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THE EFFECT OF CHANGING DIMENSIONS OF EXTENSION ON CROP DIVERSIFICATION IN KIRINDI OYA IRRIGATION AND SETTLEMENT PROJECT: A CASE STUDY

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ABSTRACT

A crop diversification (CD) program was carried out from 1990 to 1994 at Kirindi Oya Irrigation and Settlement Project (KOISP) to solve the problem of water shortage. This study was carried out to analyze and compare the extension approaches of two phases (1989 to 1991=phase I, 1992 to 1994=phase II) using extension dimension (characteristics) methodology to compare the impact of extension activities on progress of crop diversification and to make recommendations for an appropriate extension approach for similar situations. The data were collected on extension planning, extension activities, and the progress of crop production for the period of 6 years (1989 to 1994). The results showed that the extension approach in phase I was based on technology transfer and had the dimensions (characteristics) of "all households", "information dissemination only", "individual farmer based" and "top down". However the approaches in phase II had the dimensions of "groups", "input supply also", "problem solving", "target category" "organizations" and "bottom up"., successful results on crop diversification (CD) were achieved due to the changes of extension dimensions in phase II. The results revealed that an extension approach for CD program should contain extension dimensions; "towards target categories", "organizations", "group based", "bottom up" "problem solving" and "input supply".

KEYWORDS: Crop diversification, Agricultural extension Bottom up approach, Extension dimension, Farmer participation.

INTRODUCTION

The goal of agricultural extension is to influence farmers to change their behavior to improve farming practices. The extension activities depend on what factors lead to change farmers' behavior and what factors that prevents changes taking place (Garforth, 1996). Therefore, agricultural extension would take different characteristics from place to place and time to time according to the socio-economical situation.

Parallel to the development of various definitions on agricultural extension, a variety of extension systems have emerged bearing different approaches (the style of action within an extension system; Contado, 1990). As each extension approach has specific characteristics, there should be a way to identify and compare them from one another. Axinn (1988) classified all extension systems into eight extension approaches. Roling (1995) introduced five extension dimensions to describe an extension approach. Garforth (1996) analyzed extension approaches by using eight non-dichotomous dimensions such as enterprise, clientele, influence, objectives, scale, scope, payment and

direction. In this context, each dimension is divided to five positions, A to E, where A and E represent the extreme ends of the dimension and B, C and D represent the intermediate combinations. Using this dimension methodology, any extension approach can be characterized enabling it to compare with another approach.

According to Chambers (1997), the extension systems could take characteristics from top down, technology transfer mode to bottom up, participatory mode. Accordingly, various extension systems with different approaches can be seen in Sri Lanka. Among them, Department of Agriculture (DOA) provides extension service for food crop sector and Department of Animal Production and Health (DAPH) for animal production sector. There are separate commodity extension services for crops such as Tea, Rubber, and Coconut, etc. The DOA practiced Training and Visit (T and V) extension system until 1994. The 'T and V' extension system had characteristics of progressive farmer based technology transfer activities, regular field visits and trainings, uniform extension activities, impact points-based extension messages, extension research linkages through formal meetings and attending only for technical matters (Wijeratne, 1988). There was a reduction of field visits and trainings after 1989 due to removal of field staff from DOA. The extension system of DOA was changed into an integrated extension system in 1995. In particular, at Kirindi Oya Irrigation and Settlement Project (KOISP) of Sri Lanka where the study was conducted, the extension approach was changed again during 1992 (Ranjith, 1993), to provide better services to farmers. Therefore, there were two different extension approaches during the period of 1989 to 1994 at KOISP.

The KOISP is a water-short irrigation project, yet almost all the farmers wanted to cultivate paddy whenever they get irrigation water. Severe conflicts emerged among farmers on water issues, hence the project management committee decided to implement crop diversification (CD) programs in 1990 (IIMI, 1992). Under this program, farmers were encouraged to cultivate other field crops (OFCs) under irrigation in well-drained soils during both *yala* and *maha* seasons instead of paddy farming.

The objectives of this study were to analyze and compare these two extension approaches using extension dimension methodology and the impact of extension activities on progress of crop diversification and to recommend an appropriate extension approach for CD programs in similar situations.

MATERIALS AND METHODS

The case study was done at KOISP in the Hambantota district of Sri Lanka during the period 1989 to 1994. This project comprises 4800 ha of old

irrigable lands, 5200 ha of newly developed irrigable lands and a large reservoir. The old paddy tracts are situated in the lower levels of the project with poorly drained soils. Conversely, the newly developed lands are located in the higher levels and major portion of them are well-drained soils. About 5200 farm families were settled in the new area and each family was given with one ha of irrigable land.

The study periods were the phase I from 1989 to 1991, and phase II from 1992 to 1994. The information needed to characterize extension approach and performances of crop production were collected. The information were collected on extension planning or who and how it planned, details of extension activities such as demonstrations, field days, field tours, farmer training classes and how these activities were conducted. The data on paddy and OFC in the old and new areas, crop extents under non-conventional water sources and farmer participation on such kinds of production methods were collected on a seasonal basis. The sources of data were monthly progress reports of agricultural instructors (AIs) of KIOSP, seasonal progress reports of subject matter officers in the inter-provincial office of Hambantota, project management committee reports of KOISP in the Irrigation Management Division (IMD) at Lunugamvehera and reports of International Water Management Institute (IWMI), Colombo.

RESULTS AND DISCUSSION

During phase I, the Assistant Director of Agriculture (ADA) and Agricultural Officer (AO) prepared extension plans with the help of Subject Matter Officers (SMOs) based on the project goals and the field problems obtained through Agricultural Instructors (AIs) (Ranjith, 1997). During phase II, ADA participated in the technical committee (TC) to prepare a water allocation plan and the seasonal agricultural production plan (IIMI, 1993). Suggestions and ideas of AIs, farmer representatives (FRs) and innovative farmers were also considered at technical committee to prepare the production plan (Ranjith, 1993). The draft seasonal extension plan was prepared by the ADA, AO and SMOs, according to the production plan and also on the information of AIs and the innovative farmers. This plan was tabled at PMC for approval (Ranjith, 1997).

During phase I, irrigation plan was made by the ID officials based on the availability of water (IIMI, 1992). Therefore, there was no proper cultivation plan at the beginning of the season. However, as mentioned previously, senior extension officers participated in the resource planning activities by attending to TC and project management committee (PMC) during phase II. They guided TC to accommodate appropriate cropping systems into the project area, to make maximum utilization of available water and other resources (Karunasena, 1993). As a result, farmers of the project

area know their allocated cropping sequences in advance, so that they could get ready to carryout agricultural activities. Extension officers gave information and encouragement to all officers and farmer representatives to carry out seasonal plan and maximum utilization of scarce water resource in the project during phase II. There were no such activities during phase I, but only DOA had carried out technology transfer activities in agriculture (Ranjith, 1997). Impact points (IP) are the areas of concern to improve its existing situation in agriculture. During phase I, ADA and AO had selected major IPs and applied them throughout the project area. However, during phase II, in addition to the major IPs, location specific issues were also considered (Ranjith, 1997). Therefore, phase I had a more or less uniform extension program for every AI but during phase II AIs had location specific extension activities too (Progress reports, DOA).

Extension officers visited fields 3 to 4 days per week to carryout various extension activities during both phases. However, during phase II, extension officers informed relevant FRs about their field visit schedules. Three kinds of officer trainings such as bi-weekly training, pre-seasonal training and special training were carried out at both phases in a similar manner. Targets of farmer training (FT) were given to AIs under each impact point. During phase I, AIs informed farmers to attend FTs. Senior extension officers selected training topics and assigned the subject matter of the training classes (Ranjith, 1997). During phase II, FRs also allowed to select the training topic. In addition, AIs forwarded training schedules to sub project management committees (SPCs). The FRs informed other farmers to attend FTs during phase II (Ranjith, 1997).

Targets of field days (FD) and farmer field tours (FFT) were given to AIs on each impact points at both phases. But, phase II had farmer participation on planning of these activities. The AIs selected contact farmers (CF) to hold demonstration activities on the basis of their capacity to do such activities. During phase II, even though FRs selected CFs, final selection was done by AIs (Ranjith, 1997). Extension officers did not participate in input supply activities during phase I. However, considering the difficulties of obtaining quality seeds of other crops, some amount of seeds was distributed through AIs during phase II. Senior extension officers coordinated the input supply also during this phase (Progress reports, DOA).

Extension duties of phase I were limited to technology transfer activities. However, during phase II, commodity groups also were formed by AIs in a tract basis as an additional duty (e.g. Red onion producing groups, shallow well farmer groups etc.). Research and extension dialogue at 2 to 3-month intervals and regional technical working group meetings at 6-month

intervals were conducted to ensure linkages between extension and research. In addition, research officers were invited to fields along with the extension officers to observe important issues. Therefore, phase I and II were similar in this aspect (Progress reports, DOA). The impact of changing extension approach on farmer participation in extension activities, input supply and the progress of CD is given below.

Farmer participation in extension activities (Farmer's attendances on FTs and FDs) were higher during phase II than that of phase I (tables 1 and 2). The χ^2 statistical test was employed to test the significance of farmer attendance in extension activities between two phases for *yala* and *maha* seasons.

Table 1, Farmer's attendance (average) attendance for various extension activities during *yala* seasons at KOISP (Source- Progress reports, DOA).

Extension activity	1989	1990	1991	Average phase I	1992	1993	1994	Average phase II
FT	16	21	23	20	25	30	31	29
FD	20	18	16	18	21	32	32	28
FFT	34	27	29	30	25	38	27	30

Degree of freedom=2, Table value of $\chi^2 = 5.991$, Observer χ^2 value = 1.07; FT= farmer trainings; FD= field days; FFT= farmer field tours

The analysis did not show a significant difference between the above mentioned two phases pertaining to farmer attendance in extension activities in both seasons. However, the improvement of farmer attendance in phase II may be due to higher relevance of those activities to farmers since farmer representatives participated in planning of those activities during this phase. Farmer representatives invited fellow farmers to attend such activities during phase II. This made more social acceptance for farmers to attend on FTs and FDs. However, there was no difference in farmer attendance in FFTs since this was done in a small scale so that only a few and interested farmers were selected for the tours during both phases. Since farmer attendance was higher in extension activities during phase II, one could assume that there was a higher rate of technology dissemination in phase II than during phase I.

During phase I, when the irrigation authority felt that there was no sufficient water for paddy cultivation, CD was started abruptly. This caused difficulties in obtaining inputs for farmers, especially quality seeds. However, during phase II, areas of CD were identified in advance (Ranjith, 1997). The DOA had coordinated input supply and sold some amount of seeds to farmers through AIs. Self-seed production activities were also promoted during phase II to solve the problem of shortage of seeds (Progress Reports, DOA).

Table 2, Farmer's attendance (average) for various extension activities during *maha* seasons of KOISP (Source- Progress reports, DOA).

Extension activity	1989/90	1990/91	1991/92	Average phase I	1992/93	1993/94	Average phase II
FT	18	19	19	19	27	32	30
FD	17	13	24	18	31	32	32
FFT	0	0	28	28	33	37	35

Degree of freedom=2, Table value of $\chi^2 = 5.991$, Observed χ^2 value = 0.366; FT= farmer trainings; FD= field days; FFT= farmer field tours.

The extent of CD at each season could not be compared merely since the seasonal conditions such as availability of irrigation water, cultivated tracks, farmer communities, crop damage by animals, etc were different among seasons. During 1990 and 1991 irrigation water was issued to several tracts to carry out CD, resulting higher CD extents. The years 1992 and 1993 were dry thus, the available limited amount of water was used to produce paddy at poorly drained old paddy tracts. However, extension approaches of phase II allowed to test, and introduce local and conventional technologies such as dug-well irrigation, rain-fed OFCs and OFCs under remaining soil moisture, etc and have given better results. Cultivation of OFCs under available soil moisture and *yala* rains were practiced in a small scale during 1992 *yala* in an old paddy tract, achieved success (IIMI, 1993). This practice was implemented in large scale in 1993, a water deficit year and better results were achieved (table 3).

Dug-well irrigation was introduced for OFCs in 1992, and satisfactory results were achieved during 1992 and 1993 (table 3). The OFCs were cultivated under *maha* rains in irrigable well-drained lands (table 4). This was a result of such introduction into seasonal agricultural production plan during phase II. Table 3 and 4 shows that the percentage of diversified crop extents was higher during phase II than that of phase I, which was a result of the impact of different extension efforts on CD during phase II. All these forms of OFC cultivation reduced during 1994 due to high water availability, committing farmers to do paddy cultivation.

Analyzing and comparing two extension approaches

Efforts were made to compare the two phases with the model developed by Garforth (1996).

Enterprise – Since extension support was limited to paddy and other crops during both phases, this approach did not come under the whole farm. On the other hand, it was not a commodity approach since extension supports were given on broad aspects of farming of food crops. Therefore, in both phases, this dimension falls in between and at C level (table 5).

Table 3. Progress of crop diversification in KOISP during *yala* seasons (Source - Progress reports, DOA).

Item	1989	1990	1991	1992	1993	1994
Total paddy extent (ha)	5316	3526	3816	1070	1862	8958
Extent of irrigated OFCs (ha)	46	248	239	0	95	38
Extents of OFCs under remaining soil moisture (ha)	0	0	0	95	945	42
Extent of OFCs under dug-wells (ha)	1	1	1	66	83	1
Extent of banana (ha)	6	36	48	74	100	126
No. of farmers engaged in dug wells	1	1	1	230	260	10
No. of banana farmers	44	128	186	224	353	403
Total extent diversified (ha)	53	285	288	235	1223	206
Total extent cultivated (ha)	5369	3811	4104	1305	3085	9164
CD extent as a % of total cultivated extent	1.0	7.5	7.0	18	39.6	2.2

Table 4. Progress of crop diversification in KOISP during *maha* seasons (ha) (Source - Progress reports, DOA).

Item	1989/90	1990/91	1991/92	1992/93	1993/94
Total paddy extent (ha)	5962	6195	9007	9956	7832
Extent of irrigated OFCs	52	48	35	15	11
Extent of OFCs under rains (ha)	0	0	0	538	289
Extent of banana (ha)	36	48	74	100	126
Total extent diversified (ha)	88	96	109	653	426
Total extent cultivated (ha)	6050	6291	9116	10609	8258
CD extent as a % of total cultivated extent	1.5	1.5	1.2	6.2	5.2

Clientele -All the farmers were given extension support during phase I. Therefore, the dimension falls on E, at all household position. During phase II, more extension supports were given to potential OFC cultivators. Therefore, the dimension falls in between target category and all households, in C position.

Influence - Extension agent tried to change farmers voluntarily, without making enforcement on farmers at both phases. Extension programs were not on problem solving basis during phase I. Therefore, the dimension of phase-I falls at level C. However, efforts were made to solve some problems during phase II, so that this dimension falls at D.

Objectives -During phase I, technology transfer was the primary objective so that the dimension falls on A. But, during phase II, efforts were made to organize some commodity groups, so that the dimension falls on C.

Table 5. Analysis of the extension approach of phase I and II under dimension methodology.

	Dimension	A	B	C	D	E
1	Enterprise	Commodity		¢ *		Whole farm
2	Clientele	Target category		¢		* All household
3	Influence	Enforcement		*	¢	Problem solving
4	Objectives	Technology transfer	*	¢		Organization
5	Scale	Individual	*	¢		Group
6	Scope	Information only	*	¢		Material input also
7	Payment	Client pay				¢ * Free
8	Direction	Top down	*	¢		Bottom up

* = phase I; ¢ = phase II

Scale -Extension activities were carried out contacting individual farmers during phase I, so that the dimension falls at A level. But, during phase II, extension was done through farmer organizations also, so that the dimension falls on C.

Scope- During phase-I, ED only provided information, therefore, dimension confined to A. But, during phase II, some inputs also were provided therefore, the dimension can be assigned to B.

Payment - Extension supports were given free of charge during both phases thus, placing the dimension on E.

Direction - Senior extension officers prepared the extension programs in phase I, so that the dimension falls on A (top down). But, farmer participation on this aspect had been seen in phase II, placing the dimension in C (towards bottom up).

CONCLUSIONS

Participation of senior extension officers in resources planning activities at project level helped to form appropriate agricultural-irrigation plan, which utilized scarce resources in a more efficient way. Farmer participation and considering suggestions from experienced farmers and field level extension officers in extension planning helped to make the extension plan more appropriate. The dimensions of an extension approach of phase II such as toward target category, problem solving, organization, groups, input supply and bottom up had given positive results in CD of KOISP.

Participation of senior extension officers in resource planning activities and participation of field level extension officers in extension planning are highly recommended for the CD programs. The extension approach should have dimensions of toward target category, problem solving, organization, groups, input supply and bottom up to obtain success in CD.

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