



## Study on the role of agricultural production cooperatives in improving farmers' technical knowledge: a case study on sugar beet growers in Fars Province, Iran

H. Mohammadi<sup>(1)\*</sup>, M. Sabouhi Sabouni<sup>(2)</sup>, B.A. Siasar<sup>(3)</sup>, B. Mir<sup>(4)</sup>

<sup>(1)</sup> Assistant Professor, Economics Group, Department of Agricultural Economics, University of Zabol, Zabol, Iran.

<sup>(2)</sup> Associate Professor, Economics Group, Department of Agricultural Economics, University of Zabol, Zabol, Iran.

<sup>(3)</sup> Assistant Professor, Department of Agronomy, University of Zabol, Zabol, Iran.

<sup>(4)</sup> Research Instructor, Department of Agronomy, University of Zabol, Zabol, Iran.

Mohammadi H, Sabouhi Sabouni M, Siasar BA, Mir B. Study on the role of agricultural production cooperatives in promoting farmers' technical knowledge: a case study of sugar beet growers in Fars Province, Iran. *J. Sugar Beet.* 2012, 27(2): 59-67.

Received October 17, 2009; Accepted October 10, 2011

### ABSTRACT

A strength of agricultural production cooperatives is improving the technical knowledge of their members which is along with their function in large-scale development. One of the main obstacles to the success of cooperatives is their inability in improving the technical knowledge of their members. The current study evaluates the role of production cooperatives of Fars province, Iran in improving sugar beet growers' technical knowledge level. Questionnaire was used for information collection. The questionnaire was validated after some revisions following consulting with professionals and experts. To realize the reliability of the questionnaire, Cronbach's coefficient  $\alpha$  was calculated as to be in the range of 0.71-0.82 for different sections of the questionnaire which was a proof of its high reliability. The data were collected from 148 questionnaires filled out by member and non-member sugar beet growers in production cooperatives. The farmers were selected by multi-stage stratified random sampling method. Factorial analysis of variance was used for analyzing the data. Results showed that personal factors including literacy level, age and field size did not impact farmers' technical knowledge improvement. Furthermore, membership in cooperatives did not by itself affect technical knowledge improvement, whereas the effect of region and the interaction between region and membership in cooperatives were significant on farmers' technical knowledge level. However, using extension services was not the reason for the superiority of sugar beet growers' technical knowledge index in different cities. Therefore, the driving force of extension services did not efficiently work in improving technical knowledge level in all cities.

**Keywords:** Extension services, Factorial analysis of variance, Production cooperative, Sugar beet, Technical knowledge

### INTRODUCTION

Cooperatives play a pivot role in creating sustained society. The objective of cooperative movement in developing countries is not only to renew old economical methods, but also to create fairer economical and social conditions. For example, in the agriculture sector of most of these countries, small and even moderate agricultural units do not have acceptable productivity and efficiency and are not able to have production with reasonable prices (Abdelrahman and Smith, 1996). Therefore, one of the most effective ways for reaching to a successful agriculture development pattern and finally, realizing the large-scale objec-

tives of development is to organize people in groups known as "agricultural production cooperatives (APCs)". Hereby, economical growth, production increase and fair distribution of incomes can be achieved in addition to the practical cooperation of rural population in various civil and social activities. Indeed, these cooperatives pave the way for boosting the production and fair distribution of interests by providing a favorable ground for institutionalizing the cooperation of rural population (Le Vay, 1983).

All the cooperatives do not act in the same way even if they are located in the same country and are governed by the same laws (Oustapassidis, 1992). Studies show that successful Indian cooperatives have longer organizational history and

\*Corresponding author's email: hamidmohammadi1378@gmail.com

more members, grant greater credits and inputs to their individual members, earn greater income, get more benefits, and incorporate more small-scale farmers (Sidhu and Sidhu, 1990). The dilemmas of cooperative movement in India can be summarized as ignoring cooperative principles, inadequate supervision by government, low level of general knowledge and training of the members, incorrect use of loans and credits, mismanagement, overlap of tasks and activities, and the lack of awareness, motivation, cooperation and the spirit of democracy (Shojakhani, 1994; Kanda, 1994). A reason for the success of cooperatives in Bangladesh is that a great importance is asserted on members' participation in weekly meetings (Paudyal, 1992). In Nigeria, lack of adequate literacy (as an obstacle) weakens members' active participation in the activities of cooperatives (Ekpe, 1994), and active participation and training of the members have been found to be the factors for increasing the number of the members of the cooperatives (Ladele *et al.*, 1994). In Korea, cooperatives were successful in improving extension services (Jong, 1992). Nonetheless, despite the advantages of the cooperatives, the extension agents are apt to use non-cooperative approaches (Khana, 1993). In addition, the success of the cooperatives has known to be reliant on sustained credit policies (Stiglitz, 1993).

After the Islamic Revolution in Iran in 1979, the planners of the constitution of the Islamic Republic of Iran who had experienced the weak performance of public and private sectors in the past concluded that a third way should be found for encouraging the participation of a greater part of the society. Therefore, the economical system of Iran was based on three sectors: public, private and cooperative. In the recent years, one objective of Iranian Five-Year Economical Development Program has always been to found production cooperatives in Iran.

Many studies have been conducted on the advantages and disadvantages of cooperatives. Sadi (2007) summarizes the advantages of APCs as increasing the technical knowledge, increasing the availability of inputs, facilitating the communication between villagers and statesmen, and developing mechanization. Pezeshki-Raad and Kianmehr (2001) stated that farmers' membership in rural production cooperatives of Sabzevār, Iran significantly promoted their technical knowledge. Mohammadi Mohammadi and Sadr Alashrafi (2006) found that the members of cooperatives in Qom Province, Iran enjoyed a moderate level of

technical knowledge and had higher technical efficiency than non-members. Shahrودي *et al.* (2007) reported that the most affecting variables on improving technical efficiency of saffron producers were practical skill, education level and technical knowledge. In addition, the most important tools for distinguishing members of rural production cooperatives from non-members include the variables of social participation, extension activities, practical skill, access to agriculture inputs and marketing. Saaiehmiri *et al.* (2008) argued that training played an effective role in improving the technical knowledge and efficiency of the members of cooperative. Azkia and Firouzabadi (2008) reported that attitude to participation, cooperation and team work was significantly stronger among the users of cooperatives than the users of micro and peasantry units. Also, Rouhani (2000) reported that the exploitation of seed drillers and the development of mechanization in rural production cooperatives of Hamedān province, especially the leveling of lands and the development of row cultivation as well as providing continual training and extension services by the experts of cooperatives resulted in the improvement of producers in these cooperatives compared to control villages.

The role of cooperation in promoting technical, economical and social components is not limited to production cooperatives. Hereupon, Shahrودي *et al.* (2009) found that irrigators' cooperative was very influential on the development of social, human, physical, financial and natural capitals, so that the irrigation network armed with irrigators' cooperative was more effective on farmers' attitude to the development and exploitation of water management methods, particularly investment on pressurized irrigation technology. This was obtained by improving reliability, coherence and social participation, improving extension-related communications, developing appropriate communication channels, improving regional irrigation system and more participation of irrigators in irrigation management. Taherkhani and Heidari Sareban (2004) indicated that membership in production cooperatives resulted in the employment and the increase in income among peasants and finally, led to the development of rural regions of Meshkīn Shahr, Iran. Ahmadi Firouzjæi *et al.* (2007) suggested that four factors, i.e. social capital, information exchange with out of the social system, trust to institutions and formal relations network and awareness, facilitated the cooperation of the members of the production

cooperatives in fulfilling development plans.

The drawbacks of cooperatives were listed as investment limitation, unconcern to cooperation principles and dailiness by Sadi (2007). Cooperatives have the opportunities of receiving support from government and traditional and local institutions as well as from social and political bodies. Cooperatives are threatened by the lack of long-time comprehensive plans, unclear legal position and its conflicts with public sector and the lack of an institution for settling these conflicts. In total, results of different investigations show that the performance of production cooperatives in meeting farmers' needs, impacting household economy and improving the knowledge of members was weak (Karimi and Rezaei Moghadam, 2005; Amini *et al.*, 2008; Azari *et al.*, 2009) or a little higher than moderate, but their success was below the expectations (Latifian, 2006). Therefore, regardless of the success or failure of cooperatives, they have played a decisive role in promoting technical, economical and social knowledge. Nonetheless, these organizations have had their own strengths and weaknesses in playing their roles, among which the most important obstacle for their development and success has been their failure in improving the training and technical knowledge of their members. Thus, the main objective of the current study was to analyze the role of production cooperatives of Fars province, Iran in improving the technical knowledge of sugar beet growers and the role of extension services in this respect.

Fars province has been ranked in the first place in terms of the production of such crops as sugar beet, rain-fed barley and grain corn in Iran in recent years. The production cooperatives of this province are engaged in various affairs of agricultural production including provision of inputs (fertilizers, pesticides, seeds, etc.) and planning different agronomic affairs. Their primary objective is production. According to the statistics published in early-2008, 171 production cooperative are registered in this province operating in 792 different villages with a total number of 52411 members (Anonymous, 2008). Since the objective of the current study was to examine the role of these cooperatives in improving farmers' technical knowledge, it was decided to study the information about one single crop at this level. Statistics shows that out of all arable lands of Fars province (which is annually over 1249533 hectares excluding fallow), over 83% (1044272 hectares) are under cultivation. The cooperatives altogether cover 642244 hectares (61.5%) of these lands. So, given

the stand of this province in sugar beet production in Iran, it was selected as the study region. The climate of more than 90% of the area of this province is of the kind of semi-desert, Mediterranean or cold mountainous (Haiati, 1995).

## MATERIALS AND METHODS

The study was carried out as a survey research during which a pilot study was conducted after determining population and the recognition of study region. Then, the results of the pilot study were analyzed and the assessment tools were adjusted accordingly. Afterwards, the required data were collected from the population. Given the importance of climate as one of the most important parameters affecting the production of sugar beet, one city was randomly selected from the cities located in three climatic conditions of semi-desert, Mediterranean and cold mountainous. They included Fasā in hot desert climate, Marv Dasht in Mediterranean climate and Eq̄līd in cold mountainous climate. Then, 38358 sugar beet growers were selected out of the members and non-members of production cooperatives as the study society and they were sampled. The method of sampling was multi-stage stratified random sampling. Accordingly, 148 sugar beet growers including 75 member and 73 non-member growers were selected in these three cities and the required data were collected from them. A pre-designed questionnaire was used for collecting the data. This questionnaire was validated by consulting with experts and after some modifications and revisions. The reliability of the questionnaire was tested by an introductory examination and Cronbach's coefficient  $\alpha$  was calculated to be 0.71-0.82 for different sections of the questionnaire. According to Table 1, the oldest farmer in the sample population was 80 years old, the youngest one was 21 years old and the mean age was 47 years. About 21% of the subjects were illiterate and the remaining had at least the basic literacy. The size of the fields of the users was very different, so that it varied from one hectare to 150 hectares with the average of 14.5 hectares.

Then, the effect of various economical and social factors were studied including membership in cooperative, region (city), using extension services, age, literacy level and land area because previous studies (Pezeshki-Raad and Kianmehr, 2001) have mentioned them as the factors with the deepest effect on improving farmers' knowledge. Among these variables, two variables of

**Table 1.** Attributes of the studied sample society in Fars province, Iran

Studied variables		Statistic	Cities			Total
			Marv Dasht	Fasā	Eqlīd	
Population		Number	59	39	50	148
Age (year)		Average	48	49	44	47
		Maximum	80	71	71	80
		Minimum	26	27	21	21
Land size (ha)		Average	9.8	19.8	15.9	14.5
		Maximum	30.0	150.0	60.0	150.0
		Minimum	1.0	2.3	3.0	1.0
Literacy level	Illiterate	Number	10	12	8	30
		Percentage	17.9	30.8	16.0	20.7
	Primary	Number	32	13	25	70
		Percentage	57.1	33.3	50.0	48.3
	Intermediate	Number	12	6	6	24
		Percentage	21.4	15.4	12.0	16.6
	Diploma	Number	1	7	7	15
		Percentage	1.8	17.9	14.0	10.3
	Associate	Number	1	0	4	5
		Percentage	1.8	0.0	8.0	3.4
	B.Sc. or over	Number	0	1	0	1
		Percentage	0.0	2.6	0.0	0.7
	Total	Number	56	39	50	145
		Percentage	100.0	100.0	100.0	100.0

farmers' knowledge and using extension services could not be extracted from the questionnaire as a discrete variable. Indeed, they were a function of other quantitative and qualitative parameters and variables. Hence, they were required to be determined as an index for each farmer. Therefore, the variables of technical knowledge and using extension services were numerically calculated for each user. To calculate these indices, the weights of extension services and initiatives which had been used by farmers needed to be determined. So, 37 agronomic recommendations as 37 initiative factors and 12 extension factors were considered which are mentioned in Results and Discussion section. To give weight to these factors, the technique used in analytic hierarchy process (AHP) was exploited (Azar and Memarian, 1995; Ebrahimi, 1997). In this technique, two choices are compared to each other in terms of one or more criteria and the qualitative assessment of the researcher regarding the superiority of one choice over the other is quantified by a certain spectrum. In this study, the initiatives regarding agronomic operations and extension services were taken as the choices and the yield of sugar beet per hectare was taken as the criterion of the comparison.

To calculate the indices of technical knowledge and using extension services, it was required to firstly calculate the raw score of each factor. Therefore, the considered factors were catego-

rized in three groups and each user's score was calculated by the following instruction in each group:

- *Two-choice questions:* In this case, the user got one when he/she had used appropriate method (according to expert's opinion) or a special extension service; otherwise, he/she got zero.
- *Multi-choice questions:* In this case too, the user's answer got one if it was the best choice according to expert's opinion; otherwise, it got zero.
- *Open questions:* In this case, if the user's answer was according to research and extension recommendations, it got one; otherwise, it got zero.

After specifying the coefficients of importance of different factors by AHP method, the exploitation of technical and scientific recommendations was determined by scores one or zero for each user. Then, the index of technical knowledge (KLI) and the index of using extension services (ESI) were calculated through multiplying the zeros and ones by the coefficients of importance of technical and extension factors as follows:

$$KLI = \sum C_i W_i$$

$$ESI = \sum C_q W_q$$

where, *KLI* and *ESI* were in the range of 0-1,  $C_i$  and  $C_q$  were the raw scores of *i*th and *q*th factors in the indices of technical knowledge and extension

service, respectively, and  $W_i$  and  $W_q$  were their weights.

of using extension services, and the effect of age, literacy and land size. SPSS-WIN software was

**Table 2.** Coefficients of importance of the factors affecting sugar beet growers' technical knowledge index in Fars province, Iran

No.	Factor	Coefficient	No.	Factor	Coefficient
1	Pre-cultivation fallow	0.012	14	Manure application	0.024
2	Sowing date	0.011	15	Application of mechanical pesticide sprayer	0.018
3	Seeding rate	0.018	16	Chemical control of weeds	0.026
4	Seed disinfection	0.018	17	Timing of control of weeds	0.027
5	Number of fertilizer dressings	0.023	18	Type or quality of applied pesticides	0.030
6	Using centrifugal fertilizer-spreader	0.018	19	Chemical control of beet pests	0.031
7	Using seed/fertilizer driller	0.019	20	Possession of tractor	0.026
8	Application of micronutrients	0.015	21	Possession of mechanical pesticide sprayer	0.032
9	Sprinkler irrigation method	0.018	22	Possession of subsoiler	0.03
10	Irrigation frequency	0.19	23	Appropriate soil texture	0.044
11	Furrow irrigation method	0.20	24	Water quality (in terms of EC)	0.030
12	P fertilization level	0.024	25	Cultivar	0.017
13	Dressing fertilization	0.33			

After determining KLI and ESI, different factors affecting farmers' knowledge level were examined. Since the studied factors of membership in cooperatives and production regions were nominal data, factorial analysis of variance was exploited (Hooman, 1995; Nikooie and Torkamani, 2001). This method allows simultaneous testing of some hypotheses. Accordingly, constant effect model of the current study was as the following considering the effect of the factors:

$$KLI_k = \mu + \alpha X_{\alpha k} + \beta X_{\beta k} + \gamma X_{\alpha k} X_{\beta k} + \lambda ESI_k + \theta_r X_{rk} + e_k$$

$$r = 1,2,3,4 \quad k = 1,2,K, 148$$

where,  $KLI_k$  was the knowledge level calculated for  $k$ th user at factorial levels of  $X_\alpha$  (membership or non-membership in cooperatives),  $X_\beta$  (city),  $ESI$  (using extension services) and  $X_r$  (literacy level, age and land size).  $\mu$  denoted total average of the society which was the sum of all possible static societies. Also,  $\alpha$  was the constant effect of membership in cooperatives,  $\beta$  was the constant effect of different regions,  $\gamma$  was their interaction and  $e_k$  was the accidental error.

Given the foregoing factorial analysis of variance, seven hypotheses could be qualitatively examined including the effect of membership in cooperatives on improving the knowledge of users, the difference between regions, the interaction between membership and region, the extent

used for the calculations and the factorial analysis of variance as well as other statistical analyses.

### RESULTS AND DISCUSSION

On the basis of the exploited survey method and the data collected from matrix questionnaires filled out by relevant experts, the coefficients of importance of the factors affecting technical knowledge and extension services indices in Fars province, Iran were calculated. Table 2 presents the description of the affecting factors and the results of calculating their coefficients of importance for farmers' technical knowledge index in this province, according which the cultivar had the highest coefficient of importance (0.14 or 14%, on average) among all factors. After cultivars, experts listed five factors with the highest coefficients of importance for farmers' technical knowledge out of 37 studied factors: mechanical harvest of sugar beets, frequency of irrigation, sowing date, harvest date and the quality of irrigation water.

Table 3 shows the coefficients of importance of the factors affecting ESI. According to this Table, out of the 12 studied factors, the most important factors were the attendance of supervisors in villages, contracting with them and the number of the meetings with extension assistants regarding sugar beet issues.

**Table 3.** Coefficients of importance of factors affecting ESI by sugar beet growers in Fars province, Iran

No.	Factor description	Coefficient
1	The distance of the village to the closest Agriculture Services and Extension Agency	0.014
2	Direct meeting with extension agent in Agriculture Services and Extension Agency to get technical information about beet	0.040
3	Attendance in extension classes, speeches and movie shows	0.115
4	Visiting sample beet fields	0.084
5	Using radio and television programs	0.049
6	Using extension journals, bulletins and posters	0.047
7	Consulting with Jihad-e Agriculture Organization of the city	0.019
8	Visiting beet fields by extension agents	0.098
9	Activity of extension assistants in village	0.083
10	Meeting with extension assistants about beet issues	0.052
11	Presence of supervisors in village	0.176
12	Contracting with supervisors	0.223

**Table 4.** Descriptive statistics for calculating KLI and ESI in sample population

Index	City	Quantity	Average	Standard deviation	Minimum	Maximum
KLI	Marv Dasht	59	0.33	0.19	0.12	0.91
	Fasā	39	0.44	0.25	0.15	0.88
	Eqlīd	50	0.44	0.22	0.12	0.85
	Total	148	0.40	0.22	0.12	0.91
ESI	Marv Dasht	59	0.60	0.06	0.50	0.77
	Fasā	39	0.59	0.05	0.44	0.67
	Eqlīd	50	0.63	0.06	0.48	0.72
	Total	148	0.61	0.06	0.44	0.77

R Squared = 0.799 (adjusted R Squared = 0.784)

**Table 5.** Results of analysis of variance for factors affecting sugar beet growers' technical knowledge

Sources of variations	Degree of freedom	Sum of squares	Mean of squares	F test	Significance level
Average of total society	10	23.493	2.349	53.333	0.000
Farmer's age	1	0.099	0.099	0.249	0.136
Farmer's literacy level	1	0.067	0.067	1.518	0.220
ESI	1	0.079	0.079	1.803	0.182
Field size	1	0.038	0.038	0.857	0.356
Membership in cooperative	1	0.055	0.055	1.249	0.266
Cultivation region in province	2	0.499	0.250	5.667	0.004
Membership in cooperative × cultivation region	2	0.230	0.115	2.608	0.077
Error	134	5.903	0.044		
Total	144	29.396			

The index of technical knowledge (KLI) and the index of using extension services (ESI) were calculated for each farmer in the sample population by the coefficients of importance listed in Tables 2 and 3. The descriptive results of these calculations are presented in Table 4 which shows that mean KLI and ESI were 0.40 and 0.61 for all 148 users. Minimum technical knowledge level was observed in Marv Dasht and the maximum one was observed in Fasā and Eqlīd. In addition, the minimum and maximum ESI was observed in Fasā and Eqlīd, respectively.

After estimating these indices, the effect of different factors on sugar beet growers' technical knowledge index was studied by factorial analysis of variance whose results are shown in Table 5. It was revealed that the studied factors altogether explained 80% of the variations of dependant variable ( $R^2 = 0.799$ ), i.e. farmers' technical knowledge. Given that F test of the source of the variation for the average of whole population was significant, this average was regarded as one of the sources of the variations of farmers' technical knowledge. It implies that farmers' mean knowledge was not zero without considering other factors. Results indicated that farmer age, literacy level, level of using extension services and land size were not significant factors in changing farmers' knowledge level. The study of other factors in Table 5 showed that membership in cooperatives did not affect farmers' technical knowledge. On the other hand, cultivation region significantly af-

ected it, whereas the interaction of membership in cooperatives and cultivation region for this dependant variable was not significant at 5% probability level. In total, the main effect of cultivation region on farmers' technical knowledge was higher than that of membership in cooperatives, and cooperatives by themselves were not able to influence farmers' technical knowledge.

For further analysis and since the information of Table 5 did not determine the statistically significant relations between the means of cultivation regions, Table 6 was prepared. According to Table 6, there was statistically significant difference between farmers' mean technical knowledge in Marv Dasht and Fasā, so that farmers' mean technical knowledge was about 0.11 higher in Fasā than in Marv Dasht, while no statistically significant difference was observed in ESI between these two cities. In addition, the information in this table revealed that mean KLI and ESI were about 0.11 and 0.03 higher in Eqlīd than in Marv

**Table 6.** Paired statistical comparison of means of KLI and ESI

City (I)	City (J)	Difference of means of cities (I-J)	
		KLI	ESI
Marv Dasht	Fasā	-0.1076*	0.0054
Marv Dasht	Eqlīd	-0.1079*	-0.0262*
Fasā	Eqlīd	-0.0003	-0.0315*

\* shows that the difference of means was significant at 0.05 level.

Dasht, respectively. However, although no statistically significant difference was observed in mean KLI in Eqlīd and Fasā, the statistically significant

**Table 7.** Average technical level of cooperative member and non-member farmers in studied cities

Membership status	City	Average	Standard error	95% confidence range	
				Lower extreme	Higher extreme
Member	Marv Dasht	0.235	0.06	0.117	0.353
	Fasā	0.337	0.08	0.178	0.496
	Eqlīd	0.516	0.072	0.375	0.658
Non-member	Marv Dasht	0.349	0.033	0.283	0.414
	Fasā	0.471	0.038	0.395	0.546
	Eqlīd	0.42	0.033	0.354	0.487

difference in ESI was about 0.03 between these two cities.

Although the interactions between membership in cooperatives and cultivation region was not significant at 5% level, more details of this effect is presented in Table 7 because of the closeness of the existing probability level of 77% to 5% probability level. According to this table, although the members of cooperatives in Marv Dasht and Fasā had higher technical knowledge level than non-members, technical knowledge level of non-member sugar beet growers was higher in Eqlīd. Therefore, membership in cooperatives did not uniformly affect the increase in farmers' technical knowledge in different regions.

### CONCLUSION AND RECOMMENDATIONS

Although some personal factors affecting farmers' technical knowledge are literacy level, age and land size, the results showed that these factors did not affect farmers' technical knowledge level. According to the analysis, it can be said that membership in cooperatives by itself was not recognized as an effective factor on increasing farmers' technical knowledge level. This finding is inconsistent with the findings reported by Pezeshki-Raad and Kianmehr (2001). On the other hand, sugar beet growers' technical knowledge was different in different regions and consequently, the interactions between cultivation region and membership in cooperatives can be related to the consequence of strong effects of the difference in technical knowledge level in the cultivation regions. Also, Oustapassidis (1992) reported that all cooperatives were not successful even when they were in one country and were operating under similar objectives and laws. Policy-makers of agriculture section have taken extension services as an approach for improving farmers' technical knowledge. Results of the current study revealed that in addition to the fact that sugar beet growers were different in terms of technical knowledge index in different regions, using extension service was the reason for higher technical knowledge index of sugar beet growers in Fasā than in Marv Dasht and that higher usage of extension services

in Eqlīd than in Fasā resulted in statistically significant differences in sugar beet growers' technical knowledge between the cities. Therefore, it seems that the driving force of extension services did not work in increasing technical knowledge level in all studied cities. Therefore, the cause of statistically significant difference in farmers' technical knowledge level between different regions should be looked for in other factors than membership in cooperative, extension services, and farmers' literacy level and land size.

Since lower literacy levels and technical knowledge of members were regarded as the most important obstacles to the development and success of cooperatives and the results of the current study showed that the cooperatives were not successful in improving farmers' technical knowledge in Fars province, the findings reported by Sadi (2007) that mention dailiness and the lack of long-term comprehensive plans for improving technical knowledge by cooperatives, were confirmed by the current study. Furthermore, the performance of production cooperatives in meeting farmers' knowledge-based needs was evaluated as to be weak in the current study which is in agreement with reports of Karami and Rezaei Moghadam (2005), Amini et al. (2008) and Azari et al. (2009). Undoubtedly, efforts should be oriented to enhance members' technical knowledge. Hereupon, new extension services different from previous ones are needed to be developed since the previous ones did not significantly affect technical knowledge. Therefore, it is recommended to concentrate extension services on the members of cooperatives as the target group and to evaluate trainings until reaching to positive results. Also, in order to increase the effectiveness of the recommendations for increasing the technical knowledge of the members of cooperatives, it is recommended to channelize more governmental support and facilities towards cooperatives.

### REFERENCES

- Abdelrahman AH and Smith C. Cooperatives and agricultural development: A case study of groundnut farmers in Western Sudan. *Community Development Journal* 1996; 31(1):13-15.

- Ahmadi Firouzjaei A, Sedighi H, and Mohammadi Mohammad A. Measuring and comparing social capital components of members and non-members of rural production cooperatives. *Social Welfare* 2007; 6(23):93-111. (in Persian, abstract in English)
- Amini AM, Zeinal Hamedani A and Ramezani M. Evaluating of most important inter organizational factors in success of poultry farmers cooperation in Tehran. *Journal of Science and Technology of Agriculture and Natural Resources* 2008; 43: 285-295. (in Persian, abstract in English)
- Anonymous. Agricultural statistic of Fars province. Fars Province Jihad-e-Agriculture Organization; 2008. (in Persian)
- Azar A and Memarian MA. AHP, A new technic for group decision making. *Management Science* 1995; 27 & 28: 22-23. (in Persian, abstract in English)
- Azari LA, Houshmand M and Naghavi SS. Measuring satisfaction from the activities of border settlers cooperatives in Khorasan Razavi Province of Iran. *Roosta va Towse' E* 2009; 12(2):87-111. (in Persian, abstract in English)
- Azkiya M and Firouzabadi SA. Social capital, land use systems, and peasants cooperative production. *Nameh-ye Olume Ejtmai* 2008; 16(33):77-98. (in Persian, abstract in English)
- Ebrahimi HR, Analysis of selecting the various irrigation approaches (M.Sc. thesis). Agricultural College, Shiraz University; 1997. (in Persian, abstract in English)
- Ekpe, E. Major factors affecting development of farmers' cooperative in selected local government areas of Ogun State. *Journal of Rural Development and Administration* 1994; 26(2): 21-32.
- Haiati D. Economic-Social and Farming-Producing Factors affecting the Technical Knowledge, Sustainable Agricultural Knowledge, Sustainability of Farming System among Wheat Farmers in Fars Province (M.Sc. thesis). Agricultural College, Shiraz University; 1995. (in Persian, abstract in English)
- Hooman HA. Statistical inference in behavioral research. Parsa Publishers, Tehran; 1995. (in Persian)
- Jong PC. The role of agricultural cooperatives in strengthening marketing extension services for small-scale farmers: with special reference to the Korean case. *Extension Bulletin ASPAC Food and Fertilizer Technology Center* 1992; 356.
- Kanda M. Cooperative movement in Andhra Pradesh-review of policies and programs. *Journal of Rural Development (Hyderabad)* 1994; 13(3): 295-307.
- Karami A and Rezaei Moghadam K. Effects of cooperative production in the producing. *Eqtesad-e Keshavarzi va Towse'e* 2005; Special issue: 1-30. (in Persian, abstract in English)
- Khana J. Cooperative versus non-cooperative behavior: the case of agricultural research. *Review of Economics and Statistics* 1993; 75(2): 346-352.
- Ladele AA, Olowu, TA and Igodan, CO. Socio-economic impact of agricultural cooperative organizations: Empirical evidence from Nigeria. *Journal of Rural Development and Administration* 1994; 26(1):1-15.
- Latifian A. Studying the turnover of agricultural cooperative in Khorasan province. *Daneshvar Raftar* 2006; 61-84. (in Persian, abstract in English)
- Le Vay C. Agricultural cooperative theory: A review. *Journal of Agricultural Economics* 1983; 34(1):1-44.
- Mohammadi Mohammadi H and Sadr Alashrafi SM. A study of economic efficiency of production cooperatives in Qomrood plain, using stochastic frontier and data envelopment analysis. *Journal of Agricultural Sciences* 2006; 11(4): 15-29. (in Persian, abstract in English)
- Nikooie AR and Torkamani J. Application of factorial analysis of variance method in studying motor type, irrigation method, and farm size effects on irrigation costs: a case study on wheat in Shiraz city. *Iranian Journal of Agricultural Sciences* 2001; 32(1) 131-146. (in Persian, abstract in English)
- Oustapassidis K. Economies of scale in agricultural marketing cooperatives: the case of the Greek Unions. *Journal of Rural Cooperation* 1992; 20(2): 127-138.
- Paudyal DP. Deedar: A success story in cooperative village development. *Community Development Journal* 1992; 27(3): 274-284.
- Pezeshki-Raad Gh and Kianmehr H. Role of rural production cooperatives in improving the technical and economic status of wheat farmers in Sabzevar. *Eqtesad-e Keshavarzi va Towse'e* 2001; 34: 343-362. (in Persian, abstract in English)
- Rouhani S. Productivity calculation of input factors in cooperation of rural production in Hamedan province. *Iranian Journal of Agricultural Sciences* 2000; 31(2): 261-267. (in Persian, abstract in English)
- Saaiehmiri A, Taghavi M and Saiehmiri K. Calculating and comparing productivity among cooperative and private producers (case study: Ilam province). *Pajouheshname-e Eghtesadi* 2008; 31: 241-263. (in Persian, abstract in English)
- Sadi HA. Evaluating agricultural production cooperatives of Iran: a case study in Kaboudarahang county of Hamedan province. *Roosta Va Towse' E* 2007; 10(2): 137-163. (in Persian, abstract in English)
- Shahroudi AA, Ahmadi Firouzjaei A and Chizari M. Factors influencing the yield and quality of saffron production: a case study in Torbat-heydarieh township. *Iranian Agricultural Extension and Education Journal* 2007; 3(1):143-158. (in Persian, abstract in English)
- Shahroudi AA, Chizari M, Pezeshkirad GhR. The influence of water users' cooperative on farmers' attitudes toward agricultural water management: a case study in Khorasan-Razavi province, Iran. *Journal of Economics and Agriculture Development* 2009; 22(2):71-85. (in Persian, abstract in English)
- Shojakhani M. Problems and prospects of cooperative movement in rural India. In *Co-operative movement in India*. New Dehli, India: Renaissance Publishing House 1994.
- Sidhu JS and Sidhu RS. Case studies of successful and unsuccessful primary cooperative service society and milk producers' co-operative society in Punjab. *Indian Journal of Agricultural Economics* 1990; 45(3): 367-373.
- Stiglitz JE. Cooperative credit in agriculture - the Israeli experience. In: *The economics theory, practice and policy*. Y. Kislav, Z. Lerman, P. Zusman, K. Hoff and A. Braverman (Eds.), 214 - 227. Oxford University Press 1993.
- Taherkhani M and Heidari Sareban V. The role of production's cooperative in rural development (case study: Meshkin shahr city). *Geographic Research* 2004; 49: 113-124. (in Persian, abstract in English)