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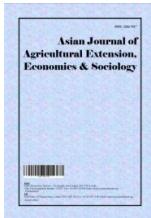
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Extension Reforms in India: An Overview

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Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

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ABSTRACT

In worldwide most of the rural population is invariably interrelated to the performance of the agrarian sector and to the sector's ability to cope with the tasks that result from growing population pressures, changing demand for food and agricultural products, resource scarcity, climate change and greater production uncertainty. The World Bank report 2007 emphasizes agricultural extension as an important development intervention for increasing the prospective of the agrarian sector. In these view Indian farm production systems, the reforms are shown to raise the role of agricultural extension services are aimed at many different strategic interventions. First, providing the significant awareness to meet the information needs of the farming community and to ensuring such information reaches to the farmers in a timely manner lies at the crux of the reforms in Indian extension reform efforts. Further, maintaining the effectiveness of the agricultural extension system as a whole and the enhancing the efficiency. The orientation of the extension structure in India is still majorly oriented on the production -led extension. But there is great need for an inclusive approach to sustainably development in the farming systems that goes beyond production led extension and considering the farmer's problems, offered resources, the combination of farming system approach, involvement of extension agents/worker and farmers in the extension system and research etc. Therefore, these new reform measures are required yet to fully recognize in the vast array of knowledge and information sources.

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ABBREVIATIONS

ICT- Information and Communication Technology, ATMA-Agricultural Technology Management Agency, KCC- Kisan Call Centers, NeGAP-National e-Governance Action Plan, NAIP-National Agricultural Innovation Project, ACABC-AGRI Clinics and AGRI Business Centres, PPP-Public-Private Partnership, FSA- Farming System approach, FFS-Farmer Field Schools.

1. INTRODUCTION

Now-a-day farming is becoming an increasingly Information and knowledge-intensive sector [1]. The contribution of agriculture sector to national GDP and economic growth depends on its total factor productivity and their yield. Further, farm productivity in turn depends on how effectively and efficiently all types of farmers maximize their production and productivity through use of the optimal different combination of inputs like seeds, fertilizer, bio-agents etc. know-how, labor and land management techniques. Yet, the existing information, awareness and evidence about how to produce of crops, process of grains and market farm commodities remain inaccessible to a large amount of small scale farmers in India. This is partly due to the effectiveness of Agricultural extension and farm advisory services that is accessible to the all kind of farmers from various available source; research and extension institutions, farmers' organizations, etc. Developing countries, in the pursuit for increasing and improving the access to information and knowledge for all farmers, have embarked on a series of reforms and resulted in huge outcomes. These are diverse and included the decentralization of Extension service provision, the privatization of some components (cost-sharing, contacting out arrangements etc.), pluralistic services delivery, participatory approaches, etc.

Some of the reform programmes have succeeded in shifting the agricultural extension structure to meet the all farmers' needs and made the structure and content highly relevant and valid to all the farmers and their enterprises. The reforms of the agricultural extension systems services were imperative in these countries given the apparent decline of the agricultural extension services for the past three (3) decades, some of which were induced by the structural amendment and also stabilization policies that aimed at streamlining the delivery of public services.

The food crisis in the year of 2007-08 revitalized the need for investments in programs to increase the production and productivity of smallholder/small farmers in agriculture. As a part of this revival, many efforts have been made to explain the role of agricultural extension services and the role of agriculture research to provide direction to decision makers in many developing countries. For example, [2] called for the reforms in the extension system through the creation of the Common Framework on Extension (CFE) which called for a new approach to agricultural extension in order to be more effective for the system. The new line of thinking was constructed on the notion that agriculture extension is as much about facilitation as it is about transfer of technology. Reforms of the agriculture extension and advisory service system in India and other growing countries face emerging and new challenges. The agricultural extension systems have become pluralistic. The participation of the private sector and agency in the provision of extension worker/agent services has been increasing during the reform process as the agricultural extension systems in these countries become more need based and demand-driven.

2. FARMERS NEED INFORMATION AND SERVICES ON NEW REFORMS

Farmers' need for information and services varies because its mainly depending on their level of access to existing sources of information, services also their quality to get information, both of which depending on their livelihood and income . According to [3] were given two components of livelihood i.e. Stores and resources refer to tangible assets owned by the household such as food stock, stores of value such as gold, jewellerys, cash savings, land, livestock and trees. Claim is also recognized as a type of intangible assets, for example loans and gifts. While large number of farmers could spend a significant units on the information needed for their farm operation and could afford private agricultural extension services. Majority of

growers in India who own less than five (5) acres of land holding continue to depend on the public (government) source of information and services. Reaching such farmers became a major objective of the extension reforms it was attempted in developing countries like India national food security goals [4,5]. Therefore, formation of farmers groups to learn all farmers together, organize and share needful information for their crop production actions have become most important element of agriculture extension reforms such as ATMA (Agricultural Technology Management Agency) in the India. ATMA it was executed to focus on a decentralized, participatory, and market-driven extension model [4]. It function as a semi-autonomous entity at the district level providing a broad set of context-based advisory services through farmers training with effective monitoring and evaluation [6].

With respect to Indian scenarios 60.00% of farmers did not access to information and extension services [7]. It can be partially explained by the large decline in the attention of public Agricultural extension (government) and the diversion of existing human resources to alternative development activities like Subsidy distribution. The information and services need by the farmers is highly context-specific, location specific and should be fully understood and applied to the provisioning of services in order for farmers to get full benefit. For example, the usage of inputs like agro-chemicals and fertilizer is a top priority of the information needed by the farmers [8]. Further, agricultural input dealers are the prime source of evidence when a farmer faced with any kind of natural disaster during the crop production period. Recently, in India many forms and channels of extension services have been emerged, depending on the type of crops grown by the farmers. Different agencies also proving extension services like private companies, operating at the grass root level and directly connecting to the farmers to crop production and marketing activities. However, the use of mobile phones includes an extra charge to the farmers. Farmers are ready to pay for such services and the use of cell phones, Kisan Call Centers; media such as TV, radio, and information and communication technology have been shown to be highly effective in terms of farmer's ability to direct connection to farmer which could provide valuable service and reaching to farmers door step.

In India public extension service has been slowly moving towards results-oriented and demand

driven approaches. The reform are needed to identify the opportunities in the public sector as well as identify the networking and possibilities of integration with other agencies like NGO, private extension service and para extension services etc. [9]. To improve the effectiveness and impact of extension the state and central level agencies developed a range of different extension approaches to address the challenges of knowledge sharing among the farming community. Several reforms measures were introduced like ATMA, Agri-clinics and agribusiness centre (ACABC) support for youths, KCC (Kisan Call Centers), and the SHC (Soil Health Card) which are the important initiatives of reforms. Many projects including the NeGAP (National e-Governance Action Plan) initiated in 2003, SSEPER (Support to State Extension Program for Extension Reforms) initiated in 2005, and NAIP (National Agricultural Innovation Project) initiated in 2006 have supported the new reforms in agriculture to help the farmers [10]. Including these, the reforms also aimed to decentralize and participatory mode of the delivery of services, frequently monitoring and evaluation systems to know about the result of these programmes and projects, In addition to the technology transfer paradigm, it increased attention to the development of the private sector through the support of public-private partnerships (PPP) hence it make a good collaboration and they will share the responsibility among public and private sector to serving the farming community.

A study conducted on Agri-clinics it indicated that combining advisory services with input sales it gives an effective and need based service to the farmers relating to inputs and their use in crop production. Success of the AGRI Clinics and AGRI Business Centres (ACABC) program completely depends on farmer demand for services. The public-private combination of the agri-clinics needs to be boosted by providing better support to farmers for on-farm soil testing and enabling agri-clinic operators to provide effective advice [11].

3. GOVERNMENT FACING NEW EXTENSION CHALLENGES

It's very challenging to meet the need of providing food for all, raising incomes level of rural people and alleviation poverty. These many challenges existed in a rapidly changing Globe. Globalization, new improved technologies, the

new relationships developing with the public as well as private sectors, the multi-disciplinary in agriculture, heterogeneity within and between countries, the geographic diversity of rural people - all these realities are putting new pressure on India in their efforts to development. Providing advice on the natural resources management, integrated pest management (IPM) and agro advisory services to the very poor farmers, the state government has some problems and difficulties in establishing markets at commercial level. The advancement of pluralistic partnerships and participatory approach are crucial for the public sector. For those Public sector has not yet completed so, the merits and demerits of institutional reform deserve consideration.

3.1 Reforms in Agricultural Extension: After Independence

After independence, India faced two major problems on economic fronts namely, the "grain bowls" of West Punjab and East Bengal states shifted to Pakistan. The Government of India has realized the gravity of the condition and implemented a programme known as 'Grow More Food Campaign' (GMF). The first approach of agrarian development was Community Development programme (CDP) followed by National Extension Service (NES). Though the focus of CD programme was to fetch inclusive development of the rural community with the community involvement but not many optimistic outcomes were seen. In sixties, the agriculture production condition was very critical that strengthening of agriculture with the recommended high yielding varieties become must and agricultural development became the only way and measure of rural development. The various other programmes such as IADP (Integrated Agriculture Development Programme), IAAP (Intensive Agriculture Area Programme), and HYVP (High Yielding Variety Programme) added momentum. At this situation, the sole purpose was of increasing crop yields by using modern means of production. The emphasis was broadened from agricultural development to rural development and various programmes like SFDA (Small Farmers Development Agency), MFAL (Marginal farmers and Agricultural labor Development Agency) these programmes were only meant for small, marginal and landless labours. IRDP (Integrated Rural Development Programme) etc., were launched during seventies and it was considered as one of the poverty alleviation programme in

the country. In addition to these programmes the most important programme was introduced i.e. T & V (Training and Visit) system, more emphasis was given to the role of extension in technology transfer to encourage utilization of research/scientific orientation technologies. T & V system was found to be highly centralized, supply driven and top-down approach and it was not suitable for small farmers and rain-fed areas [12]. In between the ICAR (Indian Council of Agricultural Research) launched four major programmes to help agri and allied sectors namely ND (National Demonstration), Operational research Project (ORP), Krishi Vigyan Kendra (KVKs)/Farm Science Centre, Lab to Land Programme (LLP) with the same objectives in mind i.e. Dissemination with the help of conducting demonstration of new technologies in the farmers' field.

Among all these approach the most important decentralized approach is ATMA

3.2 Agricultural Technology Management Agency (ATMA)

Paradigm from top-down to bottom-up approach, this is one of the new institutional scheme was established during 2005-06, moving towards demand driven and participatory approach in agriculture. ATMA operates at district level and it's responsible for all the technology dissemination activities at the district level. It has huge networking with all the line departments, research organizations, NGO's and agencies related with agricultural development at district. Essential members of ATMA like KVKs and the key line Departments of Agriculture, Animal Husbandry, Horticulture and Fisheries etc. [13].

A study carried out by [14] in 2016 on Extent of Knowledge of ATMA Beneficiaries and Non-beneficiaries Farmers towards Improved Wheat Cultivation Technology, Varanasi district of Uttar Pradesh, Sample size: Trained farmers 120 and Untrained farmers 120 (N=240).

The (Table 1) shows that, the respondents obsessed knowledge about various components of practice of improved wheat cultivation technologies with their mean score. The majority of the trained farmers possessed knowledge about practices like pesticides and weedicides (0.89) followed by field preparation (0.82), sowing technique (0.81), harvesting and storage (0.79), irrigation and fertilization (0.77), respectively. Similarly, majority of the untrained farmers were possessed knowledge about

Table 1. Distribution of trained and untrained farmers with respect to their knowledge about improved wheat cultivation technologies

Practices	Trained farmers	Untrained farmers
	Mean score (MS)	Mean score (MS)
Field Preparation	0.82	0.70
Sowing Technique	0.81	0.73
Irrigation and Fertilization	0.77	0.71
Pesticides and weedicide	0.89	0.77
Harvesting and storage	0.79	0.55

[14]

practices like pesticides and weedicides (0.77) followed by sowing technique (0.73), irrigation and fertilization (0.71) field preparation (0.70) and harvesting and storage (0.55), respectively. It is clearly indicates that the farmers of trained category possess higher extent of knowledge than farmers of untrained category regarding above five practice of improved wheat cultivation technologies according to their mean score. This might be due to the exposure of the trained farmers to knowledge through on-farm trial conducted by ATMA. The untrained farmer lacked this opportunity and hence, they showed lower extent of knowledge of these improved technologies.

3.3 Public to Public-Private Partnership (PPP)

PPP is a contractual agreement among public agency (federal, state or local) and a private sector.

- By this agreement, both public and private are shared responsibilities and assets each other and specially targeted towards financing, designing, implementing, and operating infrastructure facilities services.

4. PRODUCTION TO MARKET LED EXTENSION

To meet the demand of the market, farmer need to convert themselves from mere producers-sellers in the domestic market to producers cum sellers in a wider market sense to best realize the returns on their investments. Keeping this in view, MANAGE started working on the concept of 'Market-Led Extension' and a beginning was made through a three day national workshop on Market Led Extension at MANAGE.

New dimensions for marketing extension:

- Marketing of education programme
- Consumer preference

- Storage and preservation of produce
- Post-Harvest losses
- Promoting processing
- Grading and packing
- Cyber technology in disseminating market intelligence

5. PARTICIPATORY APPROACH LIKE FARMING SYSTEMS APPROACH (FSA) AND FARM FIELD SCHOOL

a) Farming system approach

Envisage the integration of agroforestry, horticulture, dairy, sheep and goat rearing, fishery, poultry, biogas, mushroom, sericulture and by-product utilization of crops with the main goal of increasing the income and standard of living of small and marginal farmers.

b) Farm Field School (Polam Badi)

Important platform for the learners, it's a farmers to farmers concept here the farmers share their knowledge and experience among farmers. Farmers' groups meet regularly during a season under the guidance of a skilled facilitator/executor". It will work on the principle of learning by doing and all learning in hands-on, practical and takes place in farmers own fields [15].

6. APPLICATION OF ICT TOOLS TO DISSEMINATE INFORMATION ON TIME

Nearly 103 million farm families, cultivated 165 million holdings, spread over in more than 638,000 villages in the country and as we know that there is an shortage of extension workers (1:1000 extension agent-farmer ratio). Man power and shortage of funds adversely affected the performance of public extension services. Therefore, the ICT tools are gaining important role and its act like a supplementary to the extension workers to disseminate information within a short span of time.

To create awareness among people the publicity Campaign was launched on July 5, 2010, campaign on various assistance available to the people under different schemes/ programmes. National level campaign is being implemented by way of short advertisements through Audio & Video Spots of 30 – 60 seconds duration.

6.1 State level Innovations

Innovation is stated as first time perception of an individual or an application which has not been familiar in the past by an individual [16].

After addressing limitations under T & V system, many states such as Kerala, Karanataka, Uttar Pradesh etc. were started various initiatives to connect farmers directly. For Example, **Kerala** initiated the **group approach** to extension in 1989. This approach envisaged formation of commodity groups based on their commodity to improve productivity and reduce cost of cultivation through collective purchase of inputs like seeds, fertilizers, pesticides and crop production and protection services.

In Karnataka, since 2000 a permanent office called Raitu Mitra Kendras (RMKs)/Farmers Contact Centers are being established at hubli level so that farmers can frequently contact to the Agriculture Officers (AO) to clear their doubts and avail agri inputs regarding crop production.

6.2 Para Extension Workers (PEWS)

Belonging to the local community and they have the direct contact with all the farmers of that area and they fulfill the all kind of needs related to farming community. Through Para Extension Workers the field extension is supplemented. Different kinds of Para Extension Workers are in use in different parts of the country like Kisan mitras, Mahila Kisan mitras for farmer-led extension. The whole extension system in Uttar Pradesh state now currently revolves around Para Extension Workers (Kisan Mitras) selected from each Gram panchayat. There are more than 52,000 kisan mitras present in UP.

6.3 State Agricultural Universities (SAUs) Role in Agricultural Extension

SAUs in India have been playing a major role in field agricultural extension activities. The Directorate of Extension (DOE) activities through its three major units like training unit to the farmers, communication centers and farm Advisory Services to farmers. Many activities of

KVKs (Krishi Vigyan Kendra) under the SAUs are coordinated by Directorate of extension. Agriculture Technology Information Centers (ATIC) is established in SAUs with NATP funds as a "single window system" facility for delivery of input, research products, information, diagnosis farm problems, advisory services and other services [17].

6.4 Public-Private Partnership (PPP) in Agricultural Extension

It is evident that public agricultural extension by itself can no longer respond to the diverse demands of farmers. Public funding for sustaining the huge agricultural extension infrastructure is also under considerable strain. Therefore, it was felt to promote public-private partnership (PPP) for sharing of work, resources and convergence. Thus, the first MoU was signed between Madhya Pradesh state Government and Dhanuka group to provide agricultural extension services to farmers.

7. FOURPARADIGMSOF AGRICULTURAL EXTENSION [18]

a. Technology transfer (persuasive + paternalistic):

This paradigm was prevalent in colonial times and reappeared in the 1970s and 1980s when the "Training and Visit" system (T & V system) was established across Asia. Technology transfer involves a top-down approach that delivers specific recommendations on different crops to farmers about the practices they should adopt.

b. Advisory work (persuasive + participatory):

This paradigm can be seen today where public organization or private consulting companies respond to farmers' inquiries with technical prescriptions. It also takes the form of projects managed by NGOs and donor agencies that use farmers' participatory approaches to promote predetermined packages of practices.

c. Human resource development (educational + paternalistic):

This paradigm dominated the earliest days of agricultural extension in

countries like North America and Europe, when universities gave training to local rural people who were very poor to attend full-time courses. It continues today in the outreach activities of colleges around the Globe. Top-down teaching approaches and methods are employed.

d. Facilitation for empowerment (educational + participatory): This paradigm

involves methods such as experiential learning (learning by doing) and farmer-to-farmer exchanges (farmer-led extension). Knowledge and Information are gained through interactive processes and encouraged participants to make their own decisions. The best known examples in Asia issue Farmer Field Schools (FFS) or participatory technology development (PTD).

International workshop on "Extension and Rural Development" jointly hosted in November [19]. by the World Bank and the USAID a number of policy recommendations were put forward:

- Government should focus public financing on the poor
- Government should view extension within a wider rural development agenda.
- Government should define extension policy for a pluralistic system.
- Government should make long-term and farmers benefit commitments.
- Government should develop a stakeholder coordinating mechanism.

8. CONCLUSION

Since from independence government has been experimenting with various programme to develop the rural India. Many approaches were shifted from one to other after evaluating the weaknesses of previous programmes. Later, ATMA, Farming System approach (FSA), Farm Field School (FFS) etc. and after eliminating some flaws of previous attempts for agriculture and rural development, PPP have been introduced. But still they have fail to give expected results due to various reasons like lack of sincerity in implementation and lack of funds for implementation, lack of coordination among the official and farmers, lack of farmers involvement during the planning stage of programme. Therefore there is greater attention

to be paid by government on enhancing funding, promoting reforms and strict monitoring and evaluation and committed extension workers and agencies must be there to effectively dissemination of needful technology to farm filed.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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