricultural sector contributes more than 24% of GDP, employs about 44% of the labour force, directly sustains 75% of the population and accounts for 30% of exports (Government of Pakistan, 2000). More importantly, it accounts for about 50% of total foreign exchange earnings (Dawn, 1995). If the processed raw material from this sector is included, then its share of total exports is more than 60% (Hamid, Nabi and Nasim, 1990). Moreover, this sector provides raw material to domestic agro-based industries such as sugar, *ghee*, leather, and textiles. Hence, the importance of agriculture to the economic growth of Pakistan and the well being of its people cannot be overstated.

2 PURPOSE OF THE STUDY

In this period of financial crises and budget constraints, especially in a country like Pakistan already burdened with a large debt load, international development agencies such as the World Bank are suggesting that governments should divest themselves of agricultural extension. And with the expansion of private firms into this area, it is unfeasible to operate parallel extension programmes which raises the question whether government should cease its extension activities altogether. Nevertheless, the privatisation of extension

services may not provide the solution to Pakistan's agricultural problems, particularly where reaching small-scale and resource-poor farmers is concerned. Our aim here is to address this rather broad issue from a comparative perspective and thereby observe more clearly the efficacy of privatising agricultural extension in Pakistan, particularly from the perspective of the end users – the farmers. It was thus considered essential to conduct a study of the perceived performance of both sectors and to understand how the farming community views them, including their ability to deliver a desired outcome.

Presently the public and private agricultural extension services often provide competing, overlapping, and conflicting programmes. This is especially evident in activities oriented towards cotton, Pakistan's main cash crop and second highest earner of foreign exchange after rice. Today, Pakistan is the fifth largest producer in the world, with 3.15 million hectares under cultivation (Poswall and Williamson, 1998). Recent years, however, have seen an increase in cotton pest infestations, primarily because cotton has a longer growing period than other field crops and has a specific fruiting pattern that increases its vulnerability to pests and diseases (Baloch, Kalroo and Shah, 1994). Cotton has a higher cost of production than any other crop with 66% of the total cost of production per hectare expended on chemicals for plant protection (International Cotton Advisory Committee, 1994). The primary pests and diseases that attack cotton from germination to picking are presented in Table 1.

The complete eradication of cotton pests from farmers' fields is not possible although their number can be kept below economic injury level (that is, the damage done to the crop by pests is much less than the cost of controlling them). Given the importance of cotton to the national economy and the severity of infestations, both extension sectors target cotton producers and therefore routinely visit the same farmers and provide similar information. But unlike public extension, the private sector's service is primarily interested in sales of its agricultural inputs including seeds and agrochemicals (e.g., pesticides and fertilisers). While not decrying their benefits, alternatives are not in the financial interests of most private sector agencies. For example, trials of integrated pest management (IPM), which is designed to replace pesticide applications, are being carried out by the government's CABI Bioscience Centre Pakistan outside of Lahore (Poswall and Williamson, 1998). It is difficult to envisage private agrochemical businesses disseminating IPM practices in place of their pesticides. Furthermore, only those able to pay for services typically warrant the attention of private extension personnel while the public sector (at least in theory) is open to all farmers.

The private company selected for this study was Ciba, as it is not only one of the largest providers of private extension in Pakistan but also specialises in pesticides for use on cotton, a very important crop to Pakistan's economy. Pesticide use in cotton now accounts for about 70% of total consumption (Saarcnet, 2001). The dramatic increase in its use is such that more pesticides are currently applied to cotton than to any other single crop (Poswall and Williamson, 1998).

3 AGRICULTURAL EXTENSION IN PAKISTAN

Overview

In Pakistan, agricultural extension services have traditionally been organised as part of the provincial Ministry of Agriculture. Several extension models and styles have been tried since independence, including the Village Agricultural and Industrial Development Programme (Village-AID Programme), Basic Democracies System (BDS), Integrated Rural Development Programme (IRDP), and Inputs at Farmers' Doorsteps Approach (Axinn and Thorat, 1972; Government of Punjab n.d.). Based on the linear approach, these programmes met with limited success and were abandoned one after another. The present Training and Visit or T and V system, while specifically focused on agriculture, also suffers from inherent inflexibilities, namely the over- (and seemingly naïve) reliance on contact farmers to diffuse technical information to surrounding farmers (Ahmad, 1999;

Table 1 Description of cotton pests that attack Pakistani cotton

Scientific name	Common name	Mode of attack	Attack stage/month
Sucking Pests			
Bemisia tabaci	White Fly	sucks plant sap and secretes black fluid	early stage of growth to harvest
Aphis gossypii	Aphid	same as White Fly	when the bolls open
Amrasca devastans	Cotton Jassid	sucks plant sap	early stage of growth to harvest
Thrips tabaci	Thrips	same as above	same as above
Boll Worms			
Earias vitella	Spotted Boll Worm	feeds on tender shoots and bolls	July–October
Pectinophora gossypiella	Pink Boll Worm	same as above	July–October
Spodoptera litura	Army Boll Worm	same as above	July–October
Diseases			
Cotton Leaf Curl Virus	Cotton Leaf Curl Virus	Viral	at any stage of growth

Ahmad, Davidson and Ali, 2000). This, however, is changing, due in part to pressure from a policy environment favouring privatisation. A brief critical review of these programmes is presented in the following sections.

Village-AID programme

The Village-AID programme which started in 1952 was the first well-organised and concrete effort toward agricultural development by the new government of Pakistan. Initiated with the financial assistance of the United States Agency for International Development (USAID) and the Ford Foundation (Axinn and Thorat, 1972; Asian Productivity Organisation, 1994), Village-AID provided a comprehensive community development programme based on a holistic approach. The main objectives of the programme as reported by Hussain, (n.d., p. 2) were to:

- increase the incomes of rural people through improved farming practices and cottage industries;
- inculcate a sense of self-help among the rural people to solve their own problems;
- coordinate development activities undertaken by the departments and agencies concerned with agricultural and rural development; and
- instil a welfare orientation into the entire administrative structure of the government.

In an effort to meet the broad programme objectives, Village-AID workers (both men and women) were provided with extensive 'hands-on' pre-service training in disciplines such as agriculture, animal husbandry, health and sanitation, cooperation, home economics, cottage industries, education, and youth work. Special emphasis was placed on developing qualities such as leadership, discipline, initiative, self-help and self-service in the trainees. Arrangements were also made for in-service training in order to keep field workers abreast of new information.

The initial benefits of the programme popularised it in the rural community. Nevertheless, early successes proved difficult to sustain and the programme soon lost momentum due to the lack of ongoing cooperation between participating departments and their fierce protection of perceived departmental prerogatives (Hussain, n.d.). Moreover, the Village-AID workers were assigned a broad range of duties including the formation of village councils and acting as advisers to the councils. Overburdened with job responsibilities, they were unable to provide farmers with sufficient technical information and guidance on agricultural problems. Consequently, the programme failed to achieve its agricultural objectives. Other reasons for its failure included the staff's lack of basic agricultural qualifications, ineffective coordination between village-AID workers and staff of other government departments, and the misappropriation of financial aid (Hussain, n.d.). The programme was abolished in 1961 (Axinn and Thorat, 1972).

Basic Democracies System (BDS)

A new system was phased in following another change in political regime in 1959. BDS was designed to achieve developmental objectives with the maximum participation of the people in the rural development process (Hussain, n.d.). A primary feature of BDS was the decentralisation of authority, with responsibility delegated to lower levels of the organisation. BDS consisted of four tiers: the union, *tehsil*, district, and divisional councils (Sher, 1994). While BDS can be credited with creating political awareness among the people of Pakistan, it ultimately failed to create any long-lasting positive changes in the agricultural sector (Asian Productivity Organisation, 1994). According to Rahman (1962, cited in Axinn and Thorat, 1972: 137), 'union councils paid lip-service to the programme of increasing agriculture by passing mere resolutions on which virtually no action was taken.' The BDS was therefore abolished after yet another change of government in 1970 (Asian Productivity Organisation, 1994).

Integrated Rural Development Programme (IRDP)

In 1970, the government embarked on the Integrated Rural Development Programme (IRDP). This new approach was based on the idea of close coordination and cooperation among all governmental development agencies involved in rural development. The Asian Productivity Organisation (1994: 294) observed that:

> This programme centred on the integration of all nation-building departments involved in ameliorating the lot of the farming communities and decentralisation...down to the markaz (a group of union councils) level.

IRDP remained in operation for about a decade but also failed to realise its stated objectives. In 1978, it was subsumed into the Local Government Department (Asian Productivity Organisation, 1994). While certainly well intended, the programme was too ambitious in its attempts to take on 'development' from every conceivable angle (see, for example, Lele, 1975). IRDP quickly resulted in an unwieldy bureaucracy (a problem shared by the previous programmes). The main reasons for its failure were the lack of mutually agreed objectives between participating agencies, conflicts of interest, and jurisdictional infighting among departments.

Inputs at farmers doorsteps approach

In an effort to improve agricultural productivity during the latter years of the IRDP, the government assigned extension personnel to deliver agricultural inputs such as improved seed, fertiliser, and pesticides to farmers. The government provided substantial subsidies to the farmers in an effort to encourage the use of inputs deemed essential for increasing agricultural production (Government of Punjab, n.d.). The extension personnel succeeded in popularising the use of agricultural inputs, resulting in a significant increase in agricultural production (Axinn and Thorat, 1972). Thus, 'For the first time crop production [grew] about 6 or more per cent per year, which is a very, very high rate of growth' (Gustav, n.d.: 6).

Although there was an increase in agricultural production, this approach nevertheless had the unintended consequence of turning extension workers

from agents of change into sellers of agricultural inputs (Government of Punjab, n.d.), and the highly specific assignment left them little time to carry out educational programmes for the farmers.The approach also proved costly and ultimately paved the way for the privatisation of agricultural inputs and phasing out of the subsidies borne by the Government (Government of Punjab, n.d.). The Inputs at Farmers' Doorsteps approach was replaced in 1978 with a new system of extension known as the Training and Visit system.

In summary, the early agricultural programmes in Pakistan sought to stimulate agricultural production yet failed to bring about any substantive changes owing to top-down planning, rigid centralisation, excessive departmentalisation, and, of course, the self-serving and manipulative role played by many politicians (Hussain, n.d.). On the other hand, there was a positive lesson from these earlier efforts – the need to de-politicise the task of developing agriculture. Thus, agricultural extension was separated from the notion of 'community development' while the work of input marketing was abandoned, leaving the Department of Agriculture (extension wing) free to concentrate on the delivery of extension services to the farmers. The implementation of the government's most recent extension strategy, the T and V system, marked an effort to reform and improve the effectiveness of extension services in Pakistan. It too has met with limited success. Faced with continued difficulties in improving agricultural productivity as well as budget constraints, the government has actively encouraged the participation of the private corporate sector in the provision of agricultural services and extension.

T and V System

The T and V system followed the Village-AID programme and the Inputs at the Farmers' Doorstep Approach and was implemented in two stages with financial assistance from the World Bank. According to Benor, Harrison and Baxter (1984: 9), T and V is:

> A professional system of extension based on frequently updated training of extension workers and regular field visits...provides an organisational structure and detailed mode of operation that ensures that extension agents visit farmers regularly and transmit messages relevant to production needs; problems faced by farmers are quickly fed back to specialists and research for solution or further investigation.

T and V provides for a two-step flow of information – from contact farmers to the farming community (Van Den Ban and Hawkins, 1996; Blackenburg, 1984). Within the T and V system, field extension personnel are relieved of non-extension duties such as selling seeds, pesticides and other agricultural inputs. This enables them to concentrate their efforts on informing and educating the farmer about best farming practices, from crop husbandry to plant protection. Of course, in Pakistan the shift away from the public provision of inputs such as pesticides was also influenced by modifications of the Import-Substitution policy, financial constraints, and market reforms. Now, for example, about 20 agrochemical companies have developed their own pesticide formulation facilities, mostly with technical assistance from their foreign principals. Imports of pesticides have increased 57% from 1990 to 1996, while imports of the active ingredients of these chemicals with the introduction of local 'generic' brands rose 23% (Saarcnet, 2000).

Working of T and V System in Pakistan

According to the Government of Punjab (1987: 2), the aim of agricultural extension is 'achieving improvement in agricultural production through better coordination [and] education of the farming community to adopt the latest technology'. The following comprise the primary objectives of the T and V system (Government of Punjab, 1987: 3–4):

1. establish demonstration plots in each Union Council by each Field Assistant (FA) (under the supervision of the AO or Agricultural Officer) in each cropping season (*rabi* and *kharif*) to demonstrate the latest technologies;
2. improve the mobility of the extension staff by providing bicycles for FAs, motorcycles for AOs, and four-wheel drive vehicles for upper-level supervisory staff; and,
3. strengthen the in-service and on-the-job training for FAs.

The farm families in the jurisdiction of an extension worker (FA) are divided into eight groups of about equal size with approximately 10% of each group selected as contact farmers (Government of Punjab, 1987). For example, if the total number of farm families in an extension worker's territory is 640, these will be divided into eight groups of equal size with 80 farm families in each group. Eight farmers (10% of each group) constitute that FA's contact farmers. However, there is no hard and fast rule determining the number of contact farmers. This depends, among other things, on a worker's mobility, the density of population in the area, the types and diversity of crops, the types of farming systems, etc. On average, the number of contact farmers in a group varies from eight to ten. Extension workers are obliged to pay eight visits to contact farmers during a fortnight; two days each are fixed for training and extra visits or office work. In addition to providing technical advice and information to contact farmers, the FAs and AOs organise and present group activities such as Farmers' Day exhibitions and demonstration fields. Theoretically, the programme appears sound but still it does not yield the desired results.

Credibility of public sector extension in Pakistan

The T and V system replaced conventional extension in an effort to improve and enhance the performance of public sector extension (Government of Punjab, n.d.; Ahmad, Davidson and Ali,2000). Unfortunately, the T and V system also failed to yield the expected results (Khan, Sharif and Sarwar, 1984; Ahmad, 1999). Instead, it further exacerbated the hierarchical tendencies of centralised management and top-down planning (Antholt, 1994). Moreover, T and V placed more

emphasis on operational procedure than in getting the message across to farmers (Van Den Ban and Hawkins, 1996). Nayman (1990: 72) reported that:

> *In Pakistan, bureaucrats appreciated T and V, because the pattern of internal communication in the Department of Agriculture is asymmetrical (geared to control rather than to create understanding) and top to bottom.*

The public sector's T and V system was predicated on the central premise of contact farmers conveying information received from extension agents to neighbouring farmers (Ruttan, 1996). When this was put into practice, however, it soon became apparent that the selection of contact farmers was biased toward the large resource-rich farmers, those better positioned to adopt new technologies (Sofranko, Khan and Morgan, 1988; Ahmad, 1999). In fact, Rolling (1982), promoting the cause of small farmers, argued that, at least initially, the local landed elite of the past simply became the contact farmers of T and V.

Like its predecessors, T and V has been plagued by poor performance. Khan, Sharif and Sarwar (1984) reported that T and V failed to create any lasting improvements in agricultural production. According to a study conducted by Ahmad (1992) on the effectiveness of the public sector in the Punjab's Lahore District (the central headquarters of extension), nearly 85% of the farmers had little faith in the work of public agricultural extension. Of greater concern was the fact that 80% of farmers were not even acquainted with the Agricultural Officers of their area. With the National Commission on Agriculture's conclusion that 'extension services have not improved in quality over the years and despite heavy expenditures, the benefits to the farmers have been minimal' (Government of Pakistan, 1988), the government recommended the involvement of the private sector in agricultural extension.

Given the overall lack of success of the T and V system in diffusing agricultural information to farmers throughout Pakistan, the Ministry of Agriculture changed its extension strategies in 1999. While not abandoning the T and V system per se, it modified it significantly. No longer are contact farmers used as the information conduit in the extension system. Instead of focusing on individual farmers, the public sector now deploys its agents to organise group meetings as its preferred method for disseminating information, reasoning that group meetings attract and reach more farmers who can in turn function as 'contact farmers'. While this is certainly an important first step in refashioning extension activities, it still does not ensure that those in need of information and assistance receive it.

The emergence of private sector extension in Pakistan

Although involved in extension activities since the 1980s, the private corporate sector – national and multinational agricultural input supply agencies – is now entrusted with the responsibility of supplying agricultural inputs to farmers (Government of Punjab, n.d.). According to the National Commission on Agriculture, the transition from subsistence to commercial agricultural in Pakistan will only be possible with the active participation of the private corporate sector (Government of Pakistan, 1988). Furthermore, the Commission adamantly encouraged the participation of the private sector in the process of agricultural development by making recommendations to the Government such as:

> The traditional role of the private corporate sector in providing material agricultural inputs and services needs to be strengthened and expanded to cover newly emerging needs such as specialised cultivation operations, spraying, and harvesting and to provide total package services rather than single inputs (Government of Pakistan, 1988: 423).

In light of the recommendations forwarded by the Commission, international agricultural input supply agencies such as Novartis (better known as Ciba, the name used throughout this paper), Bayer, Hoechst and Huntsman began taking part in extension work as well as selling agricultural inputs. Currently, Ciba provides farmers with a total package of plant protection and has recently become the leading international agrochemical firm in Pakistan with 22% of the pesticide market (local 'generic' companies claim to control 60%).

The opening up of agricultural extension has had major impacts in Pakistan, not the least of which is the dismantling of the Government monopoly on delivering services and extension to farmers. Public extension is now just one among many service and extension providers. In the push towards privatisation, not only have private business firms such as Ciba entered into extension, but also a multitude of NGOs (e.g., Agha Khan Rural Support Programme, National Rural Support Scheme, and Punjab Rural Support Scheme), and farmers' cooperatives (e.g., Saltland Water Users Association). While providing farmers with an array of choice and services, there is a very real danger of information overload and conflicting advice, as there is little or no coordination between the various deliverers of extension.

Ciba: A private extension perspective in Pakistan

Ciba started its business operations in Pakistan in 1972 and by 1998 had become the single largest company providing pesticides for crop protection. Its field staff not only provides technical information for the use of chemicals against insects, pests and plant diseases, but also a full package of crop husbandry services (the latest crop information as well as various chemical seed treatments and pesticides to fight off infestations). In conjunction with the introduction of its new logo, Ciba-Geigy was renamed as Ciba in 1992 (Novartis, 1997). Later in 1996, Ciba and Sandoz, two Swiss-based corporations, announced the largest corporate merger in the history of agriculture and created Novartis, from the Latin *novae* meaning new arts or skills. The new company occupies the number-one position in crop protection worldwide (Novartis, 1997). As previously noted, Ciba offers a total plant protection package and provides its services directly to farmers. It also holds farmers' meetings at village level where extension/sales personnel educate the farmers about the appropriate

use of chemicals for crop protection, as well as providing advice on agronomic practices, especially for cotton.

Working of Ciba in Pakistan

The crop protection wing of Ciba's agribusiness division focuses on the research and development of products to control weeds, pests and diseases that harm and reduce harvests' (A. Latif, 1997, personal communication, 9 January 1998). In general, Ciba's extension personnel have no formal training in extension; rather they have academic backgrounds in agricultural science and business. They do, however, receive on-the-job training at the beginning of their employment, as well as periodic training courses. Ciba's agricultural division in Pakistan is at the forefront of the private firms involved in extension work and has the following objectives:

- introducing new pesticides on to the market;
- providing technical services to progressive farmers on their doorsteps concerning the safe use of pesticides;
- conducting free pesticide trials at progressive farmers' fields and arranging field days to show the results of the pesticides.

The Technical Sales Officer (TSO) is Ciba's functional equivalent of the FA or public extension worker. As a sales representative for the company, the TSO collects orders and turns them over to Ciba's preferred agrochemical dealers who then sell the product to farmers. As an extension agent, the TSO pays farm visits to contact farmers and organises farmers' meetings or gatherings at the village level to educate them about the effective use of Ciba's plant protection techniques. The extension job mainly revolves around popularising Ciba's products among the farming community, and ultimately serves to promote the company's sales and preserve the firm's market share. On average, every TSO also supervises two to three Field Officers (FO) who are recruited on a contractual basis during the cotton season. The FOs assist the TSO in conducting farmers' meetings and discharging other sales activities.

Comparative overview of the organisational environment

In a broad sense, both sectors share similar objectives in their provision of assistance to farmers. But on closer inspection, critical differences appear. These are especially evident at the level of organisational resources. Lack of adequate funds is a major ongoing problem faced by the Department of Agriculture. Its total annual budget is 56 million rupees, of which 84% is required to meet staff salaries (G. Muhammad, personal communication, 20 January 1997). Similarly, Purcell and Anderson (1997) found that the bulk of the Department of Agriculture's budget went to meeting recurrent costs. In contrast, Ciba's annual budget is more than 2 billion rupees (A. Latif, 1997, personal communication). Extension personnel are encouraged to undertake extensive tours, personal visits, and to make phone calls to contact farmers.

Without question, Ciba's fieldworkers are better resourced and are provided with a company four-wheel drive vehicle and a business expense account. Ciba spends ten times more on one TSO than the public sector spends on an FA working at the same level (A. Latif 1997, personal communication). Public extension FAs, on the other hand, must cover their territories on bicycle (AOs on motorcycle) and receive no reimbursement for out of pocket expenses. If nothing else, the low state of staff morale and initiative is understandable among the FAs. Then too, there is little opportunity for professional advancement. As one FA commented: 'We are hired in as a Field Assistant and we will die a Field Assistant.' No such barriers are evident in Ciba.

4 METHODOLOGY

Punjab is the main producer of agricultural commodities in Pakistan, producing 83% of the cotton, 72% of the wheat, 95% of the rice, 56% of the sugarcane and 35% of the maize (Government of Punjab n.d.). For this reason, the Punjab is commonly known as the bread basket of Pakistan (Davidson, 2000). The majority of its population live in rural areas in about 25,000 villages and engage directly or indirectly in agriculture. The province is divided into three agro-ecological regions and administratively into eight divisions – including Faisalabad – and 34 districts.

Faisalabad Division, situated in the centre of the Punjab, lies south of Lahore city and shares a common boundary with Sheikhupura district to the north, Sheikhupura and Okara districts to the east, Sahiwal and Khanewal districts to the south, Leiah and Bhakhar

Table 2 Size of land holding (%)

Size of landholding (acres)	Contact farmers	Non-contact farmers	Total number of cotton farmers
<12.5	5.8	62.5	537
12.5 – 25	15.4	24	205
>25	78.8	13.5	112
Mean landholding size	91.3	16.8	
Range	8 – 625	2 – 100	
Total percent (n=)	100 (52)	100 (104)	854

Table 3 Farmers by education (%)

Educational level	Contact farmers	Non-contact farmers
Illiterate	1.9	27.9
Primary	1.9	15.4
Middle	13.5	19.2
Matric	38.5	26
FA	21.2	9.6
BA and above	23	1.9
Mean education (years)	11	7
Total percent	100	100

to the west, and Sargodha and Khushab to northwest (Government of Pakistan, 1984). It is the fourth most populous division in the Punjab with a population of about 7 million, and is further subdivided into three districts: Faisalabad, Jhang and Toba Tek Singh. About 72% of the people live in rural areas (Government of Pakistan, 1996–7). Faisalabad Division is very important from an agricultural point of view. Its alluvial soils, deposited by the Ravi and Chenab rivers, are exceptionally productive for growing cotton, wheat, and sugarcane. The majority of its population belong to farming communities, 81% percent being categorised as small farmers cultivating less than 12.5 acres (Government of Pakistan, 1990; 1996–7).

The primary reason for selecting Faisalabad Division for this study was that the major crop is cotton. It is not surprising that extension agencies focus their efforts on it, disseminating cotton innovations to the farmers. Both the Department of Agriculture and Ciba are actively engaged in extension work in this area.

A cross-sectional research design and a multi-stage sampling technique were used for the study. During the first stage, Toba Tek Singh *tehsil* (sub-division) was selected through simple random sampling, and in the second stage, 20 villages were selected through simple random sampling. From these villages, we prepared a list of all the contact farmers (n=52) of the two agencies. The lists were then crosschecked to determine who was a contact farmer of both the Department of Agriculture and Ciba. Based on their personal experience, these farmers are in a good position to rate the effectiveness of both agencies. The data were collected through personal interviews with a pre-tested and validated interview schedule. It is important to note that both the Department of Agriculture and Ciba commonly use many (77%) of the same contact farmers. Not only does this suggest a problem of service duplication, but implies that Ciba is poaching clients. Only 10% of the contact farmers were exclusive to Ciba and 8% to the Department of Agriculture.

Tables 2 to 4 present a brief overview of the respondents by landholding, age and education. To put the data in context, non-contact farmers were included in the study. The village heads (*Numberdar*) and electoral lists were consulted in compiling a list of all cotton growers (854) living in the villages under study. A sample of 104 non-contact farmers was drawn through the stratified proportionate sampling technique. A statistical formula was used to determine the sample size. Overall, contact farmers tend to own and operate significantly larger landholdings, are much better educated, and are slightly older than their non-contact counterparts.

5 RESULTS AND DISCUSSIONS

Agricultural extension is considered an organisational vehicle for transferring technology and involves the communication of innovations to farmers, especially their effective use. For this purpose, extension personnel contact their clientele with a specific extension message. The literature on extension indicates that the extension message and method of contact can be the difference between success and failure (see, for example, Campbell and Barker, 1997). The same two key variables – extension advice and contact – were used in determining the perceived effectiveness of agricultural extension work carried out by the Department of Agriculture and Ciba. Respondents were asked to rate the effectiveness of both agencies on a Likert-type scale (ranging from 1 as poor to 5 as excellent) considering the extension advice (consisting of technical information for controlling five cotton pests) and extension contact (comprising extension methods used by the extension agencies to reach the farmers).

Perceived effectiveness of the agencies with respect to extension advice

It is obvious from Table 5 that, overall, contact farmers consistently rated Ciba's performance higher. With the exception of Cotton Leaf Curl Virus (CLCV), Ciba's control measures were deemed more effective than those of the Department of Agriculture. Preference for Ciba is probably because its extension personnel not only impart technical information, but also provide for the delivery of agrochemicals (especially pesticides) to the farmers. As cogently summarised by Schwartz (1994: 10):

> Salespeople have an incentive to maintain good business relations with farmers and farmers typically place high priority on information regarding access to and use of inputs. Thus a reliable sales representative who also conducts extension activities is likely to be valued by farmers.

An interesting point to consider is why contact farmers rated Ciba less effective than the Department of Agriculture in the control of CLCV. One explanation is that this disease is incurable and, with nothing to sell, Ciba does not focus on this disease. Similarly, Pray and Echeverria (1990: 202) claim that 'the goal of private agribusiness companies is to maximise profit' and, consequently, they ignore or minimise unprofitable areas. Umali and Schwartz (1994) likewise contend that

Table 4 Farmers by age (%)

Age category (years)	Contact farmers	Non-contact farmers
<30	11.5	20.2
30 – 40	55.8	44.2
>40	32.7	35.6
Mean age	40	37
Range	21 – 60	20 –70
Total percent	100	100
(n=)	(52)	(104)

Table 5 Mean perceived effectiveness of cotton pest control by contact farmers

Cotton pest	Department of Agriculture	Ciba
Sucking insects	3.3	3.4
Spotted boll worm	3.1	3.3
Army boll worm	3.2	3.5
Pink boll worm	2.7	3.0
Cotton Leaf Curl Virus	2.5	2.4
Overall score	3.1	3.3

agricultural input supply firms like Ciba undertake complementary extension work only as a part of their sales, promoting the company in order to ensure market share. Again, Schwartz (1994: 10) writes:

> Different types of commercial firms engage in extension activities as a part of their business...input suppliers will not invest in their own private extension activities if the benefits do not outweigh the costs.

The Department of Agriculture, on the other hand, has embarked on a campaign to educate the contact farmers about possible preventive measures to CLCV such as growing resistant varieties, as well as in the use of fertilisers at the appropriate time in an effort to minimise chances of a CLCV attack (Muhammad and Sipraw, 1995). Thus, the Department of Agriculture was actively guiding its contact farmers in how to reduce the chances or severity of a CLCV attack. Not bound by particular remedies or practices, public extension can be more flexible and inclusive in its extension advice.

Correlations were performed in order to determine any association between variables (Table 6). Four characteristics of the respondents proved significant with the perceived effectiveness of extension advice: age (negative) and education (positive) with the Department of Agriculture, and size of landholding (positive) and acres of cotton cultivation (positive) with Ciba. (Of course, there is a high correlation between the last two variables.) It should also be noted that generally farmers rating extension advice higher clearly understood the advice and that the given advice was largely effective. These are, in many respects, an outcome of education (understanding) and landholdings (ability to purchase pesticides).

Further analysis revealed interesting intra-group differences (Table 7). Contact farmers rating the Department of Agriculture's advice as excellent tend to be younger, operate smaller farms, and have more education than those rating it poor. This is not surprising; after all, the mandate of T and V is to serve the smaller farmers (although not too small). Moreover, public extension agents probably have a better rapport with younger more educated farmers and thus find them easier to work with. Older less educated farmers, in all likelihood, also place unrealistic expectations on extension advice (i.e., 'science') and become frustrated if it is not successful.

In the case of Ciba, educated farmers with smaller farms reported the effectiveness of their extension advice as poor, while those with less education and larger landholdings recorded Ciba's performance as excellent. Given Ciba's interest in selling its products, it is not surprising that larger landholders rated its extension services favourably as the company's field personnel would certainly provide them with a quality service. It is more cost effective for an extension worker to convince a farmer with 400 acres of cotton to use Ciba's products for plant protection than to contact numerous smaller farmers who probably cannot afford them. In other words, catering to larger farmers helps Ciba's extension personnel achieve a sales target that earns a field agent a bonus or promotion. Certainly too, larger resource-rich farmers probably feel they do not need extension advice and are more interested in procuring agricultural inputs directly. In addition, there are much more likely to be not only class but caste differences between farmers with large landholdings and public extension agents and, the farmers being older, these social divisions are difficult to transcend.

The following story further reveals Ciba's bias towards large-scale farmers. It is not uncommon for the Department of Agriculture's extension agents to respond to unsolicited requests for information from non-contact farmers but we observed that the same is not true of Ciba. For example,when the researchers were collecting data they had the chance to travel with an extension worker from Ciba on an inspection tour of 100 acres of cotton cultivated by one of his contact farmers. On the way back, a farmer ran through the fields to the road and signalled us to stop. The researchers were curious to know what he wanted and asked the Ciba representative to stop which he duly did. It turned out that the farmer wanted the Ciba representative to inspect his cotton field which was suffering from a pest attack.

Table 6 Correlation matrix of key selected variables

Variable	1	2	3	4	5
1. Age	—				
2. Education	-0.19	—			
3. Acres of cotton cultivated	-0.01	0.16	—		
4. Landholding	0.09	-0.13	0.73**	—	
5. Advice by Dept. of Agriculture	-.33*	0.79**	0.13	-0.13	—
6. Extension advice by Ciba	0.01	0.05	0.76**	0.85**	0.05

* p<.05
* * p<.01

Table 7 Perceived effectiveness of extension advice of the Department of Agriculture and Ciba categorised by mean age, years of education and size of landholdings

Rating response	Age	Years of education	Farm size (acres)
Department of Agriculture			
Poor	48	7	102
Average	38	11	93
Excellent	38	14	71
Ciba			
Poor	38	12	19
Average	41	10	76
Excellent	39	11	168

Before getting out of the vehicle, the representative asked the farmer: 'How many acres of cotton are you growing?' Learning that the farmer had just one acre, he told him that he was out of time and as he drove away called out to him to see his neighbour about the problem. When asked why he had not responded to the farmer, the representative replied: 'There was no incentive for me to guide him; it would have been a waste of my time. Instead, I am going to contact another farmer who has grown 67 acres of cotton. Hopefully, by contacting larger farmers, I will increase my sales and reach my sales target'.

The final piece of analysis to be carried out was stepwise regression analysis in order to determine the best predictor of the perceived effectiveness of the Department of Agriculture's and Ciba's extension advice. In the deletion process, only two explanatory variables (education and age) turned out to be statistically significant at the .05 level for the Department of Agriculture. Together these two variables explained 66% (R^2 = .66) of the variance in the perceived effectiveness of the Department of Agriculture, although education alone was the better predictor (R^2 = .62). In the case of Ciba, size of landholding and number of acres of cotton grown explained 76% (R^2 = .76) of the variance in determining its effectiveness, while landholdings proved the better predictor (R^2 = .73). (As noted, landholding size and acreage under cultivation are highly correlated since this was the primary crop in the study area, especially for larger farms.)

Perceived effectiveness of both agencies with respect to extension contact

Extension contact presents an additional factor for exploring the effectiveness of both agencies as viewed by the contact farmers. The way information is disseminated is considered the organisational vehicle for technology transfer to and within the farming community (Cernea, Coulter and Russell, 1984). Technology transfer involves the communication or dissemination of innovations to farmers and assistance with their effective use. Typically, these include individual and group methods. Farmers' perceptions are influenced by how satisfied they feel with their experience (which includes quality of personal interaction, compatibility, and socio-economic standing of the participants) and the clarity and relevance of the message.

The more common individual contact methods are farm/home visits, office meetings, telephone calls, and informal contacts (Sanders, 1966; Kang and Song, 1984). These extension methods help create and maintain the agencies' credibility in the eyes of their clientele (Bembridge, 1991). All the respondents reported farm or home visits, which is the standard mode of extension contact. Interestingly, none reported office calls to Ciba and slightly less than 8% claimed making these to the Department of Agriculture. In the case of Ciba, no one up to the Technical Sales Officer level has an office. They are, however, provided with four-wheel drive vehicles to facilitate their visits with each of their contact farmers. With respect to the Department of Agriculture, it is difficult to contact a front-line extension worker in his office due to the predetermined fortnightly visit schedule and means of transport which precludes returning to the office after making farm visits. Nearly twice as many of Ciba's contact farmers reported receiving phone calls. This is another indication of Ciba's bias toward large-scale farmers as only wealthier rural residents can afford such a luxury.

Ciba makes greater use of group contact methods (96% of contact farmers reporting its use) than the Department of Agriculture (56%). According to the contact farmers, Ciba relied heavily on group meetings, followed by field tours, demonstration plots, and film slides. As a business and profit oriented organisation, Ciba designs its extension strategy to persuade farmers to adopt its products and thus maximise its returns. With its more limited budget and wider scope of agricultural interests, the Department of Agriculture primarily employs demonstration plots, supplemented with group meetings. It should be kept in mind that these activities are designed primarily for the benefit of contact farmers. If non-contact farmers attend such meetings, they do so at their own initiative. This was clear from one of the researchers' own experience when he attended a Farmer's Day in the Satiana area near Faisalabad on a hot sunny July day. The contact farmers were seated on comfortable chairs under a large canvas canopy. The non-contact farmers stood outside in the sun listening to the agricultural and extension experts. Afterwards, the participants enjoyed refreshments, mingled and discussed the presentations. The non-contact farmers remained standing outside, sweating, craning their necks to try and hear the conversations.

The mean value of the contact farmers' perception of the effectiveness of extension contact methods was, like extension advice, measured on a Likert-type scale (from 1 as poor to 5 as excellent). Here too Ciba received a more favourable rating (3.7) than the Department of Agriculture (3.0), and scored particularly high in its farm visits. In terms of intra-group variations, contact farmers rating the Department of Agriculture contact methods poorly tend to be less educated and have larger farms than those with favourable views (Table 8). Contact

Table 8 Perceived effectiveness of the agencies' extension contact categorised by contact farmers' mean age, education and size of landholding

Response rating	Age	Education	Size of landholdings
Department of Agriculture			
Poor	48.5	6.3	128.5
Average	38.5	11.4	85.7
Excellent	42.6	12.6	97.3
Ciba			
Poor	37.1	10.6	25.9
Average	41.3	10.9	69.5
Excellent	39.6	11.2	156.8

farmers with large landholdings, on the other hand, tended to report Ciba's contact methods as excellent[1]. In further regression analysis (stepwise deletion), the educational level of contact farmers preferring the Department of Agriculture proved significant, explaining 40% of the variance of the perceived effectiveness of extension contact methods. For those favouring Ciba, size of landholding accounted for 60% of the variance.

The contact farmers were also asked to rate the group contact methods of the respective services (Table 9). According to the contact farmers, the Department of Agriculture's demonstration fields are an important source of information, which is not surprising given the long-standing place these have held in public extension and agricultural universities in Pakistan and around the world (see, for example, Ruttan, 1997). Contact farmers preferring Ciba's group methods, on the other hand, emphasise organised field tours, although the demonstration field is also popular. Interestingly, these are visual modes of communication. For example, in a demonstration field, the main idea is to display a new technology where farmers can assess it in a local setting. This is similar to organised field tours which not only provide a chance for the farmers to observe, but also to share opinions with each other and ask the organiser on-the-spot questions. According to Bembridge (1991: 6; 1991), 'most adult learning is by seeing (83 percent), followed by hearing (11 percent) and other senses (6 percent).'

Results of correlation analysis underscored previous findings. Education (r = .77) and age (r = -.36) of contact farmers had an association with the perceived effectiveness of the Department of Agriculture's contact methods. In the case of Ciba, size of landholding (r = .88) evidenced a strong positive association. It is also interesting to note that, as the size of landholdings decreases, the perceptions of the contact farmers on the effectiveness of the Department of Agriculture's contact methods increases from poor to excellent. The reverse is true for Ciba. In other words, contact farmers with smaller farms and higher education tend to have a more favourable attitude towards the Department of Agriculture, and those with large landholdings were more satisfied with Ciba. Similar to the earlier regression analysis, only two explanatory variables (education and age) turned out to be statistically significant for the Department of Agriculture, explaining 63% (R^2 = .63) of the variance in the effectiveness. For Ciba, size of landholdings explained 78% (R^2 = .78).

Our results agree with the findings of Hussain, Byerlee and Heisey (1994: 47) who found that education and farm size are the most important variables in assessing what influences satisfaction with extension contact, underscoring the bias of extension providers toward better-educated and resource-rich farmers. Similarly, Faruquee (1995a; 1995b) and Alkire, Sofranko and Khan (1992) determined that extension contacts were skewed toward large landholders (also see Sofranko, Khan and Morgan, 1988 for Pakistan, and Hamid and Frank, 1993 for Bangladesh). In a study of agricultural extension in India, Feder, Slade and Sundaram (1986: 57) likewise reported 'a statistically significant bias in favour of visits to large farmers'. The predisposition towards contact farmers with large landholdings, however, is more pronounced in privately delivered extension (Umali and Schwartz, 1994).

Clearly, Ciba provides extension services to farmers with large landholdings to enhance its market share and earn profit. As noted by Pray and Echeverria (1990: 225), 'private companies have profit as their goal, and scientists and marketing personnel are rewarded with an increase in salaries when they contribute to an increase in profits.' But although the Department of Agriculture's contact farmers operate relatively large landholdings, the partiality exhibited towards better-educated contact farmers is more pronounced and probably stems from a greater ease of communication between these farmers and extension personnel and their willingness to try different types of agricultural practices (Sims and Leonard, 1990). In addition, as slightly younger farmers, their landholdings are still smaller than their older counterparts.

Table 9 Rank order by mean perception of the Department of Agriculture and Ciba's extension contact methods by contact farmers (n= number of responses)

Department of Agriculture *Extension Contact Method*	*Rank*	*(n=)*	**Ciba** *Extension Contact Method*	*Rank*	*(n=)*
Demonstration plots	4.0	(23)	Field tours	4.4	(34)
Farm visits	3.6	(52)	Demonstration plots	4.0	(28)
Group meetings	3.8	(14)	Farm visits	3.9	(52)
Radio talks	3.0	(31)	Group meetings	3.7	(50)
TV talks	2.9	(10)	Film slides	3.5	(26)
Printed material	2.8	(47)	Printed material	3.0	(43)
Telephone calls	2.7	(8)	Telephone calls	2.8	(18)
Office calls	2.7	(4)	TV talks	2.7	(3)
Other	1.9	(10)	Other	0.0	(0)

6 THOUGHTS AND CONCLUSION

In Pakistan, public agricultural extension services were reorganised into the T and V system of extension in the 1970s with the support of the World Bank. In the late 1980s, the National Commission on Agriculture, citing the failure of public extension to appreciably increase agricultural productivity, recommended the inclusion of the private sector for the accelerated development of agriculture. This research, based on empirical evidence from one area of Pakistan, suggests that both sectors operate competing and overlapping programmes with a key difference in the clientele with whom they work directly. Furthermore, both extension services exhibit a pronounced bias towards farmers with above average education and landholdings, although the Department of Agriculture prefers better-educated farmers, while Ciba concentrates on farmers with large landholdings.

It is worth mentioning too that small and medium farmers comprise approximately 93% of the farming community in Pakistan with 81% cultivating less than 12.5 acres of land (Government of Pakistan, 1996–7). The overwhelming majority of small farmers fall under the category of non-contact farmers; that is, they have no formal contact with either agricultural extension agency. In the extension literature, the main premise for not contacting these farmers is that the latest technology and information will 'trickle down' from contact to non-contact farmers (Khan, Sharif and Sarwar, 1984; Bindlish and Evenson, 1997; Hussain, Byerlee and Heisey, 1994) such that the extension system 'concentrates on contact farmers [who are] expected to pass information on to fellow farmers with similar problems' (Nagel, 1997: 15). Contrary to popular conceptions, most non-contact farmers reporting pest infestations in our study area sought information on its eradication from pesticide dealers, followed by the Department of Agriculture, neighbours, and lastly Ciba. The results in this case study challenge the assumption that these farmers will be reached through contact farmers. This agrees with the findings of Ahmad and Haq (1994) who reported a lack of enthusiasm on the part of contact farmers to pass on agricultural information to other farmers. Indeed, this is the main reason for the ineffectiveness of T and V extension in the Punjab, and probably in Pakistan in general. Furthermore, many non-contact farmers feel excluded because of their caste position, small properties, and low incomes. The recent shift in extension delivery by the Department of Agriculture, while a good start, will in no way ensure that these farmers gain better access to agricultural information.

The adulteration of agricultural inputs by agrochemical dealers is also an especially serious problem, especially for non-contact farmers dependent on pesticide dealers for information (*Daily Jang,* 7 September and 24 October, 1992). Many farmers frequently claim that pesticide dealers sell them a product (often adulterated or out of date) whether or not it is recommended for the pest attacking their cotton. From the researchers' observations, when the farmers complain, the dealers argue that they have not followed the instructions properly. It was also noted that the dealers will sometimes mislead farmers by saying: 'Wait and see, the pesticide will work but it may take a week or so to eradicate the pests completely.' In these instances, since the farmers do not understand the life cycle of the pests, they are vulnerable to false information. This practice causes a two-fold loss in the form of money and cotton production.

Despite being frequent victims of unscrupulous practices, when asked why they contact pesticide dealers for information (and products), the same answer is often cited, 'I have no other option.' The irony here is that most of the non-contact farmers, especially those who are small and illiterate, are not aware of the existence of other sources of information – particularly formal sources. In other words, the pesticide dealers are locally accessible to the farmers whereas the extension agents are not.

Reliance on agrochemicals also raises health concerns. Contact and non-contact farmers alike 'have been trapped on a pesticide treadmill of more frequent applications' (Poswall and Williamson, 1998: 12). Two of the chemicals most commonly used on cotton are monocrotophos and methamidaphos, organophosphate chemicals that have been classified as extremely hazardous by the World Health Organization. Unfortunately, many farmers are unaware of their proper use, a burden falling more heavily on females who are exposed to these chemicals in their work treating the cottonseeds and in harvesting (Ijaz and Davidson, 1997).

In sum, the majority of the farming community has yet to be reached by either extension agency. Aside from not having ready access to up-to-date and relevant information, many farmers are susceptible to exploitation by pesticide dealers. Our findings imply that there is an urgent need to restructure, redesign and re-organise agricultural extension services in Pakistan. Not only must they take into account farmers' needs and well being, but they must promote sustainable agricultural practices that are more cost effective in the long term. Unquestionably, we need to reconsider Pakistan's agricultural extension services but privatisation may not necessarily provide the best solution to 'get agriculture moving'. Whether privatisation or any other strategy to boost food production will further stimulate agriculture and alleviate hunger depends on the economic, political, and cultural rules that people make. These rules determine who benefits as a supplier of the increased production, whose land and crops prosper, and who gets the food and at what price.

While certainly food for thought for extension practitioners, research scientists and policy makers, innovations are required in extension systems not only to facilitate agricultural development, but to promote a second 'Green Revolution' which will not leave some farmers behind. Hard decisions, with far-reaching consequences that will shape Pakistan's economic and cultural environment, will have to be made. Failing this, it is likely that the agricultural situation in Pakistan will deteriorate in the coming years and the information gap between rich and poor will worsen.

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ENDNOTES

1. A Gamma statistic was run to see if there is any association between age, education, and size of farm and effectiveness of extension contact. In the case of the Department of Agriculture, a positive relationship (.87) was found between the education and extension contact, while for Ciba the association between age, education and extension contact was virtually non-existent. A positive association (.76) was found between size of farm and effectiveness of Ciba's extension contact.

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