

Review

Innovations in public sector-led agricultural extension

Souvik Ghosh

Directorate of Water Management (ICAR), Bhubaneswar- 751023, Odisha, India. E-mail: ghosh_wtcer@yahoo.com. Tel: 91-9437205444. Fax: 91-674-2301651.

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This paper briefly analyse the genesis, development and change in public sector-led extension approaches in India showing its temporal pattern, emerging innovations in extension approaches and the way forward. It discusses decentralized, community based, pluralistic extension approaches and their opportunities as well as limitations in changing agricultural and natural resources scenario. The paper gives emphasis on the public sector-led agricultural extension approaches being tried in India and the lessons learnt which may have relevance in planning and implementing future agricultural extension initiatives in other developing and underdeveloped countries.

Key words: Extension reforms, extension approach, public funding, public delivery.

INTRODUCTION

Experience over the last twenty years has created debate concerning the role of public sector agricultural extension in dissemination of scientific technologies under different farming systems and most significant shortcomings of it are mentioned as (a) unresponsiveness to cater for the variation in farmers' needs, (b) lack of ownership by the intended beneficiaries, (c) failure to reach resource-poor farmers (youth and women), (d) limitations in the quality of field and technical staff, and (e) high and unsustainable public costs. If extension is to meet the diverse needs of modern farming, a fundamental change of approach/process supports is called for educating and enabling farmers to define and solve their own problems and determine and take some responsibility for the extension services they require (Antholt and Zijp, 1994; Gbêhi and Verschoor, 2012; Rivera, 1996).

Public sector extension in both developed and developing countries is undergoing major reforms. Governments of less developed countries have invested large sums in public sector extension and are achieving uneven impact, often at unsustainably high costs. Further, the fundamental premise of the conventional public sector extension - that low-income farmers are unlikely to obtain technical information and knowledge geared towards increasing agricultural production, unless it is provided by government - increasingly put under assessment. Several factors argue for a reassessment of conventional role of public sector agricultural extension;

some among them are lack of fiscal sustainability, poor coverage and performance, changing contexts and opportunities and pressures towards participation and good governance (Farrington, 1995; Garforth and Harford, 1997).

Agricultural extension continues to be in transition as governments and international agencies are advancing structural, financial and managerial reforms to improve extension (Kidd et al., 2000; Rivera, 1997). Decentralization, pluralism, cost sharing, cost recovery, participation of stakeholders are some of the elements in extension's current transition. The implementation of many of these reforms is influenced by the extent of understanding of its role and function, partnerships among the different actors, available expertise and an explicit agenda on institutional learning (Sulaiman and Hall, 2002). Views on extension have changed from technology dissemination with emphasis on increasing agricultural production to helping farmers organize themselves, linking of farmers to markets and value chains (Swanson, 2006; Shepherd, 2007) and providing environmental and health information services (World Bank, 2008). Extension is being viewed as a part of agricultural innovation system (Hall, 2006; Leeuwis, 2004; Rivera and Sulaiman, 2009). There is no formula for reforming extension. Nonetheless, there are a number of lessons to be learned from these strategic determinations and their varied experiences.

In this context, the present study briefs genesis, development and change in the public sector-led agricultural extension approaches being tried in India showing its temporal pattern, emerging innovations in extension approaches and the way forward. The lessons learnt are indicated which may have relevance in planning and implementing future agricultural extension initiatives in other developing and underdeveloped countries.

TEMPORAL PATTERN OF PUBLIC SECTOR AGRICULTURAL EXTENSION IN INDIA

The implementation of the World Bank funded Training and Visit (T&V) system of extension during the late 70s through to the early 90s marked a pivotal period of change and that defines three phases of extension in India over the last five decades - the period before T&V, the T&V period and the period after T&V (Sulaiman and Hall, 2002).

Organized attempts in the field of public sector extension started after country became independent in the year 1947. Pre independence efforts had been largely local area specific attempts, mainly the initiatives of few individuals and organizations, impact of which was restricted only to the areas of implementation of respective programmes. Community Development and National Extension Service are two important programmes in the 1950s being emphasized by external aid for agricultural development. With little progress in agriculture as the country had to procure food grains, many new programmes were initiated to increase agricultural production during 1960s. Agricultural extension function was solely performed by Department of Agriculture (DoA) till 1960s. Indian Council of Agricultural Research (ICAR) involved in extension with National Demonstration Programme in 1966 followed by the establishment of Krishi Vigyan Kendras (KVK), initiation of Lab to Land and Operational Research Programmes, all of which were merged with the KVKs during 1990s. At the same time, State Agriculture Universities (SAUs) also started extension activities in the form of trainings, demonstrations, exhibitions, etc, which were further strengthened with the establishment of Directorate of Extension in each SAUs. With the emphasis on creating irrigation infrastructure, Command Area Development Authority (CADA) was set up in 1970s, which also started extension activities through on-farm development and demonstration works in the irrigation commands. Rural extension programmes through mass media like radio and television also initiated after establishment of radio and television stations.

The perceived inefficiency of extension to disseminate information to farmers, poor links with research organizations and lack of training and management ability

of extension functionaries initiated the launching of T&V system of extension in India in the mid 70s with World Bank funding. It also followed the linear model of transfer of technology. It had led an improvement in funding and manpower with organisational changes including a unified command for the service. During 1980s, public sector extension of most of the states in the country was busy in implementing the T&V system with mixed results. Evaluation studies revealed positive impact in irrigated areas (gains in terms of productivity) and limited impact in the majority of the rainfed areas. Lack of utilization of information support, lower involvement of farmers except few contact farmers and weak research-extension linkage and feedback mechanisms, failure in the areas of natural resources management were identified as some of the major weaknesses of T&V system (Purcell and Anderson, 1997, Department of Agriculture and Cooperation, 2000). The 'blaming each other' syndrome further paralyzed the system as extension functionaries mentioned lack of viable, need based and appropriate technologies to transfer while the research system viewed the extension system as weak and failing to transfer technologies for adoption in the farming systems.

With the cessation of external support as well as understanding of the weakness of a single model of extension for all kind of situations, states started to shift from the T&V system to other new extension approaches; hence, the 1990s saw many experiments in providing extension services (Sulaiman and Hall, 2002). The post T&V period has been witnessing much experimentation in the extension approach as without donor funding the T&V system found expensive to operate. These included decentralization (extension planning and control under elected bodies at the district/block level), contracting NGOs for some extension activities, adoption of a group approach (instead of the earlier individual approach); use of para-extension workers (as substitutes for field extension workers from the DoA); setting up multidisciplinary teams of scientist at the district level; setting up agro-clinics, and the formation for a registered societies like Agricultural Technology Management Agency (ATMA) at the district level by integrating the functions of key stakeholders involved in agricultural development in the selected districts, Watershed Associations at watershed level under rainfed farming systems, *Pani Panchayats* / Water User Associations (WUAs) at irrigation command level under irrigated farming systems. Farmers' associations and producers' cooperatives in selected crops and commodities also started becoming involved in extension activities, primarily for the benefit of their member farmers.

Agricultural extension in India is at crossroads as the Department of Agriculture (DoA), the main extension agency, is struggling to find a fresh approach after the end of the Training and Visit (T&V) system. The shortcomings of public sector extension in India are documented (Farrington et al., 1998; Indian Council of

Agricultural Research, 1998; Department of Agriculture and Cooperation, 2000). The great majority of extension remains publicly funded and publicly delivered. Although the requirements of farmers and rural families often go beyond agricultural production technologies, the emphasis continues to be on the dissemination of crop production technologies with the approaches having remained stuck in the linear model that is, Rogers diffusion of innovation model in spite of its criticism (Röling, 2006). The technology development (research) and technology transfer to farmers (extension) are performed by two separate organizations with tightly defined and mutually exclusive roles. Such organizations also do not have strong linkage with other public agencies with allied roles in the agricultural and rural development sector. Coordination and linkages in between ICAR and SAU systems and State Department of Agriculture for extension activities is found to be weak (Indian Council of Agricultural Research, 1996).

The deteriorating fiscal condition of states without external support has influenced the performance of the DoA. With about 85% of the budget going on salaries, there has not been enough left for operation expenses, and this has resulted in underutilization of existing facilities and personnel for extension activities (Sulaiman and Sadamate, 2000). Although several new organizations have been formed to do extension in selected regions, crops and commodities, the DoA continues to operate alone, ignoring the presence of these organizations, which can potentially complement and supplement its efforts. Moreover, DoA officials are pre occupied with implementation of number of state and central sponsored schemes having input subsidy delivery and other aspects.

The evidence suggests that, even low-income farmers will pay for tangible inputs expected to be profitable (pesticides, vaccinations, certain seedlings), that they seek advice at the time of purchase, and that government selective efforts to expand the types of advice that input suppliers can provide are likely to yield high returns (Farrington, 1994). In a study conducted in three Indian states covering a sample of 720 farmers found that about half of the farmers expressed willingness to pay for agricultural information (Sulaiman and Sadamate, 2000). Charging for extension may be based on receipt of materials in kind such as donating a proportion of the crop produced or selling of farm-related materials. However, the extension agent's advice must be appropriate to the circumstances. An example of this kind of fee charging for extension exists in China (Fei and Hiroyuki, 2000), where contractual arrangements are developed between farmer and extension technician, and payment for extension services depends on the production and sale of farm products. Farmers and extension technicians have a direct contract in this regard. Although not feasible in all instances, this system provides a valuable alternative for cost recovery in

developing countries including India.

EMERGING INNOVATIONS IN PUBLIC SECTOR EXTENSION

Over the last decade, the need for extension functionaries to reorient their skills and activities towards community mobilization, conflict management, problem solving, education and human development has been emphasized (Farrington et al., 1998; Sulaiman and van den Ban, 2000). In view of the market failures and the state failures inherent in providing agricultural extension, community-based approaches, which involve farmers groups, have gained increasing importance in recent years to provide this service. Community-based extension (CBE) is perceived as an important strategy because it promises to overcome both the state failures and the market failures inherent in extension (Rivera and Zijp, 2002; World Bank, 2005). In most developing countries, the farmers-to-agent ratio is more than 1000:1; hence, farmers have a hard time exercising demand and holding service providers accountable without some form of organization (Anderson and Feder, 2004). Farmers' associations can play an important role in aggregating farmers' demands for extension and in representing farmers in participatory models of extension management so as to make extension more demand driven (Feder et al., 2010). National Agricultural Advisory Services (NAADS) program of Uganda (also an example of reform by replacement), the first large-scale program in Africa that involved the contracting out of agricultural extension; Farmer Field School (FFS) approach to extension services, promoted in a large number of countries and Agricultural Technology Management Agency (ATMA) model being implemented in India are the examples of CBE.

NAADS represents a model of community participation, because farmers' organizations are involved in each step of the extension delivery chain (Feder et al., 2010). The FFS approach to delivering information and educational services was designed originally as a means to introduce knowledge of integrated pest management (IPM) to irrigated rice farmers in Asia, but it has since been expanded to numerous countries, covering various agricultural themes (van den Berg and Jiggins, 2007). FFS educates farmers on specific technological features of their crops and the field environment. FFS involves farmer participation in the stage of extension delivery where the extension agents interact with the farmers. However, extension agencies that use FFS may also involve farmers' groups in other stages of the extension delivery chain, such as financing. The ATMA model involves farmers' organizations in all stages of the extension delivery chain (Feder et al., 2010).

In India, although extension practices have changed over time, their role and relationship with research

remains stuck in the institutional design of technology dissemination, which are evident in more recent initiatives. ATMA model developed under the theme of Innovations in Technology Dissemination (ITD) as a part of World Bank-supported National Agricultural Technology Project (NATP) project aimed at strengthening and reforming the agricultural research and extension system. ATMAs are constituted at the district level to bring convergence among programmes of various departments, with their activities being guided by a committee comprising farmers and other stakeholders. The design of the system thus provides ample farmers influence on extension activities, since every village is represented (Swanson, 2008). The approach was pilot tested in 28 districts spread over 7 states between 1999 and 2003. A study conducted at the pilot phase of this program in 28 project districts suggested that the reformed extension system contributed to increasing farm income and rural employment through agricultural diversification. During this period, average farm income across the 28 pilot project districts increased 24%, in contrast with only 5% in non-project districts (Tyagi and Verma, 2004).

Based on the success of this pilot in the 7 states, in 2004 the Government of India has expanded this model with its own funds across all 567 districts in the country. In spite learning of the limitations of single model of extension (for e.g. T&V system) being followed all over, the initial success of ATMA has again led to its replication across all districts in all the states. However, at present it is experiencing implementation challenges including insufficient support; mismatch with diversity of application contexts; lack of local ownership; and capacity and institutional constraints (Sulaiman and Hall, 2008). It is treated as just one more central scheme that state level extension services have to implement with lacking of dedicated manpower and functional autonomy at all levels. Budgetary provision is less than Rs. 100 lakh allotted for each district, which is shared by different agencies to independently implement training, exposure visits and demonstrations. Extension functionaries and line departments lack understanding of this approach to integrate extension through ATMA.

There is an increasing realization that public extension by itself cannot meet the specific needs of various regions and different classes of farmers. The policy discussion document released by the Department of Agriculture and Cooperation (DAC) envisaged a number of significant changes in the provision of publicly funded extension in India (Department of Agriculture and Cooperation, 2000). The National Agricultural Policy and the Policy Framework for Agricultural Extension also affirms the need for extension to engage with issues beyond technology dissemination (Department of Agriculture and Cooperation, 2002). Linking farmers to markets is important, and extension services need to sharpen their ability and expertise to do this. Quite often,

linking farmers to markets has to go beyond providing price information, and involves developing new market arrangements. Community driven extension has been emphasized to operate.

Extension, especially in the public sector, needs to strengthen the capacity of small farmers to access, adapt and use knowledge, and this will necessitate the provision of technical, managerial and organizational support. Farmers who are small and poor can benefit from these arrangements only when they are organized into groups. The success of Kerala Horticultural Development Programme (KHDP) in supporting vegetable and fruit growers in southern Indian state Kerala has been due to its adoption of institutional learning as the key management tool (Sulaiman and Hall, 2002). KHDP conceived in 1992 to improve the overall situation of fruit and vegetable farmers in Kerala by increasing and stabilizing their income, reducing cost of production and improving the marketing system. KHDP used self-help groups (SHGs) as its key concept for promoting the development of farmers and experimented with different approaches to provide better access by farmers to technology markets and credit. New institutional arrangements evolved through partnership with other organizations as evident from the KHDP that partnered with research and financial institutions, and traders to make the whole system successful (Sulaiman and Hall, 2004).

Several organizations are presently providing extension services in the country although their presence is more in well endowed areas with wide variation in budget, human resource and approaches. Three agencies have significant presence viz. DoA, farmers' associations, farmers/producers cooperative. The DoA is still primary source of information for the majority of the farmers though their satisfaction varies. Farmers' associations, cooperatives generate their own funds for taking up the activities in most of the cases. Public sector extension in India is giving priority to promote and sustain farmers' organizations.

There have been many attempts to deliver extension service by DoA in partnership with other organizations following the recommendation of policy framework for agricultural extension, DAC 2000. Pluralistic extension approach is found in case of watershed management programme in rainfed area and participatory irrigation management programme in irrigated area as in both cases multiple government agencies and farmers associations are involved in implementation of the activities. Watershed development activities involve management of natural resources like soil and water along with various agronomical interventions with a focus on livelihoods improvement through community participation in planning and implementation. As a result of the debate over non-performance of publicly supplied irrigation system in early 90s, participatory irrigation management and irrigation management transfer have

been advocated as a solution following the concept of peoples management of developmental infrastructures that requires local solution to local problems affecting them. It is realized that adequate operation and maintenance at grass-root level requires involvement of farmers and organized farmers group can manage the irrigation systems in an effective manner. Focusing only on the dissemination of production technologies is no longer sufficient as the current priorities of Indian agriculture include conservation of soil, water and biodiversity, diversification of crops, development of rural infrastructure and creation of employment in rural areas.

The goal of extension is therefore moving from technology dissemination to system management, building coalitions of different stakeholder, leading the innovation agenda and building new learning organizations. Public sector extension needs to make conscious efforts to learn from ongoing institutional experiments and should be restructured with the necessary skills and capacities to integrate information and expertise available in different organizations (Sulaiman and van den Ban, 2003). Emerging extension innovations tried over space and time mainly fall under four broad models, namely, decentralization (shifting responsibility of extension to local governments), privatization (shifting substantial or total ownership and control to the private sector), cost recovery and cost sharing, participatory and demand driven extension (group approaches, farmer field schools and farmer consultations/participation during implementation).

WAY FORWARD

To meet farmers changing need for information and advisory support (van den Ban, 1998), extension should engage with a wide range of issues related to agriculture. These include markets, credit and insurance, in addition to technology and research services and making arrangements for the supply of inputs. The field of extension now needs to address a wider range of activities viz. linking farmers to markets (Neuchatel Group, 2002), reducing vulnerability and empowering the rural poor (Farrington et al., 2002), developing micro-enterprises (Rivera et al., 2001), poverty reduction and environmental conservation (Alex et al., 2002) and strengthening and supporting farmer organizations (Sulaiman and Hall, 2002).

A multi-institutional approach is common, recognizing that farmers get information from several different sources and that some organizations are more effective in reaching certain categories of farmers. There are situations where diversified strategies are followed that employ multiple mixed approaches. No single institutional strategy is dominant in the reform of public sector agricultural extension (Rivera and Qamar, 2003). Some are using the private sector to carry out what was traditionally a public sector activity; some are

decentralizing and reorienting public sector agencies; and still others are working through NGOs and farmer organizations.

Structure, organization and operating system of public sector extension may differ from country to country, even from region to region. Nonetheless, a major concern for extension is to operate in the context of agricultural innovation systems so that new knowledge is applied and used (Rivera and Sulaiman, 2009). A key objective in reforming extension is to make it a better instrument for the promotion of innovation, the dissemination of knowledge and the facilitation of development. In this context, research into use (RIU) launched by the UK's Department for International Development (DFID) in 2006 is an entirely new sort of programme in India that has adopted six competing and overlapping innovation narratives, viz. i) Poor user-led innovation approaches, ii) Public-private partnership-led innovation approaches, iii) Capacity development-led innovation approaches, iv) Below-the-radar-led innovation approaches, v) Investment-led innovation approaches and vi) Research communication-led innovation approaches (Hall et al., 2010).

The market-driven imperative, vital to production and value-chain development and the knowledge imperative, central to the advancement of human capacity and institutional development are viewed for overhaul in agricultural extension. The market-oriented ideology is affecting the priorities of agricultural extension. The challenges that lie ahead for public sector agricultural extension and its reform are no longer issues of a system in transition. One issue for the smallholder farmers is whether support will be provided for the development of markets and whether extension will take a supportive role in helping smallholders develop contractual and cooperative arrangements to access markets. Another critical issue is whether government will develop and expand education network as a resource for supporting and developing its extension workforce (Rivera, 2009). Following two decades of criticism and public sector reform of extension services, a new recognition of the role of the public sector in promoting extension is resulting in the advancement of diverse strategies of agricultural extension.

CONCLUSION

Public sector extension has to play a much greater role in the changing agricultural situation. It has to provide information and advice to farmers not only on technologies but also on solving specific field problems, markets related issues, pricing, quality of the produce and implications of government policy changes time to time. Public sector extension could considerably improve its effectiveness through developing partnerships with other organizations that have emerged in the extension field over last two decades. Innovation is process of

generating, accessing and putting knowledge into use, happens only when actors with different bits of expertise interact with each other. As the farm family not only requires agricultural development support but also the support for diversified livelihoods, extension machinery has to have not only technology but also expertise to meet the required services of the farmers for better livelihood. There is a need to restructure government extension machinery with a new set of operational procedure with more flexible approach to meet the emerging needs of farmers at local level and to improve the cooperation among different government departments and other development agencies.

REFERENCES

- Alex G, Zijp W, Byerlee D (2002). Rural extension and advisory services – New direction. Rural Strategy Background Paper No 9, World Bank, Washington, DC.
- Anderson JR, Feder G (2004). 'Agricultural extension: Good intentions and hard realities'. *World Bank Res. Observ.* 19(1):41-60.
- Antholt C, Zijp W (1994). Participation in agricultural extension. The World Bank, Washington, DC; <http://nird.ap.nic.in/clic/Rrd124.html>.
- Department of Agriculture and Cooperation (2002). National Agriculture Policy. DAC, Ministry of Agriculture, Government of India, New Delhi.
- Department of Agriculture and Cooperation (2000). Policy framework for agricultural extension. Extension division, DAC, Ministry of Agriculture, Government of India, New Delhi.
- Farrington J (1995). 'The changing public role in agricultural extension'. *Food Pol.* 20:537-544.
- Farrington J, Christoplos L, Kidd A, Beckman M (2002). Extension, poverty and vulnerability: The scope for policy reform: Final report of a study for the Neuchatel Initiative. Working Paper 155, Overseas Development Institute, London.
- Farrington J (1994). Public sector agricultural extension: Is there life after structural adjustment. ODI Natural Resource Perspective, Number 2, Overseas Development Institute, London.
- Farrington J, Sulaiman VR, Pal Suresh (1998). Improving the effectiveness of agricultural research and extension in India: An analysis of institutional and socio-economic issues in rainfed areas. Policy Paper 8, National Centre for Agricultural Economics and Policy Research, New Delhi.
- Feder G, Anderson JR, Birner, Deininger RK (2010). Promises and Realities of Community-Based Agricultural Extension. IFPRI Discussion Paper 00959, Development Strategy and Governance Division, International Food Policy Research Institute, Washington, DC.
- Fei Xu, Hiroyuki T (2000). 'Fee-charging extension in China: Implications and function'. *J. Ext. Syst.* 16(1):58-67.
- Garforth C, Harford C (1997). Extension experiences in agriculture and natural resources management in the 1980's and 1990's. In: *Farmer-led Extension: Concepts and Practices*, Scarborough V, Killough S, Johnson DA and Farrington J (Eds.). London. Intermediate Technology Publications.
- Gbèhi C, Verschoor G (2012). Making knowledge-based services more demand-oriented? An experience with 'public funding, public delivery' extension in Bénin. *J. Agric. Ext. Rural Dev.* 4(13):372-384.
- Hall A (2006). Public private sector partnerships in agricultural system of innovation: concepts and challenges. UNU-Merit Working paper 2006-002. Maastrish, The Netherlands.
- Hall A, Dijkman J, Sulaiman VR (2010). 'Research into use: An experiment in innovation'. *LINK LOOK* pp. 1-4. March, 2010, Indian Council of Agricultural Research (1998). National Agricultural Technology Project: Main document. ICAR, New Delhi.
- Kidd AD, Lamers JPA, Ficarelli PP, Hoffmann V (2000). Privatizing agricultural extension: Caveat Emptor. *J. Rural Stud.* 16:95-102.
- Leeuwis C (with contributions from van den Ban A) (2004). *Communication for rural innovation. Rethinking agricultural extension.* Blackwell Science, Oxford.
- Neuchatel Group (2002). Common framework on financing agricultural and rural extension. Swiss Centre for Agricultural Extension and Rural Development, Lindau.
- Purcell DL, Anderson DR (1997). *Agricultural extension and research: Achievements and problems in National systems.* World Bank, Washington, DC.
- Rivera WM, Zijp W (2002). *Contracting for agricultural extension: International case studies and emerging practices.* CABI, Wallingford, U.K.
- Rivera WM, Van Crowder L, Qamar K (2001). *Agricultural and rural extension worldwide: Options for institutional reform in the developing countries.* Food and Agriculture Organization of the United Nations, Rome.
- Rivera WM, Qamar MK (2003). *Agricultural extension, rural development and the food security challenge.* Food and Agriculture Organization of the United Nations, Rome.
- Rivera WM (2006). *Extension Reform Strategies for Agricultural and Rural Development.* *J. Ext. Syst.* 22:16-22.
- Sulaiman VR (2009). 'Extension: Object of reform, engine for innovation'. *Outlook Agric.* 38:267-273.
- Rivera W (2009). 'Production and beyond: a defining moment for public sector extension'. *J. Agric. Educ. Ext.* 15(4):371-384.
- Röling N (2006). Conceptual and methodological developments in innovation. Keynote for Innovation Africa Symposium, Kampala, Uganda.
- Shepherd AW (2007). Approaches to linking producers to markets: A review of experiences to date. *Agricultural management, marketing and finance services*, Food and Agriculture Organization of the United Nations, Rome.
- Sulaiman VR, van den Ban AW. (2003). 'Funding and delivering agricultural extension in India'. *J. Int. Agric. Ext. Educ.* 10(1):21-30.
- Sulaiman VR, Hall A (2002). 'Beyond technology dissemination: Reinventing agricultural extension'. *Outlook Agric.* 31:225-233.
- Sulaiman VR, Hall A (2002). Beyond technology dissemination: can Indian agricultural extension re-invent itself. Policy Brief 16, National Centre for Agricultural Economics and Policy Research, New Delhi.
- Sulaiman VR, Hall A (2008). 'The fallacy of universal solutions in extension: Is ATMA the new T&V'. *LINK LOOK*, pp. 1-4. March, 2008.
- Sulaiman VR, Hall A (2004). Towards Extension-plus: Opportunities and Challenges. Policy Brief 17, National Centre for Agricultural Economics and Policy Research, New Delhi.
- Sulaiman VR, Sadamate VV (2000). 'Privatizing agricultural extension in India'. Policy Paper 10, National Centre for Agricultural Economics and Policy Research, New Delhi.
- Swanson BE (2008). Global review of good agricultural extension and advisory service practices. Food and Agriculture Organization of the United Nations, Rome.
- Swanson BE (2006). 'The changing role of agricultural extension in a global economy'. *J. Int. Agric. Ext. Educ.* 13:5-18.
- Tyagi Y, Verma S (2004). Economic rate of return of the innovations in technology dissemination component of National Agricultural Technology Project. Report Submitted to National Institute for Agricultural Extension Management. Hyderabad, India.
- van den Ban AW (1998). 'Supporting farmers' decision making process by agricultural extension'. *J. Ext. Syst.* 14:55-64.
- van den B, Jiggins H (2007). 'The impacts of farmer field schools in relation to integrated pest management'. *World Dev.* 35(4):663-686.
- World Bank (2005). *Agriculture Investment Sourcebook.* Washington, DC. <http://go.worldbank.org/CCC68JMIZ0>.
- World Bank (2008). *World Development Report, Agricultural and Rural Development.* Washington, DC.