

See discussions, stats, and author profiles for this publication at: <https://www.researchgate.net/publication/284003781>

Agricultural Extension Services in Pakistan: Challenges, Constraints and Ways forward

Technical Report · January 2014

CITATIONS

0

READS

8,278

2 authors:



Babar Shahbaz

University of Agriculture Faisalabad

104 PUBLICATIONS 370 CITATIONS

[SEE PROFILE](#)



Salman Ata

University of Agriculture Faisalabad

6 PUBLICATIONS 30 CITATIONS

[SEE PROFILE](#)

Some of the authors of this publication are also working on these related projects:



Rural Development [View project](#)



Introduction of Exotic Tissue Culture Date Palm Plants Under Cooperatives Department [View project](#)

Enabling agricultural policies for benefiting smallholders in dairy, citrus and mango industries of Pakistan – Project No. ADP/2010/091

Background Paper No. 2014/1

Agricultural Extension Services in Pakistan: Challenges, Constraints and Ways-forward

Babar Shahbaz and Salman Ata

Institute of Agri. Extension & Rural Development,
University of Agriculture Faisalabad, Pakistan

September 2014

1 Introduction

This background paper has been prepared within the framework of the research project “Enabling agricultural policies for benefitting smallholders in dairy, citrus and mango industries of Pakistan” which is funded by the Australian Centre for International Agricultural Research (ACIAR), and is being undertaken by a team of the researchers from Victoria Institute of Strategic Economic Studies at Victoria University Australia in collaborating with different organizations and Universities of Pakistan.

The overarching aim of this project is to review prevailing policies and develop options, evaluate and define implementation pathways for new enabling policies to improve the livelihoods of smallholders in the dairy, citrus and mango subsectors of Punjab and Sindh provinces. One of the specific objectives of the project is to document important policy-related constraints to, and opportunities for, increasing the income of smallholders in the dairy, citrus and mango enterprises in Punjab and Sindh. Indeed an efficient, well-organized and resourceful extension system is inevitable for improving farmers’ livelihood by helping them in increasing crop productivity and overcoming production-related constraints.

In this milieu, this paper provides an overview of extension services and constraints and challenges faced by the extension system of Pakistan. The evidence from existing literature on agricultural extension systems is examined and approaches in Punjab and Sindh provinces of Pakistan with particular reference to crops (including fruit) and livestock extension services are and synthesized. More specifically the paper focuses on a number of guiding questions, including:

- 1) How extension services have evolved in Pakistan?
- 2) What is the current setup and approaches of agricultural extension and research in Pakistan?
- 3) What is the evidence on constraints and challenges faced by the extension system in Pakistan's Punjab and Sindh provinces?
- 4) What are the 'ways-forward' and what policy implication can be drawn?

The structure of this paper is as follows. After this introduction the next sub-section presents contextual overview of the situation with focus on the importance of agriculture in country's economy, and global debates on the significance of agricultural extension services. Historical perspective of extension services in Pakistan is given in Section 2, followed by current agricultural extension system in Pakistan (Section 3). A brief description of agricultural research system is discussed in Section 4; while Section 5 presents and analyzes evidence regarding constraints and challenges faced by the extension system of Pakistan. Discussion and recommendations are given in section 6.

1.1 Context: setting the scene

Agriculture is the dominant sector of Pakistan's economy with 21% contribution in overall GDP, and engagement of 45% of total labor force of country in this sector. More importantly, livelihoods of rural people¹ depend on agriculture and livestock enterprises. Agriculture considerably contributes to improving food security, accelerating economic growth and reducing poverty in rural areas (Government of Pakistan, 2013). According to the researchers, agricultural sector of Pakistan has the potential to be a frontline sector in boosting economic growth and reducing rural poverty (Haque, 2002). Majority of the farmers in Pakistan are smallholders² whose subsistence livelihoods depend on agriculture (Bhutto and Bazmi, 2007), and proper functioning and performance of agriculture sector is linked with the overall wellbeing of small farmers (Government of Pakistan, 2007). Nevertheless, despite fertile soil, an efficient canal irrigation system, supportive climate, good agricultural education and research setup, full-fledged public agricultural extension set-up, and hardworking farmers (Davidson and Ahmad, 2002), Pakistan is a food insecure country (WFP, 2010) and yield of most of the crops is considerably lower as compared to yield obtained by many developed countries³. Many researchers and practitioners (see for example, Burton *et al.*, 2012; Davidson *et al.*, 2001; Muhammad, 2005) have argued that an efficient agricultural extension and information system is inevitable for boosting agricultural productivity in any country.

¹ About 62% of total population of Pakistan lives in rural areas

² Majority (more than 80%) of the farmers in Pakistan are small landholders

³ For details visit the website <http://faostat.fao.org/>

Sustainable, profitable and more productive agriculture with scarce resources is the challenge being faced by the developing countries around the globe (Burton et al., 2012; Zijp, 1998). There are no two opinions on the fact that future agriculture will be more reliant on modern technologies, innovations and intensification – instead of increasing cultivated area or using more natural resources (Rivera and Alex, 2004). As a matter of fact agricultural technologies and innovations are continuously changing and farmers are needed to be well aware about recent advancements in order to enhance their crop yield. In this milieu, agricultural extension, being an institutional input, is one of the key factors which make significant contribution towards agricultural development (Davidson *et al.*, 2001). Agricultural extension service equips rural agrarian communities with basic agricultural education and it is the vital mechanism which helps farmers in improving their capabilities by adopting and diffusing agricultural innovation (Betz, 2009). According to Farooq *et al.* (2010), it is an arranged and systematic communication with and among farmers with the purpose of helping them. Its purposes are especially tailored to an improved insight into the need of farmers, their practices as well as problem identification and solution (Havrland and Kapila, 2000).

During the past few decades – particularly after green revolution – agricultural extension services are emerged as the most important institutional part of agriculture sector. Agricultural extension is one of the key components of Agriculture Knowledge and Information System (AKIS) – research and education being other two components. Most of the researchers agree that AKIS would be effective if there is strong linkage between its components i.e. research, education and extension (Ashraf *et al.*, 2007; Qamar, 2005). The extension education is now a full-fledged discipline, having specific philosophy, principles and objectives (Moayedi and Azizi, 2011). Extension services give high importance to utilize the potential of rural communities, improving their livelihoods, and bringing positive changes in their behavior (Rivera and Alex, 2004). In order to achieve the primary task of farmers’ education and technology dissemination, agricultural extension organizations use a wide variety of extension teaching methods (Muhammad, 2005; Bajwa *et al.*, 2010). Agricultural extension is among various ways which have role in poverty reduction and food security improvement (Farooq *et al.*, 2010). It can also help the farmers in judicious use of natural resources for a sustainable agricultural development (Ikram-ul-Haq *et al.*, 2009).

Many extension reforms around the globe stem from the focus on rural development as a necessary element of poverty reduction. Decisions made by the millions of rural households on different aspects of crop production, soil fertility and resource management depend on the knowledge and information available to them. The effectiveness of rural development programmes largely depends on an efficient extension system. Pakistan, which is primarily an agricultural country and majority of the rural population is directly (or indirectly) involved in agriculture and livestock related activities, have achieved substantial improvements in agriculture sector but still production and yield of most of the crops is unsatisfactory. In this

context, this paper attempts to analyze agricultural extension system and approaches in Pakistan and analyzes some of the factors (challenges) hindering the effectiveness of agri. extension services in Pakistan's largest provinces (Punjab and Sindh).

The next section gives an overview of evolution of agricultural extension systems in Pakistan

2. Extension approaches in Pakistan: historical perspective

Agricultural institutions were established on scientific lines by the British colonial government with the introduction of massive canal network during the beginning of 20th century. Many of the existing agriculture department and institutions related to the irrigated agriculture in Pakistan are legacy of the colonial raj (Gill, 1996). Secretary of Agriculture was the in-charge of agriculture, animal husbandry, forestry and fisheries wings⁴. Major institutional component of agriculture wing were Regional Directorates of Agriculture in Lahore (Punjab), Peshawar (Khyber Pakhtunkhwa) and Hyderabad (Sindh) and Bureau of Agricultural Information situated in Lahore. The main objectives of regional directorates were to improve area under cultivation, managing seed and fertilizer stores, supply of agricultural inputs, plant protection and training of the staff etc. The extension wing was part of the regional directorates. Each regional director was assisted by deputy directors (at division level), who, in turn were supported by extra assistant directors and other supporting staff. Animal husbandry wing was responsible for the livestock development (disease control, animal breeding and nutrition etc.). Agricultural education in the Punjab was initiated around 1905 when Punjab Agriculture College and Research Institute was established in Lyallpur (now Faisalabad). Bureau of Agricultural Information (created in 1962) was responsible for information dissemination through print media and audio-visual aids (Gill, 1996).

Although extension service in the country has been public since independence, but it has never been a responsibility federal government and provinces are mandated for the provision of agricultural extension services. Nevertheless, according to Qamar (2012), "Extension services in Pakistan remain traditional, using old extension methods and top-down and technology-driven approaches. Linkages with research and agricultural academic institutions are minimal at best", but many researchers agreed that the extension services played leading role in bringing about green revolution.

Since independence of Pakistan in 1947, agricultural extension services are part of the overall rural development strategies (Abbas *et al.*, 2009). Different extension and rural development programmes have been launched in the country to uplift the rural areas. Some of the significant programmes include: Village Cooperative Movement, Village Agriculture and Industrial Development Programme (Village-AID), Basic Democracy System (BDS), Integrated Rural

⁴ The departments of forestry, livestock and fisheries were later separated from agriculture department

Development Programme (IRDP) and Training and Visit (T&V) programme. Most of the researchers agree that none of these programmes were successful in long run and, hence, were abandoned one after the other (Malik, 2003; Bajwa *et al.*, 2010). Nevertheless, a quick overview of some notable programmes is as follows:

2.1 Village Cooperative Movement

This was the first programme initiated in Pakistan after independence (in 1947) for the development of agriculture and rural areas. Though provincial Ministry and Department of Agriculture were responsible of extension services in Pakistan, but immediately after independence the village cooperative movement started by the Cooperative Department was assigned the responsibility of improving agriculture sector in the country. Village level cooperative societies were the institutional component of this programme and member of these societies were trained regarding agricultural technologies. Provision of farm inputs and agricultural technologies were the main components of this programme (Luqman *et. al.*, 2013) but it achieved limited success in this regards because, according to Gill and Mushtaq (1996), the cooperatives took less interest in agriculture and confined themselves to the provision of credits.

2.2 Village-AID Programme

Started in 1952, the Village-AID programme was the first well-structured, large scale and strong effort for agricultural and industrial development in the rural areas of Pakistan (Mallah, 1997). This programme was funded by United States Agency for International Development (USAID) and the Ford Foundation, and was based on a holistic approach with demonstration as the main extension teaching method for technology adoption (Axinn and Thorat, 1972; APO, 1994). Improved farm productivity with better farm practices along with the development of cottage industry was major focus of the programme.

Under this programme, 150-200 villages in each district were organized as “development area”, and this area was assigned to a government officer who was answerable to the Deputy Commissioner working at district level (Waseem, 1982 and Muhammad, 2005). Paternalistic approach was used in this programme as government functionaries were supposed to act as guide of the village for dissemination and adoption of agricultural technologies. In-service training in order to keep field workers update about latest information was an important feature of this programme (Davidson, 2001). The programme gained initial success with regards to social mobilization of the farmers but this success could not sustained due to a continuous non-coordination among the allied departments and their desperate attempt for the protection of perceived departmental prerogatives (Muhammad, 2005). Multiple duties assigned to Village-AID extension workers (Davidson, 2001; Chaudhry, 2002), irrelevant qualification of staff members, lack of cooperation between allied departments (agriculture, livestock, cooperative

etc.), top-down approach and financial constraints were some of the causes due to which programme could not achieve its objectives (Abbas *et al.*, 2009; Luqman *et al.*, 2011). This programme was terminated in 1961 without any formal and systematic assessment (Chaudhry, 2002).

2.3 Basic Democracies System (BDS)

With the change of government in 1959, a decentralized governance system, known as Basic Democracies System (BDS), was implemented in Pakistan. The system was planned with the intention of achieving development goals by the participation at grass-root level in rural development activities (Abbas, 2009; Davidson, 2001). Decentralization was a basic characteristic of this system, with responsibility delegated to lower levels of the organization (Abbas, 2009; Chaudhry, 2002; Davidson, 2001). The union council, tehsil, district, and divisions were the four administrative levels of BDS (Muhammad, 2005). Participation of local people in community development programmes was the basic objective BDS (Mallah, 1997). Union Councils were responsible for agricultural development but long term positive impact of BDS on agriculture sector could not be realized (APO, 1994). With the change in political regime in 1969, this system was also terminated.

2.4 Training and Visit System

Training and Visit (T & V) extension system was promoted by the World Bank in about 50 developing countries during mid-1970s (Anderson *et al.*, 2006), and in Pakistan it was initiated during 1978. The programme was initially started in some selected districts of the Punjab and Sindh provinces and then extended to the whole country (Gondal, 1989). This programme brought fundamental changes in extension approach of the country. According to Abbas *et al.* (2009), “The philosophy of (T&V) system was based on triangular relationship between researchers, extension workers, and farmers”. The main approach of T & V was frequent training of extension workers and strict schedule of field visits (Benor *et al.*, 1984). Field Assistants (FAs) were the frontline extension workers and they were supposed to contact 10% of the all farmers within their jurisdiction (Government of Punjab, 1987). Extension workers had to pay eight visits to contact farmers during two weeks; two days each were fixed for extra visits and training or office work. In addition to providing technical advice and information to contact farmers, the FAs and agricultural officers had also to organize group activities such as exhibitions, farmers’ day, and demonstration fields (Davidson, 2001).

The T&V approach gained some success in improving the traditional extension set-up but its success was far from anticipated (Anderson *et al.*, 2006; Davidson, 2001). Several weaknesses have been reported by the researchers; for instance, lack of effective monitoring, top-down approach, biases in the selection of contact farmers, more emphasis on the delivery of extension

message rather than adoption (Abbas *et al.*, 2009; Hussain *et al.*, 1994). Lack of coordination between the line departments, Inadequate professional training of extension staff, Ineffective and unreliable input supply system, Lack of mobility, and lack of reliable logistic support, slow promotion of extension staff, lack of participation of the farmers in implementation and decision making and political instability in the country are some of other factors that hindered the success of T & V (Chaudhry, 2002; Ashraf *et al.*, 2007). In the words of Riaz (2010), “The agriculture extension service established under the T &V system has gradually weakened during the 1990ies. There were no proper facilities for regular backup training to the staff; no funds for traveling and daily allowances were drastically reduced, adaptive research farms discontinued etc.” Likewise Malik (2003) narrated that the T & V system could not sustained after the completion of the project in 1994-95, because the provincial governments were unable to provide budgets for its continuation.

Nonetheless, T & V system still has marked influence on country’s present extension approach (see Section 3.4).

3. Current agricultural extension system in Pakistan: post devolution scenario

In 2001, the military government led by General Pervez Musharraf introduced *Devolution of Power Plan* in Pakistan, which was and designed to decentralize the administrative authority at local government and empower local elected representatives with more authority and responsibility at the grass root level (NRB, 2005). The devolution of power plan brought administrative changes in the almost all public sector departments including Agricultural Extension department (Saeed *et al.*, 2006). Districts were given more autonomy regarding planning and execution of development projects. *Eighteenth amendment* in the constitution further devolved some functions of federal Ministry of Food and Agriculture to the provinces.

3.1 Federal Ministry of National Food Security and Research

Eighteenth (18th) amendment to the constitution of Pakistan passed by the parliament in 2010 brought devolution in various federal ministries⁵ as seventeen ministries including that of food & agriculture, health and education were abolished and the responsibility was transferred to the provinces in 2011 (Dawn, 2013). A new Ministry of National Food Security and Research (MNFSR) was created at the federal level which replaced Ministry of Food and Agriculture. This ministry deals with policy issues regarding food grains and agriculture, import and export of food grains etc. Mission statement of MNFSR is given as under;

“The Ministry of National Food Security & Research is mainly responsible for policy formulation, economic coordination and planning in respect of food grain and agriculture. It also includes procurement

⁵ http://www.app.com.pk/en/_index.php?option=com_content&task=view&id=100264&Itemid=1 (accessed August, 2014)

of food grains, fertilizer, import price stabilization of agriculture produce, international liaison, economic studies for framing agricultural policies⁶.”

The attached departments, institutes and boards etc. working under MNFSR are;

- Pakistan Agricultural Research Council (PARC)
- Agricultural Policy Institute
- Federal Seed Certification & Registration Department
- Department of Plant Protection
- Animal Quarantine Department
- Pakistan Agricultural Storage and Services Corporation (PASSCO) Ltd.
- Pakistan Oilseed Development Board
- Fisheries Development Board
- Livestock and Dairy Development Board
- Pakistan Dairy Development Company
- Federal Water Management Cell

These institute and departments carryout several functions related to agricultural research and development. However provinces bear the major responsibilities of agricultural extension related activities. The devolved functions of the agriculture ministry have increased the responsibilities of the provinces (Dawn, 2012). A brief description of provincial extension system under decentralized setup is given below;

3.2 Provincial Agricultural Organizations

Agriculture is the provincial mandate according to the constitution of Pakistan⁷ and a range of provincial level organization exist even after decentralization of 2001. Agriculture Department (Punjab) comprises of various directorates and sections (also see Annexure-1);

- Director General Agriculture (Research)
- Director General Agriculture (Extension & Adaptive Research)
- Director General Agriculture (Field)
- Director General Agriculture (Pest Warning and QCP)
- Director General Agriculture (Water Management)
- Special secretary (Agriculture Marketing)
- Directors of Agriculture (each for Information, floriculture, crop reporting service, economics and marketing)
- Planning and Evaluation cell
- WTO cell

⁶ <https://www.facebook.com/minfsr/info?ref=stream> (accessed August, 2014)

⁷ The functions of agriculture and livestock were transferred from Federal to Provincial government through 18th Amendment in the constitution passed in 2011

There is slightly different set-up in Sindh province where Secretary Agriculture leads the Directorate General of Extension, Research, Engineering and Water management, Cane Commissioner, Sindh Seed Corporation, Planning and Monitoring Cell (see Annexure-2).

Agricultural extension service is focus of this paper, therefore we shall discuss extension wing of Agriculture Department in a bit more detail.

Directorate General Agriculture (Extension & AR) Punjab works under the umbrella of Department of Agriculture and maintains links with the district governments on agricultural extension matters (Annexure-2). They are responsible for providing extension services in all crops and fruit (mainly citrus and mango). Main objectives of the office of the Director General (Agri. Extension and Adaptive Research) in Punjab are;

- Transmission of modern crop technology and agricultural techniques to the growers;
- Ascertaining the problem of growers relating to crop production and conveying them to the Research Wing for attention;
- Organizing fruit and vegetable shows, exhibition and meals;
- Demonstrating new varieties and techniques by laying out demonstration plots;
- Multiplying foundation seed from the nucleus seed for further distribution to progressive growers through the Punjab Seed Corporation;
- Propagation pedigree nursery plants of fruits at Government nurseries for distribution to growers;
- Layout orchards, model farms and budding of fruits;
- Assisting crop reporting services in conducting surveys, collection of data, and Helping farmers in taking remedial measures against pest attack.

(Source: www.agripunjab.gov.pk)

In Sindh province, Agri. Extension wing of provincial Department of Agriculture, Supply and Price is responsible for carrying out extension related activities. The main function of the agri. extension services of Sindh include, “..... to advise / educate growers / farmers in modern crop production practices and technologies, so as to increase over all farm production and improve yield per unit area. To achieve the goal, the Agriculture Extension Workers are performing their duties to disseminate the timely seasonal information amongst the growers for cultural practices; proper seed requirement, timely sowing, balanced and efficient use of fertilizer, efficient/judicious use of irrigation water, pesticide use, effective crop management, harvesting, threshing and storage / marketing etc.”⁸

⁸ <http://www.sindhagri.gov.pk/ext-setup.html>

For livestock extension, provincial Livestock and Dairy Development Department (in Punjab) has two Director Generals one each for Research and Extension (Annexure-5). Directorate General (Extension) has several Directorates including Directorate of Animal Health, Lahore, Barani (Arid) Area, Rawalpindi, Livestock Farms, Lahore, Breed Improvement, Lahore, Barani Livestock and Poultry Research Inst. Attock, Punjab Smallholder Dairy Development Project, Gujranwala, Small Ruminant, Multan, Research Center for Conservation of Sahiwal Cattle (RCCSC), Toba Road, Jhang, Animal Disease Report & Surveillance System in Punjab, Communication & Extension, and Buffalo Research Institute, Pattoki.

Mission of the Livestock and Dairy Development Department of Punjab is to “Support livestock development in a policy environment that enables farmers to realize the dividends of livestock farming by smartly deploying public investments in core public goods & inducing private capital /initiative in the sector for poverty alleviation, food security & generation of exportable surpluses”⁹. Livestock and Fisheries Department of Sindh is responsible for carrying out livestock related extension activities in Sindh province.

3.2.1 District extension offices

After devolution of power in 2001, district level offices of the Department of Agriculture got more autonomy. District Coordination Officer (DCO) is the top level bureaucrat who reports to the elected representative (District Nazim¹⁰). There are Executive District Officers (EDOs) under DCO including EDO (Agriculture). The EDOA coordinates agricultural activities with other sister departments (such as Water Management, Fisheries, Livestock, Soil conservation, Forestry etc.) at district level. EDOA supervises District Officer for Agriculture (DOA) who is responsible for planning and execution of overall agricultural extension activities in the particular district. There is slightly different setup in Sindh where a Director works at the division level and Deputy Director at district level (see Annexures-3 and 4).

Livestock and Dairy Department has more or less the same structure as that of Department of Agriculture at district level, supported by the District Livestock Officers (DLOs) and Veterinary Officers. The Irrigation and On-farm Water Management Directorate provides extension advices on relevant matters mainly through Water Users Associations.

3.2.2 Tehsil extension offices

Tehsil (sub-district) is the next tier of administrative setup after district and there are usually 2-4 tehsils in a district. In Punjab province, office of the Deputy District Officers for Agriculture

⁹ <http://www.livestockpunjab.gov.pk/>

¹⁰ District Nazim is equivalent to Mayor. Presently there are no nazims so EDOs are directly under the control of DCOs.

(DDOA) handles agricultural extension activities within its tehsils; whereas in Sindh province, Assistant Director works at the taluka (equivalent to tehsil). Likewise in livestock sector, Deputy District Livestock Officer (DDLO) works under DLO.

3.2.3 Markaz (sub-tehsil) level extension offices

Agricultural Officer (AO), the frontline extension worker, is based at markaz¹¹ (center). The AOs are responsible or carrying out agricultural extension activities in their respective markaz. Being frontline extension workers, they are in direct contact with the farmers.

3.2.4 Union Council

Under each AO, there are several Field Assistants (FAs) based at Union Council (UC¹²). Their number corresponds with the number of Union Councils in the particular markaz. The FAs are supportive extension workers and hold Diploma in Agricultural Sciences. Under each FA there are 2-3 Beldars who are fieldworkers/laborers rather than technical persons, and support the FAs and AOs in their routine field activities.

3.3 Extension by the private sector

“We need private sector participation in generating and transmitting agricultural innovations to stakeholders, building market and storage infrastructure, and training of farmers to new management models and technologies. Creating enabling environment for the private sector will remain our main focal point in agriculture development strategy” (Government of the Punjab)¹³

The importance of private sector in agricultural development was acknowledged for the first time at the government level when National Commission on Agriculture accentuated that the transition from subsistence to commercial agricultural will only be possible with the participation of the private corporate sector (Government of Pakistan, 1988). In light of the recommendations forwarded by the Commission, agricultural input supply agencies – predominantly international pesticide and fertilizer enterprises – began taking part in extension work as well as selling agricultural inputs during the late 1980s (Riaz, 2010). The opening up of agricultural extension has had major impacts in Pakistan. According to Siraj (2011, p-16) “The interest of private sector in providing extension services comes mainly from their aggressive “marketing strategy” of selling the product and extension services as one package.”

¹¹ Usually a tehsil contains 2-5 markaz, depending on the population

¹² UC is the lowest tier of local government administration. Usually 2-6 villages make a UC

¹³ <http://www.agripunjab.gov.pk/index.php?rb=24>

Almost all major private national and multinational companies engaged with agriculture and livestock related businesses are also rendering advisory services to their clients. Riaz (2010) categorized following areas where private companies are providing advisory services in Pakistan;

- Plant protection: by pesticide companies
- Seed variety introduction and adoption: by seed companies
- Crop/plant nutrition: by fertilizer companies
- Sugarcane: by sugar factories
- Tobacco: by tobacco companies
- Maize: corn processing companies and seed companies
- Oil seeds: by edible oil processing companies
- Dairy: by national and multinational companies

Table 1 gives brief description of extension activities of some major national and multi-national companies in Pakistan.

Table 1: Different private companies active in extension and advisory services

Name of Company	Type	Product	Extension and Advisory Services
Ali Akbar Group	National	Pesticides, seeds, micronutrients	Nationwide network of two major franchises (Apna Zarai Markaz and Target Zarai markaz) provides advisory services in addition to selling of the products. Use printed material, meetings and demonstrations for farmers education
Auriga Group	National	Micro fertilizers, hybrid seeds (rice)	Provide on-field advisory services to the farmers
Fatima Group	National	Fertilizer and Sugar Mill	On field extension services
Fauji Fertilizer Company (FFC) Ltd.	National	Fertilizer	Providing farm advisory services since 1980s through 5 Farm Advisory Centers and 14 Regional Agri Services Officers. Print informative literature on fruit, crops and vegetables
Jaffer Group	National	Plant protection, plant nutrition, irrigation system	Use printed material and farmers' meetings for information dissemination related to crops, fruit and vegetables
Four Brothers Group	National	Seeds, chemicals, tractor,	Work through nationwide franchise network (Tarzan Markaz). Establish model farms and provide advisory services to the farmers
Pioneer Pakistan Seed	Joint venture with Du-Pont USA	Hybrid seeds	Providing advisory services to the farmers through agronomists and field officers. Establish demonstration plots, training events, field days, festivals etc.
Syngenta Pakistan	Multi-national	Pesticides, seeds	Syngenta has two separate advisory services: one for its pesticides and one for its vegetables seeds. Work through intensive franchise network (Naya Savera). Conduct pesticide trials, group meetings, demonstration sites, pamphlets, individual visits, field days etc.
Monsanto	Multi-national	Chemicals, seeds	Demonstration sites, farmers' meetings pamphlets/crop guides

Nestle Pakistan	Multi-national	Milk, yogurt, butter, juices	Advisory services consist agronomists, veterinary doctors and agricultural engineers to help the farmers (mainly in Punjab province) with their milk production by offering different trainings from fodder production, hygiene and milking practices to constructing cowsheds.
Engro Corporation Ltd.	National	Milk, ice cream, fertilizer	Advisory services to dairy farmers
Pakistan Tobacco Company	National	Tobacco	Advisory services in tobacco production technology (mostly Khyber Pakhtunkhwa province). Group meetings and training sessions during different stages of tobacco crop production.
Bayer Crop Science	Multi-national	Plan protection chemicals	Advisory services to their clients through printed brochures, individual and group meetings.

(Source: websites and information from company's representatives)

3.4 NGO sector in extension

In the push towards privatization, not only private companies have entered into the arena, but also different NGOs and farmers' organizations are also actively working. Over the past two decades, there has been mushroom growth of NGOs in Pakistan but there are few international, national and local NGOs are working specifically for agricultural development. WWF-Pakistan is one of the major international organizations working on different projects since long. Main goal of WWF is conservation of biodiversity and protection of natural eco-system. The Pakistan Sustainable Cotton Initiative (PSCI) is one of its flagship initiatives with the objectives of promoting better management practices for cotton production, demonstrating best water management practices and convincing the farmers to reduce the use of pesticides and fertilizers. WWF Pakistan adopts different extension strategies (group meetings, farmers' field school, print media etc.). Similarly Agha Khan Rural Support Programme (AKRSP) is the pioneer RSP in Pakistan and its success is based on active participation of rural community (Bennett, 1998). Primarily working in the Northern Areas of Pakistan, the AKRSP has undertaken numerous extension activities including trainings of the farmers in production technology of fruits and vegetable, value addition (household agricultural products) and marketing. Community participation model of AKRSP was adopted at the national level through nationwide rural support programmes. Sungi Development Foundations, Lok-Sanjh Foundation, The NGO World, SDPI are some of the notable national NGOs working on rural development issues, but their activities depend on the funding received from international donor agencies.

3.5 Current extension approaches/methods

The current extension approach in the country is more or less a modified version of T & V approach. The farmers' training methodology being followed in the Punjab by the extension field staff in current decentralized system is called "Agricultural Hub Programme" and it is almost similar to that of T&V system. The methodology of "Hub program" is given as under;

A progressive and socially accepted farmer (termed as Hub farmers) is identified by the field assistant at UC level (more or less one from each village of the UC) and the farm of selected grower serves as a demonstration center for other farmers. The extension field staff visits this selected farmer at least once a week on a fixed day and arrange farmer meeting to introduce and disseminate approved agricultural technologies. The identified hub farmer is recommended by the DDOA (extension) for registration with the seed corporation for the multiplication of seeds for use in the respective village. District and tehsil level extension officials may visit any of such demonstration centers randomly for monitoring of the progress. Other farmers are invited to the center and record of the same is maintained.

Major difference between current and T&V approach is that previously the extension activities were centrally managed by the Director General Agriculture (Ext & AR) whereas presently extension is decentralized and managed at the district level by DOA who is answerable to EDOA. In the previous (T&V) system, the extension field staff followed a strict fortnightly schedule to provide the information to the contact farmers who were supposed to pass on the information to other farmers. But now crop specific training sessions, during different stages of production cycle of major crops and fruits, are arranged (for example see Table 2) and the role of CFs has been abolished and now AOs conduct training sessions with the help of “Hub Farmers”. Another difference is that under T&V the Field Assistants were front line extension workers but now Agricultural Officers are the frontline extension workers.

Table 2: Farmers’ Training Schedule for Mango and Citrus in the Punjab¹⁴

Phase	From	To	Points Of Emphasis
<u>Mango</u>			
I	1st Jan	28th Feb	<ol style="list-style-type: none"> 1. Weed Control 2. FYM Applications 3. Balanced Use of Fertilizer 4. Irrigation Method & Requirement 5. Plant Protection
II	1st Aug	15th Sep	<ol style="list-style-type: none"> 1. Pruning After Harvest 2. Irrigation Requirement 3. Application of Phosphorus, FYM and Gypsum
<u>Citrus</u>			
I	15th Nov	31st Dec	<ol style="list-style-type: none"> 1. FYM Application 2. Balanced Use of Fertilizer 3. Inter Culture 4. Weed Control 5. Plant Protection
II	1st Jan	15th Feb	<ol style="list-style-type: none"> 1. Irrigation

¹⁴ Source: <http://agripunjab.gov.pk/index.php?f=2&m=20&l=14&r=0>

			2. Balanced Use of Fertilizer
			3. Plant Protection
			4. Pruning
III	1st Jun	15th Jul	1. Irrigation
			2. Spray of Bordeaux Mixture
			3. Replacement of lures

The Farmer Field School (FFS) system is also being used by the extension departments. Fruit & Vegetable Development Project (FVDP) launched by Punjab Agricultural Department as a pilot project in 10 districts of the Punjab, initiated the concept of farmers' Filed Schools (FFSs) in the Punjab at the wider scale. FVDP established FFS in mango, citrus and vegetable growing regions.

Information technologies (esp. internet) are increasingly being used for information dissemination. The information portals of Punjab Agricultural Department¹⁵, and Livestock and Dairy Development Department¹⁶ contain good information resources. However Agriculture and Livestock departments of Sindh lack worthy online resources.

Agricultural help lines are also available for answering the queries of formers. Directorate of Agricultural Information, Punjab has facilitated the farmers by providing them toll free helplines (0800-15000 and 0800-29000) for acquiring information pertinent to their urgent and emergent issues. Likewise Livestock and Dairy Development (L&DD) Department has also extended the facility of help line (0800-78686) for providing livestock related information to the farmers.

4. National Agricultural Research System

A well-coordinated and competent research system is inevitable for effectiveness of extension system of any country. Pakistan's National Agricultural Research System (NARS) comprises of several federal and provincial research centers and institutes, agricultural universities and regional adaptive research farms. Pakistan Agricultural Research Council (PARC) is the apex agricultural research institute with headquarters in Islamabad and technology transfers centers in provincial capitals. PARC works under Federal Ministry of National Food Security and Research and undertakes/coordinates agricultural research, organizes training, disseminates agricultural technologies through its network of technology transfer institutes located throughout the country (Khan, 2006). PARC has four technical division viz. Plant Sciences, Animal Sciences, Social Sciences and Natural Resources. Ten research establishments are working under PARC throughout the country where research is conducted according to the agro-ecological needs of various regions.

¹⁵ www.agripunjab.gov.pk

¹⁶ <http://www.livestockpunjab.gov.pk/>

Other noteworthy federal research organizations working under Pakistan Atomic Energy Commission include Nuclear Institute for Agriculture and Biology (NIAB), Faisalabad, National Institute for Biotechnology and Genetic Engineering (NIBGE), Faisalabad, Nuclear institute of Food and Agriculture, Peshawar.

At provincial level, Ayub Agricultural Research Institute (AARI), Faisalabad is the largest agricultural research organization which conducts research in all disciplines of agricultural science. Several agricultural research institutes are also working under the umbrella of AARI in different zones of the Punjab. Agricultural Research Institute Tandojam is the prime research institute of Sindh province. Sindh Horticulture Research Institute MirpurKhas, Rice Research Institute Dokri, Wheat Research Institute Sakrand, Quaid-e-Awam Agriculture Research Institute Larkana are also conducting research on different aspects of agricultural sciences. These research institutes are supported by a network of agricultural research stations and sub-stations.

Adaptive research farms in various agro-ecological zones of the Punjab develop “production technology packages” for different crops in collaboration with extension administrative staff. These packages are written shape in Urdu language and then a committee comprises of extension and research officers approve the draft. The draft is finally approved in the meeting of crop management group (CMG) chaired by the Secretary or Minister of agriculture (Ali *et al.*, 2006).

There are two agricultural universities in Punjab (one each in Faisalabad and Rawalpindi) and one veterinary university in Lahore; while Sindh Agricultural University Tandojam is the sole university in Sindh province. These universities are semi-autonomous and receive core funding from the Higher Education Commission. University of Agriculture, Faisalabad is by far the oldest and largest agricultural university of Pakistan and it was established in the pattern of US land grant universities. Teaching, research and extension are the main roles assigned to these universities. There are several agricultural colleges in different locations and similarly some general universities also have full-fledged agriculture faculties or department.

Agricultural research spending relative to agricultural GDP in Pakistan is lowest in the region. Within South Asia this indicator, known as the R&D “intensity ratio”, is highest for India. For every 100 dollars of agricultural GDP, India spent 0.4 dollars on public R&D in agriculture followed by Sri Lanka and Bangladesh with 0.34 dollars each, Nepal 0.27 and Pakistan spend only 0.25\$ (Flaherty et al. 2013).

5. Challenges and constraints

It has been widely acknowledged by the researchers and agricultural practitioners that Pakistan’s agriculture sector has made substantial progress in achieving food self-sufficiency, especially during the Green Revolution era, but country’s agricultural yields have been stagnant for the last many years and its overall agricultural growth has slowed down during the last decade (Burton et

al., 2012; Govt. of Pakistan, 2013). The institutional arrangement of Pakistan's extension service faces many challenges in delivering services to farmers in the milieu of drastic changes in traditional markets, climate change and globalization (Rivera *et al.*, 2001). Some of the challenges and constraints are briefly discussed in this section.

5.1 Targeting the right clientele

Targeting the right and relevant clientele is the key to success of any extension approach. However evidence indicates that in Pakistan both public and private sectors seldom target small and resource poor farmers. For instance Davidson (2001) observed that the government extension department is biased towards comparatively more-educated farmers, and private sector extension is more inclined towards large and resource-rich farmers rather than the small farmers because main objective of private companies is to maximize profits. The approach of public extension service is to target some selected farmers (hub or contact farmers) and majority of smallholders are "non-contact farmers" which means that they have no formal interaction with the agricultural extension personnel. Though the extension literature indicate that the philosophy behind contacting some specific (contact) farmers and excluding "non-contact farmers" is that the technology and innovations will be trickled down from contact to non-contact farmers (Davidson, 2001; Khan *et al.*, 1984) but, in Pakistan, the evidence suggests that most of the small farmers consider themselves as "information poor" and desperately need current and relevant agricultural information (Siddiqui and Mirani, 2012; Siraj, 2011). Likewise Khooharo (2008) conducted a research study in Sindh and conclude that knowledge level of non-contact farmers regarding handling of pesticides was significantly lower than that of contact farmers. Non-contact farmers mostly depend on pesticide dealers, for information, who had partial knowledge and profit generation motives. In the same vein, Davidson (2001) observed that the majority of the farmers have not been approached by any extension agency – either public or private. Bajwa (2004) argued that the public sector extension services do not reach the majority of small farmers due to various reasons such as inadequate funds and weak accountability system.

Rural women in Punjab and Sindh provinces are actively involved in agricultural activities in general and livestock related activities in particular. Livestock keeping in both of the provinces is subsistence oriented and participation of women is substantially higher than those of men (Batool *et al.*, 2012). Likewise women's participate in multiple farm activities is high, but extension services in Pakistan are male farmers oriented and ignore women (Khan, 2006). One of the reasons is lack of female extension workers and due to cultural norms male extension workers cannot interact with rural women.

5.2 Lack of linkages

Effective institutional linkages among extension service providers, research organizations, educational institutes, and farmers are inevitable for an efficacious Agricultural Knowledge and Information System (Ashraf *et al.*, 2007). However, lack of coordination between various stakeholders of agriculture sector of Pakistan has been highlighted by many researchers. For instance, Davidson (2001) narrates “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”. As a matter of fact, lack of linkages between different departments remained a problem throughout the historical development of rural development and extension programmes in Pakistan (Luqman *et al.*, 2013). In the words of Khan (2006), “Agricultural extension planning in Pakistan is an example of government controlled program planning where local people and representatives of other stakeholders were seldom involved”.

Dearth of liaison between research and extension is reported as the “fundamental weakness” in traditional extension approach in Pakistan (Abbas *et al.*, 2009). According to Burton *et al.*, (2012) “Agricultural extension services [in Pakistan] are outdated and agricultural universities operate in relative isolation from research and extension institutions”. Burton goes on by pointing out the lack of coordination between different components of AKIS “Agricultural universities, research and extension institutions produce knowledge that is beneficial to farmers. However, they work mostly in isolation from one another.” Gill and Mushtaq (1998) elaborated that Extension wing of Agriculture Department has its own network and On farm Water Management (OFWM) has its own, and both wings are carrying out similar extension activities (e.g. establishing demonstration plots and are organizing farmers field days), independently, without mutual coordination. Same problem can be found in NARS where agricultural universities, federal and provincial R & D organizations and extension departments are all working within their own (self-created) empires and have no precise functional linkages. The universities are autonomous and perform their roles (education and research) with very little liaison and coordination with related public and private sector organizations (Khan, 2006).

Formal linkages within the provincial wings of Department of Agriculture do exist officially, but are not effective (Shah, 2003). Even within the Department of Agriculture, there is very little coordination between the Extension and Adaptive Research wing, and Directorate of Agriculture Information and district governments (Siraj, 2011). There is an urgent need to institutionalize the linkages between agriculture extension, agricultural universities, research, and farmers to strengthen AKIS.

5.3 Partial decentralization

Decentralization and devolution of the authority/responsibility of central or provincial government at the local level has been adopted in many developing countries during the past

decade. The motivation for the initiative is that the local level offices, being close to the farmers, would be able to design and implement development programs with involvement of local communities. The concept is no doubt very good, but its implementation in developing countries (including Pakistan) has not been smooth (APO, 2006). As mentioned in the previous section that decentralized extension system was implemented in Pakistan in 2001 but the evidence suggests that the decentralized extension system has not shown any considerable change in the efficiency of extension service in Pakistan. Most of the researchers who examined extension services after decentralization reported that public extension service of Pakistan still remains inefficient, top-down, autocratic, large landholders' oriented and ignoring the gender equality issue (Abbas *et al.*, 2009; Farooq and Ishaq, 2005). Farooq and Ishaq (2005) pointed out that the personnel responsible at district level for implementing agricultural extension activities are not fully conversant with the philosophy, rationale and operational strategies of the decentralized extension system. It was found that majority of the extension field staff of reported no change in facilities; while at some places this has been decreased after devolution. The DDOs and AOs are not involved in financial transaction and only the EDO and DOs deal in financial matters. Funds have been reduced by 25 to 30% and decentralization has also weakened the morale and motivation of agriculture officers and staff. Likewise Ashraf *et al.* (2009) reported that majority of the farmers did not perceived any change in the overall performance of the agriculture extension after devolution.

Sipra *et al.* (2006) conducted a study to investigate the impact of decentralized extension system in the central Punjab and reported various merits and demerits of devolution. Some of the advantages of devolution include; increased interaction between officials and the farmers and better monitoring, but there are many demerits of decentralizations such as undue involvement of local political representatives in administrative matters, increasing political influence in transfer and promotion of the staff and unclear and incomplete rules and regulation regarding decentralized extension system. Khan (2006) argued that, "though the district is made a focal point for planning and implementation, the inter-district linkages have weakened. It may also be fair to say that the district has now become isolated, as it does not have any linkage with other districts even within the same province".

Due to the absence of elected district government for the last many years, the extension services are under the DCOs who are sometime more interested in the development of urban areas and therefore frequently utilize the services extension field force in urban areas in some irrelevant tasks (Shahbaz and Ali, 2011). Political interference has also increased after devolution (Saeed *et al.*, 2006)

5.4 The ardent private sector

There is a lack of evidence on the effects of the extension by private organizations in developing countries, nevertheless Hanson and Just (2001) emphasized that more dependency on private

extension system may result in many complications and inefficiencies. This is particularly worrisome in countries like Pakistan where market-driven solutions may worsen the information gap and further disadvantage a large sector of the rural economy (Davidson, 2004). Many studies have shown that privatization reform had resulted in farmers' losing access to public agricultural extension services (Umali and Schwartz 1994; Feder, Willett, and Zipp 1999). In Pakistan Davidson *et al.* (2001) conducted a study to compare public and private extension and their research suggested that both sectors drive overlapping extension programmes with a key difference in the clientele with whom they work directly. Their study indicates that private companies concentrate on farmers with large landholdings and ignore small farmers. Although large private companies have well developed system of in-service training of their field staff, but Ali *et al.* (2011) assessed the competencies of private extension staff and concluded that farmers perceived the extension field staff of private companies as incompetent. Nevertheless, the privatization of extension services alone may not provide the solution of Pakistan's agricultural problems; particularly in reaching smaller-scale and resource-poor farmers (Davidson, 2002; Abbas 2005) and therefore public extension service has to play its role in collaboration with other stakeholders.

5.5 Climate change and natural disasters

Climate change and associated natural disasters are the emerging challenges being faced by the agriculture sector throughout the world. The abrupt change in weather affects the agricultural sector (Shakoor et al., 2011) but agricultural extension services (of Pakistan) lack capability and capacity for supporting smallholders in coping with the changing climate (Burton *et al.*, 2012), declining natural resources (land, water) and natural disasters. Burton *et al.* (2012) commented, "While tremendous global changes in the climate, economy, and technology are reshaping the lives of people worldwide, the agriculture sector of Pakistan remains traditional". Flash floods have become regular feature in the irrigated areas of South Punjab and Sindh during the last many years. These floods cause heavy damage to arable land and other assets of farmers during moon-soon, but we do not see any concrete and systematic planning by the Agriculture Department to cope with the catastrophic impact of flood,

5.6 Intrinsic weaknesses

Many researchers have labeled the extension system of Pakistan as top-down, supply-driven and male-farmers focused, large-farmers' oriented (Burton, 2012; Khan, 2006). Field extension worker is anticipated to support large number of farmers in a vast geographical area. Agriculture Officer who is front line extension agent works at the Markaz Level and he has to look after on an average 30-40 villages. Even in some districts there are more than 60 villages under the domain of an AO. Multifarious tasks are given to the extension officials which are sometime irrelevant to their profession (Shahbaz and Ali, 2011), it is almost impossible for the AO to pay detail visits to every village during each cropping season.

Career development path for extension workers is unattractive with very slow promotion, minimal benefits and lack of rewards (Burton, 2012). Absence of efficient monitoring and evaluation system at the lower tier of extension set-up is another intrinsic weakness hindering the effectiveness of public extension system in Pakistan.

Another weakness of extension system is lack of specialized knowledge and training of extension workers in different aspects of agriculture including plant and animal health, soil analysis etc. Minimum required qualification of AOs, who are front line extension workers, is B.Sc. (Hons.) degree in Agricultural Sciences and they possess generalized knowledge (Burton *et al.*, 2012). There is minimal involvement of subject matter specialists (SSMs) in the field work.

5.7 Market liberalization and globalization

Free trade agreements and market liberalization pose threats as well as opportunities in the agriculture sector. However modest preparedness is found in this regards. The evidence show that the extension staff and farmers are not well aware of the positive and negative consequences of trade liberalization.

5.8 Diversification of livelihoods in rural areas

Livelihoods diversification is a major characteristic of rural survival but often ignored by the policy makers (Ellis, 1999). Agriculture and livestock is subsistence oriented livelihood strategy for overwhelming majority of the smallholders in the Punjab and Sindh provinces. Though sufficient evidence in this regards is not available but some researchers (see for example Adams, 1994; Shah *et al.*, 2005;) have argued that small farmers consume most of their farm produce within their households and depend on multiple non-farm livelihood strategies – remittances, labour, small business, salaried job etc. – for cash income. In this scenario, it is a challenge for Pakistan's agricultural extension services, which are traditionally inclined towards large and progressive farmers, to engage poor and smallholder farming households for more productive, valued and profitable agricultural activities.

5.9 Less emphasis on horticultural crops

Horticultural crops (fruits, vegetables, flowers, medicinal plants) are now gaining more and more attention of agricultural extension service around the globe because of the high profit margin. However in Pakistan, main focus of extension services is traditional crops and there is meager emphasis on horticultural crops.

6. Conclusions and ways forward

This paper has highlighted various issues which are hindering the effectiveness of agricultural extension system in the Punjab and Sindh provinces. Pakistan inherited agricultural extension system from British colonial government with traditional hierarchal top-down technology-driven approach. After independence (in 1947) a series of rural development programmes were undertaken and agriculture and agriculture extension – being integral components of rural development efforts – remained the most important part of the overall rural development strategies. Several extension and rural development programmes have been launched in the country to uplift the rural areas but a critical analysis shows that most of these programmes were terminated one after the other without any systematic evaluation. Nevertheless T & V extension system introduced in late seventies had marked influence on current extension approach which is modified version on T & V approach. Decentralization of power introduced in 2001 added a new dimension to the extension system as districts are now given more responsibility and authority regarding extension work. Eighteenth amendment in the constitution (in 2010) further devolved agriculture wing of federal government at the provincial level. Public extension department working under the provincial governments have large-scale field force from district to UC level but private sector has also been emerged as a major player.

The core functions of extension services include dissemination of empirical and useful information (Okunade, 2007) and consequently making the farmers aware of new agricultural technologies and finally motivating them for adoption (Khan *et al.*, 2010). For sustainable agriculture to prosper, policy formulation processes must be pluralistic, enabling and participatory. Effective policy processes will have to bring together a range of stakeholders for meaningful interaction (Röling *et. al.*, 1997). Globally, the public sector plays leading role in the provision of agricultural extension services to the farmers (Swanson, Bentz and Sofranko, 1997).

In Pakistan however – despite full-fledged extension departments and wide network of agricultural research and education organizations – public extension services have generally been futile to deal with the site-specific needs and problems of the farmers (Ahmad, 1999, Ahmad *et al.*, 2000).

Targeting the right and relevant clientele is the key to success of any extension approach. Overwhelming majority of country's farmers are smallholders but evidence indicates that in both public and private sectors target large and medium scale farmers and they seldom reach small and resource poor farmers. Consequently, the small farmers mostly depend on private companies for agricultural information who may not be well informed and are inclined towards the promotion of their own business. Similarly we find a gendered information gap among farming community. Rural women work equally with men in agriculture sector, particularly in livestock and vegetable production, in addition to their routine household activities. But there are very few female extension workers both in public and private sectors and there are negligible efforts on the part of extension services regarding targeting rural women. Urgent attention is required for

revamping extension approaches for Pakistan so as exacerbating information gap between men and women, small and large, rich and poor farmers can be minimized.

Evidence also indicates that there is no significant improvement in extension services after decentralization rather in some cases decentralization has added complexity in the situation. District extension offices are under the administrative control of DCOs who sometimes use extension field staff in irrelevant tasks. Absence of local governments has further aggravated the issue.

This paper has also identified many intrinsic weaknesses of public extension services. For instance lack of extension workers and low extension worker to farmers' ratio, poor incentive mechanism, lack of specialized knowledge and on-job trainings, absence of effective M&E system are some of the main hindrances identified in this paper. An extension system that could promote sustainable agriculture and address the rural development issues is in dire need. Agricultural extension can play an important role in rural development. Extension system will have to move from the narrow focus on technology transfer to a knowledge-based extension philosophy.

Changing pattern of climate is another challenge for Pakistan agricultural sector. Climate change and associated natural disasters (particularly floods) are now major challenges being faced by the agriculture sector of Pakistan but we see little preparedness in this regards. There is an urgent need to adapt to variable weather patterns that are emerging in the country, particularly in the arid areas. A systematic and research informed series of actions is needed in this regard, ranging from better flood management systems, improvement in infrastructure, and climate change adaptable farming and cropping systems.

The agricultural knowledge and innovation system in Pakistan needs to be revisited because in the post-green revolution era the farming system has become complex due to the emergence of many new stakeholders in agriculture, including the public and private sector, multinational companies, donors, NGOs, banks, academia, local governments, media and farmers' organizations etc. Lack of effective institutional linkages between different stakeholders (public, private, research, education and NGOs) etc. is a major factor hindering the effectiveness of extension services in Pakistan. This necessitates the creation of enabling environment in the milieu of agricultural extension where all stakeholders can work together for the development of agricultural in the country.

Mass media (electronic and print) can play a central role in bridging the knowledge gap among farmers. However, access to media in rural areas is limited due to varied reasons, and consequently farmers are unable to utilize the full potential of media for improving their agricultural knowledge (Khan et al. 2010). We have to reconsider how to better harness electronic, print and online (web-based) media for informing the farmers about agricultural technologies. Privatization of extension services alone may not provide the solution of Pakistan's

agricultural problems; particularly in reaching smaller-scale and resource-poor farmers. Pakistan's agricultural extension services need to be revamped, but privatization may not necessarily provide the best solution to get the desired results.

REFERENCES

- Abbas, M., T. E. Lodhi., K.M. Aujla and S. Saadullah. 2009. Agricultural Extension Programs in Punjab, Pak. J. Life Soc. Sci., 7(1): 1-10.
- Adams, R. 1994. Non-Farm Income and Inequality in Rural Pakistan', *Journal of Development Studies*. 30(1):146-167.
- Ahmad, M. 1999. A Comparative Analysis of the Effectiveness of Agricultural Extension Work by Public and Private Sectors in Punjab, Pakistan'. PhD Thesis. University of New England, Armidale NSW.
- Ahmad, M., A.P. Davidson, and T. Ali. 2000. Effectiveness of Public and Private Sectors Extension: Implications for Pakistani Farmers'. Paper Presented at 16th Annual Conference of AIAEE held at Arlington VA .
- Ali, S., M. Ahmad, T. Ali and M. Shahzad (2011). An assessment of professional competencies possessed by extension field staff of private agri. Extension system in Punjab, Pakistan. *Pak. J. Agri. Sci.*, Vol. 48(3), 217-220.
- Ali, S., M. Ahmad, T. Ali, S. W. Hassan and M. Luqman (2011). Role of private extension system in agricultural development through advisory services in the Punjab, Pakistan. *Pakistan Journal of Science* (Vol. 63 No. 2 June, 2011)
- Anderson J.R., G. Feder and S. Ganguly. 2006. The Rise and Fall of Training and Visit Extension: An Asian Mini-drama with an African Epilogue. World Bank Policy Research Working Paper 3928. Agriculture and Rural Development Department World Bank.
- APO (Asian Productivity Organisation). 1994. Agricultural Extension Systems in Asia and the Pacific. Report of an APO Study Meeting 15th–25th June, 1993, Tokyo.
- Ashraf, I., S. Muhammad and K. M. Chaudhry. 2007. Effect of Decentralization on Linkage among Research, Extension and Farming Community. *Pak.J.Agric. Sci.* 44(4):660-665.
- Ashraf, I., S. Muhammad, K. Mahmood, M. Idrees, and N. Shah. 2009. Strengths and Weaknesses of Extension System as Perceived by Extension Field Staff. *Sarhad J. Agric.* 25(1): 131-134.
- Axinn, G.H. and Thorat, S. 1972. *Modernising World Agriculture: A Comparative Study of Agricultural Extension Education Systems*. New York: Praeger.
- Bajwa, M.S., M. Ahmad and T. Ali. 2010. An Analysis of Effectiveness of Extension Methods used in Farmers Field School Approach for Agricultural Extension Work in Punjab, Pakistan. *J. Agric. Res.*, 48(2): 259-265.
- Bajwa, R., 2004. *Agriculture Extension and the Role of the Private Sector in Pakistan*. National Rural Support Program, Islamabad, Pakistan.

- Batool, H. M. Warriach, M. Ishaq, S. Latif, M. Afzal, A. Bhatti, N. Murtaza, S. Arif and P. C. Wynn. 2012. Participation of Women in Dairy Farm Practices under Small Holder Production System in Pakistan. Proceedings of the 15th AAAP Animal Science Congress 26-30 November 2012, Thammasat University, Rangsit Campus, Thailand
- Bennett, J. 1998. Development Alternatives: NGO-Government Partnership in Pakistan. Working Paper Series # 30. Sustainable Development Policy Institute, Islamabad.
- Benor, D., Harrison J.Q., and M. Baxter. 1984. Agricultural Extension: The Training and Visit System. Washington D.C: World Bank.
- Betz, M. 2009. The Effectiveness of Agricultural Extension with Respect to Farm Size: The Case of Uganda.
- Bhutto, A. W. and A. A. Bazmi. 2007. Sustainable Agriculture and Eradication of Rural Poverty in Pakistan. Natural Resources Forum, 31: 253–262.
- Burton, M., T. Fileccia, A. Gulliver, M. K. Qamar and A. Tayyab. 2012. Pakistan: Priority Areas for Investment in the Agricultural Sector. Report Prepared under the FAO/World Bank Cooperative Programme. Food and Agriculture Organization of the United Nations, Rome, Italy.
- Chaudhry, K.M. 2002. Community Infrastructure Services Program (CISP): HRD Manual. Muzafarabad: Department of Local Government and Rural Development, Govt. of AJK.
- Davidson, A. P and M. Ahmad. 2002. Effectiveness of Public and Private Sector Agricultural Extension: Implications for Privatization in Pakistan. The Journal of Agricultural Education and Extension.8 (3), 117-126.
- Davidson, A. P. 2001. Privatization and the Crisis of Agricultural Extension in Pakistan: Caveat Emptor. Case Study Prepared for the Workshop held on November 12-15, 2002 in Washington, DC, Hosted by the Sustainable Agricultural Systems and Knowledge Institutions.
- Davidson, A.P., M. Ahmad and T. Ali. 2001. Dilemmas of Agricultural Extension in Pakistan: Food for Thought. Agricultural Research and Extension Network. Network Paper No. 116.
- Dawn (2012). Grappling with devolved responsibility. Daily Dawn, Jan. 9, 2012. <http://www.dawn.com/news/686725/grappling-with-devolved-responsibility#comments> (accessed August, 2014).
- Dawn (2013). Social agenda with new federalism. Daily Dawn, March 25, 2013. <http://www.dawn.com/news/797732/social-agenda-with-new-federalism> (accessed August, 2014)
- Ellis, F. 1999. Rural Livelihood Diversity in Developing Countries: Evidence and Policy Implications, Natural Resource Perspectives Number 40, ODI.
- Farooq, A, M. Ishaq, N. A. Shah and R. Karim. 2010. Agricultural Extension Agents and Challenges for Sustainable Development (A Case Study of Peshawar Valley). Sarhad J. Agric. 26(3): 419-426.
- Farooq, A. and M. Ishaq. 2005. Devolving the Farm Extension System, P: III. Economic and Business Review. Daily Dawn, Karachi. Monday, 2005.

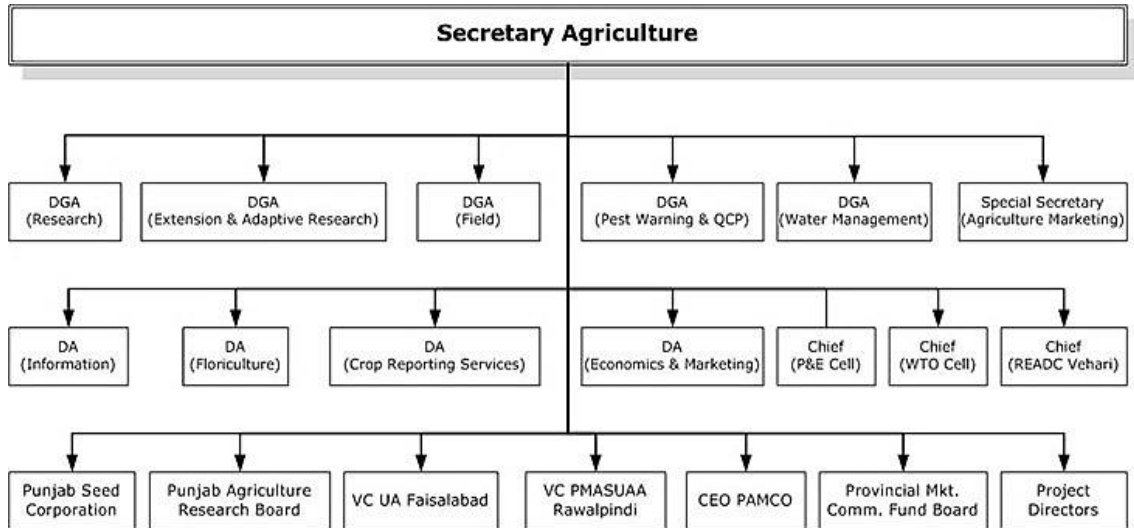
- Feder G., A. Willett, and W. Zijp. 1999. Agricultural Extension: Generic Challenges and Some Ingredients for Solutions. World Policy Research Working Paper 2129. Wash., D.C. May.
- Gill, M. A. 1996. Participatory Irrigation Management: Pakistan's Experience. Paper Presented at International Seminar on Participatory Irrigation Management held in Turkey, April 10-17.
- Gill, M. A. and K. Mushtaq (1998). Managing irrigation for environmentally sustainable agriculture in Pakistan. Pakistan National Programme, IIWI, Lahore, Pakistan.
- Gondal, B.A. 1989. Punjab Agricultural Extension & Adaptive Research Project Phase-II with regards to Training Component in Sargodha Division. Sargodha, Pakistan: DDA (Tr) Sargodha Division.
- Government of Pakistan. 1988. Report of National Commission of Agriculture. Islamabad, Pakistan.
- Government of Pakistan. 2007. Economic Survey of Pakistan 2006-07. Ministry of Economic Affairs. Government of Pakistan, Islamabad, Pakistan.
- Government of Pakistan. 2013. Economic Survey of Pakistan. Ministry of Economic Affairs. Government of Pakistan, Islamabad, Pakistan.
- Government of Punjab. 1987. Punjab Agricultural Extension and Adaptive Research Project Phase II. Revised, Directorate General Agriculture (Ext. and Res.) Punjab, Lahore, Pakistan.
- Hanson, J.C. & Just, R.E. 2001. The Potential for Transition to Paid Extension: Some Guiding Economic Principles. Paper presented at the Allied Social Science Association annual meeting in New Orleans, Louisiana. College Park, Maryland: Department of Agricultural and Resource Economics.
- Haque, U.I. 2002. Uplift of Landless poor through Agricultural Reforms: WB. Dawn Econ. & Business Rev. 29 April- 5 May, 2002. pp.1-6.
- Havrand B., P. Kapila. 2000: Technological Aspects of Extension Service in Developing Countries. *Agricultura Tropica et Subtropica*, 33:3–9.
- Hussain, S.S., D. Byerlee, and P.W. Heisey. 1994. Impact of the Training and Visit Extension System on Farmers' Knowledge and Adoption of Technology: Evidence from Pakistan. *Agricultural Economics*.10(1):39–48.
- Ikram-ul-Haq., M. Ahmad, T. Ali and M. I. Zafar. 2009. An Analysis of Farm Services Centre (Fsc) Approach Launched for Agricultural Extension in NWFP, Pakistan. *Pak. J. Agri. Sci.*, 46(1): 69-72.
- Jan, I, H. Khan and M. Jalaluddin (2008). Analysis of agricultural extension system: a discrepancy between providers and recipients of the extension services empirical evidence from north-west pakistan. *Sarhad J. Agric.* Vol.24, No.2, 2008
- Khan, G.A., S. Muhammad, K. M. Chaudhry and M. A. Khan. 2010. Present Status and Future Preferences of Electronic Media as Agricultural Information Sources by the Farmers. *Pak. J. Agri. Sci.*, 47(2): 166-172.

- Khan, M. H. 2006. *Agriculture in Pakistan: Change and Progress 1947-2005*. Vanguard Books (Pvt) Ltd., Lahore, Pakistan.
- Luqman, M., B. Shahbaz, T. Ali and M. Iftikhar. 2011. *Critical Analysis of Rural Development Initiatives in Pakistan: Implications for Sustainable Development*. *Spanish Journal of Rural Development*. 4(1): 67-74
- Malik, W. 2003. *Operationalizing Agricultural Extension Reforms in South Asia: A Case of Pakistan*. Paper presented at the Regional Workshop on 'Operationalizing Reforms in Agricultural Extension in South Asia' New Delhi, India, May 6-8, 2003. (The World Bank Group Washington, D.C.).
- Mallah, M.U. 1997. *Extension programs in Pakistan*. In *Extension Methods: Memon, R. A., E. Bashir (Eds.)*. National Book Foundation, Islamabad, Pakistan. pp 35-60.
- Mengal, A. A. , M. U. Mallah, Z. A. Mirani and B. N. Siddiqui (2012). *An analysis of public and private agricultural extension services in Baluchistan, Pakistan*. *Pakistan J. Agric. Res.* Vol. 25 No. 4, 2012.
- Moayed, A. A and Azizi, M. 2011. *Participatory Management Opportunity for Optimizing in Agricultural Extension Education*. *Procedia Social and Behavioral Sciences*, 15:1531-1534.
- Muhammad, S. 2005. *Agricultural Extension: Strategies and Skills*. Unitech Communications, Faisalabad, Pakistan.
- Muhammad, S. 1994. *An Effective Communication Model for the Acceptance of New Agricultural Technology by Farmers in Punjab, Pakistan*. Unpublished Ph.D. Dissertation. Reading University UK.
- Okunade, E.O. 2007. *Effectiveness of Extension Teaching Methods in Acquiring Knowledge, Skill and Attitude by Women Farmers in Osun state*. *J. Appl. Sci. Res.* 3(4):282-286.
- Qamar, M. K. 2005. *Modernizing National Agricultural Extension Systems: a Practical Guide for Policy-Makers of Developing Countries*. FAO, Rome, Italy.
- Qamar, M. K. 2012. *Modernizing National Agricultural Extension Systems: A Practical Guide for Policy-Makers of Developing Countries*. Research, Extension and Training Division. Sustainable Development Department. Food and Agriculture Organization of the United Nations, Rome, Italy.
- Qamar, M. K. 2012. *Pakistan - Priority Areas for Investment in the Agricultural Sector*. Country Highlights, Prepared under the FAO/World Bank, Cooperative Programme.
- Riaz, M. 2010. *The Role of the Private Sector in Agricultural Extension in Pakistan*. *Rural Development News*, 1/2010; Pp 15-22.
- Rivera, W. M., M. K. Qamar, and L. Van Crowder. 2001. *Agricultural and Rural Extension Worldwide: Options for Institutional Reform in Developing Countries*. Rome: Food and Agriculture Organization of the United Nations.

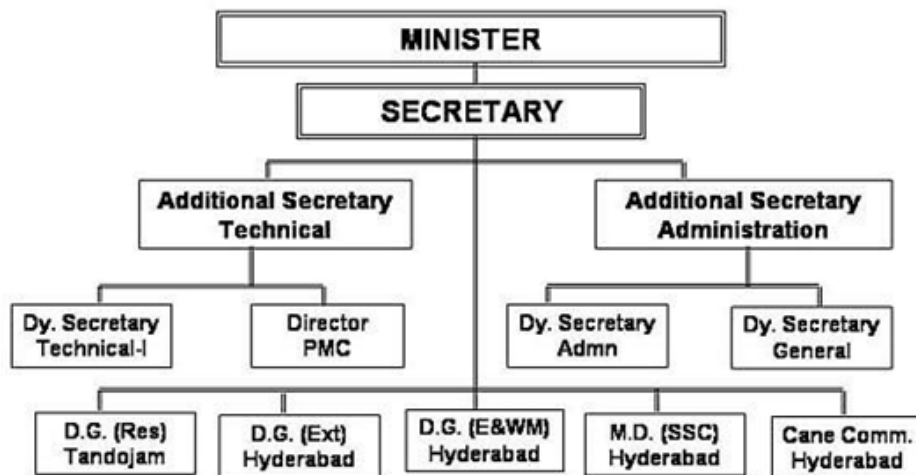
- Rivera, W and G. Alex. 2004. Privatization of Extension Systems: Case Studies of International Initiatives. Volume 2. Agriculture and Rural Development Discussion Paper 9. Extension Reform for Rural Development. The World Bank.
- Röling, N. & Pretty, J.N. 1997. Extension's Role in Sustainable Agricultural Development; In: Improving Agricultural Extension: a reference manual (Eds: B.E. Swanson, R.P. Bentz, and A.J. Sofranko). FAO, Rome.
- Saeed, R., M. Abbas, A. D. Sheikh and K. Mahmood. 2006. Impact of Devolution on Agricultural Extension System in the Central Punjab: Perceptions of Agricultural Extension Workers. Pakistan Journal of Life and Social Sciences. 4(1-2):: 20-26.
- Shah, H., M. A. Khan, N. Akmal and M. Sharif. 2005. Livelihood Assets and Livelihood Strategies of Small Farmers in Salt Range: A Case Study of Pind Dadan Khan District Jhelum, Pakistan. Pak. J. Agri. Sci., 42(1-2):82-88.
- Shah, N. S. (2003). Rationalization of national agricultural Research system in Pakistan. Quarterly SCIENCE VISION Vol.8(3&4) January - June, 2003
- Shahbaz, B and T. Ali. 2011. Agricultural Extension System in Punjab Decentralised or Dispersed? The Nation. October 03, 2011.
- Siddiqui A. A. and Z. Mirani (2012). Farmer's perception of agricultural extension regarding diffusion of agricultural technology. Pak. J. Agri., Agril. Engg., Vet. Sci., 2012, 28 (1): 83-96.
- Siraj, M. 2011. A Model for ICT-based Services for Agriculture Extension in Pakistan. CABI International. USAID. Pakistan's Food and Agriculture Systems.
- Swanson, B.E., R.P. Bentz, and A.J. Sofranko (Eds.). 1997. Improving Agricultural Extension: a reference manual. FAO, Rome.
- Umali, D. and L. Schwartz. 1994. Public and Private Agricultural Extension: Beyond Traditional Frontiers. World bank Discussion Paper No 236. Washington.
- Waseem, M. 1982. Local Power Structure and the Relevance of Rural Development Strategies: A Case Study of Pakistan. Community Development Journal, 17(3):225-233.
- WFP. 2010. The State of Food Insecurity in the World Addressing food insecurity in protracted crises. World Food Programme of the UN.
- Zijp, W. 1998. Empowerment through Communication. In: Wallace IR (Ed.), Rural Knowledge Systems for the 21st Century: Rural Extension in Western, Central and Eastern Europe. Proceeding of the Symposium held at Reading, Cambridge and Edinburg Universities 6-17 July 1997. AERDD, The University of Reading, Reading, UK.

ANNEXURES

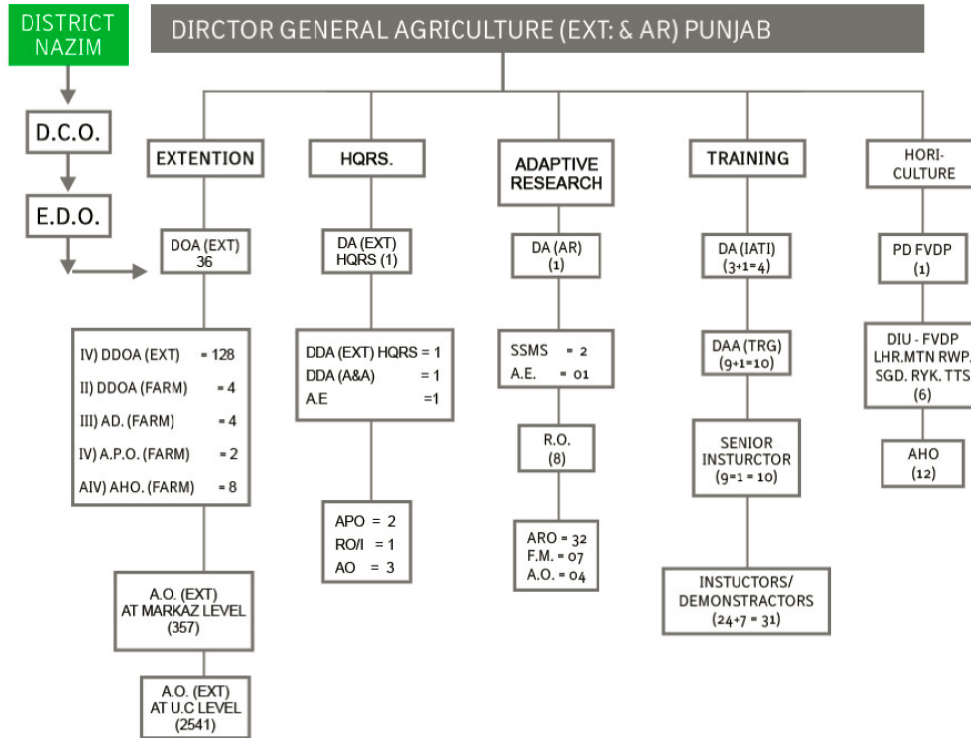
Annexure-1: Organizational set-up of Punjab Agriculture Department



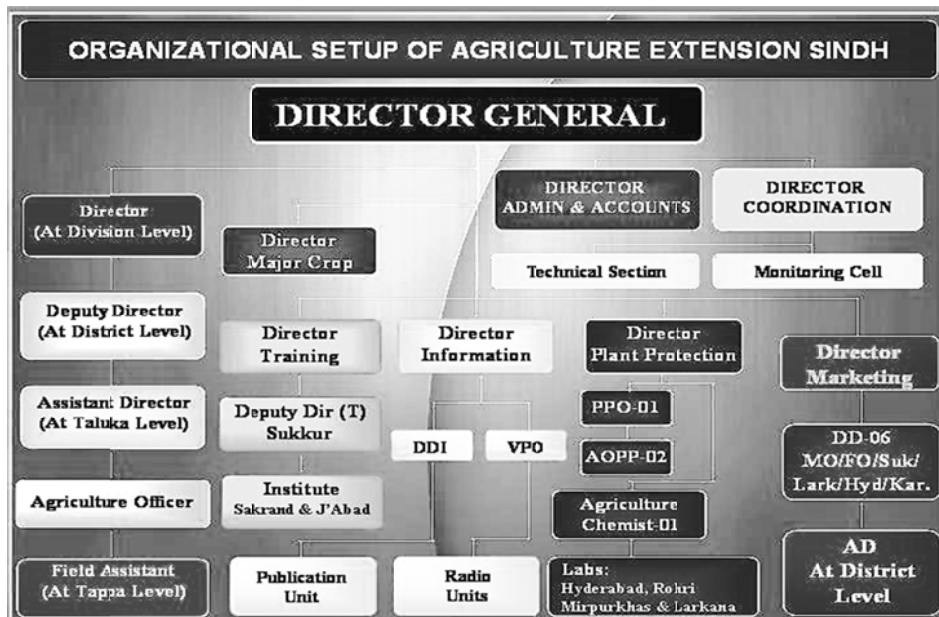
Annexure-2: Organizational Structure of Sindh Agriculture Department



Annexure-3: Organizational Structure of Directorate General of Agriculture (Ext. & A.R.), Punjab



Annexure-4: Organizational Structure of Directorate General of Extension, Sindh



Annexure-5: Livestock and Dairy Development Department, Punjab

