Impact Assessment of Agricultural Extension Reforms in Bihar

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ABSTRACT

The study was conducted to assess the impact of NATP in Bihar's perspective. Data were generated from 540 farmers over a period of three year (2005 to 2007). Results of extension reforms have demonstrated improvement in the extension systems which have taken keen initiatives in development process. During NATP period ATMA have been able to generate some financial resources and develop infrastructure to facilitate the trainings. Study reveals that scientists have become more responsive to the needs of farmers and have sharpened their focus of research to meet location-specific requirement of different farmers. Need-based training and exposure visits to farmers and farmer-led extension have played a very effective tool for technology dissemination. There has been considerable improvement in adoption of new technologies and farm practices by all categories of farmers. Technological interventions made by NATP could substantially increase the income of all sections of farmers. It is also noted that NATP was not started in all districts at a time. Hence, all districts did not get same results. Therefore, it can be concluded that pilot testing of this experiment shows quite encouraging results. The indigenously developed concept of innovative transfer of technology in an integrated manner can be adopted in state and can be the integral part of national policy.

Keywords: NATP; Need-based training; Exposure visits; Technological interventions;

*E*xtension is presently an object of reform, while continuing to be an increasingly important engine for knowledge, innovation and development *(Rivera and Sulaiman, 2009)*. Extension is often viewed as comprising public, private and semi-public systems that make up a multi-institutional, multi-sectoral pluralistic system. Also, views on extension have changed in emphasis from agricultural production to helping farmers organize themselves, and most recently to the linking of farmers to markets *(Swanson, 2006; Shephered, 2007)*. India's main extension system is primarily responsible for delivery of technical message which is being operated by Department of Agriculture (DoA) through state, district and block level machinery. However, research institutes and agricultural universities also play a limited role in extension services. During mid-90s, Government of India (GOI) and World Bank explored a new approach to address the prevalent problems and constraints of extension system. As a result, a new decentralized extension approach which emphasized more directly on agricultural diversification and increasing farm income and rural employment came into existence. The ATMA model was pilot-tested through Innovations for Technology Dissemination (ITD) component of the World Bank funded, National Agricultural Technology Project (NATP) that became effective in 1998 and concluded in June 2005. As a follow up action on success of ATMA model under ITD component of NAIP, GOI has initiated new centrally scheme on Support to State Extension Programmes for extension reforms, and had funded setting up of ATMA in all 588 rural districts. Scientific study of the technology transfer system is essential for making future program more effective. Significance of NATP is widely known. *Prakash and De (2008)* reported that due to technological interventions through ATMA, majority of respondents had medium knowledge about bee-keeping and a significant association between knowledge and independent variables viz., age, education, family type, family size and sources of information utilized was observed. Therefore, it was thought essential to measure the impact of ATMA model established under ITD component of NATP in Bihar. The specific objectives were: (i) comparative analysis of impact indicators in NATP and non-NATP districts (ii) to understand the research-extension-farmer interface, and (iii) to study the level of diversification, adoption of technology and change in crop yields in the study of locale.

METHODOLOGY

Impact assessment was conducted at process and outcome level of NATP. The impact indicators which were included in the investigation were research-extension-farmer linkage, level of diversification and adoption of technology and change in crop yields. Target farmers were compared for pre and post-technological intervention over three years from 2005 to 2007, with 2005 as the base year and 2007 as the current year. To facilitate such temporal comparison of agro-economic situations facing target farmers, baseline and impact assessment surveys were conducted. To provide reflections upon NATP districts, farmers of non-NATP areas also included in sample. The study was conducted through pre-tested and semi-structured interview schedule. Sample units were selected through multi-stage stratified random sampling method. In order to have a comparative picture of temporal changes in NATP and non-NATP, a set of households were selected. For comparison, three villages equidistant from three circles / clusters of equal distance from non-NATP districts were selected randomly as control. From each NATP districts, 9 representative villages (3 villages from each of three equidistant blocks) and 15 farmers (from each selected villages) representing different land holding classes were selected randomly. Similarly, 15 farmers from each selected villages from non-NATP district, representing different farm-size classes were selected as control. A total of 540 farmers (405 from NATP districts and 135 from non-NATP districts) responded for this investigation.

RESULTS AND DISCUSSION

Comparative analysis of impact indicators: Comparative analysis of impact indicators in NATP and non-NATP districts have been presented in Table 1. The analysis reveals that average operational land holding was observed to be largest in Munger (3.02 ha) and smallest in Madhubani and Patna in case of NATP district. Banka (3.48 ha) being the largest in non-NATP district whereas Nalanda and Darbhanga are being the smallest. Over period, size of operational holding has marginally increased in Munger (0.48 ha) followed by Madhubani and Patna district. Proportion of irrigated gross cropped area show that Madhubani and Patna district had relatively higher irrigated area compared to other districts. Study shows an increase in irrigated area in both NATP and non-NATP districts. Change in cropping intensity indicates that it increased marginally in both NATP and non-NATP districts but this increase was higher in NATP district Munger than in any non-NATP district. This can be attributed to the fact that in NATP districts, efforts were made to introduce new crops, especially horticulture crops while in non-NATP districts efforts were made by various

Table 1 Comparative study of impact indicators in NATP and non-NATP districts (N=540).

	NATP District			Non-NATP District		
	Patna	Munger	Madhubani	Nalanda	Banka	Darbhanga
Average operational land holding per household (ha)						
Baseline	2.04	3.02	2.04	2.18	3.48	2.18
Current	2.22	3.5	2.22	2.18	3.48	2.18
Change	0.18	0.48	0.18	-	-	-
Irrigated area (% of gross cropped area)						
Baseline	93.5	65	93.5	92.6	90	92.6
Current	97.3	83.7	97.3	97.7	94.6	97.7
Change	3.8	18.7	3.8	5.1	4.6	5.1
Cropping intensity (%)						
Baseline	199	147	199	185	185	185
Current	200	187	200	191	200	191
Change	001	040	001	006	015	006
Gross sown area under horticulture						
Baseline	7.5	4.5	3.31	14.58	-	0.61
Current	11.42	4.0	17.57	30.60	-	3
Change	3.92	(-) 0.5	14.26	15.62	-	2.39
Households associated with farmers organizations (%)						
Baseline	-	-	-	-	-	-
Current	38.90	28.9	60.23	-	-	-
Change	38.90	28.9	60.23	-	-	-
Base year 2005; Current year 2007						

on-going programs but were relatively weak and also major focus was on superior cereals. Extent of diversification was assessed through comparing cropping pattern across pre and post-NATP situations. On an average, some shift in cropped area under horticulture was noticed in both NATP and non-NATP districts. But across districts, shift was relatively higher in NATP districts than non-NATP districts in the state. However, across different NATP districts, net shift area was quite high in Madhubani (14.26 %) as compared with Nalanda (non-NATP districts) where cropped area shifted by 15.62 %. Investigation also reveals that majority of households in NATP districts were associated with farmers' groups / organizations as NATP approached group approach rather than individual. Madhubani district had highest (60.23 %) households associated with farmers organizations followed by Patna (38.90 %) and Munger (28.90 %).

Research-extension-farmers linkage: Improving research-extension-farmer linkage was one of the objectives of NATP. To attain this objective a number of steps were taken in addition to in-built institutional and operational mechanism. ATMA Governing Board (AGB), ATMA Management Committee and (AMC) and Block Technology Team (BTT) provided robust mechanism for regular interface among scientist, extension functionaries and farmers. In addition, joint workshop and training programme were organized. Moreover, scientist and extension officers were sensitized to interact regularly with farmers in order to obtain feedback on research and extension activities. Study attempted to assess two-way linkage between farmers, extension officers and scientists at different levels. Two-way interaction between farmers, extension officers and research scientists of KVK, SAU and Zonal Research Station (ZRS) increased during NATP period.

Table 2. Research-extension-farmer interface

Particulars	NATP districts (%)			Non-NATP districts (%)		
	Baseline	Current	Change	Baseline	Current	Change
Farmers visit to extension officers and scientists						
Village extension workers	10.28	28.72	18.44	6.81	12.12	5.31
Block level line department officers	13.82	50.35	36.53	1.51	10.61	9.1
District level line department officers	3.90	26.95	23.05	-	9.09	9.09
Non-governmental organizations	-	6.38	6.38	-	-	-
Extension staff of agri-business firms	11.70	29.43	17.73	2.27	36.36	34.09
Scientists of KVK/SAU/ZRS	10.28	31.20	20.92	2.27	3.78	1.51
Extension officers and scientists visiting at farmers field						
Village extension workers	8.10	31.56	23.46	3.03	8.33	5.30
Block level line department officers	12.05	51.06	39.01	0.75	3.03	2.28
District level line department officers	3.50	30.14	27.64	-	2.27	2.27
Non-governmental organizations	-	7.09	7.09	-	-	-
Extension staff of agribusiness firms	1.77	26.95	25.18	1.51	6.06	4.55
Scientist of KVK / SAU / ZRS	5.31	23.04	17.73	-	1.51	1.51

Base year 2005; Current year 2007

ATMA Governing Board and management committee provided common platforms for regular and face-to-face interaction among scientists, extension functionaries, and farmers. On one hand, it improved awareness level of farmers and on or, scientists' and extension personnel understood of farmers' needs and problems.

Diversification of farming system : Through ATMA's field activities major emphasis was laid on diversification of farming system as a strategy for risk management and sustainable income for farmers. Farmers were motivated and trained through trainings, exposure visits to successful sites within and out of state and suitable demonstrations on latest recommended technologies.

Study reveals that existing farming systems were diversified by inclusion of animal husbandry/dairying, horticulture, fisheries, goat rearing, poultry and bee keeping (Table 3). Such a high level of change is attributed mainly to shift from food crops to horticulture crops due to introduction of scientific cultivation of medicinal and aromatic plants, vegetable farming, floriculture and vermicomposting by a large number of farmers. Diversification initiatives yielded very positive results in Patna and Madhubani districts as about 33.67 % farmers in Patna district started horticulture activities whereas in Madhubani district a major change consists of horticulture and dairy along with fish farming.

Table 3. New enterprises introduced in farming system under NATP and non-NATP districts.

Particulars of new enterprise	NATP Districts (%)			Non-NATP Districts (%)		
	Patna	Madhubani	Munger	Nalanda	Darbhanga	Banka
Animal husbandry	25.00	10.8	32	2.20	17.80	-
Vegetable cultivation	8.69	10.8	25.8	28.90	-	-
Horticulture	3.26	-	1	-	-	-
Fisheries / duckery	-	7.5	1	-	-	-
Bee-keeping	2.17	4.30	-	-	-	-
Vermi-compost	4.34	-	1	-	-	-
Management of nursery farm	5.43	-	1	-	-	-
Aromatic and medicinal plants	8.69	-	-	-	-	-
Floriculture	3.26	-	-	-	-	-
Exotic vegetables	2.17	-	-	-	-	-

Table 4. Farmers adopting improved technologies in NATP and non-NATP districts.

Adoption of technologies	NATP Districts (%)			Non-NATP Districts (%)		
	Patna	Madhubani	Munger	Nalanda	Darbhanga	Banka
Zero tillage technology	8.7	-	11.3	-	-	-
IPM in paddy	2.3	-	-	-	-	-
Scientific cultivation of fruits	-	5.4	2.1	-	-	-
Fodder production technology	-	1.1	1	-	-	-
Fish production technology	-	1.1	-	-	-	-
Scientific dairy farming	-	1.1	-	-	-	-
Makhana production technology	-	1.1	-	-	-	-

Table 5. Change in crop yield in NATP and non-NATP Districts.

Crop (q / ha)	NATP districts (%)			Non-NATP districts (%)		
	Baseline	Current	Gain	Baseline	Current	Gain
Paddy	31.05	33.65	2.60	35.53	36.26	0.73
Wheat	29.99	32.10	2.11	30.01	27.09	(-)2.92
Maize	56.82	56.00	(-) 0.82	48.23	48.80	0.57
Potato	172.40	175.22	2.82	195.90	184.83	(-)11.07
Tori	9.55	9.99	0.44	4.35	9.00	4.65
Onion	190.40	205.70	15.30	123.30	157.16	33.86
Yellow sarson	13.43	14.43	1.00	8.50	8.96	0.46
Lentil	11.45	11.71	0.26	10.90	10.22	(-)0.68
Gram	11.21	9.64	(-)1.57	10.56	8.89	(-)1.67
Lathyrus	10.8	12.40	1.60	-	-	-
Brinjal	222.44	214.34	(-)8.10	-	-	-
Cauliflower	199.40	202.46	3.06	-	-	-
Bhindi	101.12	140.65	39.45	-	-	-
Moong	11.09	11.46	0.37	5.55	10.41	4.86
Sugarcane	576.55	500.00	(-)76.55	-	-	-
Arhar	15.60	13.84	(-)1.76	-	-	-

Base year 2005; Current year 2007

Table 6. Annual total income (in Rs.) of sample households.

District	NATP districts			Non-NATP districts		
	Baseline	Current	Net gain (%)	Baseline	Current	Net gain (%)
Patna	99462	107312	7850 (7.89)	117763	124299	6536 (5.55)
Munger	111223	116602	5379 (4.83)	118230	121535	3305 (2.79)
Madhubani	56463	74355	17892 (31.68)	44632	55096	10464 (23.44)
Overall	89049.33	99423	10373.66 (11.64)	93541.66	85331	6768.33 (7.23)

Base year 2005; Current year 2007

Adoption of new technologies / practices: NATP put ample efforts in promoting sustainability through enhancing environment friendly technologies as well as latest improved farm practices (Table 4). Some of these include

adoption of zero tillage technology, integrated pest management, scientific cultivation of fruits, fodder production technology, fish production technology, and scientific dairy farming and makhana production technology. A number of training programs and exposure visits for farmers were conducted through ATMA initiatives to promote these technologies / practices. IPM practices have quite wide acceptability among farmers in NATP districts. Zero tillage has become quite popular in Munger and Patna districts and has been accepted by farmers as a measure for sustainability and cost reduction.

Change in crop yield in NATP and non-NATP Districts: Increase in crop yield have been presented in Table 5. Adoption of various improved technologies and farm practices has resulted into yield enhancement in both NATP and non-NATP districts. However, increase in yield was higher in NATP districts due to several interventions made by NATP. Diversified farming system and adoption of improved farming technologies / practices and increased crop yield which resulted in increase of income. Average / household's total annual income is given in table 6. On an average, annual income in initial period was relatively high i.e. Rs. 93541.66 in non-NATP districts compared to NATP districts (Rs.89049.33). On an average, income of a household increased by more than 11 % in NATP districts as compared to 7.23 % in non-NATP districts. Incremental income owes to rise in crop yield as well as shift in cropping pattern towards high value crops. This clearly shows that strengthening / improvement in process of existing extension system were able to reduce adoption lag and people could diversify their income sources. However, increase in income was higher in those districts which were highly developed and base-income was already quite high. However, farmers in non-NATP districts were also experienced an overall 7 % increase in household income.

CONCLUSION

During NATP period ATMA have been able to generate some financial resources and develop infrastructure to facilitate trainings. Role of information technology was also realized by NATP and good infrastructure has been created at many places. Farmers' response was found to be quite encouraging. However, relevant information relating to improved technologies and farm practices need to be provided in local languages for easy diffusion of knowledge. Information per se is necessary but efforts have to be made to convert them into enhancement of knowledge base. Study reveals that scientists have become more responsive to needs of farmers and have sharpened their focus of research to meet location-specific requirement of different farmers. Need-based training and exposure visits to farmers and farmer-led extension have played a very effective tool for technology dissemination. There has been a considerable improvement in adoption of new technologies and farm practices by all categories of farmers. It is fact that NATP was not started in all districts at same time; hence, all districts did not demonstrate their performance equally. Madhubani district performed well as it started functioning early. The interventions made in NATP for improving and strengthening process could substantially increase the income of farmers in NATP districts and almost all sections of farmers were benefited. Spill over effect of these interventions was seen in nearby districts also. Overall, it can be concluded that pilot testing of this experiment shows quite encouraging results and should be started in whole state. Results indicate that this indigenously developed concept of innovative transfer of technology in an integrated manner can be adopted in state and can be the integral part of national policy.

REFERENCES

1.   Prakash, S. and De, D. (2008). Knowledge level of ATMA beneficiaries about bee-keeping. *Indian Research Journal of Extension Education*, **8** (2&3) : 62-64.

2.   Rivera, W. M . and Sulaiman, V. R. (2009). Extension: object of reform, engine for innovation, *Outlook on agriculture*, **38** (3) : 267-273.

3.   Swanson, B. E. (2006). The changing role of agricultural extension in a global economy. *Journal of International Agricultural and Extension Education*, **13** (3) : 5-18.

4.   Shepherd, A. W. (2007). Approach services, FAO, Rome.

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