

Using Dichotomous Distribution to Assess the Efficiency and Social Modeling of Agricultural Extension Projects in the Islamic Republic of Iran

I. Malek Mohammadi

ABSTRACT

There is undoubtedly general agreement that the efficiency of educational investments should be maximized through the managerial process as far as possible. Agricultural extension is one of the crucial tasks in developing agricultural societies calling for considerable consumption of intellectual investment. The management of agricultural extension projects (AEPs) however, needs careful planning in utilizing this investment specially in terms of meeting the right clientele. This paper reports on the use of a statistical device which can be applied for planning the social modeling of agricultural extension programs. This statistical device, the so-called Dichotomous Distribution of the Extension Clientele (DDEC) was designed and used by the author to determine the social modeling of agricultural extension projects in Iran and the degree to which the extension projects have been successful in reaching their target clientele. The procedure consisted of four major criteria: farmers, educational needs, participation in AEP, access to utilities needed for adoption and utilization of the innovation (advice given by the extension agents). As a result of using this method and interviewing 912 farmers through 57 randomly selected AEPs, it was found that 66 percent of the projects in 1988 and 60 percent in 1989 were thoroughly efficient, and 16 percent in 1988 and 12 percent in 1989 were efficient. Four projects in each year were found to have a very low efficiency rate while one project in 1988 and four projects in 1989 were inefficient in terms of their social modeling. This procedure has been applied to study the social modeling along with the efficiency of the extension projects dealing with the biological control of rice stem borer in eastern part of Mazandaran province where rice is the dominant cash crop. According to this result obtained from the recent research projects, it was shown that the less differences among the number of trained farmers and the target groups the more efficient were the extension project. In addition, there was statistically significant difference among those of target groups and non-target groups in terms of applying the extension biocontrol guidelines in rice production practices. The related extension projects were also efficient ($r=0.73$) in terms of their social modelings.

Keywords: Agricultural extension , Target groups , Extension projects , Social modeling.

INTRODUCTION

Agricultural extension is, by design, res-

ponsive to clientele demands and relies on their voluntary participation. Those farmers least inclined to seek assistance have not been

¹ Department of Agricultural Extension and Education, College of Agriculture, University of Tehran, Karaj, Islamic Republic of Iran.

served as well as those who have been motivated to and able to ask for and utilize the program [11].

The solution may be found in the careful study of planning for a more effective service. The point is that someone outside the process can often help to frame the question and thus improve the value of the answer. Extension can use its understanding of broad socioeconomic trends and its experience with them to help community decision makers ask the right question in terms of extension efficiency and/or effectiveness [12]; that is, how responsive and effective has extension been in identifying and serving clientele and in providing new programs for new social and economic problems and priorities [11]?

Efficiency is easily measured by computing the ratio of output to input. Alternatively, effectiveness is not easily measured and is even less easily defined. It focuses on "doing the right things" rather than "doing things right". It seems logical that to do the right thing the clientele for an extension program should be identifiable and identified [9]. Another point is that in extension programs, program planners should consider and contribute to agricultural productivity as well as (the human development of their clientele and their acquisition of more effective living skills [13]. To respond to both dilemmas, extension specialists and administrators should improve the quality of the social modeling of AEPs.

In fact, before running an AEP, it is important to determine which sector in rural, or even urban areas, benefits from the project in order to find out how extension sets its projects, directions to meet the needs of the people. Or, more specifically, how agricultural extension activities may be directed to handle the right section of society. Intellectually, this kind of socio-technical endeavor has to be handled seriously, especially when sometimes extension does not receive enough

funds. Tight budgets, hiring freezes, and even layoffs are the reality for today's extension service.

Today's extension clientele are wider, more sophisticated, and more demanding. A theme receiving considerable emphasis is that of marketing extension, making what we do and how we do it visible, particularly to those with influence on our budgets [3].

The question to be answered is; "How do we survive, much less flourish, in times of limited resources?" [3]. Good extension marketing plans also include efforts to understand the clientele. However, extension has neglected this essential marketing step for two reasons. First, promotion is often erroneously considered to be synonymous with marketing. Knowing your customer is frequently overlooked in the rush to promote extension programs. Second, because extension is an older agency, we tend to believe that after all these years we know our clientele [4].

This study was conducted to allow extension administrators and program planners to gain a suitable understanding of social modeling and its influence on program effectiveness. Also, in this article, matching theories of management and organization [7,9], with research methods in agricultural extension produces a model to assess AEPs and the direction these projects may take in society regarding their economical efficiency.

MATERIALS AND METHODS

Target Group Criteria

Target group criteria are the basic factors identifying a specific social group and distinguishing it from other groups. These kinds of criteria should be identified in extension programs to let agents serve the right people. Determinant group criteria are those which are related to the accomplishment of project goals. In each case, determinant group criteria are clearly set up to define a specific population

in an AEP for the sake of the efficient and effective delivery of extension program planning to the clientele. These criteria also make it easier to prepare research designs and assessment tools to study AEP outcomes. To choose the appropriate criteria, it is important to consider their totality, sensitivity, generality, limits and easiness [6].

One considerable dilemma in designing an evaluation system is determining the sources of the rural development outcomes. These outcomes are usually found through four sources as the projects' general goals, basic goals, the experimental group and finally, their basic needs [6]. Since all those who live and work in rural areas are obviously not relevant for all AEPs, but mostly participate in these projects along with the right clienteles just for fun and regardless of their professional interest, it is therefore vital to come up with clear criteria to identity the proper target groups. However, in societies under the extension projects there are actually two groups of clienteles that can be recognized; the first group comprises of those who are a truly relevant clientele and second those who, regardless of not being a relevant clientele, participate in extension projects merely for fun. In this study, the first group is considered as experimental, and the second group is taken as a control. Obviously, all members of both groups were working at the same job (i.e. growing wheat, barley, alfalfa, vegetables, fruit, and so on). At the same time, the component of the modeling criteria for grouping them, was prepared in a way that they could be considered as the experimental units. The criteria selected in this research were as follows:

1. Relevance of the AEP to the professional needs of the participants.
2. Participation in the AEP.
3. Access to the facilities (utilities) needed by participants to apply innovations.
4. Application of the innovations.

So far, only four criteria were used in modeling extension clients, hence, in total, 16 cases were recognized with the probability of $P=0.0625$ for each, based on binominal distribution [5]. Each one of these criteria is described as follows:

Participation

The first factor which was considered in grouping the extension clientele was their participation in extension training projects. In this case, the subject clientele was divided into two groups in any rural area under study. First, those who participated in the project and second, those who did not.

Utilities

Another factor, which played an important role in social modeling in this study, was access to the utilities needed by the participants to apply the innovations. For this, the clientele was also divided into two groups: first, those who could prepare the utilities needed and second, those who could not afford additional utilities to adopt the innovations offered through the AEP. Using the above two criteria together, four experimental groups were formed as shown in Table 1.

Table 1. Grouping AHP clientele based on their participation and utilities needed"

Par	Util	
	+	-
+	1	3
-	2	4

Group 1 consists of those clienteles that **participated** in the AEP and could afford the utilities needed to apply the innovations. Group 2 are those who already had access to the **utilities** needed but did not participate in the AEP. Group 3 are those who participated in the AEP but could not afford utilities needed for adoption; and finally group 4 are those who neither participated in the AEP nor had access to the utilities needed.

Training Needs

Basically, the subject and content of the AEP should be devised such that professional needs of the clientele are met. Also, the voluntary participation of the clientele is a fundamental principle in extension education as the very first motive. Essentially, when only the training needs for an AEP were considered, the extension clientele was divided into two groups: first, those who needed training, and second those who felt no training was needed for that specific AEP. Again four groups of clientele were recognized as the result of putting participation and training needs together as shown in Table 2.

Table 2. Grouping AHP clientele based on their participation and professional needs.

Par	Util	
	+	-
+	1	3
-	2	4

Adoption

Adopting the innovation offered by the extension agents in any case would be among those factors which can affect farm products. Of course, usually not all of those who participated in AEPs (regardless of the reason) adopted the innovations offered (even adoption at low rates was considered a successful AEP in this study). As the result of interacting adoption with participation, again four groups of clienteles were identified as shown in Table 3.

Table 3. Grouping AEP clientele based on their participation and adoption

Par	Adop	
	+	-
+	1	3
-	2	4

Social Modeling

In order to approach the basic goals of this research, it was necessary to use a design showing the normal grouping of the relevant clientele arising from the interaction of four criteria at the same time. Thus, as a result of the interaction, 16 cases were recognized.

As shown in Table 4, the results of the normal grouping of the extension clientele, based on the criteria discussed above, created 16 totally different groups. The characteristics of each group may be determined by the relevance or attribution of each criterion to them. Meanwhile, the probability for each one of the 16 cases would be $1/16$ [5].

Since factors influencing the grouping of the clientele, in each subject AEP, followed a normal binominal distribution pattern (accommodating for the situation of the population under this study) combination of binominal distribution of T was used (frequency of the factor in the population X its normal probability in the society) [13]. In this distribution though, $T=16$, $N=4$ and $p = 1 / N = 1/16=0.0625$ in case each one of the four criteria was involved.

Table 4. Binominal distribution of AEP clientele based on selected four criteria

Group	Participation	Access to Utilities	Education Needed	Adoption
1	+	+	+	+
2	+	+	+	-
3	+	+	-	+
4	+	+	-	-
5	+	-	+	+
6	+	-	+	-
7	+	-	-	+
8	+	-	-	-
9	-	+	+	+
10	-	+	+	-
11	-	+	-	+
12	-	+	-	-
13	-	-	+	+
14	-	-	+	-
15	-	-	-	+
16	-	-	-	-

Table 5. Number of cases and their probability based on the number of criteria involved

Criteria	Cases	Probability
4	1	0.0625
3	4	0.2500
2	6	0.3750
1	4	0.3500
0	1	0.0625

Assuming nine experimental units among 16 units from the same area need an AEP, based on the extension equation (i.e. presenting educational guidelines to meet the needs of the clients according to the utilities available to them) it should be expected that at least nine experimental participants adopt innovations. Then $P \ll 0.5625$. In fact, in a symmetric population, when in the distribution of $T=4$, the probability of building each one of the 16 cases will be $P=0.0625$, naturally the standard probability of the target experimental units, in the area population, will be $P=0.0625$. On the other hand, the probability of bringing up each single model in a uniform population is $P_2 = \frac{1}{n_2}$ in which n_2 is the number of experimental units which require training. To test the hypothesis in this study, ($H_0: P \leq P_2$) the standard score test was used through the following formula [13]:

$$Z = \frac{\sqrt{P(1-P)} \left(\frac{1}{n_1} + \frac{1}{n_2} \right)^{-1/2}}{\left(\frac{1}{n_1} + \frac{1}{n_2} \right)^{-1/2}}$$

in which:

$$P = \frac{X+Y}{n_1+n_2}, P_1 = \frac{Y}{n_1}, P_2 = \frac{X}{n_2}$$

and, X is the number of target clientele in the sample; n_1 is the sample size ($n = 16$ in a symmetric population); Y is the number of clientele in each one of the rural areas known as the target clientele; and n_2 is the number of the subject clientele under the same subject AEP. Results from this part of the

study are shown in Table 6.

Also, to calculate the efficiency coefficient the following equation was applied:

$$r = 1 - \frac{n_1 - n_2}{N}$$

In this equation, r is the efficiency coefficient; n_1 is the number of farmers who needed AEP training; n_2 is the number of the target clientele; and finally, N is the number of farmers interviewed in each subject AEP. Table 8 shows AEPs social model efficiency coefficients.

RESULTS AND DISCUSSION

Results from utilizing the Z test to compare the number of respondents who needed AEP training with the frequency of the target respondents are presented in Table 6. At the second stage, the hypothesis of the population being asymmetric under a certain AEP, that is, comparing the number of target clienteles in social modeling in each AEP with normal cases (when basic criteria are homogeneous and the population is symmetric), was tested. To approach this goal, the probability of the target group who participated in the AEPs was studied (the number of experimental units in the symmetric population under a normal situation was taken as a control group and the number of those under each AEP as the experimental). Results from this part of the study are also presented in Table 6 under Z based on the years of the study. As shown in this table, at the first stage, the hypothesis for those AEPs in rows: 12, 15, 18, 20, 30, 46, 48, 56, 57 and 63 in 1988, and AEPs in rows: 7, 9, 12, 15, 18, 27, 29, 30, 34, 36, 46, 48, 56, 57, and 63 in 1989 were rejected. Hence, it was proved that at $P=0.05$, the probability of target clienteles being among AEP participants was less than that for those who needed AEP training, specially when the number of clienteles covered by

the AEPs was small. Therefore, target clients in the rest of the AEPs in Table 6 were statistically facing the same probability as those who needed AEP training. This suggests that the **efficiency** of social modeling for the relevant AEPs should be high.

At the next stage, due to testing the second standard score or Z, results also showed that the hypothesis that the population under certain AEPs is symmetric was tested and as a result of this the hypothesis concerning AEPs in rows: 1, 6, 7, 12, 14, and 20 in 1988 and AEPs in rows: 1, 7, 9, 12, 14, 20, 37, 38, 40, 43, 48, and 56 in 1989 was rejected at $P=0.05$. Therefore, statistically it was accepted that the probability of target clientele participating in an AEP was the same as the probability of normal binominal distribution.

Obviously, this latter point had some shortcomings in the social modeling of those projects due to the limited number of target clientele who participated. Or in other words, the relevant AEPs were actually lacking in efficiency. However, at the same time, the hypothesis of asymmetry for the population under AEPs (at least, because of the larger number of the target clientele rather than their frequency in normal binominal distribution) for the rest of the AEPs was accepted. Of course, recent findings can play an effective role in increasing the efficiency ratio of the social modeling for related AEPs. Actually, according to the information in Table 6, 74 percent of the AEPs in 1988 and 74 percent in 1989 were homogeneous in terms of the basic social modeling criteria.

To study the homogeneity of the criteria used in the AEPs social modeling and also assess the balance of this modeling, participants with good access to utilities needed to adopt innovations were considered as the control group, and those who participated in an AEP training session and adopted innovations received from extension agents were taken as the experimental group in utilizing the X^2

(goodness of fit) test.

Results from this part of the study are given in Table 7 under the heading of X^2 . The same test was also utilized to assess the balance between basic social modeling in AEPs and to compare the frequency of the clientele in different groups under AEPs as the control group and the frequency of other basic criteria as the experimental group.

In fact, if the AEPs were modeled in a proper way so as to meet the right target group prior to being exposed to the clientele, then they should be more efficient in terms of covering more relevant groups rather than just being exposed to the masses. It should be noted that under those circumstances, joining four criteria together is not highlighted, although it should be the main focus of an AEP as will be discussed later.

Moreover, the first and second X^2 values, with $df=3$ and $P=0.025$ should be greater than 4.11 in order to accept the hypothesis of the difference between the probability of involving each criteria.

But, regarding data in Table 7, all cases under x_j and x^* (except the AEP in row 12 in 1988) were smaller than 4.11. Therefore, the hypothesis was not accepted and, as a result, the assumption of equal frequencies for each criterion was adopted. On the other hand, in all cases except one, each criterion involved in the population in such a way that no significant difference existed between its frequency and the frequency of the population needing AEP training, was reported.

This procedure has been applied to study the social modeling along with the efficiency of the extension projects, dealing with the biological control of rice Stenborer in eastern part of Mazandaran province, where rice is the dominant cash crop. In this area, there were about 1215 rice growers in which 160 of them were randomly selected for this investigation. In order to evaluate the social

Table 6. Comparing frequency of AEP clientele needing AEP training and target clienteles based on AEP subject, project area and year of the study

Row	Subject	Area	Z_1		Z_2		Row	Subject	Area	Z_1		Z_2	
No.	AEP		1988	1989	1988	1989	No.	AEP		1988	1989	1988	1989
1	Wheat	Broojen	-24	-243	1.14*	1.14*	32	Total		202	1.77	3.98	3.23
2		Bojnurd	3.7	1.86	4.15	3.19	33	Cotton	Turkman	6.09	4.9	4.93	4.38
3		Ardebil	4.03	3.83	4.63	4.13	34	Sunflower	Bojnurd	1.86	.26*	3.19	2.24
4		Salmass	3.04	3.24	3.84	3.95	35	Soya		279	284	3.13	3.06
5		Dashtestan	4.63	4.63	5.31	4.94	36		Bojnurd	1.86	1.53*	224	244
6		Malier	3.04	2.43	224*	1.14	37		Ghomshed	-3.7	-3.7	.04	.04*
7		Kurdkuy	1.71	1.31*	1.54*	1.54*	38	Fruit	Brujen	-3.7	-3.89	.04	(1*
8		Total	6.79	5.66	4.13	3.54	39	Pistachio	Damghan	3.89	3.24	4.27	3.95
9	Barley	Bandar	243	0*	3.51	1.11*	40	Citrus	Bamm	-3.24	3.89	.5	.5*
		Abbas					41	Dale	Dashtestan	4.62	4.62	5.31	5.31
10		Marvdashl	3.05	2.43	3.51	3.19	42	Almond	Esfarien	3.89	2.07	3.95	3.34
11		Sarab	3.04	2.63	3.19	3.3	43	Pomegranate	Mehriz	-3.89	-4.43	-1.01	-.98*
12		Kurdkuy	-.38*	-.83*	.62*	.75*	44	Apricot	Esfarien	1.64	2.07	3.69	3.65
13		Total	4.64	272	3.61	3.04	45	Apple	Firuzabad	3.89	3.24	3.65	3.05
14	Rice	Lordegan	-3.7	-3.7	.04*	.04*	46		Ghomshesh	-1.01*	-1.01*	213	213
15		Gonabad	4.63*	4.63*	4.27	4.6	47		Total	1.81	1.43	3.16	2.81
16		Total	.54	.54	4.27	4.6	48	Grape	Firuzabad	-1.01*	1.01*	0	-1*
17	Beans	Bruder	243	263	3.51	3.65	49		Bruder	263	263	4.27	4.27
18		Ghomshesh	1.01*	1.01*	3.34	3.34	50		Total	1.07	1.07	264	247
19		Total	2.43	2.59	3.8	3.89	51	Cow	Marvdashl	3.63	3.63	4.39	4.39
20	Alfalfa	Bamm	-1.01*	-2.63	1.46*	.606*	52		Sarah	2.63	3.63	3.95	4.39
21		Malier	3.04	3.04	2.57	2.57	53		Marard	-3.89	263	-1.01	3.95
22		Total	1.27	.18	217	1.14	54		Total	1.08	.77	3.14	3.14
23	Potato	Bandar	3.24	3.04	3.95	3.17	55	Sheep	Esfarien	3.24	3.24	3.24	3.24
		Abbas					56		Mehriz	1.53*	-.5*	1.46	2.4*
24		Sarab	3.89	4.23	4.6	4.74	57		Damghan	1.01*	1.01*	275	2.44
25		Total	5.47	5	4.93	5.14	58		Total	1.46	2.07	2.86	3.1
26	Eggplant	Bandar	4.63	4.63	5.31	5.31	59	Goat	Kohkiluyeh	4.43	4.43	4.84	4.84
		Abas					60	Honey	Dehdasht	4.43	4.43	4.49	4.15
27	Onion	Bandar	4.62	1.08*	4.94	2.7	61	Dairy	Marvdashl	4.43	3.7	4.84	4.49
		Abas						Sanitation					
28	Tomato	Minab	3.89	3.24*	4.6	4.27	62		Esfarien	3.24	263	4.27	4.27
29	Vegetable	Firuzabad	3.7	-.26	4.84	2.75	63		Salmas	1.31*	1.31*	3.51	3.51
30	Sugar Beet	Marvdashl	.63*	.2*	3	1.14	64		Total	5.51	4.63	5.24	5.05
31		Salinas	2.07	2.07	3.95	3.95							

Table 7. Comparing frequency of key criteria with AEP clientele needing training (A) and mean frequency of key criteria.

Row	Subject	Area	X_1^2		X_2^2		Row	Subject	Area	X_1^2		X_2^2	
No.	AEP		1988	1989	1988	1989	No.	AEP		1988	1989	1988	1989
1	Wheat	Broojen	0	0	0	0	35	Cotton	Turkman	.015	.021	.011	Oil
2		Bojnurd	.025	.008	.025	.005	36	Sunflower	Bojnurd	.074	.14	.048	.128
3		Ardebil	.017	.04	.005	Old	37	Soya	(mil, Ji, i11	.095	.115	.095	.112
4		Sal mass	.035	.03	.032	.027	38		Bojnurd	.247	.141	.232	.14
5		Dashlestan	0	.003	0	.38	39		Ghomsheh	0	0	0	0
6		Malier	.308	.275	.266	.38	40	Fruit	Brujen	0	0	0	0
7		Kurdkuy	.26	.26	.277	.277	41	Pistachio	Damghan	.004	.02	.003	.116
8		Total	.042	.035	.035	.fas	42	Citrus	Bam in	.75	0	.89	0
9	Barley	Bandar	.013	1.5	.013	.8	43	Date	Dashtestan	0	0	0	0
		Abbas					44	Almond	Esfaricn	.062	.034	.027	.021
10		Marvdasht	.017	.034	.016	.031	45	Pomegranate	Mehriz	1	0	1.33	0
11		Sarab	.076	.09	.048	.083	46	Apricot	Damghan	.36	.18	.07	.051
12		Kurdkuy	2	4.35*	.875	1.017	47	Apple	Firuzabad	.048	.122	.043	.118
13		Total	.041	.122	.042	.103	48		Ghomsheh	0	0	0	0
14	Grape	Firuzabad	1.16	1.41	1 (2	21X	49		Total	.024	.06	.021	.055
15		Brujen	.023	.023	.016	.016	50	Rice	Lordegan	4	4	1.33	1.33
16		Total	.138	.163	.133	.187	51		Gonabad	.017	.007	.003	.004
17	Cow	Fumann	.016	.016	.000	.009	52		Total	.01	.006	.009	.001
18		Sarab	.065	.059	.061	.04"	53	Beans	Brujerd	.118	.1	.121	.103
19		Marard	2	0	2	0	54		Ghomsheh	0	0	0	0
20		Total	.03	.024	.03	.024	55		Total	.035	.034	.035	.032
21	Sheep	Esfaricn	.066	.066	.007	0.67	56	Alfalfa	Hamm	.25	.333	.244	.363
22		Mehriz	.04	.02	.027	.014	57		Ma layer	.248	.248	.214	.214
23		Sc in ii.ni	.22	.27	.148	.214	58		Total	.146	.16	.086	.109
24		Total	.078	.08	.068	.074	59	Potato	Bandar	.036	0	.036	0
25	Goat	Kohkiluyeh	.008	.008	.004	.001			Abas				
26	Honey	Dehdasht	.017	.023	.014	.013	60		Sarab	.013	.01	.012	.005
27	Dairy	Marvdasht	.004	.01	.003	.004	61		Total	.015	.16	.015	.109
	Sanitation						62	Eggplant	BandarAbas	0	0	0	(1
28		Esfaricn	.01	.004	.004	.1117	63	Onion	Bandar	.003	.172	.003	.1
29		Sal mass	.25	.25	.148	.148			Abbas				
30		Total	.025	.039	.017	.018	64	Tomato	Minab	.004	.01	.003	.004
31	Hay	Sarab	0	0	0	.11	65	Vegetable	Firuzabad	.01	.224	.004	.06
32		Turkman	.045	.36	.018	.07	66	Sugar Beet	Marvdasht	.166	.25	.04	.148
33		Total	.01	.068	.002	.016	67		Salmas	.027	.027	.019	.019
34	Pastine	Kohkiluyeh	.295	.295	.14	.14	68		Total	.043	.064	.013	.039

Table 8. AEP's social modeling efficiency coefficients

Table 8. AEP's social modeling efficiency coefficients

Row No.	Subject AEP	Place (Area)	1988			1989			Row No.	Subject AEP	Place (Area)	1988			1989						
			A	B	C	A	B	C				A	B	C	A	B	C				
			Fr	%		Fr	%					Fr	%		Fr	%					
i	Wheat	Brujen	15	3	m	1	15	3	20	1	36	Sunflower	Bojnurd	15	9	60	.8	is	6	60	.7
2		fiojnurd	15	1	80	.8	15	>	60	.86	37	Soya	Gonabad								
3		Ardebil	13	1	11	.6	12	10	83	.83	38		Kurdkuy								
4		Salmass	15	11	72	.8	16	12	75	B6	39		Total	28	15	54	.7	31	16	52	.7
5		Dashtestan	16	1	to	.5	15	94	.94	10		Bojnurd	15	6	1	.5	k.	7	44	.6	
		Malayer	13	6	40	.1	15	3	20	.80	41		Ghomsheh	15	1	7	.5	15	1	7	.4
7		Kurdkuy	15	4	27	.4	15	4	27	.10	42	Fruit	Brujen	15	1	7	1	1	1	6	1
8		Total	31	(	1	.7	L	5	54	.11	43	Pistachio	Damghan	16	16	10	.9	16	16	10	.8
9	Barley	Bandar	15	1	67	.8	15	6	25	.50	44	Citrus	Bamm	16	1	6	.5	16	1	6	.6
		Abbas		1	3						45	Date	Bushahr	16	16	10	.1	16	16	10	.1
10		Marvdasht	15	1	7	.7	15	60	.75	46	Almond	Esfarien	16	12	75	.8	16	12	75	.8	
11		Sarab	15	1	60	.7	13	8	2	.73	47	Pomegranate	Mehriz	16	0	11	.0	15	0	0	.2
12		Kurdkuy	7	1	14	.3	6	1	17	.50	48	Apricot	Damghan	14	10	71	1	16	10	63	.8
13		Total	41	10	79	.3	38	1	70	.70	49	Apple	Firuzabad	16	11	69	.7	16	9	16	.3
14	Rice	Lordegan	15	1	7	.1	15	1	7	1	50		(Ghomsheh)	16	6	38	.1	16	16	10	.1
15		Oonabad	16	1	81	.8	16	1	H	.88	51		Total	32	17	53	.8	32	15	17	.7
16		Total	31	1	45	.8	15	48	.88	52	Grape	Firuzabad	16	1	6	.1	16	0	0	.5	
17	lie.mi	Brujurd	15	1	67	.8	16	1	6	1	53		Brujerd	16	1.1	81	1	16	13	11	1
18		Ghomsheh	16	10	63	.3	16	10	.3	1	54		Total	32	14	11	.7	32	11	41	.6
19		Total	31	2	5	.1	16	66	.4	55	Cow	Fumann	11	10	91	.9	11	10	91	.9	
20	Alfalfa	Bamm	16	1	47	.6	16	2	1.1	.67	56		Salmass	16	12	75	.9	16	12	75	.9
21		Malayer	15	7	47	.5	15	17	.51	57		Yazd	16	0	0	.0	16	0	0	.0	
22		Total	31	11	4	.5	31	9	.56	58		ToUl	43	22	51	.8	43	22	51	.9	
23	Potato	Bandar	16	12	75	.8	4	4	100	1	59	Sheep	Esfarien	16	10	63	.7	16	10	63	.7
		Abbas								60		Mehriz	16	4	25	.8	16	7	44	.1	
24		Sarab	16	1	K	.13	14	1	93	.93	61		Damghan	16	8	50	.8	16	7	11	.7
25		Total	32	2	81	.9	17	94	.94	62		ToUl	48	22	46	.7	18	21	50	.7	
26	Eggplant	Bandar	16	1	10	.1	16	16	10	1	63	Goat	Kohkiluyeh	15	14	93	.9	15	14	93	.9
		Abbas								64	Honey	Dehdasht	15	13	87	.8	15	12	87	.8	
27	Onion	Bandar	16	1	M	.9	17	7	50	.78	65	Dairy	Marvdasht	15	1	93	.9	15	13	87	.9
		Abas								66	Sanitation	Esfarien	16	13	81	.9	16	13	81	.9	
28	Tomato	Minab	16	1	88	.9	16	1	81	.93	66		Salmass	15	10	17	.1	15	11	7	.1
29	Vegetable	Firuzabad	15	1	93	.3	15	7	47	1	67		Total	26	37	S	M	1	78	.1	
30	Sugar	Marvdasht	16	1	6	.1	11	3	27	.20	68		Sarab	16	16	10	1	13	13	10	.1
	Beet									70		Turkman	16	11	K8	1	16	9	50	.9	
31		Salmas	16	12	75	1	16	12	75	1	71		Total	32	30	M	1	29	22	77	.9
32		Total	26	18	69	1	27	15	56	.83	72	Pasture	Kohkiluyeh	16	4	25	J	16	4	25	.3
33	Cotton									73		Lordegan	15	0	0	.0	15	0	0	.0	
34										74		Total	31	4	13	M	31	4	13	J	
35		Total	32	2	81	.8	32	2	72	.82	75	Grand/T	9.2	53	59	.8	9.2	53	59	.8	

A: Number of interviewees

B: Number and percentage of target interviewees

C: Efficiency coefficient

modeling of extension projects, the above four criterion were considered as the basis for judgement. Primarily, research findings showed that, 95.6 percent of the rice producers needed training in biological control. It was also concluded that, "the less difference between the number of trained farmers and target group, the more efficient the extension projects". Moreover, there was statistically significant difference between those of target groups and non-target groups in terms of applying the extension biocontrol guidelines in rice production practice. The related extension projects were efficient ($r=0.73$) in terms of their social model (i.e. serving the target group more than non-target group).

AEP'S Efficiency Coefficient

According to Bennett [1], formal evaluation studies employ both qualitative and quantitative attribution. Qualitative attribution refers to whether the end users' adoption of specific practices and technologies (and the subsequent impacts of these adoptions) is due in some part to extension, research agencies, industry, and/or intermediated users. Qualitative attribution may also be based on conclusions drawn from many observations, studies and inferences.

Quantitative attribution refers to the extent to which the end users' adoption of specific technologies and practices, and consequent impacts, is attributable to activities by extension, research agencies, industry, and intermediate and/or end users.

In terms of qualitative evaluation of AEPs, the efficiency of each AEP was studied using the statistical model described so far in this article. Results from this stage of the study are presented in Table 8.

Data regarding each AEP efficiency shows that 36 AEPs out of 55 (66 percent) in 1988, and 34 out of 57 (60 percent) in 1989 were

recognized as quite successful; 9 AEPs (16 percent) in 1988, and 12 (21 percent) in 1989 were successful, respectively. At the same time, four projects in each year of the study were found to have a low success rate, and finally only one project in 1988 and four projects in 1989 were unsuccessful in terms of meeting the target group clientele.

Furthermore, when the projects, from the most successful to the unsuccessful, were assigned scores from 5 to 1, projects conducted in 1988 received in total 250 scores, whereas the 1989 projects received 245. Comparing these efficiency values with those of 1986 and 1987 (208 and 202, respectively) showed considerable improvements. Again comparing the average efficiency values 4.36 in 1988 and 4.2 in 1989, with the efficiency value of 1987 (3.9) shows that not much improvement was recorded.

REFERENCES

1. Bennett, C. 1990. Cooperative Extension Roles and Relationships for a New Era. Extension Service. United States Department of Agriculture. U.S.A. PP. 29.
2. Bowers, J. 1986. Which Way, Extension? Extension Review. United States Department of Agriculture.
3. Clark, C.R. Spring 1987. Human Resource Development: Key to Extension's Survival. *Journal of Extension*, 22.
4. Dorothy, H.M. and Reverts, M.A. Fall 1988. Knowing our Customers. Ibid.
5. Edwards, L.A. 1980. Basic Statistical Methods, (Trans M.R. Sadegh Tehranian). PP. 156-157. Ferdowsi University Press. Mashhad, Iran.
6. Kiakujuri, S. (Translator). 1987. Rural Development: Control and Evaluation Experiences from Asia. Secretary of Program and Budget, Tehran, Iran. PP. 80-81
7. Malek-Mohammadi, I., Monsefi, I., Kharazi, K. and Zarifian, Sh. 1998. Effectiveness and Social Modeling of Agricultural Extension Projects on Rice Biological Control in East Mazandaran Province. Iran. *Iranian J. Agr. Sci*, 29(2).

8. Perrow, C. 1972. Complex Organization, A Critical Essay Introduction to Modern Society. Scott Foresman and Company, Glenview Illinois, U.S.A.
9. Smith, F.S. and Swisher, M.E. Fall 1987. The Best Little Program Toll in Extension. *Journal of Extension.*, 26.
10. Tosi, L.H. 1976. Theories of Organization. St Clair Press, Chicago, Illinois, U.S.A.
11. United States Department of Agriculture. 1980. Evaluation of Economic and Social Consequences of Cooperative Extension Programs. Washington D.C. U.S.A. PP. 5.
12. Weber, A.B. Spring 1987. Extension Roles in Economic Development. *Journal of Extension.*, 16.
13. Wissemann, F.A. 1991. Process Used by Selected Illinois Extension Agents (Advisors) to Produce High Quality Programs. Unpublished Ph.D. Dissertation, U.S.A., 3: 80-81.
14. Bhattaeharryya, K.C. and Jonson, A.R. 1987. Concepts and Methods of Statistics, (Trans M.I. Shahrashoob) Vol. 11, University Press, Tehran, Iran. PP. 375-496.

بررسی کارآیی و مدل‌بندی اجتماعی طرح‌های ترویجی کشاورزی با استفاده از توزیع دوجمله‌ایها

چکیده

بی‌شک افزایش کارآیی سرمایه‌گذاری‌های آموزشی از طریق فرآیند مدیریت صحیح، موضوعی است که مورد قبول همگان است. ترویج کشاورزی یکی از فعالیت‌های حساسی است که در توسعه جوامع کشاورزی، نیازمند سرمایه‌گذاری عقلایی قابل توجهی است. مدیریت طرح‌های ترویج کشاورزی نیز به همین دلیل محتاج برنامه‌ریزی دقیق برای استفاده از این سرمایه‌گذاری است. بخصوص از جهت رویارویی با افراد هدف یا ارباب رجوع واقعی. این مقاله درباره یک روش آماری است که می‌تواند در طراحی مدل‌بندی اجتماعی برنامه‌های ترویج مورد استفاده قرار گیرد. این روش آماری که اصطلاحاً استفاده از توزیع دوجمله‌ای در مدل‌بندی اجتماعی ترویج نامیده می‌شود، بوسیله نگارنده تهیه و به منظور مطالعه مدل‌بندی‌های اجتماعی طرح‌های ترویج کشاورزی و همچنین سنجش کارآیی این طرح‌ها در دستیابی به ارباب‌رجوع واقعی مورد استفاده قرار گرفته است. این روش شامل چهار معیار است که عبارتند از: نیازهای آموزشی کشاورزان، شرکت آنها در برنامه‌های آموزشی، دستیابی آنها به امکانات برای نوپذیری و بالاخره، اجرای رهنمودهای ترویجی ارائه شده به آنها در برنامه‌های آموزشی ترویج. استفاده از این روشها و مصاحبه با ۹۱۲ نفر کشاورزانی که به طور تصادفی از بین کشاورزان مخاطب طرح‌های ترویجی (۵۷ طرح ترویجی به تصادف انتخاب شد) برگزیده شده بودند، نشان داد که ۶۶ درصد از طرح‌های مزبور در سال ۱۳۶۹ و ۶۰ درصد از آنها در سال ۱۳۷۰ در مدل‌بندی اجتماعی و دستیابی به افراد هدف کاملاً موفق بوده‌اند (در حد ۸۰ تا ۱۰۰ درصد) و ۱۶ درصد از طرح‌های سال ۱۳۶۹ و ۱۲ درصد از طرح‌های سال ۱۳۷۰ کارآ بودند (در حدود ۶۰ تا ۸۰ درصد). چهار طرح در هر یک از سال‌های مزبور کارآیی خیلی کمی داشتند (۴۰ تا ۶۰ درصد) و بالاخره یک طرح در سال ۱۳۶۸ و چهار طرح در سال ۱۳۷۰ کارآیی نداشته‌اند. با استفاده از این تجربه تحقیقی و روالی که در این مقاله توضیح داده شد به آسانی می‌توان از مدل مزبور برای تشخیص افراد هدف در میان کشاورزان استفاده کرد و از این طریق بهره‌وری طرح‌های آموزشی را به میزان قابل توجهی اضافه کرد. از این طریق است که می‌توان نسبت به ارزش افزوده طرح‌های ترویجی یعنی آموزش سایر افراد بوسیله خود کشاورزان اطمینان یافت و حتی المقدور در کاهش هزینه‌های ترویجی نیز کوشید.