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Linking research institute with post offices for dissemination of agricultural technologies: an action research

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ABSTRACT

Action research on establishing linkages with post office in dissemination of agricultural technology was conducted. In the first phase of the study, the post offices and their personnel (n=50) at district, block and villages levels in the district of Sitapur of Uttar Pradesh were contacted to explore the linkage possibility. The trend analysis of post office works showed that during last 10 years (since the popularization of mobile phone), there was sharp decline (about 50%) in the mail and delivery of ordinary post. Similarly, the sale of postal stamp and revenue stamp had declined to the same extent. However, the collaborative activities and tie-up with other agencies like bank, investment agency, insurance departments, etc had increased (15–20%) considerably which was the opportunity for establishing linkage. The major possible linkage activities as felt by the post office personnel was dissemination of quality seed and related package of practices of IARI. Based on the findings of first phase, up to *rabi* 2011–12, 1 014 farmers under seven post offices in two blocks namely Sidhauli and Kasmanda covering 30 villages were reached through this approach. The major crops included in the programme are wheat, paddy, pigeonpea, *bajra*, mustard, bottle gourd, pumpkin and okra. It was observed that more than 90% of the farmers received the seed of above crops sent through post office within 4–6 days of despatch from IARI. With a particular case of wheat, total 780 kg seed of IARI wheat varieties (HD 2733 and HD 2824) was sent by post to the farmers of the study area during *rabi* 2009–10. Survey was conducted with the identified farmers (n=200) to analyse the feedback of the farmers regarding IARI seeds, seed sending mechanism and related issues. The performance of IARI crop variety was found superior as compared to prevailing popular varieties. Farmers as well as village post office personnel found this approach very effective and successful means for making the improved agricultural technologies available in the rural areas in relatively lesser time and cost. The economic viability of this approach was found superior for low volume-high value crops than high volume crops. Capacity building of farmers and post office personnel was done to enhance their level of agricultural knowledge; and cost sharing for high volume crops further helped to improve the sustainability dimension of this approach. Based on the findings, empirical model was emanated.

Key words: Agricultural technologies, Post office linkages, Technology dissemination

The shifting priorities of Indian agriculture for diversification, commercialization, sustainability and efficiency have made it mandatory for the state extension departments to introspect their extension approaches. In some of the states, the departments of agriculture (DoA) have changed their approaches as highlighted below. Still, the basic issues regarding the type of technological backstopping required by the farmers and the changes in extension organisation needed to provide have not been addressed.

The empirical synthesis by Sulaiman and Van den Ban (2000) revealed some of the changing nature of Indian agriculture in the recent time which includes shrinking resource base (Selvarajan and Joshi 2000), changes in demand and consumption pattern (Kumar 1998, Bhalla *et al.* 1999), changing farming systems, declining public investments in agriculture (Chand 1999), and international developments.

The following six extension models are either being used or was used in past in developing countries including India have been briefly compared as follows: i. The national public extension model has been historically the dominant extension model throughout the world and it has usually been a key institution within and reporting to the Ministry of Agriculture. Although India's State Agricultural University

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(SAU) Model is based on the US Land Grant Model, the SAUs are responsible to the Department of Agriculture in their respective states and the Indian Council of Agricultural Research; ii. The commodity extension and research model was introduced by colonial powers in Malaysia, Mali and other colonies exporting cotton, palm oil etc. (Ruttan 1982, Eicher 1989); iii. The Training and Visit (T&V) extension model was launched in Turkey in the early seventies and then spread to India and throughout Africa under World Bank sponsorship in the late seventies and the eighties. The T&V model consumed about three billion dollars of donor assistance over the 1975-1995 period. However, the T&V model has proven to be financially unsustainable (Anderson *et al.* 2006); iv. The NGO extension model started in the nineties; many NGOs shifted gears and moved from providers of food aid and humanitarian assistance to become "agents of development." The NGOs established food and community development projects in many African countries in the 1990s that were primarily financed by bi-lateral donors. For example, in Mozambique in 2005, the NGOs employed 840 extensionists as compared with 770 public extension workers (Gemo *et al.* 2005); vi. The private extension model is spreading in industrial countries such as the Netherlands, New Zealand, the United States and more recently in some middle income countries such as Chile and low income countries such as Uganda. Under the private model, the farmer is expected to pay some of the cost of extension with the hope that public outlays on extension will be reduced (Anderson and Crowder 2000) and vi. The Farmer Field School (FFS) approach model emerged in Asia in the 1980s when extension workers offered advice to farmers on using IPM (Integrated Pest Management) to control pests in rice mono-cropping areas in the Philippines and Indonesia (Feder, Murgai and Quizon 2004a; Gallagher *et al.* 2006). The model was remarkably effective in reducing pesticide use by up to 80 per cent on farms in these two countries. The FFS model is now being used in around 50 developing countries. But farmers completing a school are reported to have limited success in spreading the new technology to their neighbours.

Currently, the above six basic extension models are in various stages of development and implementation in the developing world. Instead of trying to identify the "best fit" extension model for a particular country, the reality is that a pluralism of models is being used in most countries in Asia and Africa (Davis 2006, Birner and Anderson 2007 and Birner *et al.* 2006). Virtually India, now has a mixture of public, NGO and private firms (e.g. seed and fertilizer dealers) delivering extension assistance to smallholders. Besides, the various states of India is experimenting with different extension initiatives. Some of them are:

For example, Maharashtra adopted the single window system from July 1998 and under this model, Departments of Agriculture, Soil and Water Conservation and Horticulture were merged at the operational level. Kerala decentralized the functioning of the Department of Agriculture way back in 1987 by creating offices of DoA (Krishi Bhavans) in all panchayats. In 1989, the state initiated the group approach for extension in rice farming and this was subsequently extended to other crops. The agricultural development programmes are at present decided at the panchayat level.

Punjab had been continuing with the SAU-Farmer Direct Contact method over the past two decades and has also upgraded all front-line extensionists to graduate level. Andhra Pradesh Agricultural University has also established District Agricultural Advisory Technology Centers in all the districts for technology refinement, diagnostic visits and for organizing field programmes in collaboration with DoA and allied departments.

Different approaches are also being tried in several projects in specific districts. For instance, the Agricultural Technology Management Agency (ATMA) model is presently under way in six selected districts in the country. This is a bottom-up approach based on Strategic Research and Extension Plans (SREP) prepared at the district level based on Participatory Rural Appraisal/approach. Integration of the activities of agricultural and allied departments and other organizations such as KVKs is expected to be achieved through ATMA at the District level.

Krishi Vigyan Kendras (presently numbering 631) continues to be the main source of training for farmers and agro-based entrepreneurs at the district level. The need for making the system broad based, demand driven, and farmer accountable has been widely recognized. The need for linkages between other extension providers, prioritizing public interventions, cost-recovery, contracting out services, higher use of mass media and Information Technology etc are also gaining acceptance. Measures to achieve many of these are presently under experimentation.

The above context give ample credence to include post-office as the viable model for technology among resource poor farmers remotely located in various parts of India.

The Indian Postal Services were established in the current format largely under the East India company. It was first established under the name "Company Dawk". In 1688, the first post office of the Company Post was established at Bombay/Madras. The system was reorganized and the service opened to the general public by Warren Hastings, the first governor general of Bengal with supervisory powers over Bombay and Madras, in 1774. A Postmaster General was appointed and metal tickets or tokens were issued to pay for the postal charges. The presidencies of Bombay and Madras followed suit.

In 1835 a Committee was set up for unification of customs and postal system of all the presidencies. The result was the first Indian Post Office Act of 1837. It not only provided for uniform rates and routes but for the uniform designs and other specifications of the postmarks for each category of post office. A Commission was set up in 1850

and submitted its report in 1851 that resulted in the post office act of 1854. Under the provisions of this act, the monopoly of carrying mail in the entire area of British possessions in India were granted to Indian Post office and office of the Director General of Post Offices of India was established. Mr H P A B Riddle, till then the Postmaster General of North West Presidency, was appointed the first Director General in May 1854.

The Indian Postal Service, with 155 333 post offices, is the most widely distributed post office system in the world. The large numbers are a result of a long tradition of many disparate postal systems which were unified in the Indian Union post-Independence. Owing to this far-flung reach and its presence in remote areas, the Indian postal service is also involved in other services such as small savings banking and financial services.

From the experiences of Republic of Korea, postal services were found successfully utilized for e-commerce and farming particularly fish farming for marketing of the produce using ICT enabled technologies (ITU 2010)

MATERIALS AND METHODS

Under the action research project of IARI, New Delhi on Cyber Extension Model for Agricultural Development, establishing IARI–Post Office linkage was one of the thrust areas. The main aim of IARI-Post Office-Farmer linkage was to establish and strengthen the relationship with post office as the linking medium for dissemination of agricultural technologies and information to the farmers who are remotely located. This effort ensured the location specific adaptation and diffusion of IARI technologies. This helped the farmers to enhance the productivity and profitability from crop husbandry. The project is being implemented in the Sidhauli and Kasmanda blocks of Sitapur district of Uttar Pradesh since *rabi* 2009. Seven *Gramin* post offices from five clusters of villages namely, Gandhauli, Neelgaon, Amberpur, Behma, Manwa, Chaudia Manpara and Rehua were identified for the study. Research was conducted phase-wise.

In the first phase, exploratory and descriptive study on possibility of establishing linkages with post office in dissemination of IARI technology was done. The post office personnel (n=50) at district, block and villages levels were contacted and interacted to explore the possibility. The analysis of organisational structure of Indian Postal department was also done. The post office personnel were interviewed on the parameters of possible linkage activities, perceived mechanism to establish such linkage and also trend analysis of postal work load since last ten years (since the mobile telephony gained momentum) was also done.

Based on the experiences of first phase, the suitable crops and their varieties were identified and disseminated through postal network in second phase. The analysis of performance of these crops were done in terms of area coverage, yield obtained, total quality produce generated for further use, and their economics for high volume-high value and low volume-high value crops. Post office personnel's and farmers' perception (n=200) were ascertained and correlated to see the degree of convergence. The impact of capacity building programme for farmers and post office personnel was ascertained on selected behavioural dimensions.

The collected data were analysed and treated with descriptive and inferential statistics like rank, percentage, average and rank correlation test to draw meaningful conclusions.

RESULTS AND DISCUSSION

Exploration of linkage opportunity and possible mechanism

Exploratory interaction with the post office personnel helped to identify the entry point for IARI in developing linkages with the post office. These entry points might be at the national level with the Director General, Indian Postal Department, New Delhi with aim to have Memorandum of Understanding (MoU) with postal department regarding IARI-Post office tie-up. Another possible entry point was at the divisional level with Superintendent of post office with the purpose of implementing the above MoU and for holding regular meeting of IARI representative with post office personnel and representative of various other partners. The third entry point could be Branch post office at the village level with the aim of building capacity of Branch Post Master (BPM) and village *pradhan* about IARI technologies and also including BPM as the beneficiary of IARI technology (Fig 1).

The major linkage activities as recognized by the post office personnel were timely delivery of the seed and package of practices posted by IARI to the farmers, regular discussion with the fellow farmers about the package of crop cultivation as sent by IARI, establishing the model demonstration plot by the branch post master for the other farmers and persuasion to the main seed producer farmers to share the produce with other farmers in the village in that order (Table 1).

In order to perform the above functional activities, the required structural mechanism as suggested by the post office personnel included making formal Tie-up with state headquarter (CPMG, Lucknow) through MoU with Director General, Indian Postal Department, New Delhi (Rank I); Deputing permanent representative of IARI at district level to attend the meeting with postal superintendent (Rank II); appropriate training to the Village level BPMs on the aspects of technologies to be transferred (Rank III) and utilizing Branch post office (village level) for database creation, management and marketing on payment basis (Rank IV) (Table 2).

The trend analysis of post office works showed that during last 10 years (with popularization of mobile), there was sharp decline (about 50%) in the mail and delivery of ordinary post. This has happened mostly after the accessibility

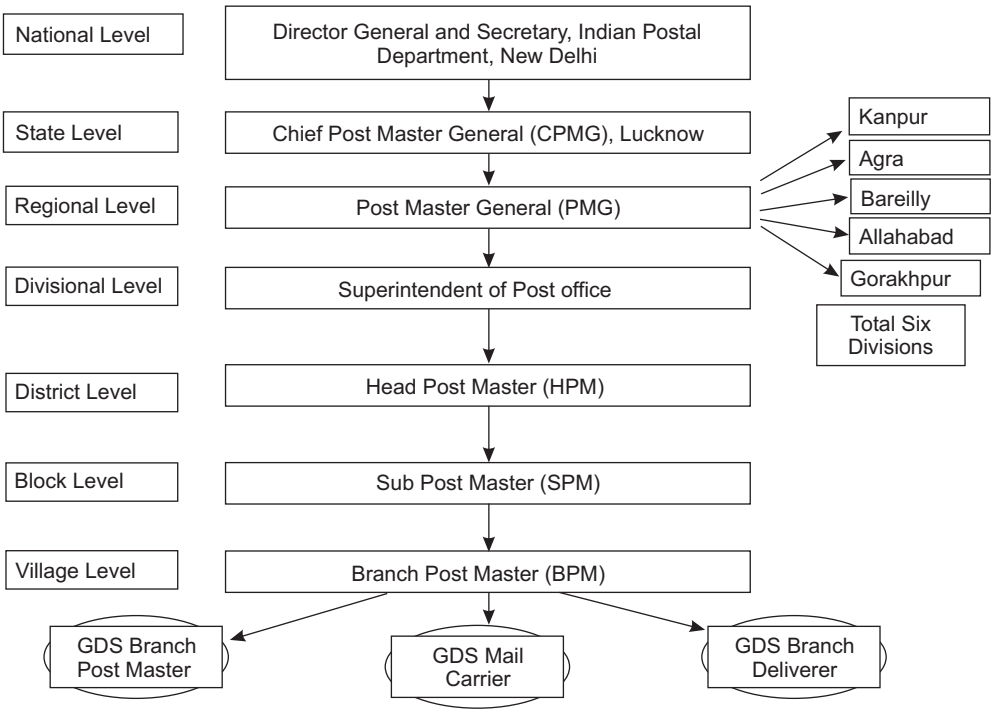

Fig 1 Organization Structure of Indian Postal Department

and affordability of mobile phone by the rural people and hence, the use of postal communication system was reduced to the greater extent. Similarly, the sale of postal stamp and revenue stamp had declined to the same extent. Number of saving account (10%) and recurring deposit holders (50%) showed increasing trends (Table 3). This may be mainly because of the fact that Government of India has implemented various employment generating programmes which ensured the sustained income for rural people. Hence, saving in the form of recurring deposit (RD) showed increasing trend. The collaborative activities with tie-up with other agencies like bank, investment agency, insurance departments, etc had also increased (15–20%). As matter of fact that many private players have ventured into basic postal services through couriers and also the sale of revenue stamps has been outsourced by the postal department, the reason for such trends is comprehensible. Moreover, this particular finding helped to conclude the possibility of establishing and sustaining the linkage with post offices.

Table 1 Major linkages activities to be performed by village level post office as perceived by post office personnel

(n=50)

Major activities	Rank
Timely delivery of the seed posted by IARI to the farmers	I
Establishing the model demonstration plot by the BP master for the other farmers	II
Regular discussion with the fellow farmers about the package of wheat cultivation as sent by IARI	III
Persuasion to the main seed producer to share the produce with other farmers in the village	IV
Creation, maintenance and use of database of IARI technology spread through post office	VI
May serve as the centre of consultancy at the village level on behalf of IARI	V

Dissemination of crop varieties

In the second phase, the IARI technologies which included mainly improved crop varieties were disseminated. In order to identify the suitable crop and their appropriate varieties for the region, exploratory analysis of prevailing

Table 2 Rank order of potential mechanism to involve post office in disseminating farm information as perceived by post office personnel

(n=50)

Perceived mechanism	Rank
Develop tie-up with state headquarter (CPMG, Lucknow) through MoU with DG, IPD, New Delhi	I
Depute permanent representative of IARI at district level to attend the meeting with postal superintendent	II
Village level BPMs may be trained on aspects of technologies to be transferred	III
BPM may also be included as of the stakeholder to act as the gatekeeper	IV
Branch post office (village level) may be utilized for database creation, management and marketing on payment basis	V

Table 3 Trends of major activities performed by the post office

(Based on office records and personal discussion)

Particulars of services	Years (1999–2010)				% increase or decrease
	1999–2001	2002–2004	2005–2007	2008–2010	
Ordinary mail	****	**	*	*	50% reduction
Registered mail	***	***	***	***	No change
Speed post	**	**	***	***	Increase by 10%
Saving accounts	*	**	***	***	Increase by 10%
RD	*	**	***	****	Increase by 50%
Sale of postal /revenue stamp	****	**	*	*	50% reduction
Premium products	*	*	**	**	15% increase
Collaboration	*	*	**	**	15-20% increase

Number of asterisk indicate the greater extent of various services available with the post office

agro-climatic condition in project area was also done. Out of seven selected post offices, the cluster of villages under Manwa and Ambarpur post offices represented lesser resource endowed situation like sandy loam soil with partial irrigation facility through tube-well. Participatory discussion with farmers, therefore, helped to identify the priority crops for *kharif* (mainly *bajra* and long duration pigeonpea), *rabi* (mustard) and summer (vegetables in some patches). Similarly, the catchment area under five post offices namely Gandhauli, Neelgaon, Behma, Rehua and Chaudia Manpara represented fully irrigated situation (through canal as well as tube well) with productive loam soil. Hence, the major crops identified for these areas were paddy and *bajra* in *kharif;* wheat and mustared in *rabi*; and vegetables like bottlegourd, okra, pumpkin, brinjal in summer as well as *kharif* seasons. Besides seeds, the information packages were also sent to the farmers by post. The details of seeds of different crop varieties disseminated through post office have been mentioned in Table 4. The quantum of quality produce obtained through on-farm multiplication of high yielding improved varieties of the above crops is given in Table 5.

The varieties disseminated though post office were

Table 4 Extent of dissemination of various crop varieties through post office

2009-2012

Season	Crop	Varieties	No. of blocks (PO) covered	No. of farmers covered	% received by post office	% returned by post office
Rabi 2009–10	Wheat	HD 2824 HD 2733	07 (50)	78	83.33 (65)	16.67 (13)
Summer 2010	Bottle gourd	Pusa Naveen	03 (30)	50	90 (45)	10 (5)
Kharif 2010	Paddy	PRH 10, P 1121 , P1460 P 992, P 2001,	02 (02)	128	97.65 (125)	2.35 (3)
	Pigeonpea Bajra	Pusa 383, Pusa 443				
Rabi 2010–11	Wheat	HD 2987, HD 2985,	02 (07)	133	99.13 (132)	0.87 (1)
	Mustard	Pusa Jaikishan				
Summer 2011	Okra	A4	02 (07)	150	100	
	Bottle gourd	P. Naveen			(150)	
	Pumpkin	P. Viswas				
Kharif 2011	Paddy	P44, PRH 10, PS5	02 (07)	175	100	
	Bajra	P 383			(175)	
Rabi 2011–12	Mustard	Pusa Jaikisan	02 (07)	140	100	
	Wheat	HD 2733 and HD 2985	02 (07)	160	(140) 100 (160)	
Total			02 (07)	1014		

Table 5 Quality Seed Pool generated for major crops at farmers' level (2010–11)

Particulars	High volume and high value crops		Low volume and high value crop		
	Wheat (HD 2985 and HD 2987)	Paddy (PS 5)	Mustard (P. Jaikisan)	Bajra (P 383, P 443)	Bottle gourd (P. Naveen)
Number of farmers covered (quantity of seed supplied)	103 (1 000 kg)	61 (700 kg)	30 (30 kg)	8 (8 kg)	4
Total area coverage (Acre)	27.20 acre	132 acre	8 acres	3.2 acre	1.0 acre
Average yield obtained	22 q/acre	16.5 q/acre	8 q/acre	7.5 q/acre	130 q/acre
Total quality produce generated	598 q	2 173 q	64 q	24 q	Fruits: 130 q

assessed under different bio-physical situations prevailing at farmers' level. Based on the suitability, farmers are encouraged and facilitated for farmer-to-farmer diffusion of the preferred crop varieties. With reference to the particular case of wheat crop, farmer-to-farmer diffusion of wheat seed is mentioned in Table 6.

Capacity building of the stakeholders

Village level post office staff and the farmers are the main stakeholders in this entire process. It was planned to strengthen their capacity with respect to IARI technologies and their correct use at the farm level. Two days training programme were for the farmers as well as post office staff. For the *rabi* 2010, training programme was conducted for 120 farmers and post office personnel on 21–22 September, 2010 in collaboration with the nearby Krishi Vigyan Kendra at Ambarpur, Sitapur. In this training programme, farmers were exposed to the crop management technologies, integrated nutrient management, integrated disease and pest management and post harvest handling of the related crops. Both class room theory as well as practical hand-on session was kept in the training. Similarly, post office staff were trained to develop and maintain the model demonstration plot at their farm for the benefit of other farmers in their villages. The impact of the training programme was ascertained on the parameters like gain in knowledge level, change in skills and farmers likely adoption of the recommended technologies. Findings are contained in Table 7.

Table 6 Diffusion of quality produce of wheat seeds disseminated through post office

Particulars	Value
Total seed production of wheat during *rabi* 2009–10	195 q
Expected quantity to be used as seed in 2010–11 (@75% of the total produce)	146 q
Expected area to be covered in 2010–11	146 ha
Use pattern of seed produced	
a. Used for sowing in own field	35 (53.8%)
b. Shared with other farmers besides own sowing	15 (23.1%) given to 45 farmers
c. Home consumption	05 (7.7%)
d. Sold in market as seed/grain	10 (15.4%)
Quantitative pattern of produce/seed utilized	
a. Used for sowing in own field + home consumption + sold	30 q + 19 q + 10 q
b. Shared with other farmers and own sowing	42 q (6q +36 q)
c. Home consumption	15 q
d. Sold in market as seed+ grain	30 q (20 q + 10 q)
Area covered	
a. Self	30 ha (32.6%)
b. Shared with others	42 ha (45.7%)
c. Through market (anticipated)	20 ha (21.7%)
Actual percent of total anticipated area to be diffused	63%

Economic viability of the Model

The effectiveness and economics of technology delivery through post office was worked out for relatively high volume crops like wheat and paddy and relatively low volume crops like mustard, *bajra* and vegetables (Table 8).

Table 7 Capacity building of the farmers and post office personnel and its impact

Particulars	Farmers (n=100)	Post office personnel (n=50)
Selected from	From 10 villages under 5 post offices	Village, block, district and *mandal* level
Subject matter covered (KVK, Ambarpur)	Production, protection and post harvest management related technologies for wheat and mustard	
Mode of training (21–22 Sept. 2010)	Combination of classroom and practical demonstration (seed treatment, fertilizer application, soil sampling, etc.)	
Level of knowledge before training		
a. Wheat	56%	50%
b. Mustard	62%	54%
Level of knowledge after training		
a. Wheat	72%	75%
b. Mustard	76%	79%
Gain in knowledge		
a. Wheat	28.6%	50.0%
b. Mustard	22.6%	46.3%

Table 8 Economic viability of seed dissemination through post office (2010–11)

Particulars	High volume and high value crops		Low volume and high value crop		
	Wheat (HD 2985 and HD 2987)	Paddy (PS 5)	Mustard (P. Jaikisan)	Bajra (P 383, P 443)	Bottle gourd (P. Naveen)
Total quantity of seed supplied	1 000 kg	700 kg	30 kg	8 kg	4 kg
Average yield obtained	55 q/ha	42 q/ha	20 q/ha	18.75 q/ha	325 q/ha
Total cost involved (₹)	322 000	1 722 020	52 883	11 168	10 000
Gross return (₹)	711 800 (including value of straw)	3 259 500 (@ ₹ 1 500/q)	172 800 (@ ₹ 2 700/q)	27 888 (including value of stover)	39 000 (@ ₹ 300/q)
Net returns (₹)	389 800	1 537 480	119 917	16 720	29 000
Net return/farmer (₹)	3 784	25 204	3 997	2 090	7 250
Net return/acre (₹)	14 330	11 647	14 989	5 225	29 000
B:C ratio	2.21:1	1.89:1	3.27:1	2.5:1	3.9:1

Findings showed that the post-office model of technology dissemination was economically viable for wheat (B:C ratio 2.21), paddy (1.89), mustard (3.27), *bajra* (2.5) and bottle gourd (3.9).

Perception of the partners

The perception of farmers and post office personnel's showed that post office personnel felt that through post office, the timely delivery of seed to the remotely located farmers was possible as well as the small and poor farmers may covered through this approach who otherwise are left in target oriented input delivery system by other public extension systems (Table 9). On the other hand, farmers expressed that post office was the better alternative to private seed agencies and they also supported the possibility of timely delivery of seed through post office. The rank order correlation coefficient (r=0.695) was found significant ($P<0.01$) which showed the convergence of the perception of both the partners involved in this approach.

Cost sharing for sustainability

In order to make this linkage model self sustaining, cost sharing approach in technology dissemination through post office was adopted since *kharif* 2011. Farmers' shared 50% of the cost for paddy, wheat and mustard during *kharif* 2011 and *rabi* 2011-12. As a result, a sum of ₹ 38 600 was generated. Farmers felt this approach more practical, meaningful and giving sense of ownership in the seed received by them. The economics of cost sharing approach for high volume (wheat) and low volume (mustard) crop has been given in Table 9 for first year. From the season *kharif* 2012, farmers have agreed to pay 100% seed cost. Thus, the approach seems to be economically viable and hence, it needs to be validated on large scale.

Operational model evolved

Based on the experiences of the action research, an operational model was evolved which may be treated as the standard yard stick for using post office as the means of technology dissemination by other institutes/agencies/ departments.

The operational model (Fig 2) of linkages with post office was developed which may operate at three levels. At the first level, farmers' awareness about IARI technology could be enhanced by systematically analyzing the prevailing cultivation practices and technology use gap and subsequently, timely sending them the seed of suitable variety with packages. At the second level, knowledge and

Table 9 convergence of the perception of farmers and post office personnel

Perception	Post office personnel (n=50)		Farmers (n=200)	
	% response	Rank	% response	Rank
Timely delivery of seed to remotely located farmers	85	I	92.00	II
The approach is less costly	45	VI	66.67	VI
Large number of farmers could be covered by this approach	60	IV	80.00	V
Better alternative of private seed agencies	75	III	93.33	I
Other inputs (biofertilizers, plant protection chemicals, etc.) may also be supplied	50	V	70.67	VII
Small and poor farmers can be covered through this approach	80	II	86.67	III
Post master needs to pay more attention for success of this approach	80	II	84.00	IV
Rank correlation coefficient (r)			0.695* (P<0.01)	

Table 10 Economics of seed dissemination through post pffice on cost-sharing basis

Particular	High volume crop (Wheat HD 2733)		Low volume crop (Mustard P. Jaikisan)	
	Cost shared up to 50%	Cost shared up to 100%	Cost shared up to 50%	Cost shared up to 100%
Seed quantity sent	14 q (14 ha, 140 farmers)		1.4 q (08 ha, 70 farmers)	
Seed sown per farmer	10 kg (1 000 m^2)		2 kg (4 000 m^2)	
Total Seed cost (₹)	42 000		9 520	
Postal cost (₹)	17 640		1 764	
Total cost (A)	59 640		11 284	
Average Yield (q/1 000 m^2)	5.5		2.5	
Gross return (₹/1 000 m^2)	6 600 (@ Rs 1 200/q)		6 250 (@Rs 2 500/q)	
Cost of production (₹/1 000 m^2)	3 000	1 371		
Seed cost shared/farmer (₹)	213	426	81	162
Total cost accrued (₹/1 000 m^2)	3 213	3 426	1 452	1 533
Net return (₹/1 000 m^2)	3 387	3 174	4 798	4 717
B:C ratio	2.05	1.92	4.3	4.1

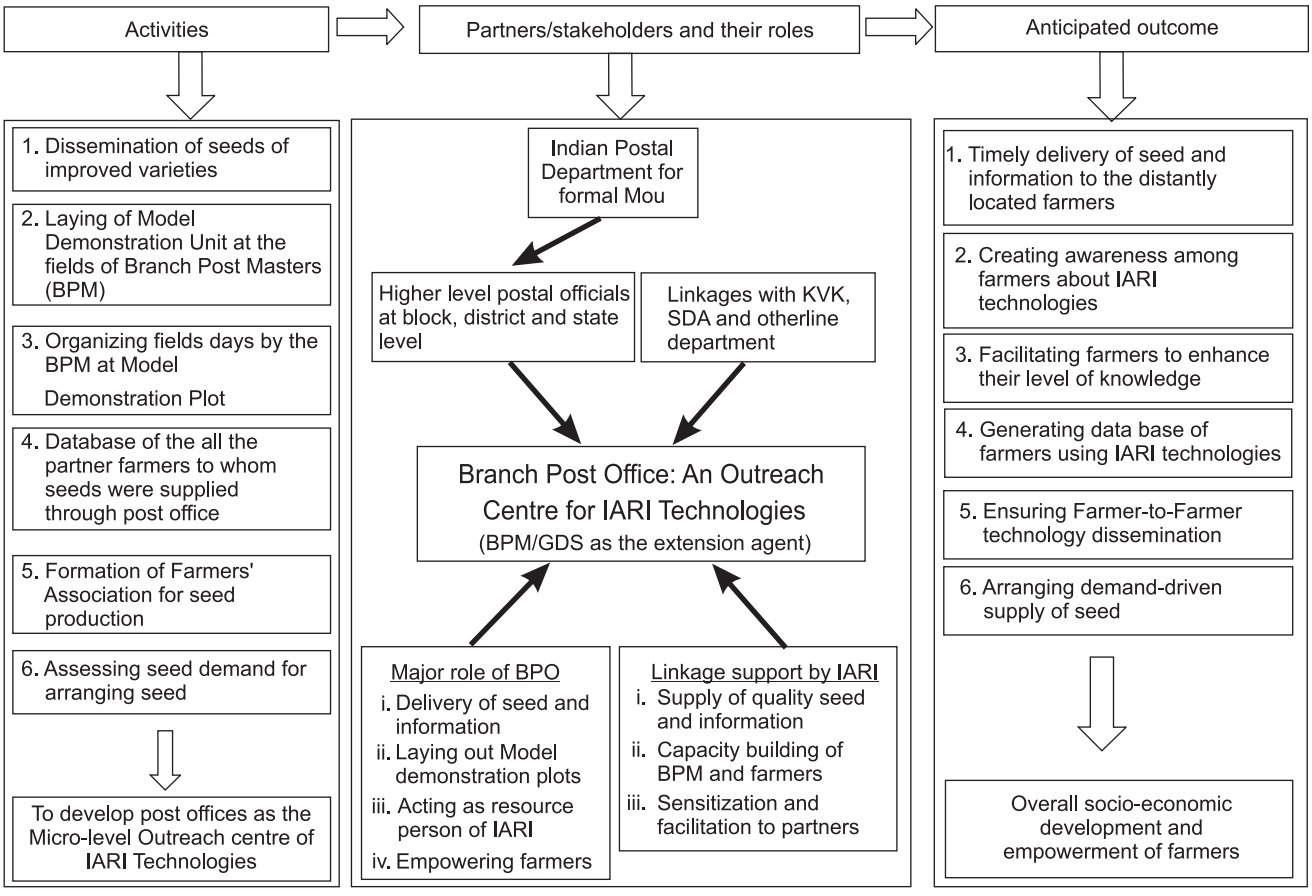

Fig 2 Operational model for dissemination of agricultural technologies through post office

skill gap of farmers could be minimized and farmer-farmer diffusion of quality seed and knowledge may be ensured through appropriate training to GDS and identified key-farmers to develop them as resource person for other farmers (for seed, knowledge, etc.). At the third level, farmers' capacity could be further built by strengthening their linkages with local KVK, SDA and other related agencies operating in that area.

The experiences gained in the above study emanate the potential roadmap for strengthening public-public linkage for farm technology dissemination in India. This model is particularly relevant in Indian context as most of the Indian farmers are operating from the remote villages where no other system to contact them operate, except for the post office. Moreover, the proposed model of institute post office linkage may be evolved as the valid first line transfer of technology model for large number of ICAR institutes working on various crops and commodities with national mandate but having limited manpower and other resources for transfer of technology.

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