

AGRICULTURAL EXTENSION IN INDIA: CURRENT STATUS AND WAYS FORWARD*

Sulaiman V Rasheed

*Centre for Research on Innovation and Science Policy (CRISP)
Hyderabad, India*

1. INTRODUCTION

Agricultural extension in India is in transition. After several years of neglect, public sector extension has been witnessing renewed interest and policy attention during the last few years. It is under pressure to reform its purpose as well as the way it is managed and is also being encouraged to work closely with extension providers from the private and voluntary sector. While the need for strengthening extension services and expanding its mandate is fairly recognized, the on-going reform process is yet to make a significant impact on improving extension's contribution to agricultural development. Development of agriculture continues to remain critical for India's economic growth and poverty reduction. Indian agriculture faces several challenges and agricultural extension services can and should contribute to addressing these challenges. However, to do this effectively, extension needs to address some of the challenges it faces currently and should reinvent its role and mission.

The paper reviews the evolving extension landscape in India and the current reforms in organizing extension and identifies areas for priority attention to help achieve India's objective of achieving faster, sustainable and more inclusive growth during the XIIth Plan Period (2012-2017). The four main sections of the paper begin by providing an overview of the emerging challenges faced by Indian agriculture and its implications for organizing extension and advisory services. The next section presents a review of the current status of extension including the public, private and voluntary initiatives and the status of on-going reform process. This is followed by a discussion on the generic issues facing extension provision in India. The paper concludes by arguing for four areas of priority attention. These include, measures to promote pluralism and partnership at the district level: enhanced funding for extension, convergence among schemes and co-ordination among various extension providers; much stronger research support to extension to address the needs of small farmers and disadvantaged regions; and support for change management process in extension that includes, new professional inputs for organizational redesign and human resource management.

2. CHALLENGES IN INDIAN AGRICULTURE AND ITS IMPLICATIONS FOR ORGANIZING EXTENSION

2.1 Emerging challenges in Indian Agriculture

India's economic security is heavily dependent on agriculture. About half of India's population is either wholly or significantly dependant for their livelihoods on some form of

* Background Paper prepared for the Roundtable Consultation on Agricultural Extension, Beijing, March 15-17, 2012.

farm activity – be it crop agriculture, horticulture, animal husbandry or fisheries. Although the Green Revolution increased production and productivity of food crops, improved food security and raised rural incomes, India still has a large poor (27.5% of the population living below the poverty line based on 2004-05 data) and malnourished population. “Expansion of farm incomes is still the most potent weapon for reducing poverty” (Planning Commission, 2011).

Though foodgrain production has touched a new peak of 241 million tonnes in 2010-11, growth in agriculture in the Eleventh Plan (2007-12) is likely to average only about 3.3 percent per year (Planning Commission, 2011). The Draft Approach Paper to the 12th Five Year Plan argues the need for ensuring a minimum of 4 % growth in agriculture during the XIIth Plan (2012-17). Larger agricultural regions with low and uncertain rainfall (arid and semi-arid regions) are yet to witness significant improvements in productivity and rural income. Producers in far-flung and interior areas and those regions that are less integrated with markets still suffer from lack of access to appropriate services (credit, inputs, market, extension etc). Slackening growth in rainfed areas has also resulted in widespread rural distress.

Indian agriculture is essentially small farm agriculture with the majority of farmers owning less than 1 ha of land. Small and marginal farmers now constitute over 80 percent of farming households in India. The average farm size has been declining. “The slow growth of opportunities in the non-farm employment sector has led to the proliferation of tiny and economically non-viable holdings”(NCF, 2006). The land and water resource base for an average farm holding has declined over the last few decades and this essentially means producing more food from less land and water resources. There are wide gaps in yield potential and national average yields of most commodities are low. “In addition to stressed natural resources and very inadequate rural infrastructure, there was clear evidence of technology fatigue, run-down delivery systems in credit, extension and marketing services and of insufficient agricultural planning at district and lower levels” (Planning Commission, 2011).

The last few years have also witnessed the diversification of agriculture towards high value commodities such as fruits, vegetables and livestock products at a fast pace. High value commodities account for a large share of the total value of agricultural production in a number of districts in India. Urbanisation has also resulted in the emergence and rapid expansion of super-markets for retailing agricultural goods. “However the raising demand for food items and relatively slower supply response in many commodities has resulted in frequent spikes in food inflation. The need for a second green revolution is being recognized more than ever before” (Government of India, 2011).

Increasing de-regulation of trade has added new challenges to Indian farmers, who are forced to compete on quality and prices on several products not only in the export market, but also in domestic markets. However, quite often only the large farmers are able to integrate their production to suit the demand cycles and quality standards and small and marginal farmers are left out of these arrangements. All these developments have led to the expansion of contract farming arrangements — most of them led by agri-business companies. Experience of these arrangements however has been generally mixed. “In order to make contract farming an effective development tool, strong mechanisms must be in place to monitor contracts and ensure that growers — the more vulnerable partners — are not exploited” (Singh, 2005). These are currently lacking in most cases.

Studies have shown that at least one third of the future growth in productivity should come through innovations in crop technologies. “Public sector technology generation often fails to take into account farmers’ needs, perceptions and location-specific conditions for each crop, leading to significant gaps between the varieties released by public sector institutions and the number of varieties actually used by the farmers. Private sector research and the seed industry often focus on those crops and varieties which have adequate scale (massive markets) and scope (repeated sales). As a result, some crops/crop groups get little research attention” (Planning Commission, 2011).

Private sector participation in agricultural R&D has been on an increase. Recent estimates reveal that the business funding (largely private) for agricultural R&D constituted about 11 percent of the total R&D funding (Pal and Jha, 2007). The largest private investment occurred in chemicals (pesticides and fertilizers) and food processing, followed by seed and machinery. More recently, growth has been in plant breeding and biotechnology, animal health and poultry. While this has added to improved flow of new technologies, there are concerns on the higher costs of these technologies and, therefore, the restricted access and small farmers being by-passed.

In the dry lands and mountain ecosystems, livestock contribute anywhere between 50 to 75 percent of total household income of the rural population. Support to these massive and highly diverse livestock populations in these regions is lacking (Planning Commission, 2011). Though fisheries sector provides employment to millions of people and contributes to food security of the country, its potential hasn’t yet been fully exploited through scientific management, training and market development.

The country is also experiencing change in key climate variables, namely temperature, precipitation and humidity which has already started affecting its agriculture and it has to consider adaptive measure to cope with these changes (Government of India, 2008). Measures may include the introduction of the use of alternative crops, changes to cropping patterns, and promotion of water conservation and irrigation techniques.

2.2 Implications for organizing extension

Agricultural extension services can and should play an important role in addressing many of these challenges. Perhaps, there is no agency at the ground level, other than agricultural extension services that can provide knowledge support to farmers and other intermediaries who are supporting farmers and at the same time support programme implementation. Considering the changing nature of agriculture and the evolving challenges, producers currently need a wider range of support, including organisational, marketing, technological, financial and entrepreneurial. To be successful, farmers require a wide range of knowledge from different sources and support to integrate these different bits of knowledge in their production context.

Addressing many of these complex issues requires solutions which are beyond the decision-making capacities of individual farmers. Collective decisions on resource use and marketing would necessitate forming new forms of collaboration and this is particularly important as this sector is dominated by small farms — often with weak bargaining powers and limited political voice. While a production led strategy was the sole focus of extension earlier, this needs to be expanded to include a market led strategy to deal with the new challenges.

But to play this role effectively, extension should expand its mandate beyond disseminating information on technologies so that it can better respond to the evolving demands for support and services of farmers. This includes, organizing user/producer groups, linking farmers to markets, engaging in research planning and technology selection, enable changes in policies and linking producers to a range of other support and service networks (Sulaiman and Hall, 2004, Rivera and Sulaiman, 2009).

The number and diversity of organizations involved in extension and advisory services have increased over the past few years and extension should also play an increasingly important intermediation and facilitation role to support application of new knowledge including technical knowledge. To do this, it should also reform its strategies and programme delivery architecture to better meet the needs of its large number of clients representing varied resource base and risk bearing capacity.

Though the theory and practice of extension has considerably evolved globally during the last few years (Box 1), this is yet to make any significant change in the way extension is understood and practiced in the country.

Box 1: Changing views on innovation, communication and extension

In the old way of thinking about agricultural innovation, innovation was a task related to the production of ideas by research, and the supply of these by extension to farmers and then their consequent use. The role of extension in this earlier framing was about making sure farmers were aware about new ideas developed by research. In other words, its role was about communicating innovation. While innovation was considered as new information or technology earlier (Rogers, 1962), during the 80's innovation began to be considered as an outcome of interaction among stakeholders, with the role of the communicator being mainly to facilitate this process of interaction (Rolling and Wagemakers, 1998).

Currently innovation is increasingly recognised as a process by which new knowledge is generated, diffused, adapted and used to result in social and economic change. This process requires interaction and knowledge flows among multiple actors within the Innovation System (Hall et al., 2004; Hall, 2009). (An innovation system represents a network of organizations focused on bringing new products, new processes and new forms of organizations into social and economic use, together with institutions and policies that affect their behavior and performance). Communication can play a major role in supporting the three essential processes relevant to innovation: *network building*, *supporting social learning* and *dealing with dynamics of power and conflict* (Klerkx and Leeuwis, 2008).

The role of the communicator has shifted from that of a disseminator of information initially to that of a facilitator of interaction subsequently and, more recently, as a broker (Klerkx and Leeuwis, 2008) or an agent playing a wider range of intermediation tasks at a range of interfaces situated within (and between) networks of stakeholders operating in different societal spheres (Leeuwis and Hall, 2010). In other words, the role of communication has broadened from being an intermediary between science and practice to include a wider range of intermediary roles, such as mediation, knowledge brokering, facilitation of exchange, demand articulation, visioning, etc.

In the development sector, extension agencies have traditionally used some of these communication strategies, including advisory communication, organising horizontal exchange in support of diffusion, persuasive mass media campaigns, awareness raising, training, information provision, etc. New evidence indicates that these classic strategies need to be accompanied by other communication strategies and services for innovation to take place (Leeuwis, 2004; Klerkx and Leeuwis, 2009). These other strategies and services include: network brokerage, demand articulation and knowledge brokerage, visioning, process facilitation, interactive design and experimentation, learning-oriented

monitoring, exploration of opportunities and constraints, lobby advocacy communication and conflict management.

In many countries, extension is currently called as rural advisory services. The Global Forum for Rural Advisory Services defines *extension also called rural advisory services, as consisting of all the different activities that provide the information and services needed and demanded by farmers and other actors in rural settings to assist them in developing their own technical, organizational and management skills and practices so as to improve their livelihoods and well-being* (GFRAS, 2010).

Extension may include services within three areas:

- Technology and information sharing,
- Advice related to farm, organizational and business management and
- Facilitation and brokerage in rural development and value chains.

Agricultural extension services need to assume new challenges and reform itself in terms of content, approach, structure and processes. Extension in this context includes all those agencies in the public, private and civil society that provide a range of agricultural advisory services and facilitate application of new knowledge. A strong, vibrant and responsive extension with an expanded mandate is a pre-requisite for achieving a faster, sustainable and more inclusive growth through agriculture..

3. EXTENSION AND ADVISORY SERVICES IN INDIA: CURRENT STATUS

Extension in today's Indian context, includes all those agencies in the public, private, NGO and community based initiatives that provide a range of agricultural advisory services and facilitate technology application, transfer and management. While public sector line departments, mainly the Department of Agriculture was the main agricultural extension agency in the 60's and 70s, the last two decades have witnessed the increasing involvement of private sector, NGOs, community based organisations and media. With the external support drying up with the end of the T&V (Training and Visit) system of extension in the early 1990s, states have been left to fund their extension machinery and this has led to considerable weakening of public sector extension.

The situation assessment survey of farmers conducted during the 59th round of the National Sample Survey (NSSO, 2005) provided valuable insights into reach of extension services across India. The data collected from 51,770 households in 6638 villages showed that sixty percent of farmer households did not access any information on modern technology that year. For the farmers who accessed information, progressive farmers and the input dealers were the main source of information. Broadcast media was also used a great deal to obtain information, which included radio, television and newspapers. The public sector extension worker was a source of information for only 5.7 % of farmer households interviewed and the Krishi Vigyan Kendra (KVK) accounted as an extension source for only 0.7% of the sample farmers. Private and NGO extension services were accessed by only 0.6%.

The farmer household assessment surveys conducted by the International Food Policy Research Institute (IFPRI) in 5 states during recent years have also shown the importance of input dealers as an important source of information. But the IFPRI studies revealed that a significant number of farmers are also accessing public sector extension, especially the staff of the Department of Agriculture. For instance, "in Tamil Nadu, the main sources of agricultural information in 2010 was the input dealer (68.6%), followed by the state department of agriculture extension staff (51.2%). In Karnataka, of the 966 farmer households surveyed in 2006, 22% had at least one contact with a government extension

worker during the past year. In Uttar Pradesh, Only 18% of households used extension (from any source, public or private) in the past year. Of these, only 7% were from state extension officers. Other public-sector extension sources put together (that is the KVK, All-India Radio, university extension, and plant protection unit) were used 18% of the time. The remaining 75% of extension comes from the private sector”. (Babu et al, 2012). All these reveal the wide diversity in extension provision and the wide variation in the way farmers access various extension sources in different states.

3.1 Public sector initiatives

In terms of number of staff and organizational reach, the public sector extension staff of the Department of Agriculture (DoA) of the states dominate extension provision in India. Majority of the states have their staff upto Block level. Only 6 states have their staff upto the village level and 11 states have extension manpower upto Panchayat level. “Data from 27 states indicate that 36% of the posts are vacant in the DoA. Out of the 143863 positions in DoA, 52575 posts are vacant. Only 91288 posts are filled” (Chandragowda, 2011). Most of the extension personnel that are present perform multiple roles. Their visits to the field are irregular as the service is pre-occupied with the implementation of government schemes linked to subsidies and subsidised inputs. “Although farmers require information for the whole food and agriculture value chain, the public extension system largely concentrates on on-farm activities” (Glendenning et al, 2010).

Low operational budgets, with 85–97 percent of expenditures going to salaries, limit the ability of DoA staff to visit farmer fields (Sulaiman and van den Ban 2003). Lack of adequate resources also constrained the DoA in continued education of their field staff on ways of dealing with new and evolving challenges. Compared with the DoA, the other line departments, such as animal husbandry, fisheries, horticulture, sericulture do not have adequate field personnel. For instance, the state Departments of Animal Husbandry (SDAH) - the major stakeholders for the livestock development in India is mostly dominated by animal health concerns with negligible attention to production related advice to farmers. Moreover, their spending on livestock extension activities is only around 1–3% of their total budget (Chander et al 2010). Research and Extension in some of the select commodities such as Rubber, Spices, Coffee and Tea are handled by the respective Commodity Boards functioning under the Central Ministry of Commerce.

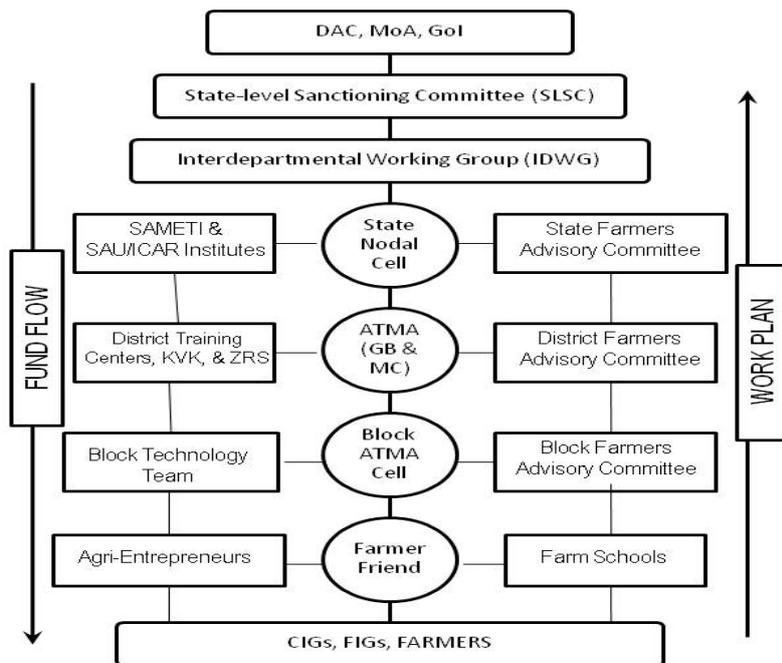
In the case of public sector extension, the major reform in recent years has been the establishment of a district level co-ordinating agency, the ATMA (Agricultural Technology Management Agency). ATMA is a district level autonomous agency entrusted with the role of agricultural technology management in the district. The district collector/deputy commissioner heads ATMA Governing Body, with members drawn from the line department, KVKs, farmers and NGOs. The central idea of the ATMA model was that it would act as a mechanism to bring together the different agencies involved in extension in a district. In consultation with farmers it identifies local research and extension priorities and develops local level problem-solving plans. Funds are specifically allocated for ATMA to implement its activities.

The ATMA was introduced as a pilot in 28 districts in seven states of India from 1998-2003 as part of the World Bank funded Innovations in Technology Dissemination (ITD) component of the National Agriculture Technology Project (NATP). Under ATMA, grass root level extension is mainly channelised through the involvement of BTTs (Block level

Technology Teams) and FACs (farmer advisory committees), farmer groups/ farmer interest groups and self help groups. Based on the “success” of this pilot in the 7 states, in 2004 the Government of India decided to expand this model with its own funds — across all districts in the country. However, the same technical support and funding available during the pilot stage was not made available at the expansion phase. Lack of dedicated manpower, functional autonomy and attitudinal barriers at all levels further constrained ATMA from achieving its goals (Sulaiman and Hall, 2008). Although ATMA has been highlighted as an innovative example of agricultural extension (Singh and Swanson 2006; Swanson et al. 2008), other than bringing few additional resources and flexibility to use these funds on activities identified in consultation with farmers, it failed to make any significant improvement in the way extension was funded and implemented (Sulaiman and Hall, 2008; AFC, 2010). ATMA however provided a platform for interaction between line departments and farmers and brought some new concepts such as bottom up planning and commodity interest groups into field extension practice.

In June 2010, the central government issued revised guidelines on ATMA implementation (DAC, 2010) mainly to address the constraints associated with the national implementation during the past five years. The revisions included hiring exclusive staff for ATMA at the district and block levels, inclusion of farmer advisory committees at the block, district and state levels and greater emphasis on ATMA’s links to the KVKs. ATMA is now operational in 603 districts of India spread over 28 States and three Union Territories. Provision of separate staff for ATMA has brought improved attention to ATMA. The revised 2010 guidelines are yet to be fully implemented in all states, though this is expected shortly. With improved links to KVKs, better convergences among different schemes/departments/agencies, and greater focus on Commodity Interest Groups, ATMA is expected to strengthen Indian extension system during the XIIth Plan (2012-2017).

Figure 1: ATMA model as per the revised guidelines (2010)



Source: DAC (2010)

The number of KVKs (Krishi Vigyan Kendras) funded by the ICAR has increased during the last few years. Presently 605 KVKs are established in the country. KVKs have the mandate of promoting technology application through on-farm trials, demonstrations and training. These activities are implemented by a multi-disciplinary team. Performance of KVKs varies widely. The effective reach of KVKs in most cases is marginal mainly due to its inadequate linkages with other development agencies. Staff shortage, limited operational funding and a narrow mandate has also led to sub-optimal utilization of KVKs. KVKs can do better if its technical expertise is linked to the facilitation support and reach of the DoA/ATMA.

ICAR has also established Agricultural Technology and Information Centres (ATICs) in some of the State Agricultural Universities (SAUs) and ICAR institutes mainly to serve as a single window offering the institute's technology, advice and products. SAUs also engage in some extension activities, often in villages near to their location. They do support the state DoA in terms of technological backstopping by way of training and problem solving advisory support. Some states such as Punjab and Andhra Pradesh have established extension centers in each district to directly advise farmers. Every state now has a State Agricultural Management Extension and Training Institute (SAMETI) at the state level. The country has four EEIs (Extension Education Institute) at the regional level and at the national level, the National Institute for Agricultural Extension Management (MANAGE) supports capacity development of extension professionals.

To incentivize the states to increase public investments in agriculture, the Central Government in 2007 introduced a new scheme, the Rashtriya Krishi Vikas Yojana (RKVY). It provides the states flexibility and autonomy in planning and executing programmes for agriculture to achieve the goal of reducing the yield gap and maximize returns to farmers. The State Department of Agriculture is the nodal department and the total allocation under the Eleventh Plan is Rs 25,000 crores. Two other programmes, namely the Backward Regions Grant Fund (BRGF) implemented by the Ministry of Panchayati Raj in 250 backward districts, have provision for capacity building of staff of panchayats/ municipalities in planning, implementation and monitoring. These programmes also have a provision for recruiting a trained community level person for agricultural extension activities. Similarly, the Swarnajayanti Gram Swarozgar Yojana (SGSY) programme implemented by the Ministry of Rural Development through the District Rural Development Agencies (DRDAs) has provision for skill development, marketing and technology support. Under the National Horticultural Mission (NHM), Precision Farming Development Centres (PFDCs) are being established to promote regionally differentiated technology validation and dissemination activities. Human Resource Development through trainings and demonstrations is an integral part of the Mission.

To tap the expertise of a large pool of agricultural graduates in the country, the Ministry of Agriculture in association with NABARD (The National Bank for Agriculture and Rural Development) and MANAGE is implementing the Agri-Clinics and Agri-Business Centres (ACABCs) Scheme. The objectives of this scheme are as follows: (a) supplement the efforts of government extension system; (b) make available supplementary sources of input supply and services to needy farmers; and (c) to provide gainful employment to agricultural graduates in new emerging areas in the agricultural sector.

Agricultural graduates are provided two-month training in agri-business development through institutions in the public/private sector. The entire cost of training and handholding is being

borne by the Government of India. The trained graduates are expected to set up ACs & ABCs with the help of bank finance. Till January 2012, 27,752 graduates have been trained leading to the establishment of 9863 ACABCs in various parts of the country (ACABC, 2012). Trained agri-preneurs face several constraints in availing bank finance to set up ACABCs. These include, lack of interest to finance this scheme, high rates of interest and the need for collateral security (Karjagi et al 2009). Farmers who have availed services from these centres have benefited by way of increased productivity (Global AgriSystem, 2008). Glendenning et al 2011 noted that embedding advisory service in input sale through agri-clinics is a useful way of reaching farmers, whose most important information needs relate to agri-inputs.

To support input dealers with location specific crop production and crop protection technologies, the National Institute of Agricultural Extension Management (MANAGE) has started a diploma course. The programme known as DAESI (Diploma Course on Agricultural Extension for input dealers) is imparted through distance education mode. The programme is currently implemented in Andhra Pradesh, Tamil Nadu and Maharashtra. So far, 2164 input dealers have been trained under this scheme (MANAGE, 2012).

The Government has also been using the media, especially the radio and television to promote information on different aspects of agriculture. For instance, the Farm and Home programme of the All India Radio (AIR) not only provides information about agriculture but also create awareness about the ways and means to improve the quality of farmer's lives (Sasidhar et al, 2008). The programmes are broadcasted daily in the morning, noon and evening. The AIR has stepped up its agricultural broadcasting activities with the launch of exclusive project "Mass Media Support to Agriculture Extension" with the title *Kisan Vani* for AIR from 15th February, 2004 in collaboration with Ministry of Agriculture (MoA) to inform local farmers the daily market rates, weather reports and day-to-day activities in their area at micro level. Presently, "Kisan Vani" is being broadcasted from 96 FM stations of AIR, days a week. While the phone-in-programmes such as "Ask the Expert" has made Radio more interactive, expansion of community radio stations in recent years has made this medium more locally relevant.

"Doordarshan," the government television channel, currently reaches 92 percent of the Indian population and it telecasts programmes on agriculture and rural development. The DD National programme also telecasts 30-minute agricultural programme, *Krishi Darshan*, in Hindi, six days a week. It covers various aspects of agriculture and related activities such as horticulture, animal husbandry, dairy and rural life. The narrow casting kendra's produce locally relevant programmes in local language and dialect and these 30-minute programmes are telecasted 5 days a week..

The MoA initiated the "Kisan Call Centre" (KCC) scheme in January 2004 to provide information to farmers seeking information on telephone, by the local agricultural specialists in their local language. Farmers could call the nation-wide toll free number of 1800-180-1551 and the calls are picked up in 25 KCCs located across the country by agricultural graduates at Level-I, with provision of escalation to Level II and Level III. Until July 2010, 49.32 lakh calls have been received from the farmers in the KCCs. (Chandragowda, 2010). Lack of adequate experience of fresh graduates at level I and difficulties in contacting concerned experts staff at level II and III (who are located elsewhere and are not often available to answer queries) is currently constraining the implementation of KCCs (Sulaiman et al 2011a).

3.2 Private and voluntary sector initiatives

Many of these extension initiatives in India emerged without any active state support. Quite often they emerged in response to deficiency in public extension service provision. These include the following:

- input agencies (dealing with seeds, fertilisers, pesticides, equipments),
- large agri-business firms (involved in manufacture and sale of inputs and purchase of farm produce)
- farmer organisations and producer co-operatives,
- non-governmental organisations (NGOs),
- media (print, radio and television) and web based knowledge providers ,
- financial agencies involved in rural credit delivery, and
- consultancy services

3.2.1 Input agency extension

About 2.82 lakh agro-input dealers are operating in rural areas covering all parts of the country. Though not equipped with adequate knowledge, dealers are one of the most important sources of information for farmers. This was also revealed through the NSSO (2005) assessment. The focus of this section however is more on the extension activities of manufacturers of these inputs.

Many agro-input companies perform some extension functions. This may also be viewed as one function of marketing and often it is the marketing officers who oversee the extension-related functions. Major categories of agro-input companies include, those dealing with seeds, fertilisers, pesticides and agro-machinery. A few of them also take up few demonstrations to publicize new products. Many of them sponsor farmer meetings or seminars organised by line departments such as DoA. These companies generally do not provide any extension support to individual growers or farmer groups as they employ only limited manpower in their target area.

Large seed companies have one marketing officer to take care of its products (linking with the dealers, create demand and match supply with demand) for a district or a group of districts and one or two marketing assistants to help them. The companies prefer graduates in agriculture for this job, but this is not an essential qualification. Pushing sales being their primary mandate, the marketing officers/assistants seldom deal directly with farmers. But in high value crops such as flowers, there are input firms, which provide total extension support to their growers. These include, advice from site selection to technological guidance throughout the growing period and advice on marketing. The cost of this service forms a part of the input cost. Nuziveedu Seeds, one of the largest seed company in India has been investing heavily in extension activities. Various farmer training programmes, known as ‘Subeej Krishi Vignan ‘ are organized by the company (Renganathan, 2010).

Unlike the case of seed companies, the extension activities of fertiliser companies are more visible and diverse, though it is difficult to fully differentiate market promotion and extension activity. Indian Farmers Fertiliser Co-operative Limited (IFFCO) and Krishak Bharati Co-operative (KRIBHCO), the two major fertiliser co-operatives in the country are actively involved in organising several extension activities. They conduct farmers meetings, organise crop seminars, arrange soil testing facilities and also implement village adoption programmes. Though the technical manpower available with them is limited, they arrange

several programmes in close collaboration with DoA and state agricultural universities. For farmer meetings, seminars, etc, the company arranges services of experts from line departments.

Tata Chemicals Limited, an agro-chemical company has initiated *Tata Kisan Kendras* (TTKs) in 1998 with the objective to provide the farmer with a package of inputs and services. This model was subsequently expanded as *Tata Kisan Sansars* (TKS) which is a network of nearly 600 farmer resource centres that caters to more than 3.5 million farmers in 22000 villages in the northern and eastern part of India. The centres are one-stop solution shops that provide farmers access to a wide range of agricultural inputs such as fertilizers, seeds, and pesticides along with agricultural services such as soil testing, crop advisory and foliar application services. The objective of the TKS network is to enable and empower the farmer in creating and generating more value for farm produce by providing information on new and improved agronomic practices and by facilitating better and more efficient use of agricultural inputs. TKS functions as a hub and spoke model. Each TKS centre is a franchised retail outlet and solution provider that caters to about 30-40 villages in the surrounding area. The centres are in turn serviced by about 30-odd resource centres (known as *Tata Krishi Vikas Kendras* or TKVK), with each resource centre looking after 17-18 TKS centres. There are more than 60 agronomists available at the hubs to provide advice on crops and farming issues. New services being explored include financial services and IT enabled market information.

DCM Shriram Consolidated Limited (DSCL) has established *Hariyali Kisan Bazaars* (HKB), a chain of agri-input retail stores to provide end-to-end support to farmers. Farmers can receive technical support from agronomists posted at these centres. The centers also provide a complete range of agri-inputs. HKBs provide access to banking and farm credit and access to markets through buy back opportunities. So far over 302 *Hariyali* outlets have been set up across eight states- Haryana, Punjab, Uttar Pradesh, Rajasthan, Chattisgarh, Madhya Pradesh, Maharashtra and Andhra Pradesh.

AGROCEL another agro-chemical company based in Gujarat provides all inputs and necessary technical guidance to farmers through its “*Agrocel Service Centres*” in Gujarat, Jammu and Kashmir, Maharashtra, Orissa, Haryana and Uttaranchal. In Gujarat, Agrocel is mainly working for organic cotton and groundnuts. Its other centres focus on basmati rice (Haryana), walnut (Jammu and Kashmir) and cashew nut (Maharashtra). It has recently entered in an ambitious project of organic cotton farming by educating farmers in cultivation of this high value cotton which has overwhelming demand in the global market.

3.2.2 Agri-business firms (aggregators, processors)

Major agri-business firms ITC and Pepsico during the last few years have initiated innovative arrangements to provide farmers with integrated production and marketing support.

Indian Tobacco Company (ITC) is a market leader in tobacco products, hotels, and packaging, and its International Business Division is one of India’s largest exporter of agricultural commodities. ITC’s extension effort revolves around *e-chaupals*, which are essentially village internet kiosks run by a local farmer (*sanchalak*), selected from the village and provided with short training. The company provides the infrastructure for the *e-choupal*, which enable access to information on weather, market prices and scientific farm practices. Producers could access information on cultivation practices, daily information on prices

prevailing in different markets and the price offered by ITC and detailed district-specific weather information through computers installed at the e-chaupal. It is a virtual market place where farmers can transact directly with the processor and can realize better value for their produce. The *sanchalak* has a transaction-based income. Farmers are free to use this facility and there is no fee or registration charge.

ITC has also established Choupal Saagars, comprising its collection and storage facilities and a unique rural hypermarket that offers multiple services under one roof. This landmark infrastructure, which has set new benchmarks for rural consumers also incorporates farmer facilitation centres with services such as sourcing, training, soil testing, health clinic, cafeteria, banking, investment services, fuel station etc. 24 'Choupal Saagars' have commenced operations in the states of Madhya Pradesh, Maharashtra and Uttar Pradesh. It's another major extension initiative is 'Choupal Pradarshan Khet' (CPK) or demonstration plots to help farmers enhance farm productivity by adopting best agricultural practices. Started in 2005-06, the crop portfolio includes soya, paddy, cotton, maize, bajra, wheat, gram, mustard, sunflower and potato.

PepsiCo was a pioneer in the concept of contract farming under which the company transfers agricultural best practices and technology and procures the produce at a guaranteed price. To support the initiative, PepsiCo set up a 27-acre research and demonstration farm in Punjab to conduct farm trials of new varieties of tomato, potato and other crops. The programme, which includes seed production, has successfully evaluated several varieties of basmati rice, chilli, corn, peanut and tomato. Additionally, the development of new tomato varieties has helped increase total annual production of tomato varieties from 28,000 tons to over 200,000 tons in Punjab. Yields have more than tripled from 16 tons to 54 tons per hectare. Under the programme, 6 high-quality, high-yielding potato varieties have also been introduced to Indian farmers. These new potato seeds have helped to increase farm income and enabled PepsiCo to procure world class chip-grade potatoes for its Frito Lay snacks division.

The company has partnered with more than 10,000 farmers working in over 10,000 acres across Punjab, U.P., Karnataka, Jharkhand West Bengal, Kashmir and Maharashtra for the supply of potatoes. PepsiCo India has also partnered with 1,200 farmers in Rajasthan to cultivate barley in a tie up with the United Breweries Group. PepsiCo India's technical team also implemented a high quality seed programme to deliver early generation and disease free seeds to farmers.

Heritage Foods India Limited, which operates fresh fruits and vegetable retail chain in South India engages a team of professionals in agriculture to manage its production, procurement and extension activities. In Andhra Pradesh, it has established a nursery cum demonstration farm near its pack house near Hyderabad. Technical support is provided by an experienced agronomist. Every month in the first week training classes for the technical staff are conducted by outside experts on production and plant protection aspects. The technical staff in turn trains the custom and registered farmers. Initially, village meetings are conducted and the services of the firm are explained. Interested farmers can register by filling an agreement form and such farmers would be provided a code and an identity card. Some of the custom farmers who are willing to invest on poly houses are encouraged to grow exotic vegetables such as yellow and red capsicum, broccoli, red cabbage, china cabbage, etc. These are procured by the company. However all organized retailers do not provide this kind of extension service. For instance in Vontimamdi, in Medak district of Andhra Pradesh, out of

the five organized retailers who procure vegetables from farmers, only ITC and Heritage provides extension support to farmers (Sulaiman et al, 2010a).

3.2.3 Farmer organisations and producer co-operatives

User groups, including farmer interest groups, farmer clubs, commodity groups, women farmer groups, special interest groups' etc play a very important role in extension. Government is also keen on promoting farmer organizations as it could create mechanism at the village level among farmer members to empower them for their own problem solving. However, there are only very few functional farmer organisations in India.

One of the oldest and most successful farmer organisations in India is the Grape Growers Association of Maharashtra (*Maharashtra Rajya Draksha Bagaitdar Sangh or MRDBS*). MRDBS provides a wide range of services to its member producers. It conducts group discussions and seminars at different locations for grape cultivators. It also published leaflets and booklets covering different aspects of grape cultivation. The association also has a full fledged independent R&D wing. The association had been instrumental in the creation of "Mahagrapes" a confederation of 16 grape grower societies in Maharashtra in 1991. The main objective of Mahagrapes is to boost the export of grapes for which facilities like pre-cooling and cold storages have been erected at each grape grower co-operative society. Due to the concerted efforts of Mahagrapes the brand of Maharashtra's Grapes is well established in the international market.

United Planters Association of Southern India (UPASI) the apex body of tea, coffee, rubber and cardamom growers in South India, has a long tradition in leadership, research and extension services in the plantation industry. It is engaged in research, statistical analysis, commodity affairs, industrial relations, taxation, finance, legal issues, publications and public relations and represents the growers' interest in national and international forums. It also organises, conferences, seminars, workshops and rural development programme. UPASI has established a tea research foundation and has seven advisory centres for transfer of technology. It also has a Krishi Vigyan Kendra (KVK) sponsored by ICAR.

Keeping in view the potential roles farmers groups can play in extension, the Department of Agriculture in various states started forming farmer groups. The group approach promoted in Kerala resulted in formation of commodity specific groups of farmers growing paddy, coconut and pepper. Some of these groups evolved later to take up a number of joint activities including extension. Promoting farmer self help groups (SHGs) is an important component of projects such as Kerala Horticultural Development Programme (KHDP), Uttar Pradesh Sodic Land Reclamation Project (UPSLRP) and Uttar Pradesh Diversified Agricultural Support Project (UPDASP).

The Kerala Horticulture Development Programme (KHDP) formed SHGs of vegetable and fruit growers to help promote new technology and participatory technology development (PTD) skills, help farmers access credit and strengthen their negotiating power through collective marketing. This programme later evolved into a company, the Vegetable and Fruit Promotion Council, Kerala (VFPC), with majority stake of farmers and has the Government and financial institutions as the other major shareholders.

Forming farmer interest groups and federating them at the block and district levels is considered as an important strategy of the ATMA (Agricultural Technology Management

Agency) extension approach implemented by the Government. The idea is to encourage farmer groups to organise different types of services for themselves, including input supply, credit, technical services and marketing arrangements-activities that would increase their productivity and incomes, while decreasing their dependence on government. However, only very few of the commodity groups formed so far by DoA remain active and functional. A few of them have even expanded the scope of their activities to take up active extension role in other crops and initiating new income generating activities. However these are exceptions, as many remain dysfunctional due to lack of efforts in sustaining these groups.

Groups, whether it is farmer groups or self help groups, cannot be formed overnight to meet over ambitious and strictly applied physical and financial targets. The groups need to be supported during the formation stage, strengthening stage and self-help stage. Groups also need continuous support to meet and deal with new challenges. DoA staff lack many of the crucial social science skills required for this task. DoA should either train its staff or should contract other organisations such as NGOs to help them in this task.

Producers' co-operatives are often formed to improve the marketing prospects in specific commodities where existing mechanisms are disadvantageous to producers. They provide farmers the advantage of economies of scale by bringing together produce from individual farms and marketing the same. Some of these organisations also provide extension services to farmers. These include: milk marketing federations in various states; rubber producers' societies (RPS) in Kerala; sugar co-operatives in Maharashtra; and vegetable and lac co-operatives in Bihar.

3.2.4 Non-Governmental (voluntary) organisations (NGOs)

Estimates of the number of NGOs active in rural development in India range from fewer than 10,000 to several hundred thousand depending on the type of classification used. Some 15,000-20,000 are actively engaged in rural development. India has a number of NGOs with varying levels of capacity, implementing a wide range of programmes. Wide variation in density of NGOs exists among states. Within states, certain districts have high density of NGOs, which overlap and compete for clients, while in other areas, there are hardly any NGOs active on the ground.

The eighties saw a spurt in the growth of rural development focused NGOs and several of them got actively involved in watershed development. In the nineties, several NGOs got involved in promotion of micro-credit through organising SHGs. NGOs receive funding from the Government, philanthropic and corporate bodies as well as international donors. Due to their effectiveness and flexible operational mechanisms, governments are increasingly finding partnering with NGOs attractive. Several Ministries of the Union Government have a separate provision to fund NGOs for specific activities. The Indian Council of Agricultural Research has supported several NGOs for establishing Krishi Vigyan Kendras (KVKs).

Bharatiya Agro-Industries Federation (BAIF), Professional Assistance for Development Action (PRADAN) and Action for Food Production (AFPRO), Foundation for Ecological Security (FES) are some of the important NGOs working in more than one state. BAIF works on livestock development, water resource management, environmental conservation and livelihood development and it operates in 16 states through 9 associate organizations. PRADAN promote livelihoods in a diverse range of sectoral activities, ranging from agriculture and natural resource management to rural microenterprises and it operates in 8

states currently. The Syngenta Foundation India (SFI) supports sustainable agricultural projects that would lead to long term productivity and income generation for farmers. It focuses on three areas, namely, increasing water conservation and usage, breeding varieties adapted to local situations and linking farmers with information. SFI partners with Syngenta Foundation for Sustainable Agriculture and also local NGOs (Ferroni and Yuan, 2011).

KRIBHCO, (Krishak Bharati Co-operative Limited), India's major fertilizer company in the co-operative sector, has initiated an NGO, the "Gramin Vikas Trust" (GVT), to promote rural development activities. GVT was established by KRIBHCO with the support from Govt. of India and Department for International Development (DFID), U.K. The mission of the GVT is to act as a catalyst to enable the rural communities to improve their livelihoods in the resource poor areas. GVT has a diverse portfolio of activities aimed at providing and enhancing the livelihood of communities in over 150 villages across eight states. GVT specializes in fields like natural resource management, watershed development, agriculture, livelihood improvement, institutional development, women empowerment, labour supports and micro enterprise development.

3.2.5 Media and Information Technology

The widespread availability and convergence of information and communication technologies (ICTs) – computers, digital networks, telecommunication, television etc in India in recent years have led to unprecedented capacity for dissemination of knowledge and information to the rural population. Some commonly used ICT applications or tools include: tele-centres, web portals, call centres, mobile phones, community radio, video, and digital photography, GIS, e-mail, audio and video conferencing.

In the nineties, private TV channels like E-TV started telecasting daily programmes on agriculture. E-TV currently telecast agricultural programmes in Telegu, Kannada and Marathi languages every day. Similarly most of the private regional TV channels telecast agricultural programmes atleast once a week. Newspapers (especially local language dailies) and farm magazines are important sources of information for farmers. Newspapers, especially those in local languages, provide at least one page every week for news and articles on different aspects of agriculture. Special farm magazines also reach a large number of farm households. India has one daily on agriculture, *Agrowon*, in Marathi published from Maharashtra. *Agrowon* has a circulation of 100,000 copies and the readership is estimated as 15,00,000. However there is a wide variation among states in this regard and there is a lot of potential for using print media in those states and districts where literacy levels are higher.

Several projects are now attempting to provide information to rural people through deployment of information and communication technologies (ICTs). The village knowledge centres initiated by the MS Swaminathan Research Foundation (MSSRF) in Pondichery aims at building a model for the use of ICTs in meeting the knowledge and information requirements of rural families by taking into account the socio-economic context and gender dimension. Creation and updating of relevant content to suit local needs is a key element of the programme. Similarly the *e-choupals* of ITC as discussed earlier, depends on internet based IT application to implement its extension and procurement strategies. A number of internet sites have come up in recent years to support agricultural development in India. For instance, websites like ikisan.com, krishivihar.com, agriwatch.com and commodityindia.com provide information to farmers on production and marketing of agricultural commodities.

Another emerging IT based personal agro-advisory system is “e-sagu” (“sagu” means cultivation in telugu language). It aims to improve farm productivity by delivering high quality personalized (farm-specific) agro-expert advice in a timely manner to each farm at the farmer’s door-steps without farmer asking a question. The advice is provided on a regular basis (typically once a week) from sowing to harvesting which reduces the cost of cultivation and increases the farm productivity as well as quality of agri-commodities. In e-sagu, the developments in IT such as database, internet, and digital photography are combined to improve the performance of agricultural extension services.

The recent study by ICRIER (Indian Council for Research on International Economic Relations) on socio-economic impact of mobile phones on Indian agriculture concluded that the mobile phones are contributing to agricultural productivity enhancements. The benefits emerge mainly from the characteristics of mobility, customized content delivery and convenience (Mittal et al, 2010). In India, IFFCO Kisan Sanchar Limited (IKSL), Reuters Market Light (RML) and Tata m-Krishi are the three successful examples of mobile information service for the farmers. Although the provision of price information over mobile phones has played an important role in reducing transaction costs in the value chain (De Silva and Ratnadiwakara, 2008), in order for small scale farmers to engage more effectively in agricultural markets other constraints such as access to credit and relevant infrastructure (from transport to storage) need to be met.

Community Radio (CR) is another innovation in use of media and it is a short range radio station that caters to the information needs of communities living in surrounding areas. Some of the ATMAs are also funding setting up of Community Radio Stations. For instance, in Maharashtra, ATMA funded setting up of Community Radio stations in two KVKs, one at Pune and the other at Ahmednagar. The success of community radio essentially depends on the extent of community control over the station and programming. For instance, of the 51 community radio stations in India, 43 are run by educational institutions and only 8 are managed by NGOs (Pandey, 2010). While NGO-managed community radio stations have been able to develop and broadcast a much more diverse portfolio of programmes, those managed by educational institutions are run on very rigid lines, with the content obviously influenced by the expertise in or objective of the educational institution.

The Digital Green, is an initiative that uses videos for agricultural development, The unique components of Digital Green are (1) a participatory process for content production, (2) a locally generated digital video database, (3) human-mediated instruction for dissemination and training, and (4) regimented sequencing to initiate a new community. Digital Green works with existing, people-based extension systems and aims to amplify their effectiveness. DG produces videos that are instructional in nature. A show normally involves small groups of 20-30 farmers who are willing to come to gather at a common site within a short distance from their homes. The mediators make the content active as they reiterate concepts between clips, ask questions to gauge comprehension and announce follow-up visits and subsequent screenings (Gandhi et al, 2009).

Sulaiman et al (2011b) noted that ICTs in general have not contributed effectively to the challenge of putting new knowledge into use as they are mostly used to support traditional communication tasks — such as information dissemination and training. The potential of ICTs remain under-utilised due to three reasons. (a) lack of appreciation of the new communication-intermediation tasks required for innovation, (b) underestimation of the roles of intermediaries and their capacities for innovation and (c) lack of networks needed for

communities to make use of the information provided through ICTs. ICTs are also not being used widely by rural women due to lack of access to complementary sources of support and services (Sulaiman et al 2011a).

3.2.6 Financial Institutions

Financial institutions lending to agricultural sector provide advice and consultancy to potential borrowers on financial viability of their proposals. All banks involved in agricultural lending organises farmer meetings and seminars every year. Banks also lend limited financial assistance to other organisations or state Department of Agriculture for organising agricultural seminars and farmer meetings. NABARD (The National Bank for Agricultural and Rural Development) has been supporting the establishment of farmer clubs. Farmers' Clubs are grassroot level informal forums of farmers. Such clubs are organised by rural branches of banks with the support and financial assistance of NABARD for the mutual benefit of the banks concerned and the village farming community/rural people. 54,805 Farmer Clubs exists in the country as on 31st March 2010. The broad objective of setting up Farmers' Clubs is to achieve prosperity for the farmers with overall agricultural development in its area of operation by facilitating credit counseling, technology counseling and market counseling. NABARD provides financial support to farmer clubs for an initial period of 3 years.

BASIX, a new generation financial institution established for the promotion of sustainable livelihoods, have successfully demonstrated the importance of an integrated provision of financial services and technical assistance for the rural poor. The Holding Company of the BASIX Group is called Bhartiya Samruddhi Investments and Consulting Services (BASICS) Ltd.) which started operations in 1996 as India's first "new generation livelihood promotion institution". BASIX intermediates extension services for farmers across eight crops (Cotton, groundnut, soybean, pulses, paddy, chilli, mushroom and vegetables) as well as dairy operations and rearing of goats and sheep. The agricultural livestock and enterprise development services are made available by 1000 livelihood service providers, who work like extension agents for 200-400 customers each (Glendenning et al 2010).

3.2.7 Consultancy

Farmers generally consult other relatively progressive farmers for information and advice related to production, post harvest management and marketing. Another major source of advice is the local input dealer. Some input firms such as AGROCEL and *Tata Kisan Kendras* provide free consultancy services. Emergence of paid extension services in agriculture is a relatively recent phenomenon. Many professionals after retirement from agricultural research organizations have been providing consultancy (free or paid) to farmers. Farmers often meet the travel expenditure or arrange a vehicle for the expert for field visits. In high value crops such as fruits and flowers, private consultancy services exist and they charge on an area basis during the season for which they make about 3-4 visits to advise the farmer on technical aspects. At present big farmers, farmers growing commercial crops like coffee, tea, spices, flowers, grapes, pomegranate etc and those having large poultry units and dairy farms are availing consultancy services. The payment is made mostly based on acreage, period and sometimes based on number of visits.

Para technicians (those without professional degrees but trained in specific skills) do provide services for a fee in the area of artificial insemination, grafting, etc and charge for the service.

Similarly para extension workers promoted by DoA in states such as UP, Rajasthan and Madhya Pradesh also provide limited extension services (message delivery and training) to fellow farmers in his/her village. One of the major constraints faced by farmers have been their inability to adjust the broad technological package (package of practices) to his/her specific field conditions. The field level staff of DoA neither have the time, incentive or needed expertise to provide this very crucial technical support. Studies have shown that farmers are willing to pay for such services, especially in the area of plant protection and training programs (Sulaiman and Sadamate, 2000).

In a study conducted among 720 farmers from three states of India, Sulaiman and Sadamate (2000) found that about 48% of farmers expressed willingness to pay for agricultural information. Farmers' willingness to pay has not been uniform across producers. Farmers having higher total area and higher area under non-food grains were more willing to pay for better quality agricultural information. The demand is more for quality extension services in the area of plant protection and training programs. One important condition for payment for advice is that it should be based on visit to his field. Farmers as a group are also willing to share the costs for bringing expert advice. The willingness to pay was more for services in non-foodgrain crops, especially, horticultural crops (fruits, vegetables, flowers and spices) and oilseeds.

Ahuja and Punjabi (2001) based on a survey covering 110 households in Gujarat have found that a large majority of farmers, even the small and marginal farmers, are willing to pay for extension services. Farmers were willing to pay an amount of Rs.250-300 per household per year for extension services. Some of the private entrepreneurs who have established agri-clinics have been charging an annual fee of Rs.150/ha/year for advice and regular visits to fields.

However, it should be borne in mind that pay-worthy services are generally absent in India. The challenge is therefore in creating quality services to meet the increasing demand. The government can facilitate emergence of quality services through creation of new units within the DoA (agri-clinics/agri-poly clinics etc) or through strategic placement of its funds with other extension providers (contracting to NGOs and private extension service providers) or through facilitation of the emergence of private extension service providers. The scheme of "agri-clinics and agri-business centres" emerged in response to this increasing realization.

3.3 Public-Private Partnerships

Public and private organizations quite often have different agendas, but yet they could come together for mutual gains. The term private in Public-private Partnerships (PPP) is often understood to stand for the "private corporate sector". But under PPP, private sector can include a broad range of organizations from corporate sector, private business entities, community based organizations, and voluntary organizations or NGOs. PPP is considered as an important strategy for agricultural development in India and research and extension organisations are currently mandated to initiate specific activities under PPP. PPP is going to be very crucial in the area of agri-processing and marketing and the same can be meaningfully extended to extension services as well (Pandey, 2010).

The concept of PPP in Agricultural Extension Management was first introduced in Hoshangabad district of Madhya Pradesh during 2001 where the Department of Agriculture, Government of Madhya Pradesh and Dhanuka Group joined together. The National Institute

of Agricultural Extension and Management (MANAGE) provided the conceptual framework and facilitated this PPP initiative. The Hoshangabad model has been identified as the first case of PPP in Agricultural Extension Management and shared on different platforms, which aimed at promotion of Public-Private Partnership in Extension. It provided several lessons on operationalising PPPs in agricultural extension (Chandrashekara, et al, 2006).

PPP is also an important strategy in the ATMA extension strategy. Many of the ATMAs have developed PPP especially in the area of linking farmers to markets. For instance, in Patna district of Bihar, Baidyanath Ayurveda Bhawan Ltd. Patna has entered in to agreement with growers to buy-back all the herbs/ medicinal supplied by the farmers if they are of good quality. (Singh and Swanson, 2005). They have also indicated the price at which they would be buying the products. For this ATMA, based on discussions with the company, contacted the farmer interest groups (FIGs) trained by it to go for the production of herbs like *Buch*, *Shatawar*, *Pippli*, *Sarpgandha*, *Safed Musli* etc. This experiment in market-led production has suited both the buyer and the producer and many farmer groups have joined similar initiatives.

However, many of these successful partnerships are more often an exception, rather the rule. Despite repeated emphasis on collaborative extension efforts involving public and private agencies, this approach is yet to get adequate attention. Some of the critical constraints related to establishment of successful PPPs include, bureaucratic hurdles, delays in decision making, hoarding of information/technologies, fear of operational compatibility, lack of a common platform to get into an operational MoU among partners, lack of initiatives and mission mode approach, unwillingness to share credit among partners and reluctance for investments from private players (Sadamate et al, 2008).

Suitable partnership among national and regional players involving commodity boards, research institutes, farmer organizations and business houses will certainly prove to be successful, provided such partnership arrangements are made on professional terms and conditions, centered around teams, free from conventional bureaucratic control with incorporation of inbuilt project planning, implementation and monitoring arrangements. Lack of a common platform to broker such alliances has also led to non-operationalisation of PPP in practice. Lack of an overarching policy framework that defines the role of the private sector in the agricultural sector at the macro level and lack of regulatory framework for certifying extension efforts of different agencies have also contributed to non-operationalising PPPs.

4 GENERIC ISSUES IN EXTENSION AND ADVISORY PROVISION IN INDIA

As discussed in detail in Section 3, India has a wide diversity of extension service providers representing the public, private and the voluntary sector. Most of them provide new information, knowledge and skills through trainings; visit to farmer groups; organizing demonstrations, farm schools and exhibitions; and disseminating information through different media and ICT tools such as mobiles. Farmers also visit research centres and extension units to access new information and knowledge and also go to other districts and states on exposure visit currently supported by ATMA.

But it is quite astonishing to note that the producers are not getting adequate support in addressing their expanding and complex challenges and many remain untouched from many of these initiatives. “Despite the variety of agricultural extension approaches that operate in

parallel and sometimes duplicate one another, the majority of farmers in India do not have access to any source of information” (Glendenning, et al 2010). Using the data from the National Sample Survey Organisation (NSSO, 2005), Adhiguru et al, (2009) reported that small farmers have less access to public extension compared to large farmers.

The huge yield gaps (between demonstration fields and farmer fields as well as huge variation in yields among farmers within the same block); the agrarian crisis or the rural distress being witnessed in several districts and the increasing migration from rural to urban areas in search of employment all points to the inability of extension services to address the knowledge and support needs of farmers. The NSSO 59th round farmer assessment also revealed that given an alternative option, nearly 40 per cent of farmers would likely to quit farming. The National Commission on Farmers (2006) observed that there is a general feeling among farmers of being ‘left behind’ in large parts of rural India. Though extension cannot on its own address any of these issues, it also hasn’t done enough in terms of responding or foreseeing some of these disturbing trends.

Though a lot of relevant knowledge on increasing productivity and income of farmers are currently available and extension seems to be disseminating many of these, it is becoming increasingly clear that farmers are not able to apply this new knowledge and getting benefited out of these. It appears that there is something fundamentally wrong with the way extension is practiced in the country? Some of the issues currently constraining extension in fully supporting farmers is discussed in detail below.

4.1 Continued focus on technology dissemination

Though the nature of agriculture has changed considerably over the past two decades and farmers need for support has widened extension agencies continue to focus their activities mainly on disseminating technologies. While promoting knowledge about new and old technologies would continue to remain important in the years to come, this alone is not enough for farmers to deal with the new challenges. Farmers need a wide range of support covering technical, organizational, marketing and entrepreneurial aspects and without such an integrated support, new knowledge can’t be applied in practice. Very few organizations such as the Vegetable and Fruit Promotion Council, Keralam (VFPCCK) have tried to provide this kind of integrated support, which is called as “Extension-Plus” in the literature (Sulaiman and Hall, 2004, Sulaiman, 2012). Though contract farming performed by agri-business companies do provide some kind of integrated support, they don’t focus on farmer organizational development. The importance of providing this integrated support to producers by extension has been articulated by the Working Group on Agricultural Extension for the XIIth Plan constituted by the Planning Commission.

Under ATMA, extension to some extent has started expanding its mandate. For instance, it extension has started organizing commodity interest groups. But again the focus remains mostly on provision of technical support. Many of these groups need marketing support and hand holding support to evolve as federations to access new markets and develop new market relationships. Marketing extension is talked about but is understood and implemented mostly as provision of output price information in various markets and this is highly inadequate to address the challenges in marketing.

Extension and advisory services alone won’t have all these expertise and skills, but it should partner with others who have these to provide integrated technical support to farmers.

Extension, especially the public sector, including the DoA, ATMA and the KVKs do not have adequate knowledge or personnel skilled in market development, value addition, value chain development, farmer organizational development etc. These kinds of support are neither sought by extension nor is it provided to extension by others. Extension is unable to broker relationships and working arrangements with others actors who can bring these kinds of complementary skills and expertise. Moreover, lack of an inventory of various extension providers in a district also constrain exploration of areas of collaboration.

Extension still operates in the Research-Extension-Farmer paradigm that restricts its linkages to only research and farmers. Extension needs to embrace systems frameworks such as innovation systems framework, which accommodates more number of actors, their interactions, role of institutions and learning to reinvent its future. This is especially so in dealing with the poor. Quite often, communities continue to remain poor due to weak, non-existent and exploitative relationships with actors who have access to new production inputs, services and knowledge. Farmers need a range of support that improves their capacity to access, adapt and use knowledge, inputs and services and extension should reinvent its role in the changing circumstances.

India has a Policy Framework on Agricultural Extension (DAC, 2000) which was developed by the Department of Agriculture and Co-operation (Ministry of Agriculture) a decade back. The nature of agriculture as well as extension evolved considerably during the last few years and perhaps this is the right time to revisit the previous policy framework. India needs a well articulated policy on extension and advisory service provision articulating the broadened mandate of extension and the role of partnership in achieving this broadened mandate. While a generic policy framework at the national level is desirable, having a policy framework and operational guidelines on implementing extension policy at the state level would be the best way forward in reforming extension.

4.2 Inadequate technical support for extension

Even after more than three decades of improving extension's links with research, extension doesn't receive the needed technical support from research. Though the country has 20825 agricultural scientists (Jha and Kumar, 2006) within its public sector, (mostly spread over 97 ICAR institutes, 46 state agricultural universities; five deemed universities, one Central Agricultural University), it hasn't been able to support extension to the desired extent. Research extension linkages has often been perceived and implemented as organizing formal interface meetings of the district level officials. While such meetings are important, increasing the number of such meetings or workshops with research is not the solution to this problem. What is important is the nature and quality of the relationship which has to be reflected in more joint activities.

While extension needs expertise and interactions of a problem solving nature, what research often provides is broad or generic technical recommendations. There is huge variation in the natural resource base, farming systems and socio-economic conditions of farmers in rainfed regions and broad technological recommendations make vary little sense in these kinds of situations. Adequate focus has to be given on effective technology selection, optimization, application and management. In 2003, more than one half of ICAR researchers were engaged in crop research and SAUs researchers spent a considerably higher portion of their research time on crops research (70 percent) [Beintema et al, 2008]. Moreover less number of

researchers were working on livestock (15.8 percent) and fisheries (2.5 percent) [Jha and Kumar, 2006].

While KVKs being district level organization with much better grasp of ground situation, can better support extension with aspects related to technology backstopping, integration and management, KVKs are not formally mandated to do this and instead they concentrate more on organizing its own training programmes. Each KVK has a provision for one programme co-ordinator, 6 subject matter specialists and 3 programme assistants. Currently more than 4500 technically qualified staff that can potentially provide technical support to field extension is available with the KVKs. Though joint guidelines recently issued by the Director General, ICAR(Secretary, DARE) and the Secretary (Agriculture), emphasizes much stronger support by research to extension at different levels, its implementation is uneven.

Lack of interest to support extension arises mainly from the lack of recognition of this important task in the personal evaluation of scientists. KVKs are funded separately by ICAR and their contributions are evaluated based on the number of on-farm trials, front-line demonstrations and trainings conducted by them. Many KVKs don't have the mandated number of staff, adequate training facilities and operational funds. Lack of adequate number of scientists in the research centers, especially in the regional stations and lack of adequate operational funds [with both research and extension] to support regular and need based field level experimentations and interactions further constrain provision of technical support for extension.

4.3 Limited human and financial resources

The capacity of the public sector extension has considerably weakened over the past few years, with limited operational funding and large number of vacancies which remained unfilled. Estimating the total number of personnel involved in extension in India has been problematic due to several reasons. Firstly, there is no common classification about who is involved in extension. Most of the so called extension staff do multiple roles and in some cases do more of non-extension functions related to scheme implementation and administration. Some estimates talk about the number of staff trained in agriculture (degree/diploma) within the state DoA as the number of extension staff where as other estimates talk about similar manpower available in allied departments such as Horticulture, Soil Conservation etc. Secondly there is no official estimate on the number of staff involved in extension and advisory services in the private and NGO sector.

Tiwari (2008) reported that “about 22 percent of the posts across agriculture and allied departments remained vacant in 2005-06. Out of the 144,861 sanctioned posts, only 112325 positions remain filled” Recent estimate by Chandragowda (2011) collected from 27 states indicate that 36% of the posts are vacant in the DoA. Out of the 143863 positions in DoA, 52575 posts are vacant. Only 91288 posts are filled”. Both estimates clearly reveal that the number of personnel available for extension in the public sector is on a decline.

As part of the revised ATMA guideline (DAC, 2010), specific assistance is provided for recruiting manpower for ATMA. While at the district level, the PD, ATMA and the Deputy DP, ATMA are recruited by way of deputation from the line departments (mainly DoA), the block level positions such as Block Technology Manager (BTM) and Subject Matter Specialists (SMS) are recruited on contract. This would add to the available manpower for extension, but these revised guidelines are yet to be adopted fully in all the states.

It appears that the two SMS appointed on contract in each block through ATMA is going to be the frontline staff for public extension as other staff of DoA and other line departments (Horticulture, Animal Husbandry, Fisheries et) are all engaged in implementation of different schemes. The Working Group on Agricultural Extension for the XIIth Plan constituted by the Planning Commission has recommended doubling of the SMS positions (to 4 SMS per block). However, the poor salary for the contract staff at the block level currently discourages potential applicants and without increase in salaries, many who have joined now in these positions currently would leave when they get better paying jobs. This is already happening and in several districts agricultural graduates are not coming forward to work as SMS under the very poor salary (Rs.5000/- as salary+Rs.3500/-to cover operational expenses per month).

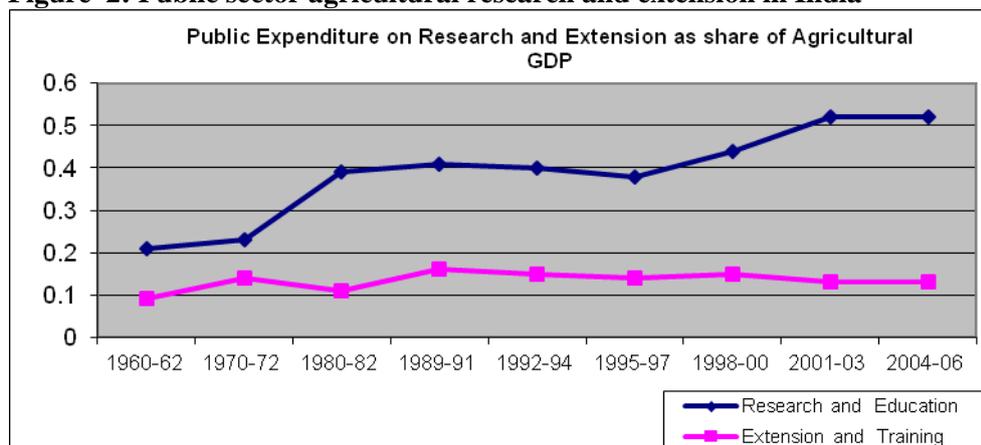
These salaries have to be increased if public extension is going to depend on SMS to deliver services in the field. Their capacity to provide customized solutions to farmers based on local needs also needs considerable strengthening. Though ATMA recently introduced the idea of farmer friend (a progressive farmer who is high school/senior secondary qualified to help ATMA in village-based, bottom-up planning process and to serve as vital link, between extension systems and farmers at village level), a clear assessment on its impact could be made only later (say after 2 years or so).

The Working Group on Agricultural Extension further argues “that even with this proposed doubling each SMS still be having more than 6200 cultivators or about 10-11 panchayats and therefore the state governments must ensure that at least 30% of the existing manpower available with the states should work exclusively for providing extension. Besides this the system should use Agri-preneurs trained under the ACABC schemes and the input dealers trained under DAESI, to make sure that there is at least one extension personnel for about 1200 cultivators” (WGAE, 2011). However manpower planning for extension personnel in a country like India which is vast and diverse, based on a generic ratio is not much relevant now. One should ideally exploit the advances in ICTs, the availability of farmer groups and other extension providers and the specific challenges in each district and block to decide on the quality, capability and placement of human resources.

The number and diversity of private extension service providers have increased during the last two decades. These include NGOs, producer associations, input agencies, media and agri-business companies. There is no inventory on these different extension providers even at the district level where this data (including the geographical or programme focus, human resources, technical capacity, investments for extension, etc) could have been valuable for initiating interactions. Many of these private and NGO extension providers do provide better and improved services to farmers, but their effective reach is limited and many of the distant and remote areas are neither served adequately by the public or the private sector (Sulaiman, 2003).

Coming to financial support for extension, a study by Balakrishnan et al, (2008) revealed that the public expenditure on extension and training as a share of agricultural GDP has been remaining stagnant from 1989 to 2006. It is interesting to note that this stagnation happened during the same period, where the public expenditure on research and education has been increasing (Figure 2).

Figure 2: Public sector agricultural research and extension in India



Source: Using data from Balakrishnan et al (2008)

However several initiatives were taken during the XIth Plan (2007-2012) by the Planning Commission and the Ministry of Agriculture to strengthen extension provision. While expansion and strengthening of ATMA brought additional funds for extension at the district and block level and strengthening manpower for extension training at the state level training centre (SAMETIs), the additional central assistance for agriculture through the RKVY (Rashtriya Krishi Vikas Yojana) brought additional funds for agricultural development at the district level. However, these resources were not optimally utilized due to pressure on scheme implementation and lack of separate staff to perform extension activities. Though exclusive professional support for field implementation is provided at the block level (one BTM and 2 SMSs) through ATMA (since early 2011), the funding available for block level farmer oriented activities is only about only 10 lakhs. When considering the number of villages (100-300) in each block and the number of farmers (> 10,000), this budget is very limited. If ATMA need to have a wider impact at the ground level, funding for ATMA needs to be substantially increased.

4.4 Poor capacity to respond to changes and manage partnerships

Though there is an increasing realization on broadening the mandate of extension, insights on how to do this is limited. This should ideally come from evaluation of innovative extension arrangements and organizing and learning from action research projects. Extension needs research support in several areas to improve its functioning. These include: district level planning, manpower planning and human resource management, ICT enabled extension, marketing extension, public-private partnerships, evaluation of promising approaches/models, monitoring and learning and impact assessment.

However there is no organized research on extension in India. Though ICAR has about 200 extension scientists in its rolls, they are mostly involved in promoting technologies developed by the respective research centres, where they are employed. In SAUs, the extension faculty engages mainly in teaching. The extension research that comes out the universities is mostly from the MSc/PhD thesis work. These studies are mostly micro level investigations with little or no policy relevant findings. The National Institute of Agricultural Extension Management (MANAGE) under the Ministry of Agriculture, though mandated to do national level studies on agricultural extension, hasn't been able to fill this gap and its activities are more focused

around training and provision of technical support on extension activities to the Central Ministry of Agriculture. Similar situation exists in the case of SAMETIs [state level extension management and training centres] established at the state level.

“If organizations do not reflect critically on their mission, services, products, cultures and procedures, etc on a regular basis, they may well become dysfunctional and go bankrupt or be abolished” (Leeuwis and van den Ban, 2004). Many extension organizations do not have a culture of learning. Creating a platform to share, success, mistakes and failures and reflect upon them is essential. They should also be a “space” to experiment with new approaches and design appropriate interventions relevant to the local circumstances.

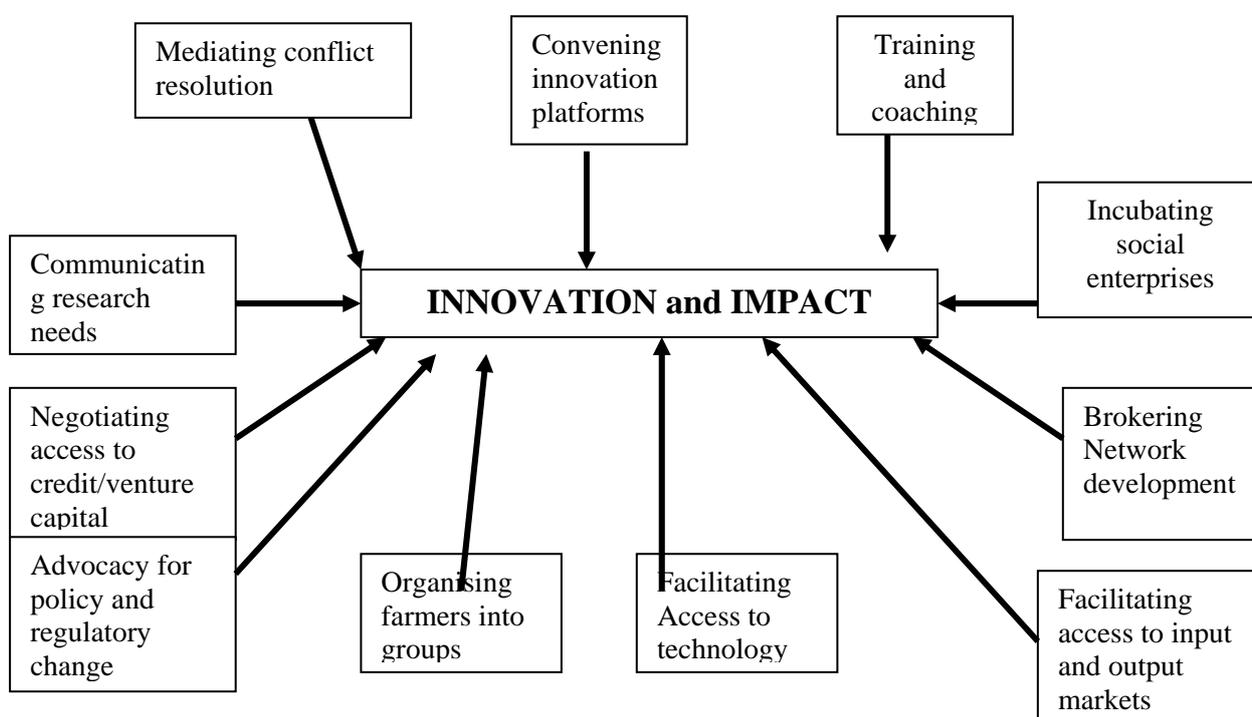
The goal of extension should move from technology dissemination to promoting innovation. This would mean that extension performs a wider range of roles. This include, leading the innovation agenda; organize producers and rural poor and build their capacities; building coalition of different stakeholders; promote information flow; experiment with and learn from new approaches, and act as a “bridging organisation” that access knowledge, skills and services from a wide range of organizations. Performing these wider roles is important for extension to reinvent its future and to be relevant to the evolving rural context.

Extension needs a wider range of skills to address the increasingly complex rural innovation agenda. Partnering with other actors with these skills and expertise is the only way forward. Partnerships have been generally weak in the public sector extension. Partnership is a skill that could be perfected only through practice and therefore it has to consciously interact more closely with other actors to perfect the art of partnering. An enabling policy framework and facilitation support at different levels are required to make partnerships a rule within extension, rather than an exception as practiced currently.

If extension has to respond better to deal with the emerging challenges, it should move from technology management to innovation management (Fig 3) which involves a wide range of functions, activities and tools that are critical for enabling innovation (Sulaiman et al, 2010b). There is a large body of evidence that clearly shows that knowledge application actually takes place only when complementary set of knowledge and services are out together. While facilitating access to technology is important, it is only one of a range of innovation management tasks. Moreover several of these functions have to be deployed together to enable innovation. Building capacities for innovation management in extension and advisory services to a large extent would allow extension and advisory services to better respond to this changing environment.

To build this capacity, three aspects need to be considered. Firstly, the focus of capacity building should shift from strengthening technical expertise to developing innovation management expertise. Capacity building within the context of extension is quite often understood as enhancing technical capacity of extension personnel to better deal with current and emerging technological bottlenecks in the field. And this is often achieved through trainings and demonstrations on new technologies and training in communication skills. As technology dissemination is only one of the elements of the innovation management, the focus of building capacity within extension and advisory services should move toward building the capacity in other functions and activities that are critical for applying new knowledge.

Figure 3: Innovation Management tasks



Source: Sulaiman et al, (2010b)

Secondly, skills and expertise in some of these aspects can only be learnt by actually doing it on the ground and therefore the approach to building capacity has to be designed in an action research mode, involving experimentation, reflection and learning. Developing new platforms for interaction by various actors (eg: stakeholder dialogues) and promoting joint interventions by coalitions of different actors are two important means of developing this capacity. Thirdly, extension and advisory services needs to be staffed with those having expertise on some of these tasks. While partnering with other organizations to access varied skills and expertise would continue to remain important, extension should have a core group of specialists with some of this expertise to technically backstop extension personnel.

5. CONCLUSIONS

Agricultural Extension faces challenging times in India. Though there is greater attention at the Central Government level on enhancing funding and promoting reforms in extension, a corresponding interest to invest more resources or experiment new models is not witnessed in many states. Extension reforms depend fully on the central assistance which is somewhat worrying. Though the private and the NGO sector are increasing their field presence and broadening their support to farmers, these are not that wide spread across different regions/districts or blocks.

Considering many of the challenges in improving extension in India, the Working Group on Agricultural Extension constituted by the Planning Commission for the XIIth Plan (2012-17) has overwhelmingly supported the idea of a National Mission on Agricultural Extension, with substantial increase in resources (Box 2). It remains to be seen whether the Government

would agree to this proposed national mission for reviving Indian extension system during the XIIth Plan period.

Box 2: National Mission on Agricultural Extension (Proposed)

The proposed National Mission on Agricultural Extension (NMAE) envisages restructuring and strengthening of agricultural extension services through a judicious mix of extensive physical outreach of personnel, enhancement in quality through domain experts, regular capacity building, interactive methods of information dissemination, public private partnerships and pervasive and innovative use of ICTs/mass media. It has identified 12 mini-missions or themes to address the different challenges. These are as follows:

1. Technology Solutions and Innovations
2. Extension Policy and Systems
3. Convergence, Programme Delivery, Governance and Innovations
4. Manpower Planning, HRD and Accreditation
5. Leveraging ICT, Mass Media and e-Governance
6. Partnerships for Agri-preneurship and Business Development
7. National and International Linkages and Partnerships
8. Mobilisation for Farmers Empowerment
9. Women Empowerment, Household Food and Nutritional Security
10. Leveraging Youth for Agriculture
11. Extension strategies for Difficult Area, Dis-advantaged Farmers and Farm Workers
12. Agrarian distress, conflicts and farm studies

While the on-going extension schemes will be strengthened appropriately. it would be implemented as components of NMAE.

Source: WGAE (2011) Recommendations of the Working Group on Agricultural Extension for Agriculture and Allied Sectors for the 12th Plan (Draft)

Some of the potential ways forward for strengthening extension and advisory provision in India could be summarized under the following four points.

1. Support pluralism and partnerships: Considering the poor reach of extension currently and the limited investments in extension, India needs more public, private and NGO extension and better co-ordination among them. Some of the public funding should be used to expand pluralistic extension arrangements by way of contracting and developing joint programmes. The public extension should take a lead in connecting these different extension providers and enabling effective communication that can foster partnerships. Identifying potential partners and developing working relationships among the different agencies should be the main task of extension managers at the district level. In the case of ATMA, this should be the role of the Project Director, ATMA and he/she should be made accountable to this task. Development of extension policies and operational guidelines to promote pluralism and partnerships at the state level would go a long way in reforming extension and enable public-private partnerships (PPPs).

2. Enhanced funding, convergence and co-ordination: Extension needs more resources from public (central as well as state) and private sector. It also needs funding support from NGOs and producers and producer groups. ATMA is emerging as a platform for bringing convergence among different programmes, co-ordination among different actors and funding support by different agencies. If atleast 10% of the

resources under different schemes are spent on extension through ATMA, this would go a long way in enhancing extension support and ensuring sustainability of ATMA in the long run. ATMA and the private sector should come together to design specific extension interventions in a project mode to provide integrated technical support to producers. There is a need to develop an overarching policy framework that defines the role of the private sector in the agricultural sector at the macro level.

3. Research support to better address the needs of small farmers: Finding better ways of reaching the small & marginal farmers and tenant farmers especially those in the rainfed and difficult regions and providing them with integrated technical support would continue to remain as a major challenge for extension. Extension needs much stronger research support to develop and promote context specific, disaggregated technological solutions in these regions having huge variation in natural resource base, farming systems and socio-economic conditions (WGAE, 2011). More number of meetings and interactions among research and extension personnel alone are not going to address this problem. Regional research stations (ICAR and SAUs) and the KVKs should take a lead in providing research support to extension by way of more decentralized adaptive research and trainings. Farmers' knowledge and practices also needs to be integrated while designing appropriate technological solutions. Reforms should also focus on addressing the issues that currently constrain provision of this research support (discussed in detail under section 4.2).

4. Support for change management: To remain relevant and to deal with the contemporary changes in agriculture and the wider support needs of farmers (organisational, marketing, technological, financial and entrepreneurial) extension has to broaden its mandate and should have a much wider range of expertise. The debate should move beyond technology dissemination and research-extension linkages to ways of promoting innovation and enhancing capacity for innovation. Extension needs professional support, for embracing new frameworks and approaches such as innovation systems and innovation management. It needs professional assistance to experiment and evaluate new policies and extension delivery models appropriate to each state, district or block.

It should have to develop a Human Resource Management Plan at the state level to figure out capacity gaps, bringing new expertise and enhancing capacities of existing human resources. The potential of ICTs also needs to be exploited to enhance coverage and effectiveness. Extension needs new manuals and guidelines on operationalising many of these new approaches. A new culture focusing on experimentation, learning and change needs to be inculcated in extension organizations so that it continues to modify, improve or fine tune its approaches and strategies based on continuous learning. Perhaps introducing this learning-derived institutional change is going to be the most difficult aspect of the change management process.

REFERENCES

ACABC, (2012) Progress of Agri-clinics and Agri-Business Centres Scheme
www.agriclinics.net

Adhiguru, P., Birthal, P.S., and Ganesh Kumar, B. (2009) Strengthening Pluralistic Agricultural Information Delivery Systems in India. *Agricultural Economics Research Review*, 22, pp. 71-79.

AFC (2010) Report on evaluation and impact assessment of the centrally sponsored scheme “Support to State Extension Programs for Extension Reforms” (ATMA) in Uttar Pradesh and Haryana”, Submitted to the Department of Agriculture and Cooperation, Ministry of Agriculture, Government of India. May 2010, .Agricultural Finance Corporation Limited.

Ahuja, V and Meeta Punjabi (2001). In search of a new paradigm for agricultural extension In India, CMA Monograph Series No 195, Centre for Management in Agriculture, Indian Institute of Management, Ahmedabad. Chandrashekara, et al, 2006)

Babu, Suresh Chandra, Joshi, P.K, Claire, J Glendenning, Kwadwo Asenso-Okyere, Rasheed Sulaiman V (2012) The state of Agricultural Extension Reforms in India: Policy Options and Investment Priorities, Draft, January 2012

Balakrishnan , Pulapre, Golait, Ramesh and Kumar Pankaj (2008), Agricultural Growth in India since 1991, Development Research Group (DRG), Study No.27, Reserve Bank of India: Mumbai.

Beintema, N, P Adhiguru, Pratap S Birthal and A. K Bawa (2008) Public Agricultural Research Investments: India in a Global Context, *NCAP Policy Brief 27*, National Centre for Agricultural Economics and Policy Research, New Delhi

Chander, M., Dutt, T., Ravikumar, R.K and Subrahmanyeswari, B (2010) Livestock technology transfer services in India: A review, *Indian Journal of Animal Sciences* 80 (11) pp 59-69.

Chandragowda, M.J (2010), Policy Framework for Reorienting Agricultural Extension System in India, Paper presented in the NAARM-IFPRI Workshop on Redesigning Agricultural Extension in India: Challenges and Opportunities”, August 20-21, 2010.

Chandragowda, M.J (2011) Extension Planning and Management in Agriculture and Allied Sector, Presentation to the Third meeting of the Sub-Group on Extension Planning and Management constituted by the Planning Commission, New Delhi, July 16, 2011

Chandra Shekara, P, N. Balasubramani and A.S. Charyulu (2006). Public-Private Partnership in Agricultural Extension Management: A case study of Hoshangabad model in Madhya Pradesh”, *MANAGE Extension Research Review*, Volume VII, No.1, 2006

DAC (2000) Policy Framework for Agricultural Extension, Department of Agriculture and Co-operation, Ministry of Agriculture, Government of India

DAC (2010), Guidelines for Modified Support to State Extension Programmes for Extension Reforms” Scheme, 2010, available at http://vistar.nic.in/projects/revised_ATMA_Guidelines.pdf

De Silva, H. and Ratnadiwakara, D. (2008), Using ICT to reduce transaction costs in agriculture through better communication: A case study from Sri Lanka, Lirneasia Report, available at <http://www.lirneasia.net/wp-content/uploads/2008/11/transactioncosts.pdf>.

Ferroni Marco and Yuan,Zhou (2011) Review of Agricultural Extension in India, Background paper to supplement the main report of the study “Prospects of Indian Agriculture and Rural Poverty Reduction” June 2011.

Gandhi Rikin , Veeraraghavan.R, Toyama and Vanaja Ramprasad (2009), *Digital Green:Participatory Video and Mediated Instruction for Agricultural Extension*, Annenberg School for Communication, Published under Creative Commons Attribution, Volume 5, Number 1, Spring 2009, 1-15. Available at <http://itidjournal.org/itid/article/viewFile/322/145>

GFRAS (2010), Five Key Areas for Mobilising the Potential of Rural Advisory Services, Policy Brief No1, available at http://www.g-fras.org/fileadmin/UserFiles/GFRAS-documents/GFRAS-Brief_Key-areas-for_Mobilizing-potential-of-RAS_web.pdf.

Glendenning, C, Suresh Babu and Kwadwo A Okyere (2010), Review of Agricultural Extension in India- Are farmers’ Information Needs being met?, IFPRI Discussion Paper 01048, December 2010, available at <http://www.ifpri.org/sites/default/files/publications/ifpridp01048.pdf>

Glendenning, C., Suresh Babu and Kwado A Okyere (2011) Evaluation of Value-Added Agricultural Advisory Services-Case Study of Agriclincs in Southern India, IFPRI Discussion Paper 01125, September 2011, available at www.ifpri.org/sites/default/files/publications/ifpridp01125.pdf

Global Agri-Systems. (2008). *Agriclincs and agribusiness centre evaluation study*, Global AgriSystems, New Delhi.

Government of India (2008) National Action Plan on Climate Change, Government of India, June 2008

Government of India (2011), State of the Economy and Prospects Economic Survey, available at <http://exim.indiamart.com/economic-survey10-11/pdfs/echap-01.pdf>

Hall, A.J., B Yoganand, Rasheed Sulaiman V., Raina, R, Prasad, S, Niak, G and N.G Clark. (Eds) 2004. Innovations in Innovation: reflections on partnership and learning. ICRIASAT, Patancheru, India and NCAP New Delhi, India 238 pp

Hall, A. (2009). Embedding Research in Society: Development Assistance Options for Supporting Agricultural Innovation in a Global Knowledge Economy”. *International Journal of Technology Management and Sustainable Development*. Vol 8, Issue 3, pp. 221-236.

Jha, D and S. Kumar. (2006). Research resource allocation in Indian agriculture, Policy Paper 23. New Delhi: National Centre for Agricultural Economics and Policy Research

Karjagi, R. H. S. S. Khan, H. S. Vijaykumar, and L. B. Kunnal. (2009). Problems of trained agripreneurs under the scheme of agriclincs and agribusiness centers in starting and running their agriventures: A study in south India. *Karnataka Journal of Agricultural Science* 22(1): 233–234

Klerkx, L. and Leeuwis, C. 2008. Matching Demand and Supply in the Agricultural Knowledge Infrastructure: Experience with Innovation Intermediaries, *Food Policy*, 33 [3], 260-276.

Klerkx, L., & Leeuwis, C. 2009. Establishment and embedding of innovation brokers at different innovation system levels: Insights from the Dutch agricultural sector. *Technological Forecasting and Social Change*, 76 (6) 849- 860

Leeuwis, C., and Van den Ban, A. W., eds (2004), Communication for Rural Innovation: Rethinking Agricultural Extension, Blackwell, London, abstract available at <http://as.wiley.com/WileyCDA/WileyTitle/productCd-063205249X.html>

Leeuwis, C. (With contributions by Van den Ban, A. W.) (2004), *Communication for Rural Innovation: Rethinking Agricultural Extension*, Blackwell Science/ CTA Oxford/ Wageningen, 412 pp.

Leeuwis, C. and Hall, A. (2010). Facing the Challenges of Climate Change and Food Security: The Role of Research, Extension and Communication Institutions. Report Commissioned by the Research and Extension Branch of the United Nations Food and Agriculture Organization, October 2010, FAO: Rome. <http://edepot.wur.nl/176533>

MANAGE, (2012) Progress under Diploma in Agricultural Extension Services for Input Dealers as on 01-04-2011, www.manage.gov.in/daesi/daesi-distyearwiselist.pdf

Mittal, S., Gandhi, S. & Tripathi, G. (2010). Socio-Economic Impact of Mobile Phones on Indian Agriculture, ICRIER Working Paper No. 246. Available at <http://www.icrier.org/pdf/WorkingPaper246.pdf>

National Commission on Farmers (2006), report available at <http://agricoop.nic.in/NCF/NCF%20Report%20-%203.pdf>

NSSO (2005), Situation Assessment survey of farmers: Access to modern technology for farming, National Sample Survey, 59th round (January- December 2003). Report 499(59/33/2). New Delhi: Government of India, Ministry of Statistics and Programme Implementation

Pal, Suresh and Dayanatha Jha (2007). Public-private partnerships in Agricultural R&D: Challenges and Prospects, In Visawa Ballabh (ed.) *Institutional Alternatives and Governance of Agriculture*, Academic Foundation, New Delhi.

Pandey, T. (2010), Convergence Model of Public Private Partnership in Agricultural Extension, Paper presented in the NAARM-IFPRI Workshop on Redesigning Agricultural Extension in India: Challenges and Opportunities”, August 20-21, 2010.

Planning Commission (2011), Draft on Faster, Sustainable and More Inclusive Growth – An approach to Twelfth Five Year Pla”, available at http://planningcommission.nic.in/plans/planrel/12appdrft/approach_12plan.pdf

Sulaiman, R.V and A.W van den Ban (2003) Funding and Delivering Agricultural Extension, *Journal of International Agricultural and Extension Education*, Vol 10, No 1 Spring 2003, pp21-29.

Sulaiman, R.V and Andy Hall (2008) The fallacy of universal solutions in extension: Is ATMA the new T&V, LINK News Bulletin, September 2008, Learning Innovation Knowledge (LINK) (www.innovationstudies.org)

Renganathan, S (2010) Agri-Business Extension: Experiences of Niziveedu Seeds, Paper presented in the NAARM-IFPRI Workshop on Redesigning Agricultural Extension in India: Challenges and Opportunities”, August 20-21, 2010

Rivera, W. R and Sulaiman, R.V (2009) Extension: object of reform, engine for innovation, *Outlook on Agriculture*, Vol 38 (No 3) pp 267-273

Rogers, E.M. (1962). *Diffusion of Innovations*. New York: The Free Press of Glencoe

Röling, N., and Wagemakers, A., eds (1998), *Facilitating Sustainable Agriculture: Participatory Learning and Adaptive Management in Times of Environmental Uncertainty*, Cambridge University Press, Cambridge, pp 153–170.

Sadamate, V.V, Rasheed Sulaiman V, Venkatasubramanian, G.R Desai and M.N Reddy, (2008), Technical Paper on Technology Transfer and Extension: Issues and Recommendations, Second Green Revolution Summit and Expo, 24-26 September, Kolkatta

Sasidhar, P.V.K, Murari Suvedi, Vijayaraghavan and Baldeo Singh (2008), “*Evaluation of Backyard Poultry on All India Radio*”, available on line at https://www.msu.edu/~suvedi/Resources/newdocuments/Evaluation_of_farm_school_paper_edited.pdf

Singh, Sukhpal (2005). Contract Farming for Agricultural Development: Review of Theory and Practice with special reference to India, Centre for Trade and Development, New Delhi.

Singh,K.M.and Swanson,B.E. (2005). “Development of Supply Chains for Medicinal Plants: A Case Study Involving the Production of Vinca Rosa by Small Farmers in the Patna District of Bihar India”. Paper presented in 2005-Post IAMA Workshop: Building New Partnerships in Global Food Chains-Experiences from North Africa, the Near East and Asia. June 29-30, 2005, Alerton Crowne Plaza Hotel, Chicago, IL

Singh K.M., Swanson B.E., (2006), Developing Market Driven Extension System in India. 627-637 p. 22nd AIAEE Annual Conference, International Teamwork in Agricultural and Extension Education”, May 14-19, 2006, Clearwater Beach, Florida.

Sulaiman, V.R. & Sadamate, V.V. (2000). Privatizing agricultural extension in India, Policy Paper 10, New Delhi: National Centre for Agricultural Economics and Policy Research.

Sulaiman, V. R. (2003). Agricultural Extension- Involvement of Private Sector, Occasional Paper-29, National Bank for Agriculture and Rural Development, Mumbai,

Sulaiman R.V and Hall, A.J (2004) Extension Plus: Opportunities and Challenges, *NCAP Policy Brief* 17, National Centre for Agricultural Economics and Policy Research, New Delhi

Sulaiman R.V and Hall, A.J (2008) The Fallacy of Universal Solutions in Extension: Is ATMA the new T&V, *LINK News*, September 2008, Learning Innovation and Knowledge (www.innovationstudies.org)

Sulaiman V R, Kalaivani N J and Jatinder Handoo (2010a), Organised Retailing of Fresh Fruits and Vegetables: Is it Really Helping Producers? CRISP Working Paper 2010-001, available at <http://www.crispindia.org/docs/CRISP%20Working%20Paper-Organised%20retailing%20in%20fruits%20and%20vegetables.pdf>

Sulaiman, Rasheed V., Andy Hall, Vamsidhar Reddy, T.S. and Kumuda Dorai (2010b) Studying Rural Innovation Management: A Framework and Early Findings from RIU in South Asia. RIU Discussion Paper Series #2010-11, December 2010, Research Into Use (RIU): UK., available at http://www.crispindia.org/docs/Rasheed-Discussion_Paper-Rural_Innovation_Management.pdf

Sulaiman VR, Kalaivani NJ, Nimisha Mittal and Ramasundaram P (2011a), ICTs and Empowerment of Indian Rural Women What can we learn from on-going initiatives?, CRISP Working Paper 2011-001, available at <http://www.crispindia.org/docs/CRISP%20Working%20Paper-ICTs%20and%20Empowerment%20of%20Women.pdf>

Sulaiman V R, Hall A, Kalaivani NJ, Kumuda Dorai and Reddy T S V (2011b), Necessary but not sufficient: Information and communication technology and its role in putting research into use. RIU Discussion Paper 16, June 2011, available at <http://www.researchintouse.com/resources/riu11discuss16info-comms.pdf>

Sulaiman, R.V (2012) Extension-Plus: New Roles for Extension and Advisory Services, In Thematic Note 3 (Module 2), Agricultural innovation Source Book, Agricultural Innovation Systems: An Investment Source Book, The World Bank, Washington

Swanson, B., K. M. Singh, and M. N. Reddy. (2008). A decentralized, participatory, market-driven extension system: The ATMA model in India. Paper presented at the International Food Policy Research Institute conference "Advancing Agriculture in Developing Countries through Knowledge and Innovation," April 7–9, Addis Ababa, Ethiopia.

Tiwari, R. K. (2008). National Agricultural Extension System - Strategy for Revitalization, Paper presented at the National Conference on Agriculture, Kharif Campaign, 29 February 2008, New Delhi.

WGAE (2011) Recommendations of the Working Group on Agricultural Extension for Agriculture and Allied sector for the 12th Plan (Draft).